Fielding Design, Design Fielding.

Learning, Leading & Organising in New Territories

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To my family and friends who are my circumstances.
To new family and friends, especially my children, Leo & May
To the future.

Yo soy yo y mi circunstancia

'I am me and my circumstance'

José Ortega y Gasset
(*Meditaciones del Quijote, 1914*)

'If you want truly to understand something, try to change it'

Kurt Lewin

Declaration

This thesis has not been submitted in support of an application for another degree at this or any other university. It is the result of my own work and includes nothing that is the outcome of work done in collaboration except where specifically indicated.

Ideas in this thesis were the product of discussion with supervisor, Professor Nick Dunn.

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Anticipatory Ethnography: Design Fiction as an input to Design Ethnography
Lindley, J., Sharma, D. & Potts, R. 7/09/2014 2014 Ethnographic Praxis in Industry Conference Proceedings.
    American Anthropological Association, p. 237-253 17 p.
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A Machine Learning: an example of HCI prototyping with Design Fiction
Lindley, J. & Potts, R. 2014
NordiCHI '14 Proceedings of the 8th Nordic Conference on Human-Computer Interaction:
Fun, Fast, Foundational. New York: Association for Computing Machinery (ACM), p. 1081-1084 4 p.
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Abstract

A framing question; *What does (meaningful) collaboration look like in action?* led to the search for and identification of a *polycontext,* a site where advanced collaborative activity is intelligible. This research aims to explore how the epistemic foundations of learning and design theory can adapt to collaborative approaches to organizing, learning and leadership as the macro-economic transition of digital transformation proceeds. Through embedded ethnographic engagement within a learning organization facilitating group-oriented, design-led collaborative learning experiences, a case study investigates multiple sites within a global organizational network whose distinctive methodology and culture provides a setting emblematic of frontier digital economic activity. The organization's activity generates environments which notionally act as boundary sites where negotiation of epistemic difference is necessitated, consequently distinctive forms of expertise in brokerage and perspective-taking arise to support dynamic coordination, presenting a distinct take on group-oriented learning. Comprising interacting investigation of communities of facilitators and learning designers tasked to equip learners with distinctive forms of integrative expertise, with the objective of forming individuals adept at rapid orientation to contingent circumstances achieved by collaborative organizing. In parallel, investigating narratives of an organization's formation led to grounded theory about how collaborative activity is enabled by shared reframing practices. Consequently, the organization anticipates and reshapes the field it operates within, the research discusses scalar effects of learning communities on industry work practices. The inquiry interrogates design-led learning and expertise formation apt for transformative activity within and beyond the digital economy. Exploring how methodological innovations within collaborative learning organizations are enacted and scaled, primary perspectives on design-led, group-oriented learning are evaluated alongside relevant secondary theoretic perspectives on collaborative organizing, learning and leading. The study synthesizes contributions that point to expansions of existing learning paradigms and anticipates how collaborative learning by design intervenes with the schematic assumptions at work in individuals, communities and fields. Observational insight, systematic analysis and theoretical evaluation are applied to problematize assumptions underlying social theory to anticipate generational expansions to the design methods field which responds to inadequacies in planning and organizing approaches applied by design. The research attempts to habituate understanding from outside design methods to better equip an explanatory understanding of contemporary design-led learning and expertise formation occurring in modern professional structures, especially in the creative industries. Together, the research investigates how learners navigate challenges of organizing, learning and leading into unseen territories.

Acknowledgements

There are things you know about, and things you do not,
the known and the unknown, and in between are the doors.

Ray Manzarek *(November 6th, 1967)*

Between two worlds Life hovers like a star,
'Twixt Night and Morn, upon the horizon's verge.
How little do we know that which we are!
How less what we may be! The eternal surge
Of Time and Tide rolls on and bears afar
Our bubbles; as the old burst, new emerge,
Lashed from the foam of ages; while the graves
Of Empires heave but like some passing waves.

Don Juan *(Canto XC, Stanza IX), Byron (1881)*

I'm not lost for I know where I am.
But however, where I am may be lost.

A.A. Milne (1926)

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1 Introduction

1.1 Innovation for the Digital Economy

1.1.1 *HighWire*

HighWire, Lancaster University's EPSRC funded doctoral training centre purports to *'Create Innovative People for Radical Change'*. Situated at confluence of three departments each representing interlinked fields; *Design, Management* & *Computer Science*. HighWire *'places digital innovation at the heart of its curriculum and ethos'* claiming *'we believe that by transcending disciplinary boundaries, we can focus on creative problem-solving in the digital economy'*.

HighWire domain spanning nature draws attention to boundaries as sites where knowledge is transferred, transformed and created. HighWire's focus on interdomain investigation is a consequence of its funding intent and objectives to investigate radical transformation through leadership in the Digital Economy. HighWire is situated at junctures between professional and research at a confluence between domains. Its directives emphasise radical innovation as its metier, cross-disciplinary innovation units are indicative of strategic manoeuvre as organisations prioritise innovation and design-led approaches to afford adaptive agility, especially in technological development.

Research groups often intervene directly with the formation and relation between academic fields. Transformation driven by prevailing social and technological circumstances, provokes consideration of how research inquiry itself is organised. The relational structure of fields in themselves, as relations between communities of practice, social worlds or activity groups is determined by the social and conceptual dynamics of how problem situations are framed within them, the formation of practitioners and the practices they employ; each has downstream implications for overarching professional structures.

The impetus to respond to economic transformation driven by technological change in parallel with the clamour to transition towards sustainable societies generates concussive impact on social structures, further driving their reformation.

Participation in HighWire's community of practice led to professional and academic engagements with research projects often at edges of practice, a corollary outcome of these engagements has been lived encounters with the stark difficulties of organising effective collaboration and consequently issues of learning and leadership in these situations. Collaborative environments necessitate encounter amongst distinct disciplinary fields and individuals with deep specialist experience, which foregrounds the relevance of a notional integrative expertise, integral to but distinct from core competencies of each. When research is situated here, poignant issues of organising emerge.

Group dynamics within communities inhere assumptions about theory and practice, arguably communities inhere ways of seeing, leading to so called professional deformation (Polyakova 2014). Individuals confronting challenges to mutual intelligibility and must negotiate and integrate different ways of thinking, to engage in *perspective-taking* means intervening with assumptions. Integral to cognitive development, perspective taking is distinguished into perceptual and conceptual modes, the process by which individuals somehow cognize attributes of others, via inference rather than directly perceptible, becoming aware of the other's needs, intentions, opinions or beliefs, and emotional, perceptual or intellectual capacities and limitations (Marvin 1976). Thus, specialist and integrative expertise can be quite distinct. Gray (2016) succinctly captures this process as liminal thinking, which is fundamental to *heedful interrelating* (Dougherty et al 2004) and (Weick 1993) – regarded as the basis of effective collaboration, especially in sites beset by contingency and uncertainty.

Various research perspectives hold boundary interactions are potent sources of innovation, the literature review organises relevant contributions on central issues of collaborative activity. A central theme in social sciences, boundary theories provide fecund stances to investigate what is arguably a pivotal factor where societies face situations which have need to contend with durable, intractable, ill-structured problems seemingly resistant to solutions when approached via classical problem-solving and decision-making.

The digital era is marked by societal restructure; socio-economic transitions reveal inadequacies in conventional organising processes, the practices of expert designers, have come under scrutiny for the agility they provide, design methods and inquiry practices are revealed as particularly apposite responses to complex problem situations, driving their adoption in different settings. A growing consensus that task complexity and need to address such *open, complex, dynamic* and *networked* societal problems creates impetus to reframe thinking itself. This has led to the so-called expansion of design as a field. This perception implies recasting organising, *learning, leading* and crucially *designing*

approaches to anticipate these, creating tricky parallel conditions where task and response must co-evolve. Various design methods movements arose in response to these perceived inadequacies by generating ongoing contributions to decision-making processes and planning theory.[1] To contribute to this continuum means first grasping digital economic change which necessitates differentiating between *digitisation, digitalisation* and *digital transformation* whilst generating understanding about how these relate, the context principally addresses the later.[2]

Insights informing this perspective, create impetus to gather insights to characterise how integrative competences in learning and leading behaviours actually emerge. In tracing out collaborative best practices, characterising digital expertise formation but also sketching features of distinct intellectual fields to respond to boundary spanning issues encountered in collaborative cooperation.

A distinct field which anticipates boundary phenomena must integrate how activity and the structure of fields interrelate and consequently how individual and group agency can learn to respond to them. Exploring collaborative phenomena meaningfully necessitates reframing how learning and expertise formation are enacted in the design field, which relies on observation of groups interacting at different scales from high functioning teams to communities of practice to disparate fields themselves.

The objective; to derive novel perspectives on collaborative activity – how learning, leadership and expertise formation occurs in situ and how this influences organising practices, thereby organisational formation and by extension, more general phenomena of organising.

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[1]. Originating with founding of the Design Research Society in the UK in 1966 (J. C. Jones 1992) (Tovey 2011) and simultaneously the Design Research Group established by Rittel (Margolin 2010).

[2] Brennen & Kreiss (2016) define *digitisation* as the material process of converting analogue streams of information into digital bits. It defines *digitalisation* as processes through which many domains of social life restructure around digital communication and media infrastructures. *Digital transformation* concerns organisational ability to weather rapidly changing circumstances, to lead, learn and adapt, often by design.

1.2 Framing Research Question - What does (*meaningful*) collaboration look like in action?

As a general framing question - *How might collaborative activity function as an integrative factor, rather than domain-specific form of expertise?* Observation makes clear that collaboration is notoriously tricky and legitimate innovation is severely challenging to plan for. Organising innovation is often coincidental, contextual, driven by circumstance and highly subject to contingency. Yet, demands of contemporary problem-situations necessitate multiple interacting parties, composites of perspectives beyond any individual. Breakthrough understanding occurs unpredictably and unevenly; no catch-all approach exists; innovative activity is highly contextual and capricious; however, certain knowable behaviours, activities and environments amplify likelihood.

Early on, engagements within collaborating research groups (exploring various frontiers of digital innovation) intensified this suspicion; collaboration between individuals occupying different disciplinary *thoughtworlds* is often hilariously, debilitatingly difficult. Nevertheless, interdomain collaboration is becoming the default in contemprary research and business.

Purposeful response requires agilities afforded by certain approaches apt to respond to ill-structured problem-situations. Meaningful progress is often confounded by intangibilities and contingency, design cognition increasingly becomes relevant to wider spheres because of a particular adeptness exemplified by designers to generate value from ill-structure. The increasingly complex nature of contemporary organisational practices is reflected in the emergence of a complementary collaborative culture, requiring radical shifts in task, role and organisational structure. Observing severe challenges in tension with potentials of collaboration motivates a search for frontier sites that might make this activity intelligible.

Mutual intelligibility between collaborators remains generally problematic, as prime topics in sociology and philosophy whilst also being fundamental to professional practice. The need for flexible approaches to cognition is highly pragmatic. Existing organisations face extraordinary challenges, and people within them must rapidly adapt their cognitive approaches to shifts in task structure. Emergent technologies afford engagement with large scale social phenomena requiring advanced cognition that stretch interpretive expertise and creativity. The demand to create advantage and sustain operation is evidence of turbulent circumstances, driving cultures of perpetual innovation. Conversely, relentless pursuit of progress through innovation has wrought great cost, which innovation culture now purports to undo.

1.3 **The value of collaboration in organizations**

If organisations as framed as action generating (Starbuck 1983) entities, they are composed of coordinated groups engaged in value creation. Business, reacting to shifts in the sociotechnical milieu, now face existential threats, digital technology is an accelerant factor, networks amplify the ability of small groups to affect radical change, disrupting activity of much more expansive, well-established entities. Survival hinges on awareness of impacting externalities how internal organising adapts to these. Learning-oriented organisations hinge on interpretive expertise (Weick 2012).

As organisations scale, particularly those, who build-out or rely upon systems encounter structural factors curtailing their agency. Agency is a multifaceted spectrum; large concerns can have a profound influence of their environment and society, whilst being subject to rigidities. Often driven by *intra* or *inter*-organisational tensions and pressures towards isomorphism (DiMaggio & Powell 1983). These factors blend both material *and* conceptual factors. Multiple structural factors - economic reporting, fiscal responsibility, legislature or legacy infrastructure of resources - product-service systems or estates influence action. Acknowledging the invaluable advantage yet interminable difficulty of collaborative activity means recognizing tasks involve expertise beyond individual capabilities.

Mintzberg's synthesis of typologies of organizational design considers organizational structures topologically, characterizing pulls that alter the shape of organizations. Internal and external conditions pull organizations; to *centralize, standardize, collaborate* and *professionalize* and *balkanize*. As specialist divisions emerge within scaling organization, social worlds form, creating factions, a condition of balkanization (Mintzberg 1980). The topological view is remarkably relevant and has significant conceptual grounding, especially relating the group dynamics of Kurt Lewin.
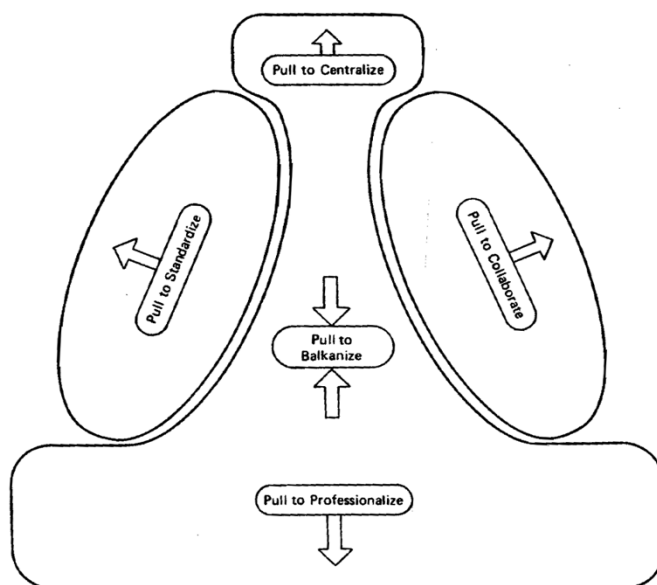
Figure 1 – The Five Pulls on the Organization (Mintzberg 1980)

Rapid changes in the socio-economic landscape raise questions about how leadership and learning are enabled in situations that are *volatile*, *uncertain*, *complex* and *ambiguous* (Bennis & Nanus 1985). Troublingly often, civilian leadership theory, codified in mnemonics like VUCA, emerges from military contexts seen in (Barber 1992), (Boyd 2017) and Osinga (2013). The guiding metaphor of economic competition is often framed as conflictual, yet the rationale for cooperative approaches remains fundamental. Within the domain of military theory, leadership and training approaches applying group dynamics aiming to foster social intelligence have gathered support; these are evidently applied increasingly to non-bellicose leadership settings, this is not unproblematic for the inherent framings and how these transfer.

The case study examines activity within a design-led creative leadership organisation. Participatory ethnographic observation supplemented by evidence based secondary research, leads to the synthesis of tentative grounded theory. Locating research in situations where collaborative phenomena are foregrounded, provides venue to understand collaborative activity, viewing cooperative, cross-disciplinary activity as fundamental to resilience and value creation. Methodologically, the research was designed to ensure relevance, validity and the potential for generalisability by grounding theorisation in pragmatic, experiential observation.

The research funding affords latitude to systematically unpack collaboration in practice. Certain fundamental research issues remain deeply troubling, yet often remain untroubled, especially as these approaches diffuse to become de facto organising practices.

Pioneering approaches are extant but distributed across fields, a core challenge to interdomain research. This research intervenes with inter-field coordination and integrative practices, exploring how design activity enables integration between domain-specific knowledge. This supports the generation of a framework of integrative expertise to enable meaningful collaborative activity. Crucially, exploring the generalisable value to organising, learning and leadership activity.

1.4 Research Questions

1.4.1 *Research Frame*

This research explores how formation of collaborative expertise occurs in digital economic contexts via observation and thematic inquiry into an exemplar micro-context. Situated within a learning organisation focused on design-led inquiry and leadership, participatory observation generates theorisation that points toward reframing of how digital expertise is formed and economic transformation enacted.

Applying empiric ethnographic methods to investigate activity within organisations reveals how organisations generate environments whose conditions are conducive to learning and frame change. The Jobs to be Done framework (Ulwick 2005) insists individuals recruit situations and task environments to enact learning responses. Organisations reflect distinct methodological approaches to learning, leading and organising that have potentially generalisable value. By exploring these situations afford expansion of theoretical understanding of organising practices with general applicability to a range of fields.

A candidate design-led learning organisation assembles groups with diverse disciplinary perspectives, engagement them in the conduct of orienting toward reflecting upon assumptive grounding of themselves amongst others. This acts to reframe individual learning, instead prioritising relations amongst groups. Group-oriented learning situations *can* generate networks of individuals with robust relational intelligence adept at sophisticated collaborative organising practices, this has led to the formation of distributed, heterogenous cultural networks; communities of practice unified by common collaboration-oriented design and learning methodologies. Such individuals are increasingly high value assets in the contingent conditions of contemporary work.

Narrative accounts of the emergence of such cross-domain organisational learning cultures are explored alongside particular situations to provide means to examine how learning, leading and organising practices are subject to design through the curation of learning situations, revealing novel patterns of collaborative negotiation of problem situations. Observational accounts support theorisation about how social and environmental factors reciprocally shape organising activity. This leads to knowledge contributions on general collaborative activity in specific design learning environments and how environments are integral to organising and enacting learning.

1.5 Research Gap – Fielding Design, Design Fielding.

1.5.1 *Problematization in Research Programmes*

Traditionally, research communities suppose issues can be categorised. Suggesting problem spaces where issues are explored within rationally bounded fields, assumes there are gaps in understanding between these territories, researchers should identify areas within inquiry where gaps exist - setting about solving them. This assumes that research fields are knowable, mappable territories with gaps in knowledge.

Critique of management literature propose alternate approaches; rather than gap spot, research contributions, must instead search for assumptions and perceptions about phenomena underpinning activity in their field. Gap spotting is common to many research fields, however, aligning well with design's concern for problem-setting, Alvesson proposes an alternative methodology – *assumptive problematisation*;

'instead of providing different strategies for identifying or constructing gaps in existing literature (and then filling them) or a prepackaged problematization to challenge the assumptions of others, this methodology enables us —through a dialectical interrogation of our own familiar position, other theoretical stances, and the literature domain targeted — to identify, articulate, and challenge different types of assumptions underlying existing literature and, based on that, to formulate research questions that may facilitate the development of more interesting and influential theories' (Alvesson & Sandberg 2011).

This research joins with this rationale, as stimulus to formulate interlinked research questions, aims and objectives Alvesson's typology usefully provides five modes of assumption linking issues at different scales within intellectual fields differing in both depth and scope; *in-house, root metaphor, paradigm, ideology,* and *field assumptions.* To be clear, in my view Alvesson's typology represents a continuum of assumptions at different scales.[3] Probing this continuum provides an extraordinarily generative territory for research contributions about collaborative practice in learning and design. This territory is treacherous, yet design practice often occupied with the swampy, social messes of practice. Engagement with this assumptive landscape involves climbing an increasingly steep ramp whose

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[3] *'Taken together, the typology can be seen as a continuum of overlapping assumptions open for problematization, where in-house assumptions form one end and field assumptions the other end of the continuum. Challenging in-house assumptions can be seen as a minor form of problematization; questioning root metaphor assumptions as a more middle-range form; and challenging paradigm, ideology, and field assumptions as a broader and more fundamental form of problematization. It may seem that challenging any of the three latter types of assumptions is most likely to generate research questions that may lead to the development of more interesting and influential theories. However, a challenge of these broader assumptions may also be superficial, since it is difficult to achieve depth when addressing broad intellectual terrains. An insightful challenge of an in-house or a root metaphor assumption can be a key part in the process of developing new theory'* (Alvesson & Sandberg 2011).

ascent is asymptotic, straying toward the rarefied heights of theory, whilst becoming increasingly estranged from practice, the unassailability of these challenges increases as they stray into territories unknowable by virtue of their tacit nature and theoretical impracticalities for application. Nevertheless, to interrogating how assumptions impact expertise formation in learning and design is exceptionally meaningful and has decided utility, the consequences are immediate and direct, not rarefied but directly felt. The consequences of failing to account for these hard questions, as design practices assume increasing responsibility for organising, planning and leading social and technical systems, is grave.

To begin to ascend Alvesson's slope means establishing how to intervene with and evaluate assumptive grounding, which is no mean feat. Derived from two sources in parallel; diligent evaluation of theories relevant to general collaborative activity and via fieldwork within an organisation, identifying specific theories and framings applied internally within situated settings.

This approach questions how research might generate novel, potentially influential theories by engaging not only with assumptions is practice but with assumptions in existing theories which affords the opportunity to unpack the assumptive grounding underpinning fields and their implications for practice.

The problematisation methodology suggests attention to methodological principles;

(1) *identifying a domain of literature*
(2) *identifying and articulating assumptions underlying this domain*
(3) *evaluating them*
(4) *developing an alternative assumption ground*
(5) *considering it in relation to its audience, and*
(6) *evaluating the alternative assumption ground.*

This position assumes looking outside the possibility of well-defined problems, suggest that these problem spaces are challenging to define. Instead by active questioning of assumptions applied to understand certain phenomena the research uncovers common assumptive concepts underpinning seemingly disparate fields. Interpreting, Bourdieu's theory of practice Alvesson recognises field assumptions may also unite antagonistic schools, which present concepts perceived at one level as different or in opposition yet at deeper levels, share common assumptions about their particular field (Bourdieu 1977). To do this we must enter the field, a subtle yet compelling prospect.

Design methods discuss how *problem-solving* is subsumed by *problem-setting*, concern for how concepts are formed and modified, changing how activity is framed. Sophisticated expertise formation

seemingly activates an ability to intervene with interpretive schemes, this then enables collaborators to design artefacts that inhere interpretive flexibility, pointing to the sophisticated conceptualisation involved in collaborative organising and design practices which presently sit outside of the design field. Scholarship within the design field is grounded in common concepts shared with sociology and psychology, asking; *how might exploration of collaborative theory and practice in parallel create potentials to challenge then expand the assumptive ground of the design field?*

1.6 *Interpretive Schema*

To understand the assumptive realm, we must make assumptions; the concept of interpretive schema appears in the work of Kant (1781) but became significant to psychology through the work of Bartlett (1932) and Piaget (1952). Although schema theories are often thought at odds with sociocultural theories (associated with Vygotsky), McVee et al argue they aren't necessarily incompatible assumptions. Kant applied schema to talk about schemas as organizing structures that mediate how we see and interpret. There were shifts away from Schema theory common to Bartlett and Piaget as ideal conceptual in-the-head structures as sociocultural theories associated with Vygotsky and Dewey which emphasise sociality, mediation and construction, became prevalent. However, the use of schema in psychology and their application in other fields remains durable. Whereas schema theory foregrounds the role of internal individual cognitive processes, sociocultural theories, privilege external, social and collective processes. Notably the work of Vygotsky and scholars applying his ideas, provides significant insights into individual meaning-making processes foregrounding the role of language as mediational tool, the primacy of social interactions, and the situatedness of social interaction and language within cultural and historical systems, which has been highly influential. Although supposedly schema theories are individual and sociocultural theories are collective, they aren't necessarily incompatible, although it has been argued they are. McVee (2005) seeks to blur the boundaries that have traditionally separated schema-theoretic perspectives and research from sociocultural perspectives, to rethinking the construct, *schema*.

Going back to the modern origin Bartlett's research point to schemas as more than in-the-head phenomena and provide a basis for thinking of them as patterns that extend beyond the knower into the social and cultural world. In Bartlett's work, argues McVee, at its inception, schema theory was not about in-the-head phenomena only. Bartlett discussed schema as an "organized setting" and not as some uniform feature of the mind (Bartlett, 1932/1961). Schemata from this perspective are not knowledge structures stored in the brains or minds of individuals for the interpretation of experience, but functional properties of adaptations between persons and their physical and social environments (McVee et al. 2005).

As the construct of boundaries is of recurrent significance for this research, attempts are made to generate blends between constructs that at first glance seem incommensurable, digging down into the origins of concepts in social and design theory, often common assumptions interlink different perspectives. However, certain concepts that appear unproblematic, under scrutiny are revealed as built on assumptions that are in fact, incommensurable. This research leverages this tension as a generative potential and general organising logic, this brings different schema of rationality into play.

With relevance to design methods, schematic negotiation (or framing practices) concern challenging assumptions that underpin theories and models which condition activity. As Cross notes, design methods respond where other fields fail, *'It is the epistemology of design that has inherited the task of developing the logic of creativity, hypothesis innovation or invention that has proved so elusive to the philosophers of science'* (N. Cross 2001). Dorst applies schematic inquiry as means to generate (frame) innovation, destabilising assumptions to *'create new ways of thinking, by design'* (Dorst 2015). This perspective implies how field-oriented design inquiry, expands and integrates concerns for problem-oriented or frame-oriented as part of an emerging philosophy of design might actively engage with the assumptive ground of the design field and as design expands, the assumptions within other fields.

Reflecting on their shared mission in launching Organisational Science, Daft & Lewin conceding their goal remained unfulfilled. Pitching rigour against relevance, they reemphasise prioritisation of rigorous empirical research methods towards contexts of discovery which explore; *'new theories and ways of thinking about organizations, coupled with a plausible methodology that grounds the theory'* (Daft & Lewin 2008). Noting how unrealistic it is to aspire to simultaneous academic and managerial relevance, that ideas migrate across communities in ways not fully understood and warning against creeping parochialism and dogmatism. This research sketches an outline of new thinking about collaborative organising activity in the digital economy, reconciling tensions between theory and practice.

1.7 Guiding Frame

Design Fielding: Learning, Leading & Organising in New Territories
What does (meaningful) collaborative activity (at boundaries) look like in action?

Research Questions

RQ1 – How might contextual inquiry into group-oriented, design-led learning environments problematize assumptions in existing theories of learning, leading and organizing? Then*;*

RQ2 –How might these insights be applied to generate novel assumptive grounds to guide future learning, leading and organizing practices and to expand the epistemological foundations of practices in the design field?

Research Aims

RA1 - To learn about and evaluate collaborative organising practices in digital economy contexts through micro-contexts within a collaborative, networked learning organisation operating globally. (Candidate organisations should exemplify advanced collaborative activity across knowledge boundaries).

RA2 - To trace development narratives of a specific community of practice, investigating the emergence of its learning methodology and collaborative activity to understand how collaborative learning networks enact change within the digital economy.

RA3 – To unpack relevant theoretical perspectives to better understand cutting-edge collaborative organising activity, relevant to the application of design methods applied to digital transformation, then evaluate underpinning assumptive concepts to support the design fields expanding concerns and application to contemporary problem-situations.

Research Objective 1

To learn from ethnographic exploration of significant sites enabling transformation in the digital economy, using to characterise how different forms of expertise and expertise formation are enacted.

Research Objective 2

To evaluate how collaborative organising phenomena occurring at boundaries are conceptualised in theory and practice, unpacking recurring assumptive concepts integral to theory through constant comparative analysis of primary observation and secondary research.

Research Objective 3

To generate contexts of discovery of grounded theory, generating new understanding about how organisations form through collaborative organising and how organisations facilitate formation of collaborative expertise.

Figure 2 - Interlinked Research Questions, Aims & Objectives

1.8 **Rationale for Study** – *Fielding Design*

Questioning the relevance of the design methods field particularly as it expands and is applied in new settings. This assumes these advances are likely to transform design practice in general. The rationale for this research then is to contribute to these advances as design continues to expand becoming a form of expertise integral to *learning, leading* and *organising*. The special relevance stems from witnessing how design activity transforms where collaborative activity is warranted. Notionally, as the design field expands, responding to complexity and contingency, it shifts design activity as individual specialist activity to collective general approach to organising and managing change. Contemporary challenges highlight the need to augment these singular perspectives of design and anticipate a collaborative view of expertise. This research explores a situated view of *why* and *how* designerly methods have come to expanded relevance, but also how design methods sustain relevance as the design field expands and transforms design practice, a process I refer to as the fielding of design or *fielding design.*

Kolko indicates radical shifts underway within the economic landscape, putting design practices closer to the heart of enterprise. This shift isn't about aesthetics but applying principles of design to the way people work (Kolko 2015). It is in response to upticks in the complexity of technology and business, thus indicative of shifts in how socio-technical entities apprehend and enact adaptive societal change. Design-centric organisations often mediate between complex technical systems and user needs to enable intuitive and useful interactions. It follows that not only has activity in the expanded design field found centrality, but in fact much of its critical work is liminal, peripherally sited at the edges, interfaces or boundaries between people, communities and intellectual fields. As design activity concerns brokerage then habituating design methods with theoretical accounts built to anticipate this kind of interrelating is a purposeful, if somewhat obvious progression. When dealing with the activities of knowledge creation and transfer, becoming equipped to anticipate boundary interaction becomes a central concern.

Peculiarly, design is often framed as merely problem-solving tool (and design learning is often oriented around instrumental problems) yet research within design methods indicate shift away from problem-solving towards co-evolving problem and solution spaces within dynamic problem situations (Dorst & Cross 2001). Design solves problems, yet critically, also generates them, anticipating downstream impacts of design activity is of great import as societies continually acclimatize within worlds created by design. Thus problem-setting (the framing activities of setting, reflection and generation) become crucial to mediate how and why designers act. As the design field's relevance extends, it transforms the field itself, yet as design activity is applied in different fields it also enacts change to those fields. Part of this expansion implies considering design as an expanded field (Dorst

2015a), which changes its meaning and practices across different scales and dimensions of activity changing the potential of structures and interactions between fields.

Design methods as a continuum, when faced with insurmountable inadequacy of problem-solving approaches has speciated new approaches which give rise to new interfaces between domains and fields. Rapidly shifting circumstances confound attempts to coordinate and organise activity to address meaningfully issues confronting contemporary society, all too often these issues are also consequences of design. This places design in a somewhat paradoxical situation, design problems themselves conceal paradoxical statements and involve reconciling paradoxes between different discourses, hence; the creation of a solution to the paradoxical design situation thus also becomes a social process (Dorst 2006).

Given the expanding scope of activity in the design field, the importance of properly anticipating and managing the consequences of this paradoxical nature foregrounds the need for more sophisticated but also simple and practical ways to harness its transformative potential. This is where accounts that habituate methods the design field can better equip it to remain ahead of incommensurability of available methods to deal with encountered problem situations. Furthermore, the study finds that to unpack the *how* and *why* of design means integrating the *where* and *when,* emphasising their locative dimension. Advances in theories of learning and practice hold that human action and cognition are fundamentally situated and enactive. An expanded design as a field is significant as it is integral to the ways we choose then realise our future in deeper ways than just systematic creation of artefacts and systems, design abets the creation of systemic modes of learning and perception.

As Ison (2010) captures, this is indicative of a *design turn.* This mean shifting perspectives on practices that acknowledge a systems view, which indicates that *'systems practice is about deliberately setting out with a systemic perspective, rather that defaulting to systematic thinking and practice'.* Differentiating systemic perception-action from systematic action-perception is crucial, this differentiation falls along a boundary comparable to that which distinguishes problem-setting from problem-solving approaches. Advanced design methods, counterintuitively, extend the systems view of the world. Philosophers of design and learning, especially experiential and situated perspectives draw heavily on systems thinking, evident in the prevalence of models characterised by looping, iterative processes and characteristically feedback loops which supposedly tack back and forth between concrete and conceptual settings. There is a common preponderance with loops in many methodological approaches ranging from core scientific method (Bacon & Descartes) to the hermeneutic circle (Dilthey & Heidegger) but also in experiential learning models (Dewey & Kolb). Although these concepts share much with hard systems perspectives that typify many development processes, their logics act as assumptive frameworks that apply to procedural expansions of rationality that have

underpinned the development of design approaches which consequently frame the resultant technological infrastructures which continue to characterise the digital era. Where technically rational approaches meet with human action, as they inevitably do, the nature of their inherent concepts radically shift their meaning, often concealing subtler but vital perspectives, which are risky to overlook. The significance and prevalence of these approaches means their similarities are subtle enough to easily misapprehend. The activity and usefulness of design approaches is not precluded by sophisticated grasp of assumptive grounding, their direct simplicity and pragmatism after all are part of their appeal. Yet, all too often, the consequences of conflating systemic / systematic perception leads to thorny consequences, this comes down to what we assume design activity is doing to the world – intervening with systems already extant in the world or as a means to generate systems to understand complexity implicit to situations.

As Ison captures it *'Design is an involvement in an activity that has many players and that translates human culture, technology and aspirations into form'*. Design first generates means to perceive to world, then results in ends which inhere those perceptions. The design turn is consequent of shifts in how humans perceive their relationship with and then act upon their environment. Paraphrasing Hooker (1992) the *direct consequences of profound change to the character and role of organised knowledge is that the future must now be regarded as a human artefact.[4]* This arguably changes the responsibilities of design activity as agent of adaptive change with respect to dynamic environments.

This kind of first order manoeuvre involves activities traditionally ascribed to design practices, that design activity means *designing a learning system that will…* Such goal-seeking or problem-solving dominant approaches conceals subtler dimensions which concerns problem-framing which involve cultivating systemic awareness of the consequences of activity, a second order logic that acknowledge design not only acts *systematically* but enacts *systemically*. Design in this view means intervening with perceptual schema to arrive at activity schema. Design approaches generate learning systems that in turn influence what can be designed. As a high-level example the world populated with highly sophisticated and influential interaction systems, resultant of systematic applications of technically-rational design methods, however the mutative consequences of living within these systems, as social action is mediated through them continues to confound analysis, which actually generates problems for design in an ongoing way, problems of scaling complexity, this is dizzyingly antithetical to meaningful, bounded problem-solving. Various scholars of technology and design in the digital era,

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[4] In full that 'the future can no longer be regarded as a natural object, a fact already there or objectively determined by present trends. Rather, it must be chosen. Artifacts are the realisation of human value judgements in facts, in the concrete design of our world. Artifacts are experiments, experiments first with what is possible and then with what is preferable. They are designs, chosen from among possible designs, because of the values they realise in the designs (Hooker 1992).

notably Castells and Lanier, contend these place societies on problematic, potentially dangerous footing, prone to cascading collapse. This highlights design's important relationship with the resilience and robustness of social systems.

Design entails acting purposefully, not creating blueprints that assume certainty into the future. It also involves recognising both first order logic (*I have designed a learning system that will...)* and second order logic (*when enacted this system was experienced as a system that…)*. This means recognising systems as epistemic devices as *integral to inquiry process* rather than only having ontological status as *existing in the real world* (Ison 2010). The expanding design field where designers are tasked to intervene with and manage social and technological settings acknowledge that design is a powerful force that shapes culture, is beneficial for both communities and businesses alike and can be applied across all human cultural and economic activities (Ranjan in Norman 2020) however the pragmatic consequences are fraught with potential and risk. This advancing view sees design activity as a *systemic* learning process that intervenes with assumptive schema to achieve *systematic* approaches to realise novel circumstances from situated factors. Stated more simply - *Design is to design a design to produce a design* (Chick & Micklethwaite 2011).

As Dorst indicates, in light of prevailing challenges, we must create new thinking by design, to generate innovation means intervening with framing (Dorst 2015b). Novel organizing, practices and outcomes cascade from changing how we learn to design and design to learn.[5]

Unquestioned assumptions about need for continuous innovation stand as propositions of value creation, yet how innovation actually occurs remains opaque. Approaches such as Design Thinking package a problem-solving methodology which usefully if ultimately near-sightedly prioritise human-centred approaches, drawing from design cognition to integrate societal need, technical capability with business requirements. Radical appropriation of design methods and their application at scale in organisations unlocks transformative power, yet critically, at great cost. Critiques of Design Thinking find it '*reduces the horizon of social possibility to fit narrow objectives of corporate product development and marketing'*. The trade-off for this agility and tight prioritisation of business value creation comes at the expense of these expanded dimensions.

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[5] As Hunt implores *'the profession of design is undergoing a paradigmatic shift away from the design of artefacts as solutions to problems. Instead, we are now starting to see these problems themselves as the symptoms of dysfunctional, larger macro-systems that are themselves shaping the problem space'* essentially '*Systems surprise. To design in the context of complex systems one must be attuned to the perverse and unintended consequences that might emerge. It is not a question of taming or solving the unknowns but modelling how they may play out and anticipating widely divergent futures. Designing to solve complex systems is impossible. But that doesn't mean we shouldn't strive to model heuristically their tendencies, potentialities, and misbehaviors'* (Hunt 2019) -a sentiment capturing the substantive design issue of our time, and a principle motivator of this study.

Chapter ɪ: *Introduction*

It's remarkable that what lies beyond digital transformation, which often frames its transitions as mitigating strategies to allow organisations to respond to the threat of change, emerging horizons mask territories characterised by unprecedented social upheaval, a realisation which clearly resolves the stakes of not getting our grasp of collaborative design activity right. As we proceed headlong into era where human dominated activity has decided geological impacts, the so-called Anthropocene, the consequences of misapprehending how to design the environments and infrastructures that sustain us, is an existential matter, an argument succinctly put forward by van Tuinen's critique of Peter Sloterdijk (van Tuinen, 2009). Sloterdijk's main contention with both phenomenology and revolutionary humanism or ecologism lies in what he repeatedly refers to with Niklas Luhmann's concept of *'reduction of complexity'*. Instead, offering a polyvalent *'grammar of shared situations'* and of *'being-in-the-middle-of-it'* that could function as a means of orientation and invention in contact and intercourse with a concrete and complex world. Noting how *'The seafarer of the future navigates in coherences, in which there can no longer be revolutions in the old style, but extroversions from moribund and biased structures, new contrarities to be baptized and fatal routines – turning movements, through which the meaning of active, conscious, shared life in the multiple mobilized world necessarily changes'* (ibid).

A framework for Transition Design attempts to capture important features of the design's field's essential resonance for transforming concerns. Importantly, tasking design to shift society towards circular economic activity and eventual sustainability means considering how fields go about *'mutually reinforcing and co-evolving areas of knowledge, action and self-reflection'* – **1) Vision; 2) Theories of Change; 3) Mindset & Posture and 4) New Ways of Designing** (Irwin 2015). To achieve this, it becomes essential to uncover the assumptions that shape not only activity but structure and relation between fields themselves. As such, Buchanan's treatise on orders of design is instructive - fourth order design is conceived to address problems of integration and directly address the domains of environments, organizations and systems (Buchanan 1992).

However, design cognition remains an active practical rejoinder to radical shifts in the structure of tasks, work, learning and organisations. From an activity theory perspective, these perceptions are indicative of tensions or misalignments between structure and action in expanded activity systems (Engeström 2000) marked by certain affects; a growing sense of inadequacy and discontent, even anxiety (Dorst 2006).

The research activity herein is founded on participant observation of situated activity in contexts, learning meant to equip learners to engage in skillful dynamic coordination and intercommunal negotiation. Individuals with diverse assumptive experiences, professional membership and cultural disposition collide within shared learning environments, insight from various fields is needed to supplement how learning and design theory accounts for the phenomena this entails. This

foregrounds how issues of *personhood* and *placehood* comingle in situ, becoming essential considerations to understand advanced collaborative activity of the kind observed throughout this research. Generally, accounting for boundary-like phenomena, interfaces, frontiers, edges and integrating this knowledge into fuller accounts of integrative expertise made use of in collaborative settings and by interacting groups of all kinds. This hinges on an essential step to supplement present approaches to learning and expertise formation, especially where methods extending from design activity are necessitated for their robust attributes in responding to complexity and enacting future states of affairs. As design activity and designers consider, often instinctively, the future as an intrinsic aspect of their design processes (Evans 2010).

In their collaborative interaction, where complexity and contingency reigns, learners have need to enact in place a form of integrative expertise akin to *heedful interrelating* (Weick 1993) and (Dougherty 2004). Exploring how a candidate organization's uniquely strong culture responds to these demands, means unpacking how learning methodology accounts for this. A focal organization was identified whose narrative origin and subsequent development founded on problematizing assumptions about how education might respond to the disruptive potentials of networked technologies which have necessitated changes to the infrastructures of organizing. As societal reconfigurations and consequent impacts upon expertise formation, professional structure and fields as intellectual categories have been difficult to anticipate if not impossible to plan for using conventional methods. Collaborative responses to decision-making or problem-solving and approaches that engender robustness to weather shifting socio-technological conditions continue to come to the fore and through their adoption have corollary impacts upon expertise, professional structures and intellectual fields themselves. These highly significant events form an unfolding narrative the research intervenes with. The study's limitations make some partiality inevitable, yet get at tension at boundaries between situated and generalized knowledge. By acknowledging situatedness this means building from a certain methodologically individualist perspective, yet as the relevant unit of analysis here are formations of more than one person, novel perspectives that are able to reconcile methodological individualism with dimensions of collectivism, enough at least to anticipate a holism sufficient to integrate the assumption that social phenomena whilst interlinked are also scalar; entailing both individual and collective phenomena and dimensions which are not necessarily reducible to one another whilst remaining rational and offering tenable explanatory potential. The research using situated collaborative interaction as venue to unpack these issues, attempts boundary-crossing activity to reconcile seemingly mutually exclusive perspectives, instead unravels their mutually constitutive and relational grounding.

Learning environments, including the special case of design studios, represent *polycontexts* where the activity of workgroups and their members is considered as *polycontextuality* or *coordinated multitasking*

where collaborators are situated amongst *distributed interlocking participation frameworks* (Goodwin 1990 in Engeström 1995). This perspective importantly eschews only vertical views of expertise, characterized by appreciable levels and a singular model of 'expert' in a given field, instead prioritize horizontal expertise. These kinds of complex organizing activities are effectively reflected in a wide range of contemporary work settings.

Hence research that investigates situations where boundary conditions are intelligible have durable value as they concern perennial phenomena. The challenges of sustaining mutual intelligibility, has long been a primary concern for sociology (particularly for Weber) although not just intelligibility in language, but of action. Singular sites within the digital economy are emblematic of macro transformations in the digital economy. Observing how expertise is enacted within these micro-environments in turn provides fertile grounds to support inquiry into the epistemology of learning paradigms whilst also outputs practical insights into how learning experiences can be organized to continue to respond to meaningfully to change.

2 Literature Review

2.1 Shifting Boundaries of Social Action

This research investigates organizational settings oriented towards learning, design and leadership. A general leitmotif - *collaborative activity at boundaries* frames this literature review.

Digital technology radically expands opportunity for collaboration through networked platforms. However, physical *co-presence* remains the gold standard for participatory formation of expertise (Sapsed 2004), an assumption that has been radically tested of late. Boundaries are framed as sites where organizing activity occurs, various strategies emerge to stabilize and harness their value. Innovation scholarship points to **boundaries** as *wellsprings of innovation* (Dougherty & Takacs 2004).

In activity theory, drivers of social change emerge from tensions arising from interacting activity systems (Engeström 2014). Individuals are seen as embedded in cultural and historical processes, expanding individual boundaries out into connected social and technological systems. Early activity theory[6] attempts to consider human activity as systemic and socially situated, expanding then dominant paradigms of reflexology, conditioning, psychoanalysis and behaviourism.

Furthermore, contemporary theory recasts knowledge and learning from static transferable resources to active, social processes occurring amongst groups. Interaction is a highly embodied process (Dourish 2004) with a mutually constitutive nature that is simultaneously social and material (Orlikowski & S. V. Scott 2008), highly contingent on context (Suchman 1987) and subject to

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[6] Principally associated with Lev Vygotsky, Alexei Leont'ev and Sergei Rubinstein (Vygotsky 1979), (Vygotsky 1934) a narrative of conceptual development detailed in (Roth & Lee 2007).

variable interpretive flexibility (Doherty & Coombs 2006). Social cooperation is driven plural design-like processes marked by sociality. Recent scholarship challenges divisions between technology, work and organization (Orlikowski & S. V. Scott 2008), emphasizing socio-materiality and situatedness.

2.2 SITUATIONS

2.2.1 *Situativity*

Situativity theory refers to theoretical frameworks which argue that knowledge, thinking, and learning are situated (or located) in experience. Context in situated theories is pivotal, addressing the unique role of environments to knowledge, thinking, and learning; arguing that knowledge, thinking, and learning cannot be separated from context, but are dependent on it (Durning & Artino 2011). Philosophically, this stance harks *contextualism*, which asserts variable validity of knowledge claims, in contrast with *invariantism*.[7]

Situated action (Suchman 1987) frames human activity taking place within *swarms of contingencies oriented to by people through their conduct and action*. Situativity denies the replicability of human procedures, arguing against predominant models of human behaviour prevalent in psychology and cognitive science, underpinned by Cartesian assumptions that human action is accounted for in inner mental processes. Suchman's accounts focus on inadequacies in designing synthetic, artificial, intelligent systems. Simply, plans guide action but fail to account for contingencies that occur as courses of action develop, which decisively shape social action (Button & Sharrock 2009). Although plans can guide action, they're subject inexorably to developing contingencies, not anticipatable in advance. As such, planning cannot determine courses of action, they're inherently indeterminate whether for individuals or groups, in fact, much less for groups. This is strongly exemplified in everyday human interaction, the flow of conversation searches indeterminate territory. The relevance here to design activity is intuitive.

Situated action emphasizes cooperation focused on context and culture rather than individuality, closely tied with socio-organizational processes (Suchman 1987). Commensurately, embodiment is crucial to cognition (Ziemke 2003). Fundamentally, limitations in cognitive theories lead to diverse socio-cognitive, material and technical perspectives, allied to concepts of embodied mind (Rosch et al. 1992), distributed cognition (Salomon 1997) and Enactivism (Hutchins 1996) which recast cognition as human cultural ecosystem (Hutchins 2013).

As Orlikowski notes, dominant models of technology-based organizational transformation; planned change, technological imperative and punctuated equilibrium each inhere assumptions about the nature of context and agency in socio-technical change, indicating organizing practices premised on

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[7] Greco argues contextualism doesn't imply relativism, instead recognizes need sensitize to interests and purposes operative in the subject's (or some other relevant) practical environment (Greco 2008).

stability - a standpoint robustly challenged by Markova's counterview; *dialogicality* (Marková 2003) which replaces stability as the basis for social representation with continuous change. Attending to social and environmental contingency remains thematically central herein.

Pressing demand for flexible, responsive learning organizations require organizing practices to deal with ongoing change. Proposing an alternate view on organizational transformation avoiding strong assumptions that typify classical perspectives by highlighting situated micro-level change enacted over time by people as they act to make sense of their circumstances. Presuming ongoing action, through a practice lens, portends inevitable, continuous change. Change is conceived of as situated and endemic to organizing practices as improvisational and grounded in everyday, knowledgeable agency (Orlikowski 1995). Orlikowski offers interpretive strategies to typify prevalent organizing discourses, *a situated, ad-hoc personal* view of organizational change.

Key thinkers, like Orlikowski differentiate organizational knowing from knowledge emphasizing embodiment. Applying sociological understandings of Lave (Lave & Wenger 1991), Wenger (Wenger 1999) and Suchman (Suchman 1987) reflect on situativity role in learning (learning occurs via sociality at edges of communities of practice) and planning (organizing fundamentally hinges on anticipating contingency).

Furthermore, shifting perspectives on organizational knowledge, notably Brown and Duguid (J. S. Brown & Duguid 1991) view of knowledge as emergent, distinguishing between types of knowledge. Using Ryle's (Ryle 1971) articulate differentiation between *knowing that* and *knowing how* to indicate different disposition of *knowing-how* from *knowing-what*. *Know-how* is a particular ability to put *know-what* into practice, a capability thus embedded in particular communities of practice, sharing Garud's perspective on differences between *know-how, know-what* and *know-why* (Garud 1997).

Sociologist Giddens (Giddens 1986) frames individuals as acting knowledgeably as a routine part of their everyday activity, seen as purposive and routinely monitoring the ongoing flow of action - their own and that of others - and the social and physical contexts in which their activities are constituted, in continual reflexive monitoring. Situativity acknowledges bounded cognition, where wholly rational decision-making is precluded, individuals are exceptional at circumventing boundedness acting fast and frugally, they are ecologically rational (Gigerenzer & Selten 2002a).

Stratification Model
The Constitution of Society
Anthony Giddens (1986)
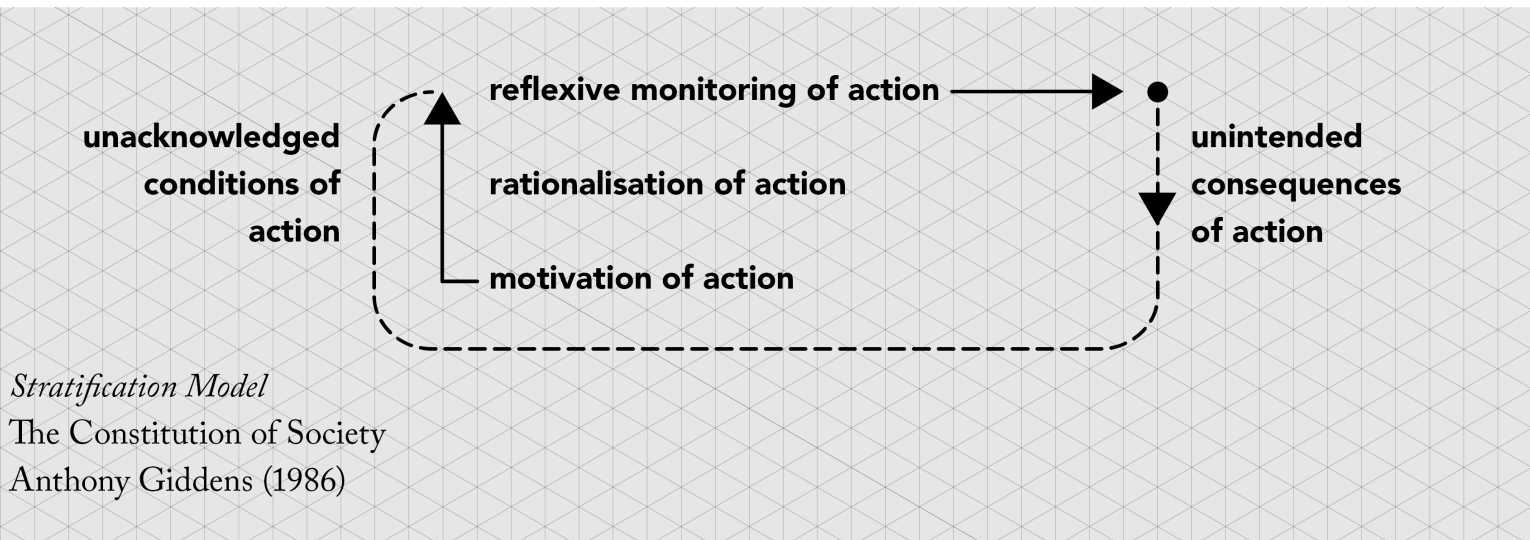
Figure 3 - Reflexive Monitoring (Giddens 1986)

Most perspectives on organizational knowledge classifications extend from (Polanyi 1983)'s distinction between tacit and explicit knowing, the contemporary view acknowledges these're inevitably mutual constitutive, mirroring Giddens' collapse of action and structure into *structuration* (Giddens 1976), here organizations are viewed as distributed knowledge systems (Tsoukas 1996). Focus on knowledge mobility, acknowledges how knowledge moves easily amongst communities with similar practices yet difficult to move across communities of practice (J. S. Brown & Duguid 1998) or sticky (Von Hippel 1994).which has implications for problem-solving and consequently adaptive agency. Notionally, knowledge may be tacit or explicit within people but by extension can be explicit or tacit within sites – both subject to revealing through embodied, affective procedures, a matter of fact that is often problematic to shoe-horn into classically rational approaches.

Acknowledging know-how's *stickiness* leads to multiple propositions to facilitate knowledge sharing across communities of practice. Most significantly, developing boundary practices (Wenger 1999) engaging knowledge brokers (J. S. Brown & Duguid 1998), using boundary objects (Star & Griesemer 1989), (Carlile 2002), boundary crossing (Akkerman & Bakker 2011) or participation in cross-functional collaborative activity (Barrett & Oborn 2010).

Boundary-like concepts are recurrent in theories of learning and organizing and as this research explores, design-like activity is thematically recurrent. It also reflects larger undercurrents of change in the general paradigm of cross-domain theories of organization.

As noted by (Orlikowski & S. V. Scott 2008), subtle semantic difference between knowing and knowledge leads us to miss fundamental aspects of Schön's field observation (1983, p. 49) informed by Ryle and Polanyi that *our knowing is in our actions* (Orlikowski & S. V. Scott 2008). These perspectives speciate great variety of research into how organizational knowledge moves, for example how collaborative envisioning practices to enable *knowing it* to *getting it* (Nandhakumar & Panourgias 2013). In many settings, complex collaborative activity is all-but fundamental to meaningful development, in designing systems, effectual cross-functioning teams are crucial. Furthermore, knowledge and knowing have entangled affective and locative aspects.

Considering this, to learn how collaborative action *takes place*, it's important to ground this in prevailing theory of action the formative foundation of situated perspectives. Setting out this basis, before discussing implications of boundaries and boundedness, means discussing activity theory (as an ongoing theoretical continuum) to understand collaborative activity in general via design and learning contexts.

2.3 Situated Learning Theory

2.3.1 *Situating cognition at boundaries*

Joining together thought with context, Situated Cognition, found in Lave & Wenger (Lave & Wenger 1991), Brown, Collins & Duguid (J. S. Brown et al. 1989) and Barbara Rogoff's investigation of participatory observation of socio-cultural activity (Rogoff 2008). Social constructivism holds that human development is socially situated and knowledge is constructed through interaction, we are products of context. There's a subtle distinction between social constructivism and social constructionism that this thesis beats the bounds of; constructionism focuses on artefacts created through group interaction whereas constructivism focuses on learning that takes place because of interactions with a group. Both hold that people work together to construct artefacts.

These canons represent attempts to reconcile thinking with sociality achieving this by application of synthetic processes. Berger & Luckman argument for the social construction of reality synthesizes Schutz's sociology of knowledge with Durkheim's theory of institutions. As such, blends between theoretical accounts forming new ones are surprisingly common. These integrations are based on common shared meta-schemata, to understand collaboration we need to understand the components of theories of relevant to collaborative interaction. However, analysis yields information about the structure of something, and how it works or know-how knowledge. Explanations lie outside, in the domain of synthetic thinking. Synthesis yields understanding, analysis yields knowledge, and it was that distinction that was critical for the emergence of the systems sciences (Ackoff 2005).

Dewey described philosophy as reconstruction, which needs to orient intellect and resources towards problems launched by each context. For participant observers, reality is constructed through transactions with existing environments, thus worldviews are always culturally dependent. Constructivism and pragmatism concur about the lack of pure and value free rationality, thus philosophy's task is to highlight power relations underlying rational discourse. Both seek to establish linkages between the validity of forms of knowledge, communication and social structures that make this possible. Hickman notes that interactive constructionism extends the perspective of Dewey, specifically his view on context that; *'the most pervasive fallacy of philosophy goes back to neglect of context'* (Hickman et al. 2009). It's important to touch on social theory of learning and organizing, perhaps best summed-up by the communities of practice perspective.

2.3.2 *Legitimate Peripheral Practice in Communities of Practice*

Important approaches to social learning allied to social psychology approach activity from the social aspect rather than cognitive focused accounts. The contemporary challenge of learning theory is to integrate cognitive and social accounts into coherent theories. As Schoenfeld recounts '*Work on the social side offers an interesting study in complementarity. On the one hand, there are some wonderfully general ideas about processes by which learning takes place, such as "legitimate peripheral participation" (LPP) (Lave & Wenger, 1991). I think this particular notion is tremendously promising, and if properly elaborated, it has the potential to bridge the cognitive and the social*'. LPP is learning theory that surrounds fostering deepening participation in communities of practice (COP), in this view learning occurs as part of the dynamics of social worlds and interactions between them.

A community of practice involves much more than knowledge, membership involves set of relationships with others over time, COPs accrete around matters that matter to people. Organizing around a shared concern provides members a sense of *joint enterprise*. To function a community needs to generate or appropriate shared repertoires and resources which act to bear the accumulated knowledge. Necessarily then, it involves praxis, ways of approaching issues that are significantly shared amongst members.

The interactions between communities can form new field as interests and new directions coalesce from their internal dynamics. How concepts and tools arise with respect to deal with changing circumstances has general value as it informs how and why activity is approached. Although this position has strong scholarly support, what isn't articulated is how the shifting dynamics of social worlds play a role in innovation potential, the shifting field of practices and adaptive, mediated exchanges within communities can be reframed as sources of new activity practices.

Furthermore, key scholars of the COP view, collaborating pairs Etienne Wenger & Jean Lave and John Seely Brown & Paul Duguid extend their theories of learning beyond institutions into extramural (outside walls), informal, social learning. They apply their understanding to set out a unified view of work, learning and innovation.

Wenger in more recent work highlights that learning is essential to identify formation, this segues meaningfully with the formation of concept, expertise and identity into a common domain; the purposeful expression of being. Wenger later abandoned LLP instead looking to inherent tension in duality instead, this seems to align with the overarching proposition that learning occurs as tension across a boundary.

Identifying four dualities that exist in communities of practice; *participation–reification, designed–emergent, identification–negotiability* and *local–global.* CoPs are seen as consisting of three interrelated practices: 'mutual engagement', 'joint enterprise' and 'shared repertoire'.

Mutual Engagement: *via community participation, members build collaborative relationships and establish norms. These relationships bind members of the community together as social entities.*

Joint Enterprise: *via their interactions, members create a shared understanding of what binds them together. Joint enterprises are (re)negotiated by members and are sometimes referred to as the community's 'domain'.*

Shared Repertoire: *via practices, the community produces sets of shared communal resources. These are applied in pursuit of their joint enterprise and can include both literal and symbolic meanings.*

Adapted from (Wenger 2007) pp. 72–73.

2.4   In Dynamic Coordination

John Seely Brown and Paul Duguid provide an integrative view of primary types of human activity; *work, learning and innovation.* They insist changes in the status of relevant organizing activity and the modes of organizing was fundamental to unlock potential in organizations. This unified view is of particular relevance here. In their view,

'Working, learning, and innovating are closely related forms of human activity that are conventionally thought to conflict with each other. Work practice is generally viewed as conservative and resistant to change; learning is generally viewed as distinct from working and problematic in the face of change; and innovation is generally viewed as the disruptive but necessary imposition of change on the other two. To see that working, learning, and innovating are interrelated and compatible and thus potentially complementary, not conflicting forces requires a distinct conceptual shift'.
(J. S. Brown & Duguid 1991)

Thus, how opposing modes of concept formation cause conflicting or problematic framings is central. They argue *'with a unified view of working, learning, and innovating, it should be possible to reconceive of and redesign organizations to improve all three'.*

However, unified perspectives mean trade-offs between accuracy, generalizability or simplicity. The reason for this is the complexity of distinguishing aspects of problem situations. Things and events are treated as discreet for conceptual utility, the task of integration them presents severe challenges, considering the total field of individuals is prohibitively complex so doing this for multiple interacting parties results in scaling complexity.

Synthesis between individual fields generally coheres diverse factors occurring across a collective field of activity. Observation is limited by the partialities of situated interpretation. Digital innovation expands the potentials for collaborative interaction, by moving from proximal to distal mediation, the forms of inquiry require adaptation, expanding unit of analysis from individuals to groups requires different methods and apparatus, the grain of data changes with respect what scale of activity is prioritized.

Very rarely does consilience between fields occur as the result of conscious actions of individuals, but it does emerge from reframing of the boundaries between fields, their porosity or flows of meaning. The difficulty integrating between different scales of organizing activity arises from different forms of potential interaction, the complexity affirming understanding tends to bound the focus to a common unit (individual, pair, group, social world or society) or dimension of interaction (for example cognitive, discursive, embodied, spatial, affective). Whereas relative phenomena might be helpfully relational.

Reductively, prevailing theoretical positions proceed from inside out, social psychology reverses this. Difficulties for Schoenfeld emerge from integrative failures between cognitive and social perspectives, Their antagonistic theories of action, arguing that existing disciplines are able to explore small aspects of relevant totality of thinking-and-acting-in-context, using the analogy of blinders preventing different fields from cross-integrating understanding. Necessarily, this produces only partial, fragmentary insights regarding activity, meaningful partiality is fundamental to focused activity, yet proceeding with the wrong frame set which can quickly become unintelligible inhere profound problems which cascade out, shaping commonly held procedures and ramifying errors of judgement by precluding open and continuous evaluating of the frame fit. The argument follows that cognitive science was able to integrate disciplines by transcending disciplinary boundaries, resulting in a new field, one which coalesced multiple fields into a synthesis that has made extraordinary progress.

However, 21st century theory still lacks integrated theoretical perspective that provides an adequate unified view of the ways we think and act (Schoenfeld 1999) one which integrates inside/out with outside/in. As Hager notes *'Schoenfeld points out that at present we have, on the one hand, 'fundamentally cognitive' and, on the other, 'fundamentally social' studies of human thought and action'.* This problem sets out the challenge for contemporary educational research; to integrate the social and cognitive. Both call for 'closely related' theories, integral approaches to 'competence' and 'acting-in-context'.

Indicatively, Hager agrees with Schoenfeld on the need to *refurbish our understanding* of learning to better account for human activity (Hager 2004). Schoenfeld identifies a schism between cognitive and social programs of inquiry highlighting incommensurability; the social tradition relies on methods and perspectives that tend to have a different analytic grain to cognitive approaches. The call to assemble integrative frameworks unifying individual and group, along with methods to inform the work done by these orthogonal but ultimately complimentary approaches.

Certainly, any workable schema to understand human action, given its complexity will likely integrate internal and external positions to integrate social and cognitive approaches. Beginning from 'either side' alone results in partial causation, humans seamlessly blend internal and shared activity, however the demand to systematize inquiry invariably shapes the fields of inquiry themselves. However abstract these perspectives become, glaringly, the rejoinder between the social and cognitive lies in the environment they take place in.

In essence, this concerns continually refurbishing understanding based on internal and external states as activity-in-situ proceeds. Reflective thought provides a form of meta-cognitive feedback common to systems thinking or is there something more complex at work? Reflection-in-action grounds meta-cognition about social activity into the site itself, it uses situated action as resource to update framings.

Schön's treatise discusses durable belief in stable states despite considerable evidence to the contrary. Discussing organizational isomorphism highlights the stabilizing influences of organizing itself which unhelpfully inhere hindrances to fluent adaptation. The use of ready-made models and processes, which may be ill-fitting, compounds this. Schön suggests change to organizing practices and envisions adaptive practices in response. The stable state, for Schön is an illusory context used to anchor other subset activity systems. Remarking;

'Belief in the stable state is central, because it is a bulwark against the threat of uncertainty. Given the reality of change, we can maintain belief in the stable state only through tactics of which we are largely unaware. Consequently, our responses to attacks on the stable state have been responses of desperation, largely destructive, and our need is to develop institutional structures, ways of knowing, and ethics, for the process of change itself (**Schön 1970).**

Learning how to respond to threats of change or even engineering value by highlighting threats remains vital for organization engaged in change. **Exploring beliefs about change, how perceptual barriers to change are circumvented is core to the thesis.** Underpinning this, processes that shift assumptive grounding of organizing activity from default position of stability to others grounded in instability are vital; Duguid & Seely Brown's perspective privileges dynamic coordination over stabilizing models that are increasingly found inadequate to contemporary problem situations. These two thematic directions emerge from data and are affirmed in the literature; *revealing integrative models of organizing that blend social with cognitive approaches* and *organizing practices founded on reactive responses to environmental dynamism rather than assumptions of stability are thus vitally important research directives.*

Creating value *'in the teeth of the uncertainty'*, means identifying how extant models of leadership, learning and decision-making become inadequate to organizing. This research takes on this task, attending to the situated activity of collaborating individuals applying situated design-like processes and sensitivity to group dynamics methods to reveal insight about their present state of affairs which point to potentials for adapting organizing practices. Fifty years since Schön spoke, tension in social conditions reinforce the need societal adaptation; for new organizing and rapid formation of new fields of activity. These tensions lend the thesis its subtitle – *to learn, lead and organize in new territories.*

Primarily, Schön's ideas renew our appreciation of societal conditions, from stability as normative to flux as normative. Focusing on shifts in professional structure Schön highlights contraction of social cycles from intergenerational to intragenerational, decaying the half-life or relevance of learning. Schön's métier was generative learning, but clearly his concern was for intergenerational learning;

another form of generativity (Erikson 1993), literally passing knowing through time. Once stable occupations now experience vast change, this reduced periodicity impacts learning's relevance, the challenge is revealing learning that is at once reflexive and perennial. Occupations followed generational cycles, mapped to life stage which necessitated front-loaded education. Gradually, education provision is being reshaped by shifts from mandatory institutional learning to periodic retraining to continuous, integrated learning. Examining impacts of changing periodicities of learning throughout life-stage formed Schön's position on societal change.

2.4.1 *Learning: adaption via reflective practice*

Reflective practice exemplifies an adaptive momentary strategy of situated response, to adapt disposition towards tasks continuously, reflective practitioners thus enact adaptive behaviour continuously. Their application has scaled consequences and implications for highly structured organizing, improvisation is necessarily in tension with formalization. Professional domains populated by isomorphic institutional and organizational entities runs contrary to continuous adaptive learning. Schön's concern for this attended to the erroneous belief in stable states offering different forms of anchoring origins to transcend strictures of inadequate forms of learning, leading and organizing.

Schön, focuses scholarship on settings where design-like organizing and expertise formation took place, learning from adaptive improvisation, formalizing inquiry processes engaging directly with continuous, generative learning, which was synonymous with reflection-in-action. Concept formation was integral to this, Schön's oeuvre addresses ways concepts are derived from environmental action, displacing concepts (Schön 2001) also exploring how framing impacts formation, through frame reflection (Schön & Rein 1995) and the related activity of problem-setting and generative metaphor he deemed so important to design inquiry as a source for meaningful innovation (Schön 2009a).

What's relevant in exploring transformation focused organizations like Hyper Island, is they emerge in response to failures in sensemaking – to mend a kind of epistemic break or rupture. The founders assert their dissatisfaction with materials and solutions they were part of creating and their apprehension that these were obsolete before their design process had even begun in large part stimulated their search for another approach to learning (Erixon 2015). Via observation, individuals meet in settings with strong cultural codes shaping conduct, they are disoriented by this experience, but find other means to anchor themselves, mainly through dynamic coordination of groups and through this through design inquiry learn to become experts in reorienting.

The contemporary view that societal change is largely driven by technological change, that digital networks these have brought about radical restructuring of what's possible. Experience has found that many accounts of innovation unsatisfying and frustratingly vague. In recent years the rhetoric of innovation has surged to become an inescapable, de facto objective of every learning and work context.

What we see in Hyper Island as a relatively mature distributed organization engaged in change leadership is strongly suggestive of the new challenges that are likely to arise now information society has radically disrupted the very meanings and basis of belief that undergirds social interaction. However, rather than seeing a world reanimated by technological possibility we encounter situations that place demands on the adaptive capabilities individuals harness to orient themselves.

2.5 BOUNDARIES

2.5.1 *Boundaries between Activity Systems*

Activity theory associated with Lev Vygtosky and in contemporary theory Yrjö Engeström asserts that natural psychological functions shared with non-human ancestors developed according to different principles than tool mediated psychological functions. That *cultural mediation* implies a species-specific universal structure of human thought and a unique associated morphology of interaction. This implies recursive and bidirectional effect loops; where tool mediated activity modifies environment and subject in parallel. This means cultural artefacts always have dual material and symbolic aspect regulating environmental interaction – thus are tools in the broadest sense – the master mediating tool is *language*. Collaboration in this view is a literacy with its own grammar, subject to expertise formation.

This indicates how development occurs within the substrate of accumulated collective knowledge, through mediation. Therefore, humans benefit from their own experience *and* their forbearers, passing forward experiential intelligence, a process referred to as generativity (Erikson 1993). Developmental change is situated, previous accomplishments are accumulated in the present (and variously accessible, afforded or intelligible in environments), thus culture is history enacted in present tense. As such, cultural mediation implicates the fundamental role of the social world in the development of material environments, since other humans create the special conditions for that development to occur.

Summatively, this argument foregrounds the activity system a necessary baseline unit of analysis; in other words, systems of relations (our circumstances) are culturally and historically conditioned, held relationally amongst individuals and their proximal organized environments. This has profound implications for the epistemological status of knowledge. This means that change, learning and development must be viewed in radically different ways, humans are nested within relational systems and learning occurs with respect to them. A working grasp of tool-mediated communication between activity systems equips us to assay how artefacts are applied to dynamic coordination at boundaries between these systems.

Diverging from the tenets of activity systems, theories that emphasise system boundaries making these sensible and integral to explanatory accounts of human activity have subsequently emerged. Sharing activity theory's concern for mediation between activity systems Boundary Object Theory has emerged to contend with this core phenomena of mediation as dealing with common objects and ordinary artefacts instead explores different classes of entity, composite conceptual and material tools, a novel category of object; *the boundary object.*

2.5.2 *Boundaries in Organizations*

Before unpacking boundary phenomena we must question; *what boundaries are, where they are located, how they function, why they form and change and vitally, how they create value.*

Importantly, various scholarly perspectives foreground boundaries as significant research constructs, purposefully searching for better means to integrate and create value at interdomain boundaries, reinforcing their pronounced sociological significance (Lamont & Molnár 2002).

Carlile foregrounds relevance of managing knowledge across specialist domains. Significantly, where adaptive innovation is desired, within learning organizations, coordination at boundaries is indispensable. Identifying research situations where boundaries are highly present, implies opportunities to explore relational characteristics of knowledge at boundaries such as *difference, dependence,* and *novelty*. Implying development of better means to explore how rational decision-making and information-processing occurs amidst diverse, interpretive differences and socio-political factors. Emphasis on exchanges at intersects, implies processes of *transferring*, *translating*, and *transforming* knowledge across boundaries rather than simple knowledge production. This requires abilities to recognize and resolve incompatibilities that occur in organizing situations, and to draw out incompatibilities these perspectives present to organizational theory (Carlile 2004).

Clearly, change[8] is neither a stable nor easily definable phenomena. In general, change may be seen as continuous rather than discontinuous and incremental (S. L. Brown & Eisenhardt 1997). This dichotomy is commonly applied to innovation processes, (Norman & Verganti 2014) propose an image schema of innovation as a landscape where meanings and capability interact, joint movement through this space takes place both through continuous, tentative steps (incremental) and discontinuous jumps (radical). Making meaningful distinctions is inherently fraught with difficulty, in practice, both interlink.

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[8] Change, like innovation, is not a singular phenomenon; when politely interrogated by Professor Rachel Cooper on the subject of this doctorate, replying *'How learning organizations undergo change by design'* the genuinely useful if laconic response *'what do you mean by change?'* – Foreshadowing the fundamental significance of social psychology and field theory – Kurt Lewin states; *'If you want truly to understand something, try to change it'* (C. W. Tolman 1996).

2.5.3 *Epistemology at Boundaries: Dialogicality*

Discussing change and stability, Markova's meta-schema, *dialogicality*, inverts social theory's assumptive foundation; insisting dynamic rather than stable phenomena should be the foundation of inquiry (Marková 2003). Theories anticipating contingency by default rather than assume propositional stability are required, in situations where uncertainty dominates robust theories of action become needful. Demand to resolve adequate response generates many theoretical and practical responses, explored herein.

This study hinges on engagement with frontiers of innovation; supposing that in territories where boundaries are renegotiated, a consequence is the emergence of new activity systems and that this may also generate the conditions for fields to reorganise around these settings. This restructuring is likely not unidirectional or simple, but is a significant phenomenon of organisation. Situating research at intersecting boundaries requires a sophisticated epistemological stance to negotiate appropriate responses. Change *takes place*, often in settings where appropriate responses, may yet have come to light. Demand to anticipate is pressing, yet complexity in interacting entities make this prospect challenging for human decision-making, which is inherently bounded (Simon 1991). Intriguingly, this restructures rationality itself.

Reasoning about how expertise formation, professional structures and institutional organizing deal with vagueness and ill-structure explored here considers how to validate efficacy of situated responses. Varied responses to circumstances, where interactions at boundaries are inevitable, mean complex organizing responses occur as individuals face uncertainty about how they can learn to know, when confronting the challenge of *transferring, translating* and *transforming* knowledge across boundaries. Boundary Object theory arises from the sociology of science to contend with this challenge, unpacking BOT affords conceptual frameworks to understand how collaborative organizing occurs.

2.6 **Boundary Object Theory**

Boundary Object Theory (BOT) originating with Susan Leigh Star (Star & Griesemer 1989) continues to profusely speciate influences on interdomain theory of practice. Grasping its core concepts and origins provides a useful means to understand collaboration where consensus is precluded. However the limitations and criticisms of boundary object theory are foregrounded by Star in a 21 year retrospective evaluation scrutinized its application across multiple cases demarcating what *is not a Boundary Object* (Star 2010). Multiple meaningful contributions extend the original concepts, it's important to distinguish when these are stretched too far. The most important factor to BOTs conceptual durability is also its principal criticism; a *Boundary Object could be anything,* yet not everything is a boundary object.

To establish relevance means unpacking principle theoretical developments, revealing substantive integral concepts and the framings it relies on. Boundary object theory, formulated in Star & Griesemer's treatise on institutional ecology (Star & Griesemer 1989). The theory's continued explanatory utility testifies to its durability, its reach lies in generalisable relevance in many activity contexts. BOT has far-reaching implications, representing key problems in philosophy of science and sociology; the difficulty in understanding how artefacts, practices and objects that support group interaction stand as sites where different perspectives are mediated to coordinate action.

In this research, the boundary object provided an initial frame for investigative research into how design activity and artefacts support collaborative learning processes and dynamic coordination in innovative organizational environments.

Often boundary objects aren't resultant of intentional design but identified via retrospective analysis, akin to sensemaking. Designing meaningful collaboration is thorny, thus identifying relevant theoretical accounts, which may not be within the purview of practitioners who need it most. BOT's underpinning concepts borrow from sociology of science, formulated into framework which has been widely co-opted, applied into multiple contexts, not always maintaining their original integrity, but consistently used to bring awareness of this nature of collaborative activity in diverse situations. However, largely this sits outside of orthodoxy in learning theory and design methods.

Adam Worrall's working paper evaluates boundary object theory, scrutinizing its theoretical relevance and validity through propositional analysis (Worrall 2010), unpacking its propositional structure supports an emergent view of collaborative activity, useful for this research.

2.6.1 *Defining Boundary Object Theory…*

Boundary Object Theory (BOT) is applied in understanding dynamic coordination via objects used by people boundary crossing contexts between different social worlds and communities of practice. This theory's potential utility to understand various ways collaborators translate and share knowledge in this research context is clear. BOT's a composite theory reliant on adapting concepts from other contexts to introduce its own concepts, most prominently, *the boundary object.*

2.6.2 *…means defining Boundary Objects*

Defining these as; those scientific objects which both inhabit several intersecting social worlds and satisfy the informational requirements of each of them.

In detail;

'Boundary Objects are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual site use. These objects may be abstract or concrete. They have different meanings in different social worlds, but their structure is common enough to more than one world to make them recognizable, as means of translation'

(Star 1989).

2.6.3 *Boundary Object Typology*

Conceived as having four types;

Standardized forms a category particularly applicable to dispersed working groups, which stress common methods of information collection consistent over long distances.[9]

Objects with coincident boundaries have the same boundaries but different internal contents. An example in the 1989 paper is the state of California; where different communities share the basic map of the state yet fill it with quite different contents and frame it with different meanings.

Ideal types are abstracted from all the bounded domains and are consequently vague and locally adaptable.

Repositories are modular piles or stacks of objects that may be used without negotiation.

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[9] related to immutable mobiles or inscriptions in Actor Network Theory Latour in (D. Jones 2005).

2.6.4 *Boundary Objects within Community of Practice Theory*

Integral to Communities of Practice (COP) theory of organizational learning. As formative components of COP's reconceptualization of organizing and learning practices Boundary Objects are the suggested mode for realizing *intercommunal negotiation*. It is significant how these theories are themselves often nested conceptual composites, theories are often grounded by concepts integral to other theories.

Communities of practice, central to situated learning (Lave and Wenger 1991; Lave 1991; Brown and Duguid 1991, 2001) indicate informal learning and organization in work-based settings often possesses a vernacular quality often involving *extramural* (outside walls) activity. Where *'groups of interdependent participants provide the work context within which members construct both shared identities and the social context that helps those identities to be shared'* (Brown and Duguid 2001).

Ad-hoc forms of learning are significant to how actual work occurs. Stacey & Nandhakumar (2009) interpreted software development processes as *chaordic*; sophisticated tasks involve temporal improvisation with respect to formal planning, this resonates with situativity (Suchman 1987). Expertise formation is enacted intuitively (Lawson 2014), Hutchins explores how learning actually occurs viewing learning as conceptual change, a kind of adaptation within larger dynamical systems, enacted in the wild (Hutchins 1996).

2.6.5 *Intercommunal Negotiation & Balkanization*

Brown & Duguid recognize how communities naturally emerge around local work practices. Cautioning these tend to reinforce a condition of *balkanization* within local settings, yet, comparably with research into social worlds (Strauss 1978) reference groups or social arenas (Shibutani 1955) can extend to wider, dispersed networks of practitioners of similar epistemic stances. These are related concepts, representing a view of multi-level societal organization. Within formal organization settings, development of practices reinforces epistemic differences between these balkanized communities, enclosing knowledge of good practices within.

Where attempts to transfer aspects of practice knowledge occur, knowledge tends to 'stick' (Von Hippel 1994) at boundaries between different groups, usually because communities lack shared work and social contexts. Successful transfer and reception of knowledge within communities of practice

hinge on socialization, not simply absorbing facts. In practice-based views, learning and expertise formation a journey to become an insider through legitimate participation. [10]

Brown & Duguid's contextual solution is *intercommunal negotiation* amongst different practicing groups; which means stretching one another's assumptions towards ways of working. Vygotsky's learning theory anticipates this, boundaries provide means to enter zones of proximal development (Shabani et al. 2010). Practice-based approaches are contrasted with routinization *'the imposition of routines'* indicative of *'conventional organizational coordination'*. Suggesting the tools to achieve intercommunal negotiation are boundary objects, integrated these into their theory. Considering boundary object's liminal status as artefacts of practice, agreed and shared between communities or across boundaries whilst satisfying the informational requirements of each group (Star & Griesemer 1989). Brown & Duguid expand this concept to business tools, familiar in project environments such as *'shared documents, tools, business processes, objectives, schedules'* (2001) a status that Sapsed (2004) disputes.

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[10] Negotiating this inside / out relationship is pivotal for researching social groups, which is why methodologically interpretive methods derived from anthropology and ethnography are amenable to field research. *Emic*; from within social group (from the perspective of the subject) and *etic*, from outside (from perspective of the observer) (Kottak 2011). Detailed accounts this debate, exploring origin of concepts in linguistics and their significance, detailed in Goodenough (1970) and (Harris 2017).

2.7 In Dynamic Coordination

However, as Sapsed (Sapsed 2004) notes, factors delimit viability of management tools to foster intercommunal negotiation. Change in practices affecting boundary objects necessarily disrupt agreement between subscribing communities, necessitating negotiation between them, which seldom occur through orthodox project management tools, which routinise and formalize exchange. Resultant negotiation stimulates reconsideration of each community's practices, possibly leading to their reconsideration, a reorientation.

The role played by entities like boundary objects in signalling and recording change in a community's practice is foregrounded by Brown & Duguid's work as characteristic of form of *dynamic organizational coordination*, differentiating it from *conventional coordination*. This paradigmatic distinction is fundamental to understand organizational transformation.

In empiric studies, Sapsed indicates how co-located and distributed teams coordinate collaboration often reveals limitations of boundary objects, as they're located at boundaries between communities of practice, their nature is necessarily marginal. Intercommunal efforts within projects often result in pooled interdependence, struggling where teams might lose face if project initiatives fail yet core business are not immediately affected. Where standard project management tools are regarded as Boundary Objects, they're prone to limitations and lapses because of their marginality *'situated at the periphery of the implicated communities' attentions'*.

Where boundary objects are imposed as control strategies, they'll likely fail, where used to combat informal and exclusive practices within local groups, this result in lack of acceptance causing lapsing and avoidance of attention to intercommunal practices. If one side ceases to engage in reviewing intercommunal artefacts, then the practice lapses completely. This indicates their reliance on entirely different forms of organizing, which consequently point to different underpinning phenomena of learning and action.

It's important to evaluate boundary object theory itself, look for clues to its integral validity and utility as explanatory theory, to assay why it's widely integrated into learning theory in organizational settings. Although, as Star defines, these are subsequently exchanged and modified by ongoing contributions, associated literature is redolent with examples of different classes of entities cast as boundary objects, our examination of collaboration at boundaries warrants a deeper look at what the *boundary object* concept signifies.

Worrall analyses BOT's theoretical statement, deconstructing it into propositions, usefully unpacking the theory, to understand the internal coherences of the theory, stating that by using and adapting

concepts from other researchers *'the theory then relates these concepts with propositions which explain the relationships between these concepts and the role boundary objects play in facilitating interactions, translations, and coherence across social worlds'*. This analytic strategy to reveal relational hypothetic propositions provides a unique way to understand its inherent meanings;

2.8   Propositions in Boundary Object Theory

1)   Boundary objects are structurally weak enough to inhabit and be used across multiple social worlds, but become structurally strong when used within individual social worlds.

H1   *If X is an object used across multiple social worlds (and thus a boundary object), then X is structurally weak in common use across social worlds and is structurally strong when used by and in each of these worlds.*

2)   Successful boundary objects satisfy the informational requirements (needs) of each of the social worlds they are used within; more successful boundary objects should satisfy more requirements from more social worlds.

H2   *The more informational requirements of social worlds a boundary object X satisfies, and the more social worlds these satisfied requirements are from, the more successful X is in its role as a boundary object.*

3)   Boundary objects, which are recognizable across social worlds, should facilitate translation and support some level of coherence between these worlds.

H3   *If an object is recognizable across one or more social worlds, and thus acts as a boundary object, then that object should facilitate translation and support coherence — to some degree — between those social worlds.*

4)   A successful translation and negotiation process is one that supports and maintains a high level of coherence between social worlds.

H4   *The translation process is more likely to be successful if a high level of coherence is supported and maintained between social worlds, and vice versa.*

5)   A high level of coherence should result from carefully managing the creation, crafting, meaning, and representation of boundary objects and the interfaces they provide between and across social worlds.

H5   *The more carefully the creation, crafting, meaning, and representation of boundary objects and the interfaces they provide between and across social worlds are managed, the higher the level of coherence will likely be.*

Figure 4 – Propositions of boundary object theory adapted from (Worrall 2010)

Worrall's (2010) analysis of Star's original prepositions, reveals core operations in boundary object theory, asserting how boundary objects as conceptual entities emerge through practice.

Supplemented by Star & Ruhleder's (1995) updated re-statement of these concepts provides grounding for an *'Ecology of Infrastructure'* for design, discussing how groups access and coordinate with large information spaces. Worrall's evaluation identifies the theory as a coherent and relational *inductive grounded theory,* albeit based on contingent factors.

Worrall applies Meleis' framework for evaluating theories (Meleis 2011) to examine internal theoretical coherences. Judging that BOT, because it considers not just the view of the scientist but of each implicated social world, lends the theory generalizability, grounded in empiricism, to be applied widely and serve as a *macrotheory* (Meleis, 1991). This view indicates how the creation and management of boundary objects is a key process in developing and maintaining coherence of action across intersecting social worlds. Relevant to this discussion, let's unpack these underpinning concepts.[11]

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[11] Notably, Afaf Ibrahim Meleis, was concerned with self-care and human action, this hinged on *'integrating practice knowledge'*. Meleis was responsible for the development of Transition Theory which was exclusively concerned with the transition of patients from a care environment (like a hospital or hospice) in the home environment, concerned with well-being and the concepts of care underpinning nursing practice. This implicates crossing another boundary from within care infrastructure back into social life. In these situations, the coherence of a theory and its practical application is certainly a matter of life and death. There is a recurrent thematization towards care and therapeutic contexts, the origins of contemporary learner centred theory and consequently user centred desire share their origins in Carl Rogers' client centred therapy that held the interpersonal encounter as a central rather than marginal concern. The framing of learning as a function of care and self-maintenance is redolent in many learning theories. Traces of Rogerian psychology formed a prominent although often tacit influence on Hyper Island's core methodology, making them sympathetic to user centred design approaches, which applied a comparable shift in design approaches. Suffice to say, re-centring core interactional relations unifies client-centred, learner-centred and user-centred approaches, indications are that design methods now have need to shift again, to decentre or becomes poly-centred in response to the growing importance of non-human systems in design interactions. In this view, the central phenomenon remains operational boundaries or interfaces for interaction and where these are instantiated amongst collaborating intelligences, apprehension of this will likely become increasingly significant.

2.9 Core Concepts of Boundary Object Theory

There are four principal concepts used in boundary object theory;

boundary objects, social worlds,
translation & coherence / convergence.

Outlining integral concepts in boundary theory, reveals something of the framework they stand upon;

2.9.1 *Social Worlds*

Social world perspective's suggest an societal image schema of *'endless formation of universes of discourse, this presents the metaphor of groups emerging, evolving, developing, splintering, disintegrating or pulling themselves together'* derived from Mead in (Strauss 1978). Social World imaginaries emerge from Schütz's sociological work, rooted in symbolic interactionist stances, hence falls firmly under interpretive epistemology. This perspective evokes imagery of dynamic fluidity, as groups form and collapse, fields of action open and close via collisions at intersecting boundaries. Blending togetherness and separateness, schema of colliding social worlds schema suggests perennial organizing phenomena, central concerns for both social scientists and philosophers.

Universes of discourse traces back to George Boole's treatise on the laws of thought (Boole 1854)[12]. Peculiarly, note how the formal logic underpinning computation and consequently digital technology also informs dominant framings of social organization. This connection is reflected in peculiar consonance; feedback which is central to technically rational perspectives (systems theory and logic) is also integral to social, intuitive (design and learning practices) fields, but has significant differences.

Tight coupling between social and technological systems, evidences a socio-technical synthesis in action, in practice inextricable relations (or conflations) dominate contemporary theory. The social world imaginary establishes the inevitable social reality of boundary interaction, which is difficult to coordinate, but risky to elide. Revealing assumptions aligns with Alvesson's imperative to identify and articulate assumptions underlying a relevant domain and evaluate them.

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[12] In the same text, Boole used algebra to develop Boolean Logic, laying foundations of the information age. Logical sentences that are possible to be expressed in classical propositional calculus have an equivalent expression in Boolean algebra. Claude Shannon, whilst studying switching circuits applied Boole's ideas, the resultant impact; switching logic, fundamental to the process theory of communication (Shannon 1948) has irrevocably shaped many fields, principally computation through circuit or transistor architecture but also deeply influencing media and by extension design theory. Peculiarly, many design theorists, notably Schön, are thickly veiled systems thinkers and cyberneticians, a matter which only becomes apparent on deeper scrutiny.

A focus on interaction processes as embodied and spatialized forms the basis of social world perspectives. In actuality, *know-how* implicates *know-when, know-where* and *know-who* as preconditions for *know-why* following (Garud 1997).

Cognition is intrinsically situated and embodied; thus locative. Schutz interprets social worlds consist of; *one or more primary activities, locations where these activities occur, technology allowing activities to be enacted and organizations to propagate their activities.* From a social world perspective, the size, boundaries, visibility, structure, and topics of social worlds vary greatly, intersecting under a variety of conditions, containing social action. Strauss views this image schema as abstract not concrete, but profoundly applicable because of its generalizability. Consequently, its application within social science research is pervasive.

2.9.2 *Translations (Interessment)*

Star & Greisemer (1989) directly apply social world perspective to their theoretical development. Further, boundary object theory borrows from the Callon-Latour-Law model of *translations* (termed *interessement* in Actor Network Theory) (Latour 2013) yet diverges in proposing 'thickening' from networks to more visceral, infrastructural ecologies. The development of boundary objects suggests ecologies, shifting organizing images about interaction, it's an expanded view of the sites of negotiation and translation as *'where the action is'* (Latour 1987) and (Bowker 2016).

Interessement concerns the creation of scientific authority, through processes where entrepreneurial activity gradually enlists participants (Latour says 'allies') from various locations, re-interpreting their concerns to align with their own programmatic goals, then establishing themselves as gatekeepers (p.389). This process of gathering authority, either substantive or methodological is what Latour & Callon termed *interessement* indicating reciprocal translation of concerns from non-scientists into those of the scientist.

In this way, Boundary Object Theory is convinced with Latour's concern for the flow of objects and concepts through networks of participating allies and social worlds. Arguing, however, that problems of translation and the effort required to manage them risk of centralization around certain concerns and sites, as likely outcome of socio-technical scientific practices.

Star & Greisemer contend the challenges that intersecting social worlds pose to the coherence of translations cannot be understood from single perspectives, holding that the advantage of ecological analysis is it does not presuppose epistemological primacy of one viewpoint. This implies that an amateur viewpoint is not inherently worse than a professional one. Notable for this research, it also presupposes epistemological primacy might be distributed amongst groups, across a joint field.

2.9.3 *Passage Points*

The BOT approach differs from the Callon-Latour-Law model which anticipates a kind of *funnelling* in the sense of reframing or mediating concerns of distributed actors into narrower passage points, whereas BOT theorizes that where social worlds intersect, efforts of translation are required where *interessement* occurs. As such, boundary objects expand or extend Law's 'passage points', but not performing identically, instead boundary objects are conceptualized as spaces at intersecting boundaries between social worlds, expanding potential for integrative discourse to take place, enabling effective translation and integration of knowledge. Fundamentally BOT aims to support collaboration without consensus, often diverging rather than converging shared concerns whilst giving venue for mutual negotiation.

2.9.4 *Coherence*

Coherence implies the degree of consistency of translations between social worlds. Coherence of sets of translations depends on the extent to which entrepreneurial efforts from multiple worlds can coexist and that an indeterminate number of coherent sets of translations are possible. Boundary Objects play crucial roles in developing and sustaining coherence across intersecting social worlds. The corollary concept of convergence extends coherence, considering how effective 'information artefacts' as tools, systems, interfaces, and devices for storing, tracking, displaying, and retrieving information, fit within communities of users that create and work with them.

This refocuses on intersections between social worlds but foregrounds how effectively boundary objects in the guise of information artefacts are in their ability to integrate and produce consistency between interacting communities.

BOT begins with social worlds as an abstract assumptive ground and uses the coherence of boundary artefacts as a more directly observable sites to witness translation processes.

As noted, BOT's concepts are integral to community of practice theory (CoP) - defined as groups of people who share common concerns for something they do and learn how to do it better via regular interaction. Lave & Wenger who place emphasis on situated learning occurring via legitimate peripheral participation and the spread of knowledge through participation (Lave & Wenger 1991).

2.10 **Using Boundary Objects (BO)**

Particular relevant; is how artefacts mediate activity at boundaries. It's worth scrutinizing whether they satisfy the criteria of so-called boundary objects. A secondary question is whether Boundary Objects are amenable to conscious design.

To some degree as theoretical constructs they function as both gateways and theoretical *coda* to engage across disparate research contexts. Investigating Boundary Object Theory led the research to identify environments where intercommunal negotiation would be prominent, eventually taking design learning environments as its context. Grounded Theory advises relinquishing theoretical framings prior to entering context, as such, key concepts had to earn their place via relevance in explaining activity. Participatory ethnographic observation provided data suffuse with examples where coordination without consensus was necessary for collaborative action, however many of the coordinating tools used to stabilize coordination between diverse teams often actually confound organizing.[13]

Succinctly; boundary objects (BO) *are mediating entities that facilitate boundary crossing. These objects cross the boundaries between multiple social worlds, are used within and adapted to many of them simultaneously, they sit in the middle, acting as passage points between of a group of actors with divergent viewpoints. They adapt to local needs within a social world yet are robust enough to maintain a common identity across sites.*

Leigh Star's seminal definition (Star:1989) has found its way, reasonably intact into over 300 research papers addressing BOT directly (as of 2016 through a Web of Knowledge Search) and countless others as a translational or explanatory concept to achieve various objectives. This particular synthesis of BOT expands Star's original thoughts by evaluating subsequent attempts apply and clarify it. As such, the concept itself remains durable despite transference across academic domains, exhibiting degrees of interpretive flexibility and conceptual plasticity, this resilience evidences both its utility as

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[13] Boundary objects provided a readily explainable sacrificial concept that was useful to explain the socio-material aspects of collaboration. This trade of concepts acts to open doors, as a readily interpretable image schema it was an important way for participants to envision how artefacts and environments were implicated into their activity. Boundary objects writ large were unique enough to provide a memorable referent point and inhere interpretive flexibility enough to mean something to individuals and groups with different epistemic stances. They operated as conceptual schema that helped frame the research, acting as a catalyst to stimulate discussion.

Boundaries are social facts resulting in material categories; As Durkheim notes; *'This proposition is self-evident so long as only material or even psychological phenomena are being considered. It would also not be disputed in sociology if the social facts, because of their total lack of material substance, did not appear – wrongly, moreover – bereft of intrinsic reality. Since we view them as purely mental configurations, provided they are found to be useful, as soon as the idea of them occurs to us they seem to be self-generating'* (Durkheim et al. 1938).

explanatory frame and interpretive power to characterize perennial phenomena occurring at boundaries between social worlds (or activity systems). It's remained relatively tightly constrained to its original purpose, yet is applied to many different entities.[14] Star was magnanimous, her objective; fostering consideration of how phenomena, as such boundary objects act profoundly well as lens to bring focus to core issues in contemporary society – enabling collaboration where multiple scales of socio-material and informational infrastructures intersect.

Summarising, deep specialization reifies social worlds with such distinct epistemic stances precluding mutually intelligibility, yet social worlds and practices erupt then evaporate with disorienting rapidity. Rather than restrict collaboration to ameliorative compromise amongst common interpretive schema or only internal to social worlds, Star envisions plurality as means to integrate radically different activity systems where consensus is neither available, nor warranted.

There are inherent problems and barriers to co-operating; lying mainly in organizing and coordinating communication amongst groups with diverse disciplinary or professional dispositions. Where significant gulfs between individual worldviews occur, these are referred to as *boundaries*. Boundary concepts are richly multidimensional, their general significance to social science explored by (Lamont & Molnár 2002) revealing their conceptual application is highly variegated, their relevance to radical (Blackwell et al. 2009) and interdisciplinary (Blackwell et al. 2010) innovation is stressed.

Reviewing relevant scholarship which responds to these challenges by employing *boundaries* as general theoretical lens, common themes link key thinkers (Star & Griesemer 1989), (L. Suchman 1993), (Engeström et al. 1995), (Carlile 2002) and (Nicolini et al. 2012) who each investigate applied interdomain collaboration. Where sophisticated development, design or coordination activity is necessary, the role of materiality in social processes becomes pivotal. Boundaries consequently are becoming more explicit because of increasing specialization; as people search for ways to connect and mobilize themselves across social and cultural practices to avoid fragmentation. Furthermore; boundaries can be seen as socio-cultural differences leading to discontinuity in action or interaction. Boundaries simultaneously suggest a sameness and continuity in the sense that within discontinuity, two or more sites are relevant to one another in particular ways (Akkerman & Bakker 2011). These boundaries, rather than flat featureless interfaces, have spatial, zonal or ecotonal qualities that require negotiation or navigation and even generate certain activities, agents and artefacts.

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[14] Sometimes spuriously, causing Leigh Star to reframe and nudge the concept back in the right direction in 'This is not a boundary object: Reflections on the origin of a concept' (Star, S.L., 2010).

2.11 FRAMES

2.11.1 *Frames & Framing Practices*

In social theory, frames or interpretive schema are fundamental, as primary concepts in sociology. Awareness of how these concepts undergird general theories of learning, design and social theory is vitally important, however they're arguably so fundamental as to become unpalatably broad.

Framing concerns how people, groups and societies form, perceive, organize, and communicate their experience. Connecting the concept to boundaries Gregory Bateson, anthropologist and systems thinker, relates frames directly to boundaries as *'a spatial and temporal bounding of a set of interactive messages'* (Bateson 1972). Succinctly, schema connote perceptual structures that condition action.

Several practices notably deal with frames; Goffman's frame analysis (Goffman 1974) explored how '*schemata of interpretation*' are means to evaluate and organize experiences. Frames of reference have domain-crossing relevance, in political psychology and media studies, enacting comparable role to paradigms in the philosophy of science albeit at reduced scale. Frames are scalar phenomena, relevant to *micro*, *meso* and *macro* contexts.

In learning, experiences stemming outside familiar schemas are consequently poorly understood or display poor intelligibility. Frames of reference are formative components of social worlds, evidenced by work on reference groups (Shibutani 1955) developed by (Strauss 1978) evaluating features of cultural arenas as '*universes of regularised mutual response*' describing interrelating territories; *social worlds.*

Research on framing effects in psychology has become highly influential. Notably, Kahneman & Tversky (1979) show how contextual framings of choice affect decision-making outcomes, threatening rational axioms by acknowledging how extrinsic manipulation of intrinsic motivators via options afforded in context influences individuals. This skews presumptions of rationality, leading to Prospect Theory's propositions which radically damage classic economic rationality, decision-making employs knowable, fallible heuristics, providing insights into decision-making under threat of risk. Importantly, in this influential view, the environment in which decisions take place is held to have integral importance to the schemata applied.

Lakoff explores framing's role in political discourse. Political argument makes use of frames, asserting political argument must be presented within a rhetorical frame, by choosing language frames to define discourses then fitting issues within broader narrative arcs. Applied by Minsky, frames are memory structures shaped by past experience, implying individuals harbour paradigmatic patterns in tension with dominant social paradigms.

In planning and design theory, Schön's frame reflection means to intervene with meaning patterns underlying discourse, intractable disputes emerge when *'contending parties have different frames'* then detailing means to enact alignment (Schön & Rein 1995). Although Schön doesn't concisely define what frames are, we infer that frames operate as sense-making devices to establish parameters in problem framing, relating this to frameworks, where disputes are transformed through reframing processes. Later, Schön produces theory about intervening with frame change; practices of frame reflection respond where frame conflict underlies disputes (Gray et al. 1996). This transformative process contributes to achieving resolution, implying relativism, highlights how mediation assists reframing towards establishing coherence and utility of frames.

Critically, intervening with frames relates to social psychology perspectives through Lewin's model of change management; *frames are unfrozen, restructured, then refrozen*. Schein argues Lewin's theoretical power lay not in formal propositions but their ability to build flexible process models by entangling the right kind of variables that could be conceptualized from observation and their applicability to individual and group settings. Lewin's model of change processes in human systems provides solid theoretical foundation upon which further intelligible theories of change could be built.

Lewin saw that human change was psychological, a dynamic process involving strenuous unlearning and relearning, attempting to actively restructure one's thoughts, perceptions, feelings and attitudes through reflective, situated thought. Frames are complexly related to situations, for Lewin this evokes the image schema; *field*; exploring how environment shapes activity and thus conditions framing processes.

2.11.2 *Interpretive Schema; Frames in Social Psychology*

Relational systems formed by people and their environment are the central organizing concepts of social psychology, informing multiple theoretical systems. The person-environment relation can also be thought of as *interpretive schema.*[15], developed to understand how individuals organize (then enact) their activities. Schema are means to articulate how people *frame* their activity. Associated practices of frame analysis, reflection and restructure explore how frames condition activity.

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[15] Lending Boundary Object theory a key conceptual condition – *interpretive flexibility*, which denotes its reliance on intervention with frames, their restructure and potentially, generation.

2.11.3 *Linking Frames & Framing*

Frames are well described, widely applied concepts. The sociological foundations of framing practice set out by Goffman (1974) surmise that individuals have limited understandings of their world, they constantly struggle to interpret their life experience to make sense of surroundings, to process new information individuals apply *interpretive schemas* or "primary frameworks" to classify information and interpret meaning. Furthermore, frames are constructed and implemented at different scales;

At macro level; framing refers to modes of social representation used in communication that resonate with underlying schema in an audience, as a tool to make sense of an issue and reduce complexity

At micro level, framing describes how people process information personally. Frames become invaluable tools to represent complex issues efficiently, especially to lay audiences by drawing on existing cognitive schemas (Scheufele & Tewksbury 2006).

Necessarily, a *meso* domain where individual and group framings interact is of special significance as it's coterminous with professional structures, notably the creative industries generally, specifically the design field. Frames and framing are corollary concepts with antecedence extending from *worldview.*

Signposting this perspectival, contextual view – a *point-of-view*, *frame, world* relational system comes into view. The same suppositional and propositional structures underpin field theories with application to social psychology and sociology, in Lewin & Bourdieu respectively. Additionally, through common conceptual constructs, domain-spanning lineages between contemporary social theories become evident, dialectical and reliant on precursor concepts. This literature review traces out relational concepts to suggest *frameworking*. Spanning across activity theory and boundary object theory but also integral to other sociological, organizational and learning theories; notably Actor Network Theory, Situated Learning and Communities of Practice theories.

2.12 WORLDS

2.12.1 *Social World Perspectives*

In the social world view, analysis can become very complicated because of a significant secondary process, *segmentation*, social worlds under scrutiny *'dissolve into congeries of subworlds'* (Strauss 1978), Rittel & Webber's view of planning indicates many problem situations are resistant to conventional means of problem-solving, Dorst argues for transcendence of problem-solving altogether, problem-situations if resistant to problem-solving, instead pointing to the role of problem framing and subsequently frame innovation. This view aligns with Schön who explored how design methodology provides a means to explore problem-setting. Schön's view explores how generative metaphors and different forms of conceptual formation delimit the process of innovation itself.

The social world perspective has been broadly applied and indicates that under scrutiny the boundaries of a given social world are populated by hybrids, that boundary zones are highly heterogenous and potentially deep spaces where alliances and overlaps make defining their bounding problematic. From a processual perspective, activities within social worlds result in ongoing divergence and closure, whilst requirement for brokerage across social worlds stimulate continuous interpretive transformation, localized problem-solving implies closure, whilst brokerage at boundaries implies disclosure.

This aligns with Lawson's model of design expertise (Lawson 2014) and Dorst's insights into frame restructure (Dorst 2015b) attending to how design activity reshapes problem-situations, practices and fields via continual framing and reframing, means advanced design attends reciprocal flow between action and structure. If design activity reshapes problem-situations, problem-solving unlocks flows of action. Problems situated at boundaries between social worlds means design activity involves learning to orient with respect to changing environmental and cognitive structures, as a locative, relational intelligence attending to perspective, frame and field shape. Problem situations are sites where new framings irrupt, when perceived and given scaffold enough to take-place, through this, new ways of thinking with the situation occur, this enables disclosure. Dorst & Lawson refer to this indicative of visionary design expertise, a process of world disclosure.

Intersecting in Strauss' view occurs between segments as new activities, sites, technologies and organizations emerge, forming new universes of discourse. This present a meta-image marked by *'tremendous fluidity'* where *'fragmentation, splintering and disappearance are the mirror images of appearance, emergence and coalescence'* (p.123). Strauss admits that observation from this position is often *'bafflingly amorphous'*. Authenticity is viewed as important to the action of power within these communities in allocating, assigning and depriving resources. Also, non-authentication processes and

strategies evolve, for instance utterances such as; *'this isn't research'*. Interestingly, this presents the image of those engaged in defending a world's 'shape' whereas others engage in changing their 'shape'.

Socialization also determines the process of entering and leaving social worlds. This frames the process of how individuals recruit situations in a different light but also foregrounds issues of how people *'encounter, rub up against, introduced to, drawn into and hooked on social worlds'* chance and accident or more concretely contingent factors are seen as integral to this. Strauss indicates that socialization theories assume entrance of novices as learning participants but acknowledges the process of 'orbiting' and simultaneous membership causing new encounters. Importantly, in this context visibility of social worlds is highly variable, Strauss presages the contemporary situation in information society, recognizing how *'social world media'* are suffuse with partially visible or invisible arenas (p.124).

Strauss' fascinating contention which makes it so valuable to interpret his perspective, is to ask whether we can view *'organizational evolution and change in terms of such processes'* (ibid). The interrelation of these internal worlds with multiple world arenas, the inter-networking of social worlds is not adequately accounted for in current theories. This image of interaction, intersection and segmentation has only increased in significance since Strauss' analysis.

2.12.2 *Lifeworld*

World-oriented concepts are pervasive in social theory, rooted in philosophy of sociology, particularly in Schutzian and Weberian sociological thought, which bridge sociological and phenomenological traditions. The Phenomenology of the Social World (Schutz 1967) presages Strauss' social world perspective (Strauss 1978) can be traced back to phenomenology and before that principles of ecological theory. Alfred Schütz (1899-1959) is not be confused with William Schutz (1925-2002), both are important to understanding the observed learning approaches and methodology.[16]

Lifeworld (*lebenswelt*) in phenomenology stems from biology. Uexküll's core proposition; organisms are enfolded in their own world, mutually exclusive from others. Inner and outer experiences are managed dynamically via perceptual interaction across lifeworld boundary. Through this, organisms reshape *umwelt* through world interaction via a 'functional circle' or *funktionkreise,* this organising concept feedback characterises systems theory in its many forms.
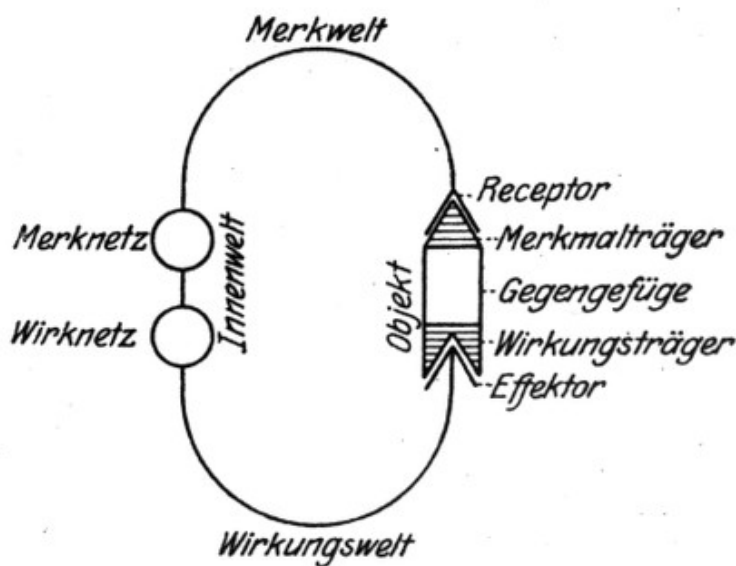
Abb. 3. Schema des Funktionskreises.

Figure 5 - Function Circle - the biological application of feedback loops in (Uexkull 1982)

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[16] Alfred Schütz, Austrian sociologist and phenomenologist, influenced by Bergson, Husserl, von Mises and Weber who influenced Berger & Luckmann and Garfinkel.
William Schutz, American social psychologist, Esalen Institute alumni and developer of FIRO, who was part of a peer group at University of Chicago's Counselling Centre that included Carl Rogers, Thomas Gordon, Abraham Maslow and Elias Porter.

2.13 **Feedback**

2.13.1 *Technical Systems, Systems Thinking & Cybernetics.*

Feedback is a powerful and ubiquitous concept, which occurs when outputs of a system are fed back into the systems as inputs as part of a chain of cause-and-effect, forming a circuit or loop. It is important to discriminate aspects and contexts of application for these profoundly important concepts and to notice their application in quite counterintuitive situations it is applied to.

However, although the concept of feedback has cognates in many fields from engineering to cybernetics and systems thinking, it is also an important meta-cognitive strategy and important in interpersonal situations. Feedback is integral to both technical and social systems, as the principles of control theory and governance. However, it's significance for organisation and implications for philosophy in general is far reaching. These related concepts have subtly different nature purposes and in application their significance diverges vastly. Machinic application of positive and negative feedback loops in closed systems is fundamental to their regulation. In biological systems, open to their environment, feedback is integral to homeostasis and equilibrium with dynamic environment.

In certain fields, interactions between these two aspects of a shared schematic concept are inevitable, the relevance of feedback to electronic engineering and software development, but also situations where sociality, management and organising is crucial. Where collaborative communication is essential aspect of designing highly technical systems, the likelihood of conflating these mutually constative concepts is high.

Feedback relationships are foundational to cybernetics and systems thinking, and are integral to theories of *enactivism* (Hutchins 1996) and *embodied cognition* (Ziemke 2003). In philosophy of mind; subject / object distinctions are fundamental concepts distinguishing between two environments, cognitive and physical, which are thought to alter one another through looping processes of feedback. The concept of lifeworld, which conceives organisms as existing within bounded, perceptual environments is fundamental for biology and consequently influenced the development of phenomenological perspectives. Lifeworld concepts are important in many settings, especially in psychology and in accounts of rationality – especially bounded rationality. Simon conceptualized human decision-makers as *satisficers*, subject to bounded rationality (Simon 1956)[17]. Extensions of rationality, especially Ecological Rationality (Gigerenzer 2002) are relevant here because they explore

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[17] In Simon's succinct metaphor of scissors, where one blade are the actual cognitive limitations of humans and the other is environmental structure. Minds with limited time, knowledge and resources can nevertheless be successful by exploiting structures in their environment (Gigerenzer & Selten 2002b).

the fit between mind and environment which is vitally important to design activity where reconciling mental, material and social considerations is crucial. Todd argues studies of rationality often ask the wrong question; how good are human at making decisions? 'Instead *Ecological rationality is the answer to a different question: How do minds "fit" their environments? Or, to restate the typical rationality question more precisely, what tools do people use to make decisions in the situations that matter to us, and how well do they work? It is not enough just to ask how well different tools perform particular actions in general. The setting — the structure of the environment — is crucial'* (Todd & Brighton 2015).

Bounded rationality is meaningfully built on by Gerd Gigerenzer's ecological rationality. Gigerenzer shows that simple heuristics often lead to better decisions than theoretically optimised procedures (Gigerenzer & Selten 2002a). Representing the cutting edge of the continuum of thinkers concerned with rationality & decision-making. Relevant to theories in biological systems, the boundary of an organism's openness to its environment is considered the primary interface which conditions subsequent interaction potentials. Incidentally, the sketched outline of an argument relevant to collaborative design activity is that shaping conditions at this interface are primary in how humans cultivate robust adaptive strategies in complex circumstances, in other words, to learn.[18]

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[18] The influence of Uexküll's biological theory on cybernetics and semiotics is notable. Concepts resembling algorithms and feedback loops (*Funktionskreis* translates to function loop). The concept of feedback loop was already familiar to engineer James Watt in the 18th Century. In present practices, it's so deeply embedded in thought processes we hardly recognise it, the basic idea of feeding the output of a system into the input.

Drawing on Rekveld, *'in the vocabulary of Von Uexküll, the jellyfish has an exceptionally simple world, consisting as it does of one loop that hardly includes anything of its environment. For animals with a richer world, that world is the sum of a number of 'Functionskreise' ('Functional loops'). In each of those, one 'Merkmaltraeger' ('sign') triggers a behavior that is aimed at eliminating its triggering sign, so the loop goes from sign to sense organ to effector organ that makes a change in the environment and eliminates the sign in some way or other. Simple organisms have two or three of such loops, complicated organisms like humans have many many of them, and two species share those parts of their world where these loops overlap or intersect. We humans have a relatively rich world because we have many of these loops, with many signs in our environment that can be triggers for action of some sort'* (Rekveld 2013)

This world image is precise and productive as it raises questions as to whether we can have access to different bounded worlds. Organismic worlds exist in parallel, in a definite sense are exemplars of observable extra dimensions. *'Von Uexküll can be seen as an attempt to develop a vocabulary to understand more of the inner logic of the worlds of different species, while trying to stay out of the trap of presupposing our human world as the true one'*

Von Uexküll's important concept; *'Die Fernste Ebene'* ('The Farthest Plane') connotes boundedness; limiting a species' perceptual world, as the distance beyond which it cannot act. This world limit is *'the space peculiar to each animal, wherever that animal may be, can be compared to a soap bubble which completely surrounds the creature at a greater or lesser distance. The extended soap bubble constitutes the limit of what is finite for the animal, and there with the limit of its world; what lies behind that is hidden in infinity'.* Rekveld applies this insight to human perception, we experience the sky as a curved dome, when actually this is only artefact of perceptual faculties (Rekveld 2013).

FEEDBACK Models
Basic Feedback Loops

INPUTS → PROCESS → OUTPUTS

FEEDBACK

Stimulus | Message | Message | Stimulus

INPUT → RECEPTOR → CONTROL APPARATUS → EFFECTOR → OUTPUT
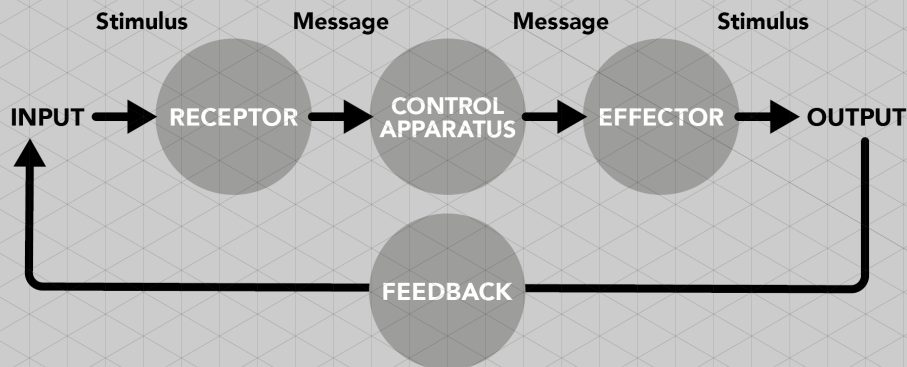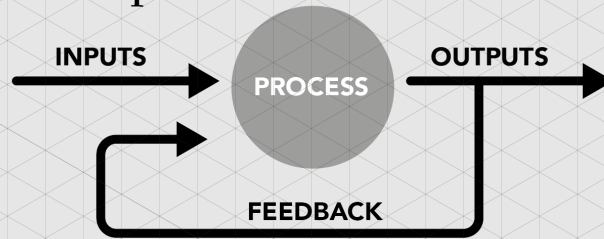
FEEDBACK

Application of feedback model to the Process Model of Communication (Weaver 1948)

The process model of commnication set forth by Shannon & Weaver illustrates an important application of feedback as the basis of information theory. This represents domain spanning efforts by mathematicians, neuroscientists, social scientists and engineers part of a powerful intellectual movement to create an exact science of the mind. Exploring concepts of feedback, self-regulation then later to self-organisation. Below depicts two simple feedback loops creating a second order system which shows immediate parallels with the Boyd's OODA loop. Boyd incorporated these concepts into his work on strategy, a metamodel integrating intra-subjective and intra-subjective loops to orient with respect to rapidly shifting environmental and operational conditions. There are strong parallels between this any many models of design, particularly those that implicate reflectivie inquiry with respect to changing environments, as described by Donald Schon. The process model has been widely applied to design and communication situations, but arguably misapprends their nature, relying of code metaphor realised as inadequate to describe complex communication situations such as those involving learning and design cognition

FEEDBACK (double loop)
Second Order Cybernetics

INPUTS → PROCESS → OUTPUT

FEEDBACK 1st order
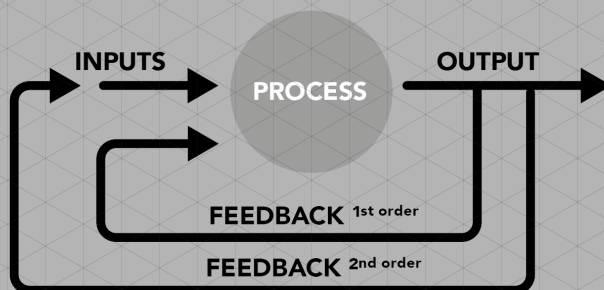
FEEDBACK 2nd order

The feedback loop is fundamental to general systems, led to the inception of Second Order Cybernetics or the 'cybernetics of cybernetics' further nested development of systems of systems have led to later generations of cybernetics. Feedback loops have impacted both technical and social image schemas forming a pervasive continuum underpinning theories of learning and design. Weiner > Bateson > Mead > Strauss.

Figure 6 – Distinguishing Feedback in Technical & Social Systems.

2.13.2 *Mutual Intelligibility between Worlds*

In forming an argument to understanding how collaboration occurs and why it fails means deconstructing why contemporary work contexts increasingly rely of high-performing, cross functional teams and how integration occurs. These circumstance foreground the chance of clashes resultant of differences in world-view resultant of differentiation in membership of disciplinary community, community of practice or intellectual field, not just the division of labour, but division in thought that simultaneously precludes concord but also presents tensions that may be profoundly generative.

Essentially, Weberian sociology revolves around the idea of *mutual intelligibility* (Winch 2008). The principal challenges facing digital societies revolve around the difficulty of adapting to changes to the *visibility* or *scrutability* of certain information environments - systems, infrastructure or apparatus. These two issues of intelligibility; system visibility or interpersonal mutual intelligibility are interlinked and of decisive importance.

Peculiarly, the logic of *digitisation, digitalisation* and *digital transformation* each involve processes which at the surface resemble one another. Boundaries between activity systems constitutive of everyday interaction follow a logic consistent with social worlds in interaction. As efforts make collaborative processes more transparent to support mutual intelligibility this affords the design of systems that are becoming opaquer, as no one collaborator has purview of every element of a system, especially as system complexity scales. Following Latour, the infrastructural apparatus making social life possible retreats becoming less intelligible, critical systems become increasingly imperceptible or invisible (Latour & Hermant 2003) counterintuitively as they become more collaborative, participatory or democratised.

The increased sociality and domain-spanning expertise demanded by contemporary organisational activity makes the value of effective collaborative activity more overt. Increasingly complex collaborative tasks and settings alongside the distribution of work packages and aspects of planning across teams using diverse information systems makes their management difficult. Management and leadership approaches to organising are increasingly moving towards agile methods and increased relative autonomy amongst teams. Blends of Design methods with elements of software development methodologies, such as Scrum or Agile are becoming the default organising logic of modern organisations. Design thinking, principal agent of expansion of application of design methods is a key example of this, arguably though the distilled principles of DT bely the significance and progress made by design methods. Interpreting scholarly progress into readily interpretable and applicable

strategies, whilst retaining their utility and critical insight has proven difficult. As psychology has been at pains to stress, crossing a threshold inevitably implies loss.

Transformative change to organisation places exceptional demands on employees and organisations themselves, this threat is often phrased to organisations as existential. The arguments for Digital transformation are often seen as irrevocable and inevitable; *change or die.* As such, changes in intelligibility in each lifeworld places distortive stress on worldview. Debatably, human cognition didn't evolve for user interfaces, databases and instantaneous communication, but human cognition has generated these environments to support increasingly complex and diffuse co-operative endeavours. Each team member has a necessarily partial and increasingly restricted picture of total function. Stafford Beer described cybernetics as '*the art of effective organisation*', further ramifying this Gordon Pask (1976) referred to systems practices as *'the art and science of manipulating defensible metaphors'* – representations and flows of information, whether in organisations or minds are fundamental aspects of co-operation.

Design-led methods, the communities, cultures, professions and industries that apply them are also largely coterminous with human activities concerned with generation and creation of complex systems. Increasingly, design has expanded beyond production of things and communication, entire worlds are subject to *artificing.* Furthermore, Design is often now implicated into the design of thinking.

There is also strong correspondence with environments concerned with education, leadership becomes increasingly untenable once stable systemic images are distributed. Instead, where dynamic coordination comes to the fore, trust and alignment of purpose supplant control and oversight. Learning involves active restructuring of concepts, resources and environments in parallel, learning to lead in complex settings consequently relies of reconciling multiple, often conflicting reports of action as system top-down perspectives retreat from view, leadership is reframed as a distributed quality across a collaboration rather than a clearly defined role. Classic panoptic management strategies become increasingly untenable driving increasing organisational flatness, a systemic management logic of aligned autonomy and distributed decision-making supplants systematic hierarchical oversight.

Furthermore, note how each of these concepts has a noun and a corresponding verb; a gerund form; *frame > framing* and *world > worlding* acknowledges how these have dual object and process characteristics, as both entities and activities.

The relevance to understand interacting groups, say in a design studio, where interacting individuals learn to negotiate meaning amongst others in complex circumstances is self-evident. Fundamentally, design-led methods are increasingly important as alternative methods to respond to challenges which

Kees Dorst has described as *open, complex, dynamic* and *networked* insisting the properties of new problem situations severely challenge assumptions behind conventional problem-solving (Dorst 2015b).

Concerning leadership in digital economic settings, critiquing organizations that play an important role in educating innovation leaders for the digital landscape, these concepts are highly relevant. Observation affirms that where experts with knowledge from different domains interact there are great risks that communication can veer towards incommensurability. However, collective activities that involve framing tend to reshape practices and consequently their operating field, a flow of practices between domains becomes prevalent, with certain metacognitive practices providing integrative expertise to manage complex collaboration. The proposition follows that the outputs of learning organisations are; situated knowledge but also sophisticated individuals who are equipped to effectively interoperate will naturally feedback their localised practices across different domains will steadily transform both forms of organising and organizing practices through an expansive network of collaborators.

The meta-concept *world* signifying the total environmental field of organisms is fundamentally important to theories of perception and as we have seen, critical concepts for contemporary philosophy.

2.13.3 *Worlding*

World concepts link to design activity as they engage in *worlding*. Heidegger's verb *worlding*, connotes generative processes of world-making. Worlds are fundamentally important to phenomenology relating to *lifeworld*, in Husserl. For Heidegger, *Worlding* is intrinsic to being, an ongoing process of becoming or bringing near, necessarily *worlding* is how we experience the world as familiar. *Worlding* is always thought of as *'complex and dynamic assemblage of ever-renewing realities, sensations and perceptions'* through which we must constantly orient ourselves with and negotiate through.

Heidegger uses this concept to explore aesthetics and particular moments where things are realised, where *'Artist and work are each, in themselves and in their reciprocal relation'* (Haynes & Young 2002) on account of a third thing prior to both from which they take their names - art. Heidegger complexly relates these matters of the responsiveness to particular things in relationships between person, activity and intellectual or practice field that conditions activity, in this case art, which Heidegger sees as complex integral wholes. We can see immediate extensions of this to other forms of generative activity, like design.

2.14 Linking frames & worlds

Spatiality is integral to social thought. Notably, social and spatial cognition are interrelated as humans live in real three-dimensional environments, movement is crucial to fulfil all needs, unsurprisingly that *'non-verbal interactions serve as the medium in which we regulate our social relations',* consequently social relations *take place* through movement and position thus *'space is the medium of social interaction – the stage of our social life'* as such, topological aspects of movement mean something, we are geared toward the environment evolution equips us for (Schubert & Maass 2011)[19].

Vygotsky's ideas clearly inspired this group of scholars including Bruner's idea of *scaffolding.* Vygotsky viewed peer interaction as an effective factor in developing skills and strategies. This view suggests educator use cooperative learning exercises to foster interaction between novice and skilful peers - within their *zone of proximal development.* We can clearly see from this how the origins of symbolic interaction were set forth in social constructivism. Hall explored the role of territory in human activity *'indicates the crucial nature of territoriality as a behavioural system, a system that evolved in very much the same way as anatomical systems evolved'* (Hall 1969)[20]. It's clear that mediation has conceptual, material and embodied components.

The constructivist theory of activity stemming from Lev Vygotsky influenced pragmatic social psychology. This viewpoint held that we learn best embedded in social environments, as we construct meaning through interaction with others. This expands upon a comparable metaphor of the construction of a building, analogising this to personal development. For Bruner, thinking is a categorising and inference making procedures. Defining cognition as a general field as *'means whereby organisms achieve, retain, and transform information'* is comparable to Vygotsky's account, which introduced mediation between the classical behaviourist dyad of stimulus – response. The $S - R$ bond was gradual dissolved and superseded by the mediation model; the $S - R$ dyad mediated by X (a mediating tool, whether conceptual or physical).

Bruner discusses the conceptual reframings that occur for mediation to make sense, Tolman noted how analogies of cognition moved from the schema of telephone switchboards to a kind of map room

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[19] The relations are clear and well expressed in social psychology from Allport's exploration of the dynamics physical contact in conflict and prejudice (Allport 1979) and Hall's conceptualisations of proximal body space in (Hall 1969) which resemble Vygotsky's zones of proximal development quite closely.

[20] Hall's hidden dimension sought to draw out this reciprocal interplay. Hall described culturally specific temporal and spatial dimensions surrounding us, personal space, his ideas about extension were highly influential on colleagues Buckminster Fuller's and Marshall McLuhan's perspectives on design and communication.

where stimulus could be organised before any response occurred (or at least these connections modified and organised) providing us with intervening *cognitive maps* (Bruner 2017).

2.14.1 *The basis of social world perspectives.*

Just as biological concepts support ecological and phenomenological theoretical accounts of perception, these accounts provide common theoretical precursors which are applied to many theories of activity.

In situations where *lifeworlds* interact such as in groups of interacting individuals, the construct; *social world* is used to denote a *'universe of regularized mutual response'* where '*each is an arena in which there is a kind of organization'* each is a *'cultural area'* whose *'boundaries being set neither by territory nor formal membership but by the limits of effective communication'* (Shibutani 1955) in (Strauss 1978). Social worlds indicate shared domains of practice.

Frame and *world* concepts have had indelible impacts on social theory, they're assumptions which reveal the organising logics of many subsequent theories of interaction. Certain concepts are vital to grasp, comprising elements of formative frameworks, theory is underpinned by various configurations of *paths, frames* and *worlds,* but also notably here, *fields.* From the perspective that purposeful activity is a situated, enaction of concepts into socio-material settings, theories can be evaluated based on their ability to relationally integrate between different dimensions of experience. Markedly, the degree to which theories rely on topological relations is surprising, whether links, interfaces or domains the basic syntax of concepts isn't linguistic, it is space.

World concepts share roots in phenomenology. *Social world* extends upon the same conceptual origins as *lifeworld* and *worldview* which characterize phenomenology. Husserl decreed *lifeworld* fundamental to all epistemology enquiry, defining *lifeworld* as the totality of ways we are conscious of the world as a *'universal horizon, as coherent universe of existing objects'* living in the world with one another, yet experienced by each of us as *'valid for our consciousness as existing precisely through this 'living together'*'* (Husserl 1970).

Lifeworld remains an important thematic in philosophy and particularly the social science sociology and anthropology, often conceived as the formative 'ground' that conditions *worldview*, referring to frameworks of beliefs and concepts through which individuals, groups or cultures interpret and interact with their respective worlds.

2.15 **FIELD**

2.15.1 *Foreshadowing the field*

This study explores these interactions to consider how designerly problem-solving and setting activity can shape fields and reciprocally how context (in the field) shapes design activity. The concept **Field** has domain spanning relevance as general entity in which action is organized or value is generated. Summatively, insights from BOT & AT are conspicuously mute in the design methods field. Considering that design activity is broadly operationalized in creating socio-material worlds, shaping culture and increasingly expanding to matters ofcoordination in organizations, not simply designing things.

The verb form of field; *to field* denotes an activity; *fielding* defined as ability to handle, to receive and answer or cope with an issue. If we frame fielding as the process of coping with threats to the integrity of a course of action whilst maintaining meaningful progress it takes on special relevance given contemporary understandings of how communities of inquiry operate.

The noun form of *field*; denotes clustering of concepts, essentially a bounded space concerned with generating some form of value.

Empiricism inheres the perception that natural sciences reveal irrefutable truths about the nature of the world *out there*. Husserl insists this is confusing, as rendering ideas intuitive is hardly intuiting the objective but rather intuitive with respect to lifeworld, suited to make it easier to conceive ideals in question, suggesting many 'conceptual intermediaries' are involved, an issue explored in other theories as tool mediation (Vygotsky 1934) and (Engeström 1999).

2.15.2 *Field Theories: In Social Psychology & Sociology*

Social Psychologist, Kurt Lewin foresaw *behaviour as a function of person and environment,* considering interaction patterns between individual and total field, or environment. In social psychology, place is framed as essential to psychological functioning and social interaction.

Rooted in Gestalt theory's holistic approach to experience. This led to the primary heuristic device of field theory; Lewin's Field Equation,

$$B = f(P\text{-}E)$$

Commensurately, sociologist Pierre Bourdieu conceptualizes society as determined by spatial arrangements, aligning with French theory's longstanding preoccupation with space.

Lewin & Bourdieu arrive independently at two radically different theories of action which both assert how environments are crucial aspects of social formation. Each theoretical treatise conjoins psychical and physical components of interaction rather than insisting on a material and conceptual dichotomy that functionally proves difficult to sustain. Lewin and Bourdieu independently resolve social theories they called Field Theory.

Connecting with scholarly attempts to deal with boundary phenomena, wherever common communities of practice form, *thoughtworlds* emerge that preclude shared understanding (Dougherty 1992). As we have seen, in these cases; clear articulation of tasks may be problematic (Fischer 2001), given differences interpretive schema, otherwise known as frames. Organizations concerned with learning and innovation tend to encourage inter-departmental problem-solving to share skills amongst collaborators to develop new products and processes. For some, their core value proposition is ensuring that this continually takes place. Hence, process improvement leads to the creation of new routines, which promote acquisition of new knowledge and skills by organizational members, and helps develop and refine core competencies, not easily imitable by competitors (Ghosh 2006). Hence, boundaries emerge where different framings of common fields of action arise.

Consequently, boundaries and fields are significant to design theory as a burgeoning field. Taking up the task of habituating these concepts into design theory to better equip it to deal with collaborative activity, means revealing relational schema that form its assumptive ground, problematising then evaluating them to point towards new grounding (Alvesson 2011).

2.15.3 *Social Psychology – Lewin's Topological View*

For Kurt Lewin, social psychology concerns *'life-space'* as an analogous concept to inquire into how (groups of) people interact. Lewin aligns with the psychology of sensation and perception, noting its basis in empiricism provides the imperative for experimental evidence, with it comes relatively firm footing in contrast with the psychology of affect, will and needs.

Fundamentally, psychology of personality contains intangibles that make generalization difficult, yet SP sought to generalize these. Lewin knew spatial perception is innately well developed by humans and that spatial perception is a well-defined field in psychology, seeking to find mutual foundations that could make these intangibles intelligible.

Various typological and categorical accounts have emerged to account for affect, but only relatively recently these aspects of individuals were subjected to experimental scrutiny through social psychology. Before Freud it was generally thought that *'elusive and highly complicated processes were intrinsically impossible'* to discriminate. However, basing psychological laws on case studies seemed methodologically unsound to scientists. In response, Lewin put forward principles of *topological psychology* and doing so laid foundations for psychological 'Field Theory' and subsequently, Group Dynamics. [21]

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[21] Unpacking activity and the grounding learning methodology applied by the study's target organization, understanding Group Dynamics became profoundly important to the research context, interpreting that Hyper Island maintains its methodological advantage in learning by prioritizing group learning phenomena.

2.16 Field Theory in Social Psychology (Lewin)

Social psychology crucially diverges from other approaches; Freudian psychotherapy argued that behaviour was conditioned by past experience, conversely, Lewin claimed that behaviour was a function of person and environment, shaped by *contemporaneity*. The resultant Field Theory has far reaching implications for understanding organisational change.

There is a crucial epistemic point to make on this journey to explore design, learning and innovation in the 21ˢᵗ century. Lewin suggests that underlying systems of concepts involved in human action, a manifold pattern sharing features with a Gestalt, an interdependence of parts. However, facts about the world cannot be acquired unless we apprehend this relational system of concepts, as epistemologically, it conditions the facts we can ascertain. The psychology of sensation and perception are crucial, rather than absolute *a priori* prepositions that anchor systems of thought, which under scrutiny are found ultimately wanting. The grounding of thought necessarily rests in a function of the situation between person and environment and by extension, perception is bound up with affect.[22]

This leads us to question the epistemic basis of learning paradigms and theories that emerge from them, a position remarkably well anticipated in Emery's account of the Heider/Gibson paradigm of ecological perception (Emery 1981).

2.16.1 *Lewin's Principle of Contemporaneity.*

To provide a basis of action, especially analysis of the conditions of organisational change 'contemporaneity' points to concentration on elements of current situations that motivate or otherwise influence people and their environment and thus shape change. Lewin asserted that *'only conditions in the present can explain experience and behaviour in the present'* (Gold, 1992, p. 70). This was meant to run contrary to psychoanalytical explanation, instead focusing on relational arrangements between people (which include their experience and goals as part of their *time perspective* in the present).

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[22] By this rationale, other people form the environment for individuals, expanding environment to include different forms of perceptual structures, notwithstanding humans and non-human systems. Total environment gathers into a framing all fields of experience, whether with or without extent. Philosophy of mind classically understands mind and entailed concepts as being space without functional extent. In the contemporary view, Rowlands argues cognition is enactive, embodied, embedded, affective and (potentially) extended (as in spread out into enactive fields). The stance taken that "classical sandwich" of cognition as being sandwiched between perception and action is artificial; cognition inevitably has to be framed as product of strongly coupled interactions that cannot be divided this way (Rowlands 2010). This is a view detailed by Ward and Mog Stapleton who view cognition as *enacted, embodied, embedded, affectiv*e and *extended* – that *Enactivism* claims *'that perception and cognition depend upon cognizer's interactions with their environment is fundamental. If a particular instance of this kind of dependence obtains, we will argue, then it follows that cognition is essentially embodied and embedded, that the underpinnings of cognition are inextricable from those of affect, that the phenomenon of cognition itself is essentially bound up with affect, and that the possibility of cognitive extension depends upon the instantiation of a specific mode of skilful interrelation between cognizer and environment'* (Ward Stapelton 2012) in (Paglieri 2016).

Lewin's sophistication was in recognising that Field Theory could not be called a theory in the conventional sense, in that the object was not objective validation of a field instead to provide explanatory utility as a perceptual framework, in this way Lewin considered FT a method of analysing causal relations and building scientific constructs (Lewin 1943) to build bridges between an ancestral or folk psychology *'based on constructs that were derived from common-sense understanding of mental processes and behavior, refined over the years, but without connection to physical processes in the brain'* (Duch 2017*)* to one with a firmer grounding in physical reality.

2.16.2 *Total Field*

Lewin implores, to grasp an individual's life-space we must blend both subjective reality and personal significance. Lewin's topological conceptualizations of social interaction views individuals in dialogue with 'total field' of environment. This interface, imagined as dynamic horizons of the *lifeworld*, correlates to many other theoretical precepts, there are clear cognates with boundary-like phenomena. For Lewin, *'to understand or to predict behaviour, the person and his environment have to be considered as one constellation of interdependent factors'* (1946).

Thus, notionally 'field' refers to*:*
(a) all aspects of individuals in relationship with their surroundings and conditions;
(b) that apparently influence the particular behaviours and developments of concern;
(c) at a particular point in time.

Lewin's field theory rule infers *'analysis starts with the situation as a whole'* (Neumann 2008).

The Gestaltist school, significantly though Koffka (Koffka 1935) placed heavy emphasis on closing this subjective-objective divide, classic theoretical dichotomization of internal subjective meaning in relation to external objective environment. Kelly's theories of personality assert that implicit patterns in personality make-up, termed constructs, shape response to situations, that individual acts are influenced by ways they anticipate events not just ways they react to them (Kelly 1963), strongly harking research into fundamentally predictive, error-minimizing foundation of cognition, at neurological level (Mar & Oatley 2008), (Friston 2010), (Hohwy 2013). Constructs of this form are analogues of frames found elsewhere is psychology.

2.17 Field Theory in Sociology (Bourdieu)

Bourdieu, who discusses how our assumptive world conditions the potential to enact framings through activity. Bourdieu called his theory of practice *theory games*, referred to formally as Field Theory in sociology.

This perspective also understands the social world to be divided into distinct arenas or *fields* of practice like art, education, religion or law. Each was seen to have its own unique sets of rules, knowledges and forms of capital. Although fields could overlap, each field was seen as relatively autonomous. Each field contained its own set of positions and practices as well as struggle for position, social capital is mobilized within each field to stake claims within the enclosed social domain. Bourdieu observed this in the art world where each generation of artists sought undermine established positions, only to be critiqued by the next generation who sought to establish their own positions of power within the field. In Bourdieu's Field theory, social fields are places where people struggle for position and inevitably, play to win (Longhofer & Winchester 2016).

2.17.1 *Habitus*

The concept *Habitus* is central to Bourdieu's thought, referring to the embodiment of cultural capital, to the deeply ingrained habits, skills, and dispositions that we possess due to our life experiences. Bourdieu commonly used metaphors derived from sports to explain this ambiguous concept, referring to it as *'a feel for the game'*.

Each individual has an embodied type of feel, that expresses the types of social situations we commonly find ourselves in or environments we are embedded in. Habitus indicates capacity to navigate certain social environments well, for example being street savvy; for a person growing up in an impoverished neighbourhood, this same set of skills & attributes, this feel may not apply to a different environment for example a prestigious college.[23]

Habitus also is thought to pertain to aesthetic taste; for example, growing up in upper class settings might provide individuals with a tendency towards appreciating fine arts perhaps simply consequent of the contents of shelves or walls in the home, arguing that aesthetic sensibilities are shaped by the culturally ingrained habitus. Yet Bourdieu warns that often is often so ingrained often it's possible for

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[23] Although the creative ability to analogize provides one such way to hack this – for example, in Leadership circles – sportspersonship or battle experience are often held to equate to skill in leading organisations, this is possible if the ability to analogise from one situation to another, implying transfer of learning, equally this might be an issue of perceived confidence rather than real applicability. However, this implies there are general patterns of behaviour pertinent to leadership, where humans are concerned, that are independent of context, relevant to integration across domains of practice – intuitively this too is a practice.

people to mistake their feel-for-the-game as natural rather than culturally developed. This misapprehension often leads to justification of social inequality, because it (mistakenly) provides belief that some people are naturally predisposed to certain conditionings and aesthetic sensitivities. This is of absolute relevance to meritocratic societies, as discussed by (Young 2011) and (A. Allen 2011).

2.17.2 *Field & 'Feel for the game' (Champs et Sens Pratique)*

For Bourdieu, a field (champs) comprises all spectrums of human experience, drawing together political, economic and cultural factors. Fields are structured spaces with their own fundamental heuristic relations. Fields constitute the game space, here where forms of organising and learning are enacted by design.

Interaction with a field requires habitus (or *sens pratique*), described by Bourdieu as *"kinds of practical sense for what is to be done in any given situation—what is called in sport a 'feel' for the game'*. Feel for the game is given by acquisition of capital which here means specialized knowledge of a field, however in certain fields this specialist expertise is integrative; how to arrive at mutual intelligibility or shared perception of common problem-situations. Extending Bourdieu, this is nationally, a feel for fields, in the sense of cultivating awareness of the *fieldness* of the way human activities are differentiated and organised.

Possessing capital implies understanding heuristic grasp of the game this occurs throughout life before and after entering a particular field environment. This relies on experience of place gathered via familial, educational, and social structures and institutions.

For Bourdieu, cultural capital is an internalised code allowing agents to interpret activity in a cultural field through relations and objects. While forms of capital are internalised individually, in practice cultural capital is dynamically multivalent. Platforms and communities on the internet, in the contemporary view, afford a vicarious feel for a field, following the logic of birds of a feather, access to and the potential for legitimate peripheral participation is amplified by digital communities and the mass sharing of mundane exchanges that occur amongst field members which would usually be hidden from view or at least situated within specialist spaces behind closed doors.

2.18.1 *Field Theory in Learning Organizations*

As Argyris notes on Field Theory, were 'laws' of psychology known, prediction of behaviour is possible only if the special nature of the particular situation are known. As a result, we can no longer seek the *cause* of events in the nature of a single isolated object, but in relations between objects and their surroundings.

Argyris & Schön applied Field Theory to support their subsequent developments, noting how Lewin refers to his FT as a meta-theoryArgyris is critical of humanist approaches to social science for implying the same fallacy they accuse positivism of making, by attempting to create false distance from their subjects.

Action research was intended to explain problems and even solve them through the use of collaboration and participation. However, as Argyris notes, at the expense of causality, many contributors to action research eschew the possibility of making causal claims favouring subjective, postmodern perspectives. Counterintuitively, as Argyris notes, the stance that causality is not relevant or testable is itself a causal claim. Arguments against causality towards more relevant ways to explain phenomena are themselves based on causal reasoning. Hence, the responsibility to understand causal relations is found to be deeper embedded and more complex. Finally, research methods and theory must allow individuals or organizations to integrate *diagnosis, invention, production* and *evaluation*. This raises issue of affect, how practicing empathy and care in research elides fallible distinctions of research objectivity. Rather than eschewing the need for devising and measuring constructs, this grounded study examines an environment relationally, an organising image emerges of integral topological relationships at work in generating framings and concepts that shape cooperative social action.

Scholarly research processes are responsible for helping subjects build better situations, where 'better' can mean more attuned explication, effectiveness, competence and generativity, providing *'enhanced learning that perseveres'*. Care is taken to establish critical distance, but not unconditionally, as this can result in 'brittle' systems. Care relates to the demand to produce rigour, legitimacy and actionable insight. Scholarly consulting therefore 'cares' to the extent that subjects are interested in learning, producing valid information, encouraging informed choice and accepting personal responsibility for action. *This sense of the preciousness of human beings inveighs against the notion that scholars, in the interest of being objective, must distance themselves from those they study'* (Argyris 1997), an imperative

methodological insight. The sense that field theory provides a meta-perspective is indicative of a desire to establish a conceptual basis for a mutual ground. [24]

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[24] (*meta-* in the etymological sense stems from roots in meaning *among* or *between* or *beyond*, the prefix meta connotes 'changing places with' and comes from the sense of being 'in the middle', which signifies brokerage or relational properties of a concept.)

2.19 Organizing Transformation

Research in this area is challenging because it explores complex collaborative activity, specifically learning and design activity in organisations engaging in creative business transformation activity. Necessarily, claims of causality are cautious and tentative, however methodologically, general actionable insights are tenable (if grounded in an evidence base that integrates experience and supporting theory).

Dynamic coordination relies on building trust and closing distance, this process is founded on what Argyris & Schön referred to as learning loops; respecting that individuals are highly capable of learning to detect and correct error in their activity (*single loop learning*) and expands into their underlying values and systems of concepts (*double loop learning*) (Argyris & Schön 1996). This expands individual reflexive monitoring (Giddens & Pierson 1998) to shared concerns. Participants are assumed to possess sophisticated innate expertise in interacting via fundamental machineries of interaction (Crabtree et al. 2012). As such, participant's perceptions are viewed as fundamental to interpretation and theory generation.

Model of transformational change
Adapted from; 'Double-loop' learning, adopted from Argyris and Schön (1974)
International Journal of Design 60 Vol. 7 No. 3 2013 (www.ijdesign.org)
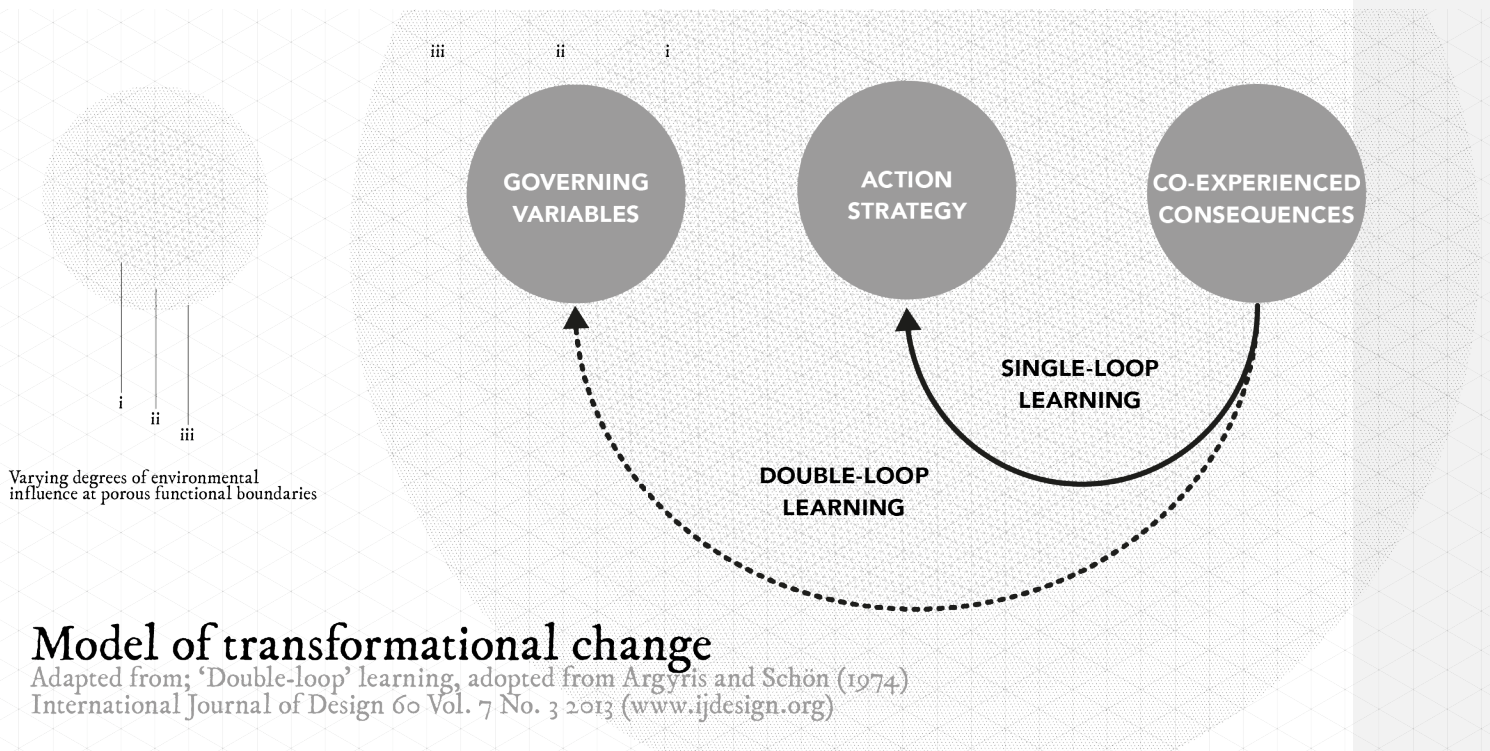
Figure 7 – Model of Transformational Change (Argyris:1996)

In this situated view, individuals act on the basis of their designs, the consequences cannot be errors if they produce what they intend. This insight links research with design, showing how design learning is akin to an orientating, disclosing activity. Understanding this gap between intention and outcome, plan and situated action reveals much about the process of design learning and how institutions enact design in its expanded mode.

2.20 **RATIONALITY**

2.20.1 *Foundations of the academic / vocational divide.*

A critical boundary in societal learning, now under threat, is the assumption that learning occurs only within the boundaries of formal institutes. Brown & Duguid's perspectives insist that learning is as likely to occur within organisational life as it is to occur in extramural settings, that is, outside of formal institutional arrangements, which is to say, across interpersonal and organisational boundaries into the domain of everyday life.

A divide between academic and vocational learning still shapes educational policy. Vocational directives support the idea that *'encouraged the view that an education system is an important instrument for securing economic growth by preparing people for paid employment'* (Halliday 2000), this approach is often characterized as instrumental.

This divide, for Weber, distinguishes between two principal types of rationality, instrumental (*Zweckrational*) and value-rational (*Wertrational*) (Weber 1978).

Dewey's contributions to learning theory centred on this dichotomy too, it remains significant in contemporary education [25]. Consonant with pragmatism, simply;

Instrumental Rationality is *reasoning about means* **and Value Rationality is** *reasoning about ends.*

Prime drivers of societal organizing are glimpsed here – life, learning and work are applied to produce extrinsic value or as valuable for their intrinsic meaning, this tension between different forms of rationality remains fundamental. In practice, this distinction represents dichotomous reasoning. Dewey resisted dualisms, recognizing them as tensions between mutually constitutive dualistic wholes. Arguing rational dualism developed to establish corrective tension where learners apprehend accord or discord when correlating their activity amongst a group, it follows that these types of reasoning are applicable to the discovery of what is *true* and what is *just*. Analogies to scientific and aesthetic rationality are obvious, truth and judgment sit on a knife-edge between effect and affect, questioning how social action and space are organized to manifest value whether material or personal.

Commodification inheres itself as progressive construal of meaning and material, giving rise to shaping influences not only upon industrial, market and economic conditions but consequently

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[25] The guiding principles guiding Dewey's institutional experiments framed occupation as core to curricula, the rationale, by experiencing sources of material production, surrounding learners how human world was produced, lent learning a natural authenticity. Contradictorily, saw industrialisation as a benign natural process, yet sought to reform society.

people, places and conditions. Embedding and subjecting life into relational activity systems and infrastructures of value creation, ramifies distinctions between vocational and academic forms of education, ultimately, whether learning serves personhood or society, questioning whether learning's purpose lies in unlocking intrinsic or extrinsic value or more likely some blend of both. Design communities, given their roots in artisanship inhere a bias towards vocation, the recent era of design methods that has resulted in expansions of design represent attempts to rationalise the internal logics of design processes to reveal a scholarly foundation, in parallel through application expanded design methods have found pragmatic application as frameworks conscripted into generating economic value, to commodify design's unique framings.

Significantly, tension between value and instrumental rationality are generative, we should question if this boundary is becoming more porous or deeply entrenched [26]. Each in isolation impoverishes personhood or the economic infrastructures society relies upon, exploiting these boundary tensions is needful and extraordinarily generative -particularly as work impinges into domestic or social life. A driving motor determining societal learning responses are encounters with interminable complexity or more specifically ill-structure. Where groups encounter with threat to or failure of meaning, which leads to loss of sense or purpose, most importantly if this precludes the possibility to engage with authentic meaning or value creation mechanisms, attempts to make sense and reorient to new structures follows, in extreme cases, rebuke of organising structure are consequent. This is an important driver of personal, organisational or societal change. This perception of meaningfulness combined with the possibility to add value, if even only as an imaginary, of a larger organised logic or

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[26] Given Dewey's experiments with institutional arrangements, consider how concepts derived from experience interleave with mental phenomena, an appropriate metaphor is spinning wool. As a means to understand how value is derived from situations through learning. A process where a product is derived; sheep raised, shepherded and sheared, then with extreme ingenuity a product must be refined and transmuted into usable products; like fleece and lanolin, the relational information and activity infrastructures implied by this is pivotal.

Industrial processes imply analytic efforts to break down, before synthesis into a novel structure or pattern that has utility occurs. These material processes are in some ways analogous to conceptual ones. These materials, already decoupled from their source and transported elsewhere are subject to generalised processes. In this case, fleece is spun into wool, to be woven into a variety of materials that have their own unique properties and uses forming the basis of exchange systems. The full spectrum of human ingenuity, expressed through forms of embodied skill and technology provides, ingenious ways to enact a transmutation. Within the bounds of this metaphorical world, a plurality of types of human skill are implicated into this process. Not only the processing itself, but skills, tools and organising of the process. Technologies that abstract hand skills such as the spinning jenny were key development of industrialisation, as complexity of abstraction evolves, complex composite technologies such as the Jacquard loom, one of the first applications of computation applied to the task of producing useful material from a given 'field' – at first pasture, then the punch card now silicon. These infrastructures are integral to the *dataome* (Scharf 2021) (defined as *'the sum total of our ideas, observations, recorded history, data, language, pictures, books, electronic blips and the information encoded in physical structures, from pencils to bricks, buildings, and machines)* which is external to the know-how held within a community but the outcome of design activity.

at least direction for societal and personal development is fundamentally important, this connects in a practical way to the mythos of progress.

However, as Ackoff concludes, reductive accounts are problematic; *'analysis yields information about the structure of something, knowledge or know how. Explanations lie outside, that's synthetic thinking'*. Simply, analysis yields knowledge, synthesis yields understanding. Furthermore, in fact, in any activity system that involves people, analysis alone fails, synthetic thinking is required (Ackoff 2005). Consequently, this places methods that operate on synthetic principles in the foreground. Also, where boundaries between fields become strictures rather than potential sites for generative tension, the outcomes can become personally, economically and ecologically deleterious. Restricting material flows to bolster demand is fundamental to classical economic logic, but within economic arenas where symbolic value, defined as *'the immaterial value attributed to an object or an idea and communicates its symbolic meaning'* (Ekstrom 2011), becomes prevalent. Clearly, learning has powerful symbolic value which underpins economic development of material exchange perhaps also where symbolic innovation plays an increasingly significant role, especially in the domain of generating expertise within the global job market.

Design methods hinge upon synthetic *abduction* which lends them an agility in ill-structured, solution resistant settings. Due to the interpretive flexibility they enable they remain fundamental to understanding, and causing change, in social systems (Ackoff 1974). Exploring how rationality inherent in design and learning theory determines mode of inquiry and belies potentially inadequate epistemological stances. Whether the cognitive / enactive activity inherent to synthetic design activity is wholly accountable within rational logic is unclear.

Coyne, addressing Rittel & Webber's account of Wicked problems is indicative of problems in theory-practice duality – *'all disciplines, including those of the hard sciences, depend on modes of practice, tools, techniques, communities, and histories. Such factors elude a coherent theory worthy of the name of 'scientific rationality'. There is no core to rationality'* (Coyne 2004). Buchanan insists judgment in design activity explicates *'concrete integrations of knowledge that will combine theory with practice for new productive purposes'* (Buchanan, 1995). The design science model (associated with Simon) takes formal mathematics as its basis, pragmatic models invert this supplanting tame and wicked problems with persistent factors of 'human practices,' 'contingency' and 'sociality.' Tamer problems exist in 'causal microworlds' that through inventive interpretive skills can be applied to the real world.

The rationale then, to unpack a view of rationality that is able to reconcile the somewhat dichotomous schema at work in practice situations, but also is able to unpack the either or (individual-society scale) approach to education to reveal a more intimate meso-scale rationale for collaborative activity. As

persons-in-group actively recruit their environment and one another into learning and the formation of professional expertise. As Coyne insists *'professionalism in design is accounted for by a raft of expert judgements grounded in contexts, practices and media, for which theory and practice constitute very crude descriptors. It is all practice'* (2004). Extending this view, acknowledging development in sociology of science associated with Latour's cadre which also arrive at comparable conclusions – theory building is too a practice of crafting perceptual frameworks to deal with the materials of the situation. In fact, it is all practice *and* infrastructure. This infers then, in a territory of coreless rationality that rationality has a situated character, situated rationality then is also a practice, crafted from the conditions present to a practice environment and its social components.

Consequently, communities function to condition perception and crucially intervene with how to learn to see the world. As such, communities play a fundamental role in producing differentiated environments whose internal dynamics form self-reinforcing loops in perception and action that shape and further differentiate the ongoing practices within them, these discriminable feedback loops generate distinct organising practices and cultural dynamics. The outcomes of these communities of practice can go onto to have far reaching influence, often forming patterns and models that reach into and reshape other communities, this effect can be proximal through interaction but particularly influential perceptual patterns can have distal impacts beyond the immediate boundaries of a particular situated *thoughtworld-in-practice*. Communities not in direct collaboration actually collude through a symbolic exchange economy where models of perceiving or acting flow and circulate. The varied weakness and strength their adoption along with the efficacy of these patterns to enact influence determines their scope of spread and 'half-life' as persistent forms of practice.

What emerges is a scalar image of how communities organise and mobilise, often by design; a special view of how cultures of organising have dynamic affects to either propagate or be induced to act. More significantly, we see a sketch of we might refer to as field dynamics. This radiative signalling in collective behaviour, occurring across scales is amplified by digital platforms and requires a refurbished understanding of how learning and organising actually occur, which disrupt seemingly secure foundations of professional rationality. What emerges is commensurate with emerging perspectives on extra-individual cooperative action, most notably distributed cognition.

2.21 **Bounded Rationality – The Scissor Metaphor**

Herbert Simon employs a succinct metaphor which captures a powerful interpretive schema; *a pair of scissors; where one blade is the actual cognitive limitations of humans and the other is structure of the environment* (Simon 1990). It provides a fecund inroad to discussions of rationality;
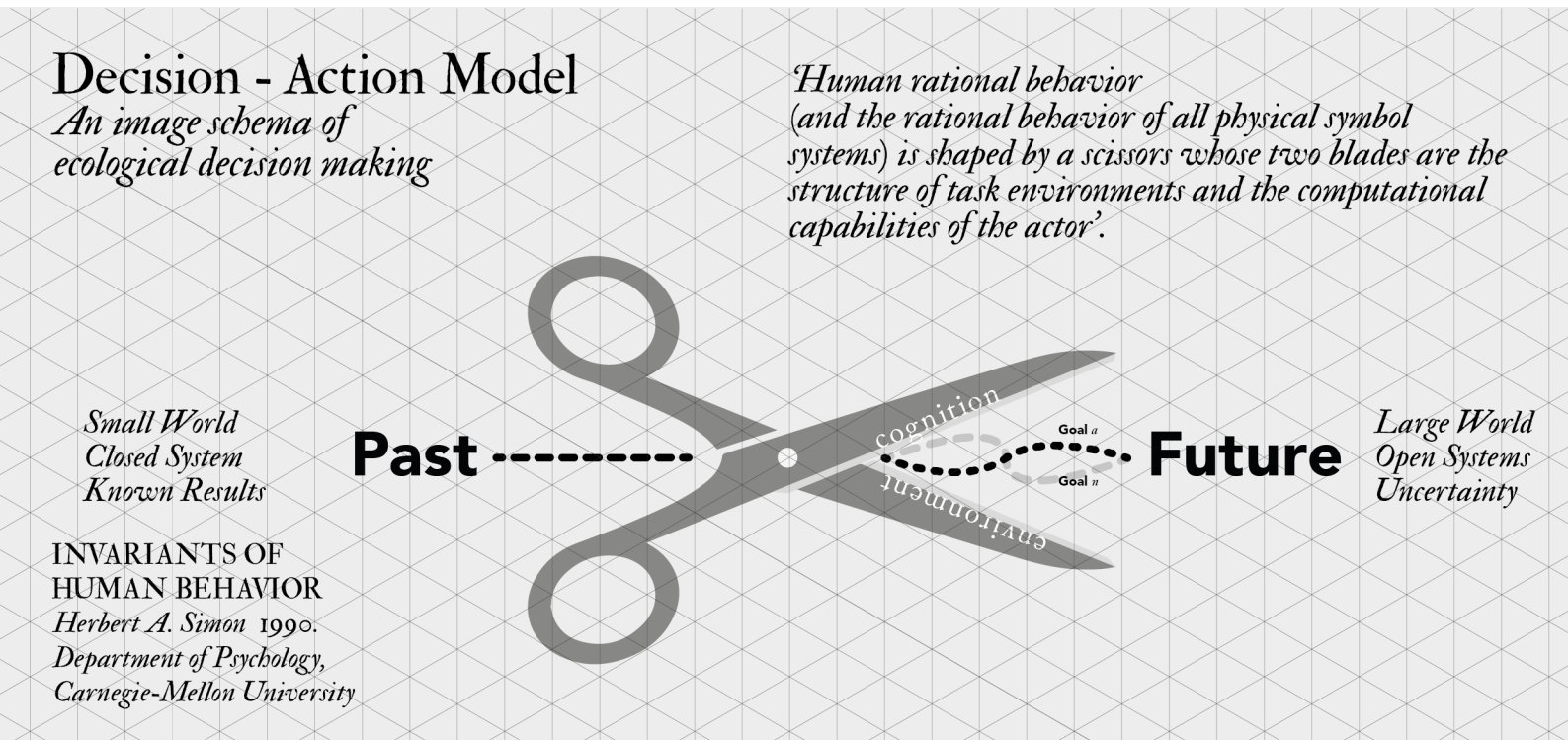
Figure 8 - The Decision-Action Model (Simon 1990)

Simon's framing of bounded cognition uses physical tools to mediate a generalised image of the conceptual-embodied nature of practices. By embodying an analytic process; cutting – an analogous explanation useful to make-sense of processes with both abstract (*conceptual*) and concrete (*physical*) components into unified activity.

In this persuasive view, human action, the ability to think and act rationally is inexorably bounded. Minds with limited time, knowledge and resources can nevertheless be successful by exploiting structures in their environment. Simon questions rationality itself, to rationalize the inevitable complexities of human activity to deal with ill-structured situations we must analytically hive away well-structured sub-problems to enable decision-making. Vitally, Simon's view of rationality is deeply situated in context – environment is firmly implicated into action. Interpreting, the tool in this metaphor represents a part cognitive, part ecological infrastructure These relational frameworks that implicate practices and environments in lockstep via enaction are held amongst (and across) communities to afford concordant activity, which are rational within their own framings.

2.22 **Professional Rationality – The New Learning**

For Coyne, in response to crisis in searches for rational basis of the professions, various approaches expand rationality to anticipate and include different kinds of professional judgement into their explanatory frameworks. In the implied practice / theory dichotomy, purposeful assumptive grounding and epistemic warrant[27] has to balance rational and aesthetic considerations. This bifurcated view of knowledge is unsatisfying for Coyne, where responses condition two modes of understanding; theoretical and practical. Illustrating that design activity explores *'concrete integrations of knowledge that will combine theory with practice for new productive purposes'* (Margolin & Buchanan 1995). To Coyne, *it's all practice* (Coyne 2005).

This quest to the foundations of professional rationality has been organized and problematized. Pragmatist responses begin with Dewey, which necessarily supported pragmatic response to circumstance, fit for the rapidly industrializing context they stemmed from. Phenomenological responses produce relations between human practices and their inevitable 'contingency' and 'sociality'. In this view, even seemingly tame problems are only wicked problems that though extreme ingenuity in interpretive skills have been bounded into causal micro-worlds. Design activity is viewed as having a more complex nature (Dorst 2011).

In Coyne's argument, important for this study, Gadamer argues that for phenomenology, *at base at our core, we are interpreting (hermeneutical) beings* (Gadamer 1975). If interpretation is the foundation of being, then, this basis is indeterminate and contingent in nature. Stemming from the basis of primacy of interpretation, narrative responses emerge. Where *'emerging narrative constructions'* compete to account for activity and become mutual consensus. In this view, professional experience takes the form of a *'trade of narratives'*. In response, activity creates agency in the production of or resistance to, narrative, resonating with both Weick & Snowden's accounts of sensemaking as flows of narrative anchored to place (Browning & Boudès 2005) where narrative is understood as response to ecological complexity, sensemaking is often conceptualized as a retrospective process, whereas design although integrating retrospection, is also anticipatory and requires demonstrable interpretive flexibility coupled to an enactive flexibility, which is presently poorly defined.

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[27] In epistemic rationality – the analogy to games is instructive where appropriate assumptions are like *rules* in a game, and epistemic warrants are like *moves* in the game. As both *rules* and *moves* are parts of a game, both assumptions and warrants are parts of epistemic rationality. This too ties together the practice aspect of epistemology – as a practice of withdrawing from ordinary empirical beliefs with more decidedly practical empirical aspects (Gao 2015). The study of rationality is a deeply complex, contested and dynamic territory. Basically, querying into the basis for the formation and justification of beliefs and how these diffuse amongst groups is a contentious topic in contemporary philosophy, yet far from stable.

Traces of a sociality of expertise can be detected in Actor Network Theory, where scientific truth is accomplished through production and contestation of inscriptions (Latour 1983). In ANT, environment typologies such as laboratories, are thought to accelerate and amplify production of inscriptions until power to assert consensus is achieved. Professionals are caught up in dialogue and negotiation to form interventions, which may also be resisted.

The dialogical view is explored by theorists who discuss that theories of social perception are based on assumptions that humans, in their desire to control and predict the world, tend to explain social and natural phenomena in terms of relative stabilities. However, they contend that *'we do not have theories of social knowledge based on the concept of change'.*

Markova characterizes mind as the human capacity to communicate, make sense of signs, symbols and meanings in experience as well as to create new signs, symbols and meanings and this capacity are rooted in history and culture. However, *'such phenomena that touch and disrupt in some fundamental ways the lives of individuals, groups or societies, are phenomena in communication and tension. They make social change not only possible, but also unavoidable'.* Markova frames minds in constant dialogue, the dialogical perspective where *'an integrated agent is engaged in a dialogue with her social environment'* (Marková 2003). Consequently, suggesting a dynamic boundary where perception and creation interleave.

2.23 **Bounded, Ecological & Design Rationality.**

A practical example of how decision-making is deeply bounded in practice employs a form of pressure metaphor, this helps us to make sense of how decision-making environments and decision-makers intersect. Designers are increasingly called to design at boundaries; the lines of intelligible difference between communities, producers and consumers, businesses and customers, service and service-users, to mediate, design interfaces and manage experiences. This kind of design activity concerns the design of environments that enable or dis-enable decision-making. We can use these to explore the frontiers of rationality, where the imaginary of perfectly rational agents has been displaced by an image of action beset by hidden biases and traps, provoking discussions about redesigning rationality itself.

Digital economic activity, especially commerce is rife with examples that take advantage of these in-the-moment biases, increasingly large entities and digital platforms are being revealed as engaging in manipulative exploitation of bias; dark patterns and echo chambers reflect general poor awareness of how vulnerable decision-making is to influence. Conversely, this evokes profound opportunity and risk for nudging behavioural change bridging personal and societal levels (Thaler & Sunstein 2012), which negate the instrumental costs and impact of gaming social structures. This, however, is not confined to business, governments increasingly make use of potentially spurious reasoning and risky strategies to organise and direct societies.

Decision-making situations are subject to human's inherently poor ability to ascertain risk in decision-making, humans understand the world heuristically, not rationally.[28] As Kahneman notes, we are able to circumvent certain biases through so called *'slow thinking'* but ultimately human decision-making can be profoundly irrational, particularly under pressure. Designers of systems are subject to bounded rationality in their decision-making too. Uniquely, designers execute decision-making within existing environments whilst integrating past states and anticipating yet-to-exist artefacts, entities and environments which are the consequence of design activity.

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[28] The transition to orthodoxy of these ideas in classic economic thought has led to a flurry of Nobel prizes, deposing primary economic schema of 'rational man' or *Homo Economicus* a precept that has been the dominant basis for economic theory and the structure of economy since its inception. Framing remains significant to psychology, typified by Kahneman & Tversky's ideas which form foundations of behavioural economics, stemming from scrutiny of framing's role in prediction (Kahneman & Tversky 1973) and decision-making under risk (Kahneman & Tversky 1979). Essentially, identical information or decision-making presented under different circumstances alter choice, by shaping perception and thus evaluation.

Users are subject to impacts of designer's biases and values, confronting the implications of designs embedded into their worlds, one way to protect against this is distributing decision-making, but this risks collective assumptions. Summatively, this analysis of decision-making under risk revealed the role of inherent biases which deeply influence subsequent economic and psychological framing of human decision-making (Kahneman & Tversky 1979)[29].

Kahneman differentiates between *system 1* (instinctive and emotional) and *system 2* (deliberate and logical) thinking, noting how through 'framing choices' humans tend to replace questions beyond their cognitive bounds with easier judgments (Kahneman 2011). System 1 mainly updates and maintains a model of personal world, representing what's normal in it. System 2 conversely, allocates attention to strenuous mental activities, that include complex computation. These operations are associated with subjective experience of agency, choice and concentration. The suggestion that blending these two modes points to optimum use of limited resources to problem-solve, Kahneman indicates 'paying attention' is apposite to actual design cognition, as limitations in field of awareness and computational resources govern response. Expert navigation of these two modes accounts for how designers enact expertise, harking Argyris' call to integrate single and double loop learning. Expert design cognition tacks back and forth between reflecting-on (retrospective) and reflecting-in action (situated) to enable generative activity (prospective). Design activity hence concerns brokerage activity creating relational schemes across rational boundaries.

Gigerenzer & Selten's converse view proposes more optimistic perspectives commensurate with active design learning, an *adaptive toolbox* of heuristics modelled on actual cognitive abilities, which are domain specific which enable them to make *'fast, frugal and computationally cheap'* decisions, this perspective assumes fitting between environments and perceptual faculties (although this is not guaranteed in synthetic environments, such as software, game environment or GUI). Masterful design envisioning often appears effortless, precisely because of the abductive reasoning and heuristic synthesis of disparate categories at its core, this is subject to bias and requires iterations of proving and improving to de-risk, it is also highly situated and difficult to generalise. Masterful design direction is increasingly favoured, because its results feel like shortcuts to more optimal situation states where seemingly no rational path is immediately clear, this often occurs through reframing relations within problem-situations, changing how the problem is perceived or restructuring the assumptions

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[29] Kahneman, a professed pessimist gives *'an idea of human nature with inherent flaws was consistent with a tragic view of the human condition'* (Pinker 2014). Arguably, System 1 is intrinsic to deep creative work, where aesthetic judgment is demanded, akin to how gut feelings compound several sensory and cognitive inputs into a *fast & frugal* feel for decisions situated in rapidly shifting problem situations, fast thinking is intuitive and embodied.

perceived to be at work. Analogizing to place; expert design inquiry concerns *pathmaking* and *pathbreaking*, both involve fluent perceptual images of situated interaction supported by experience of countless other problem territories. Consequently, externally jump can be regarded as discontinuous, often interpreted as intuitive or judged as irrational. Design rationality means making decisions with economy, not economically, reconciling instrumentalist and value-rational action. Successful outcomes rejoin with rationality, when they are emplaced into context and have ostensible utility in use, in other words, actual fit with the situation, thus becoming ecologically rational and becoming part of the environment in which decisions are made.

In this way, heuristics are matched to particular environmental structures and allow agents to be 'ecologically rational'. This implies inquiry into the structure of environments, the structure of their heuristics and matching between them. This approach extends bounded rationality, which Gigerenzer argues has become a diluted term. In response, envisioning a specific class of bounded rationality based on three premises: *psychological plausibility, domain specificity* and *ecological rationality*. Arguing that the success of domain specific heuristics hinges on their *'degree of adaptation to the structure of environments, both physical and social'* (Gigerenzer & Selten 2002a).

This asserts that heuristics are composed of cognitive building blocks blending rational and affective modes, that can be part of one of more heuristics and allow for the composition of new heuristics, where the building blocks are more general than the heuristics. Arguing against general reasoning that assumes there is a rational logical structure to reality, precluding perfect rationality assumed by other approaches, instead this view imagines rational agents as *'backwoods mechanics'* who tinker and compose with various imperfect and short-range tools working only with environmental structures and resources to hand. The function of an adaptive toolbox is to provide provisional *'cognitive, emotional, and social'* strategies *'that help to handle a multitude of goals by making decisions quickly, frugally, accurately, or, if possible, not at all'* (ibid p.43).

The apparent consistency here with active design inquiry, there appears to be functional comparisons between intuitive, responsive thought and the type of reflective thought where we engage with framing practices. Applying this framework to the observed activity, sensitizes previous insights into situated decision-making in collaborative innovation contexts. Generative metaphors[30] in this context

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[30] Generative metaphor, as defined by Schön, can either be regarded as a linguistic anomaly a troublesome construct in language or *'one which treats metaphor as central to the task of accounting for our perspectives on the world: how we think about things, make sense of reality, and set the problems we later try to solve. In this second sense, "metaphor" refers both to a certain kind of product – a perspective or frame , a way of looking at things – and to a certain kind of process – a process by which new perspectives on the world come into existence'* (Schön, 2006). Metaphor then are cognitive structures acting as a 'frame design' that can alter how situations are perceived and dealt with.

act as heuristic devices to access, share and negotiate assumptions, they provide patterning that can bridge different understandings, derived from instances of slower reflective thinking then brought into more agile heuristic exchanges. Thus, articulating assumptions brought into design situations and encapsulating these in forms that can be applied intuitively in situ has general value, especially where bounded, rational yet fast thinking is needed. A novel image of design activity (and how to learn it) is glimpsed here, one reliant hinging on boundary spanning and brokerage.

The potential is that design rationality notionally bridges these two typologies of thinking. Reframing how design cognition provides methodological responses to contingent situations that require critical, reflective thinking to be applicable to rapid, iterative situations which acknowledge the risk-taking fluency required in creative, speculative or entrepreneurial contexts, whilst mitigating risk - *'To move the understanding of the creation process from the agency of imaginative actors towards creation as a social practice, one of the most difficult remaining challenges is to transcend the methodological individualism that was imported into entrepreneurship studies from economics and psychology without much reflection'* (Steyaert 2007)[31].

Methodological individualism stems from Weber, as a doctrine that social phenomena must be shown how they result from individual action, a commitment to an 'action frame of reference' closely connecting to interpretive sociology, whose unit of analysis is individual experience. Distinguishing between behaviour and action, action is subject to interpretation, this view doesn't preclude collective phenomena, but requires an action-theoretic basis of social phenomena – *'without knowing why people do what they do, we do not really understand why any of the more large-scale phenomena with which they are embroiled occur* (Heath 2020). As such, interpretive research methods into group-oriented action such as learning or design will struggle to integrate factors driven by interactions between environment and group. Often participants are unable to account for what they know or how they act, actions are driven by situated factors, they're enactive. As to how individualist action-theoretic perspective can be reconciled with the plurality and polytely observed in collective practices in interpretive sociology remains a key question.

Heuristics are indicative of a kind of *provisional axiomatic relations* that are just robust enough to support exploration in contexts of discovery. However, and this is crucial, these heuristic guides often

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[31] Expanded theories of entrepreneurship leverage this robustness in situations where threats to uncertainty are prevalent and linear causal logic fails, the theory of *effectuation* outlines a process of generating opportunities and performing actions based only on the resources available here and now (Sarasvathy 2009). Effectuation attempt to reconcile means-ends via situated group interaction, effectual reasoning assumes the unpredictability of futures, acting on the present whilst acknowledging end goals change according to the outcome of their actions.

evaporate before that can be properly formalized, although they always leave their traces in designed systems. Where these relations aren't continually reconsidered with respect to changing setting, where design 'formalizes' structural configurations or organizing relations that inhere framing in ways that their effects become unintelligible yet continue to have shaping effects on resultant outcomes, this is particularly noticeable in organizing systems where user experiences and services are designed or organizing processes are led (as in the case study).

If systems aren't able to restructure framings inhered by the design process and are unable to flex, the consequences are deleterious. Situated practices such as *reflection-in-action* point towards continual reframing activity necessary to avoid this, however these are seen to be formative of individual expertise; notionally, practices that support *reflection-amongst-action* seem pertinent. Schön highlights need for an integrative scholarship that '*perhaps there is an epistemology of practice that takes fuller account of the competence practitioners sometimes display in situations of uncertainty, complexity, uniqueness, and conflict*' (Schön 1995).

Asking whether the forms of collaborative design inquiry occurring within environmental, cultural or institutional bounds of a community might differ from intentional or perceptual structures within individuals, moves this debate forward. Concretely, are there *supraindividual* aspects or factors non-reducible to personhood important to collaborative activity? Certainly, Schön recognises need to take account for institutional epistemology and group phenomena, are these reducible to individual decision-making or just relatable, are there emergent or teleological consequences of group organising? Certainly, activity in communities and fields of practice are not only totally reducible to their individual members, as these behave as systems. Collective action can either protect or ramify biases inherent in design activity, ensuring assumptive difference in teams and turning awareness toward strategies of negotiation employed within organisations to surface issues of individual or institutional epistemology is pivotal. Certainly, organising strategies premised on dynamic coordination promote conditions of phenomena for reconciliation of person-group value and task structuring.

Human-centred approaches supposed to mitigate bias, are as likely to amplify their consequences. The process of agreement via consensus is important to decision-making driven by group dynamics and negotiation, often mean collaborative systems are likely to propagate tacit bias. Dotmocracy, a method common in agile teams for rapidly arriving at consensus, prioritises collective priorities, the viability of easy wins and populism at the expense of systemic, ecological evaluation of the wider design situation, often ready-to-hand problem-solving subsumes present-at-hand problem-setting, yet what's needed in concerted brokerage between problem and solution space is not consensus but evaluation of perceptual and ecological fit.

Inverting the issue, cultural formation is akin to a shared perceptual structure, a collective worldview or system of values which condition the perception of individuals, in a feedback loop. The tension between *methodological individualism* that social knowledge is most appropriately derived from individuals versus *methodological collectivism* (or holism) that it is most appropriately derived from the study of group organisations, forces, processes or problems remains unresolved. A relational epistemology able to consider both seems a requisite to understand the situated, enactive practices of individuals in groups learning and design activity visible in contemporary education.

By applying frame restructuring practices into the kinds of responsive situations characterized as fundamental to the acts of designing is an interesting hypothesis to examine in practice. Revealing how situations influence decision-making, which might prevent reflection in action, design rationality perhaps provides heuristic techniques to circumvent biases inherent in situated cognition. Remember of course that the type of design activity witnessed concerns human-centred design of experiences or services and systems design to facilitate these. A peculiar difficulty of these specific situations is that designers are not only in dialogue with the design situation and their circumstantial environment, they also must actively anticipate the situation they are designing for, which may in turn be polytelic and polycontextual. This activity takes place in different decision-making environments with different information and different assumptions than users might have as they attempt to interact with systems -as-designed. Design teams must consider not only the inside of a system, but the inside view of its users; creating proxies of user's perceptual schemas over and above the schema at work amongst the design team itself, this then needs to be commensurate with situations and perceptions in the outside world.

As such this means being able to empathize and systematise, considering specific and general situations in parallel. As Schön evokes the concept of *'concrete universals'* that *'capture the peculiar combination of generality and concrete particularity'*. Intuitively, this indicates that there is a landscape of heuristic tools important to this kind of activity, design models provide one such set of heuristic devices commonly employed in design activity. Models present patterns that augment awareness beyond common sensitivities, all too often they simply entrain sequences of types of activity, which in practice are conflated. Design rationality likely differs in important ways from everyday rationality and other proposed forms of rationality. Design education concerns intervening with this capacity directly, bringing attention to nested sets of frames, often conflictual in nature. In search of a rational basis of the design professions that differs from scientific rationality, economic rationality, bounded rationality or ecological rationality in important ways. Significantly, this predictive capacity joined with amplifying acuity to empathize aligns with masterful design expertise, borrowing from (Lawson 2014) view of expertise formation, this illuminates the core of design thinking (Dorst 2011)

'The cognitive work of restructuring draws upon the richness of features and relations which are to be found in the concrete situation. There is an impetus to conclude that frame restructuring and the production of generation metaphor are related processes, in both decision makers bring conflict ways of seeing. The desire to map one onto the other is clear, yet they resist mapping. However, in concrete particular situations, participants work to restructure initial descriptions through regrouping, reordering and renaming selecting new relations from observing the situation' (Schön 2009b).

Moreover, this implies *restructuring* of the shared cognitive frameworks that emerge amongst groups.

Observation indicated Hyper Island's methodologies aim to engender experiences where individual mastery of group dynamics and self-actualization emerges via attending to social intelligence; these integrative competences amplify design cognition's potential, transforming application across domains, because of this, evaluating these environments becomes an imperative. Learning to design is sophisticated, therefore designing situations to effectuate learning this is even more challenging. The nested system of relations implicated in this process is perhaps best glimpsed within design learning environments as they attempt to enact transformational change; *design learning*.

This research's goal; To make modest contributions to how design methods facilitate collaboration and group learning, seen as enabling negotiation between conflicting schema. The consequence of this is to enable commensurate and generative exchanges between different ways of thinking held within or between communities of practice with differentiated forms of expertise. Fostering mutual intelligibility and interoperability relies on developing an expertise independent of domain specific disciplinary knowledge, a discreet specialisation of general practice. It turns out that the kind of cognition at work in advanced design, performs this brokerage effectively, which ramifies the import of design expertise within learning and leadership settings. Supplementing understanding of this topic with primary research and insight from relevant fields supports the framing of an integrative discipline and consequently it's practices, within a proper theoretical grounding. To support meaningful education about the field of integrative activity has relevance for all specialist fields. In short, insights about design cognition, as an expanded field and applied practice are seen to have value in how fields of concern interact, are modified or generated. Fields, in the extramural view are not just the preserve of research communities, but domains of practice which have need to actively orient themselves toward one another and organise around clusters of interlinked problem situations in purposeful ways. In this we glimpse a potential future not only for formal professional education, but a restructured understanding of how transformative learning is enacted amongst collaborating communities of practice.

2.24 Summary of Literature

2.24.1 *Frame / Field Reciprocity*

Analysis reveals connections between seminal theories relevant to co-operative action, the application of common concepts is seemingly useful to afford interoperability, but actually exposes a self-referential structure of assumptions. Here, boundary to domain thematic relations are central and recurrent.

This is relevant, where these theories are used to organize learning and enact designing. Social theory commonly employs topological relationships, assuming back and forth tacking manoeuvre between environments whether across boundaries whether internal or external to the person, between minds and crucially across communities. Crucially, traces of relational concepts systems are a persistent characteristic of design and learning theories, but they have their grounding in philosophy and psychology. Dubberley's compendium of design models is an excellent resource that foregrounds the common patterns of topological relations that unify design models and are codified in them. Variations of boundaries, domains and cascading or cyclical mathematical relations such as set theory are prevalent, as are sequences of activities which do more to organise what should happen than to illuminate how and why what is actually occurring takes place. Models which codify activity patterns for organising cooperative action are common to all fields, in military strategy for example the kill chain or OODA loop (Osinga 2007) are analogous to waterfall and agile methods of organising stemming from software development.

Design education in practice relies upon incepting awareness of the extent and relation between assumptions in design situations. Design processes are increasingly applied to pressing challenges, to cross-domain concerns and at variable scale, with unpredictable consequences. This study explores how framing influences collaborative activity and how the collaborative environment is actively involved in that framing activity, which subsequently impacts how communities organise. As this form of design activity operates by reconciling information from diverse and distributed sources to generate action at different scales, as such, reintroducing a synthesis of field perspectives to design learning, supports its interdomain, expanded capacities.

A key insight emerging from this study is to investigate relationships between frames and the fields they emerge from. The scales of *thought world* and *social world* interlink. Schemata common to communities habituate certain framings, participation conditions schematic patterns in members. The realities of economic systems exert deformative pressures – collective dispositions formed over time channel certain kinds of responses, this generates collective agency, a momentum which shapes organisations and consequently professional fields. Framings can be simultaneously counterproductive

yet functionally unintelligible to agents, potentially inhering brittle decision-making. Therefore, design activity that makes frames intelligible is core to organisational change and the formation of leadership expertise. To anticipate and enact these effectively is tantamount to meaningful collaboration, it also ensures resilience.

Exploring how this conditions personal agency, the phenomena; *professional deformation* implies that professional training, and intrinsic socialization can result in distortions of worldview (Polyakova 2014) this relates to Dewey's definition; *occupational psychosis* (Merton et al. 1968). Conway's exploration of organizations in practice led to valid sociological observation; Conway's Law; *any organization that designs a system (defined broadly) will produce a design whose structure is a copy of the organization's communication structure* (Conway 1968). In Sociology, these factors drive isomorphism (in three forms; *coercive, mimetic* and *normative* forces) extending sociological concepts to institutional or economic entities, exerting homogenizing influence onto organizations, limiting them to range of typologies (DiMaggio & Powell 1983).[32]

Weber argued that once established, the rational *'momentum of bureaucratization was irreversible'*. The dictum - *Time is money* connotes a rational economic logic where *people, time* and *space* are irrevocably implicated into value creation that inheres certain values, thus discussion of the shared framing of value and values becomes critical. As Beckett insists, assaulting assumptions of rationalism; *'Habit is a compromise effected between the individual and his environment'* (Beckett & Duthuit 1965).

In sociology, a social imaginary connotes sets of values, institutions, laws, and symbols common to particular social groups *'the creative and symbolic dimension of the social world, the dimension through which human beings create their ways of living together and their ways of representing their collective life'* (Thompson 1984). As such dominant framings shape the social field itself, conditioning activity and the typologies of value creation that arise. This sealing potential, is seen as pernicious, threatening needful adaptivity. These concepts provide useful frameworks to discuss *frame > field* reciprocity.

Practices that intervene with institutional imaginaries, are fundamental to transformation and organisational change. Overcoming schematic incommensurability is a primary boundary for

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[32] Drawing heavily on Weber's dictum that a rationalist spirit locked social activity into iron cages until 'perhaps until the last ton of fossilized coal is burnt'. Weber's contestation was against continual instrumental rationalization of social life. A so-called Iron Cage (originally *Stahlhartes Gehäuse* or steelhard casing) traps individuals in systems whose purposes are extrinsic ends – control, teleological efficiency and calculating rationality. The imaginary of an impermeable boundary conditioning behaviour is obviously relevant here, this resonates the sociological concept of structure. Modern social systems in Weber's view have momentum, changing them requires something beyond personal agency. Gidden's compounding of structure and action - *structuration*, foregrounds their mutually constitutive relationship, but the practices of intervening with this phenomena are not well understood and difficult to sustain.

collaboration in general. Furthermore, as shared assumptive structures dope the very fabric of what organised groups can design, the culture and environment of organised groups is pivotal, misfitting framings between specialised communities and the ecologies they design for, likely will have subtle but sustained distortive impacts in use. The amplifying subtlety of influence of design on behaviour and consequently environment is evident in the socially distortive impacts of mass platforms and a key issue for user experience and service design. It's easy to elide the bare fact that the use of any design system alters perception and action, simply, because use itself involves action which progressively changes behaviour, hence the assumptive ground is inevitably in constant motion because of interplay between communities of design and use. For this reason, strategies erode the boundary between design and use, production and consumption increase likelihood of ecological fit, but this transforms fundamental assumptions in classical economic relationships, especially how specialist expertise accommodates or anticipates everyday experience.

Conversely, Situated Learning frames processes of social formation as how learning and professional expertise formation actually occur. Situated learning is thought to occur via processes of legitimate peripheral participation (LPP) in communities of practice, outsiders learn, eventually becoming integral to communities. Wenger later replaced LPP with the concept; *duality* (harking activity theory); that tensions between opposing forces in fact are drivers of change and creativity, identifying four key dualisms in practice communities; *participation–reification, designed–emergent, identification–negotiability* and *local–global* (Wenger 1999). In this view, learning formation exerts tension within communities, reframing them; consequently, both interloper and system learn. Providing a coherent account of this practice in learning situations has real utility, this differs from classic accounts of pedagogy.

Exploring these functional concepts for their utility in understanding design, learning and collaboration, is supported by examining organization founded on enacting transformation through learning experiences and in organizations. The candidate organisations and precursor research provided potent situations to explore these phenomena. Environments, the field that activity takes place within are central to conditioning framing which underpins enactive activity. For research attempting to explore the future of learning in organizations, this thesis aims to elicit credible insight from situated experience, then reassemble these into meaningful accounts of collaborative design activity in learning situations.

These concepts concern socialization's role in learning and formation, integral to forming personality and the boundaries of world-view. These describe a process of *enculturation* (Kottak 2011), as both explicitly conscious and tacitly unconscious conditioning process whereby persons, achieve competence in their culture by internalizing practices, thus becoming enculturated. This captures

Habitus perfectly, however like Bourdieu, we can directly re-imagine learning's emancipatory potentials, through design. No greater rationale for collaboration exists, collaboration between different worldviews guards against fixity and singular perspectives, instilling robustness. Where professional communities form, so do social world boundaries, if these boundaries become self-sealed (which theory indicates they tend to), organizations can form a hermetic seal, which can drive innovation or compromise the potential for ecological fit – bias is amplified, leading to isolation and rigidity. This is where networks of interlopers play a role in emplacing transformative outsider influence, framings brought from outside to consciously enact internal restructure of perceptions. The researcher was implicated into this process; the case study identifies this occurring through two modes;

Through learners whose expertise concerns transformative approaches equips them with robust agency to enact different forms of coordination (design leadership or digital management) the organisations they go onto join are influenced by those values and approaches they take forward from their learning experience. Where these framings prove successful, they enact continual cultural and organizational change.

and

Through business transformation activity of networks of collaborators, specialists whose professional disposition concerns attending to organizational restructure through processes of emplacing learning by attending to conduct in leadership, culture and coordination.

Properly equipped, these networks of interlopers act as adroit *reframers*, the outcome of their collective activity, consequently, reshapes their field of operation. Learning organizations that produce individuals with expanded agency to engage in integrative expertise formation pointed at intergroup social intelligence, equips them as *brokers* and *interlopers* who can go onto enact change. These forms of learning hinge on developing expertise in *perspective-taking*, *frame intervention* and *schematic negotiation,* this involves developing robust capacity to interact with different framings and integrate them fast and frugally, this outlines a different purpose for collaborative design expertise witnessed 'in-house'. Such a process, necessitates folding the outcomes of computationally expensive, reflective, second loop, systemic thought back into comparatively cheap heuristic, first order, systematic action.

2.24.2 *Paths, frames, (field) & world*

Terms fundamental to design methodology such as *perspective, frame* or *problem space* are all the result metaphorical extensions that stem from embodied experience. However, this path does not assume the delivery of learning as akin delivering goods, as in conduit or transfer metaphors of learning.[33] The image schema this presents is of conscious agents moving through space, adapting and responding to evidential traces in their environment, actively restructuring material arrangements in their environment and perceptual structures (schema) in one another. As experiences along this path form their learning journey; changes in disposition occur as learnings, this is quite different to acquiring knowledge.

Expertise is path dependant and difficult to mobilise, moving along these paths, conscious interactors can change their path through frame-based decision-making, this occurs through intervening with their environment. Aligning design activity with perspectives on embodied cognition, the assumptive schema this suggests evokes interactions between paths situated at boundaries or interchanges between frames and worlds. Learning is a process of purposeful co-restructure enacted via environments which act as the venue for learning experience, a proximal space recruited for the design of distal experiences. Bringing these spaces closer into interaction supports fit between perceptual and material circumstances.

All of this can be either seen as pragmatic considerations for collaborative conduct or unhelpfully vague, yet these moments of exchange and dialogue around category errors within an assumptive framework, allow discussion of relational system of a special kind with profound utility. This foregrounds how concepts derived from the facts of human mobility and spatiality are intrinsic to all human explanatory conceptual schemas, that it is difficult, if not impossible to conceptualize without them.

As Lewin observes the difference between psychological and physical objects is important; *'In psychological and philosophical discussions it is common to identify the psychological with the "directly given." These and similar conceptions are widely accepted. However, they seem to me erroneous, both from an epistemological and from a psychological point of view. The objects of all empirical sciences, including the objects of physics, can be experienced no less directly than those of psychology'* (Lewin 2013).

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[33] A substantive discussion of how metatheoretical concepts, communicable as metaphors (code, conduit, transport, transference, parable) underpins prevailing epistemological approaches in learning theory informs this view, but was redacted to sharpen the thesis' focus and length.

In this view, direct experience concerns the appearance of objects or their phenomenal properties, however, to understand causal relationships we need to then consider their 'conditional genetic properties' for instance those of a piece of iron. The deeper our investigation of these stable, but complex properties goes, however indirect the methods, these remain properties of the same material, *'otherwise scientific analysis would be meaningless, both from a practical and theoretical point of view' (ibid).* Lewin asserts that in psychology and the other sciences, the same holds, an explanation of events is only possible if we understand their dynamic properties and their relatively stable relation to our perception of them. However, perception appears stable but has a different nature to physical phenomena, perception dictates the meaning we have for things first and the potential for their rearrangement and recombination into new things with new properties second. This structuring / restructuring potential arguably holds for psychological phenomena too.

Phenomenal and dynamic properties are products of one and the same psychological event, which are processes. Lewin's reasoning is sound, rather than ascribing actual properties to psychological events, he holds that we do this because of the *'great methodological advantage'* they afford, this is the basis of empirical observation. However, he insists a point of view that insists all psychological explanations rest on physics are erroneously *'based on the philosophical Utopia of a single universal science'.* Only if we disregard this can we represent the activity of life as a continuous progression and account for dynamic facts, this implies a *'sudden jump into an alien field' (ibid).*

Lewin's perspectives on topological psychology resulted in a field theory that offered a powerful explanatory method to understand life-spaces in group interaction. Discussing overlaps between somatic and conceptual phenomena in practice, he warns of a common fallacy but also reasons why this persists, the conflation of these quasi-facts within the life space has led to *'grave conceptual and methodological errors in psychology'* yet inside the life space, beside the person, there are *'a great number of other quasi-social, quasi-physical, and quasi-conceptual facts. These facts have a certain definite spacial relationship. The life space is articulated into regions that are qualitatively different from each other and that are separated by more or less pervious "boundaries"'* (*ibid* p.42).

2.25 Design Education: Theory in Practice, situated at boundaries

2.25.1 *Design Enacts*

Design practice is notably suffuse with examples where negotiation and complex collaboration is necessitated, design activity requires reconciliation between the domains of effect and affect, design outcomes create synthesis between worlds, however, this entails the possibility of schematic incommensurability. Design methods are an ideal candidate approach for scrutiny and expansion across other fields because of the robust cognitive patterns they afford. However, perspectives such as boundary object theory drill down into collaborative phenomena like interpretive plasticity which integrates the reality of negotiating social and material concerns in ways that design theory struggles to. Yet, as mobilizing understandings about design expertise from situations is difficult, practice knowledge is sticky, path dependant and difficult to replicate, design expertise is often viewed as internal and individual. Design experts learn to relinquish tenability of highly rationalized problem-solving, instead recognizing their reciprocal role in shaping and being shaped by problem situations.

To reassemble a coherent account of how practice, within particular learning and design situations amongst distinctive communities of practice occurs, Hutchins' sets out the treatise of *enactivism,* an account of cognition in the wild (Hutchins 1996) which builds on experiential and situated learning theory to consider collective factors. Enaction entails activity that is mutually constitutive, reconciling agency and structure by generating then occupying shared discursive spaces. Furthermore, Hutchins warns us of the cost of failing to see cognition as cultural activity.

In recent work, Hutchins sets properties of cultural-cognitive ecosystems, which act as constraint satisfaction system which settle into subsets of possible configurations of elements. Attesting that in these dynamical systems certain configurations of elements (recognisable as stable practices) will emerge (self-assemble) preferentially. In Hutchins' perspective on collective intelligence; constraints exist in many places and interact with one another through a variety of mechanisms to meet with constraints. Some are conceptual/neural; others implemented in material tools; and other emergent from the social processes of collective intelligence, notably the development of conventions, for example.

Cultural practices are emergent structural configurations in a rich network of relationships.
The development of new practices is constrained by the existing networks in the ecosystem.
Culture is learnable because the ecosystem of practices has structure (Hutchins, 2013).

This goes some way to account for the emergence of practices in communities. Design entails the creation and curation of expanded boundary sites where internal conceptual and external material

resources are organised into responses which harness interpretive plasticity to engender ecological fit that can exhibit extraordinary robustness. Designers implicate past and future states into their activity naturalistically. Design issues necessarily implicate negotiating experiential schema and affect, require entirely different framing practices and literacies than those applied by scientific methods.[34] Most importantly, group-oriented learning leverages collective intelligence, this is a characteristic of design studios, which blend cultural and environmental aspects. Design activity is a practice that leverages concrescences of events, territories and material conditions into practical and ingenious configurations unlikely to arise from single minds.

In design situations, rational and affective relations are framed into organizing concepts (inscribed as heuristic statements or codified into artefacts) which are simultaneously irreducible to, but essential to scientific methods and discovery in general. Advanced design activity involves procedural, abductive (Thagard 1997) cognitive processing, which is quite distinct to other forms of reasoning. Coincidentally, design-like activity is common to many mundane human practices (Shove 2007) but is subject to refinement and expertise formation.

Design activity's 'special' capabilities lie in how it integrates rational, intelligible structure, whilst also potentially acting outside it, implicating non-rational aspects. By codifying subtle social codes and inculcating experiential or sensory qualia, advanced design activity is adept at smoothly reconciling spatial and temporal factors through collective enaction. For this to occur, articulating features of both assumptive perceptions and physical conditions is integral. Furthermore, especially in the design of experiences, design activity must reconcile affective states which may have non-rational or irrational qualities and sets of possibilities that may be uncountable. This means cultivating and sustaining empathy (coincidentally, many of these considerations are co-terminous with effective leadership). Professionalised empathy is a specific incidence of theory of mind, or the ability to attribute mental states such as beliefs, intents, desires, emotions and knowledge, among others, to oneself and to others, whilst also actively reflecting that these may differ from others present (Gweon 2013).

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[34] A guiding example stems from the evaluation of the architecture and service design of a cancer centre. An organizing concept that acted to unify the design of a complex service space was reduced to *'distance from a kettle'* (Stacey 2011). A fundamental organizing concept could be encoded as a heuristic connoting a practical spatial constraint. What that proposition inferred however was how to encapsulate a feeling of wellbeing, signified by localised social codes; the relief and security provided by a cup of tea. The situated specificity and generalisability to common experience of this statement supports it's general intelligibility to both specialist and non-specialist communities, creating a point for generative brokerage. In the deceptive sophistication of such directives, the mark of design expertise built on close observation, is how this can disclose potential worlds that are glued together by common experiential and situational propositions.

Judgement built on observation and empiric experience of design expertise in practice, renders the following interpretation; Reframing is enabled by blending rational with affectual experiential cues, experts rely on *feel for the game*; meaning subtle decision cues synthesizing on-field (situated) and out-field (reflective) patterns of experience. This enables subtle affective reasoning (which might even appear discontinuously irrational), into a demonstrably ecologically, rational mode of thought. This is assumed to operate by encoding open framings into shareable form. If these encodings manifest a dual specific simplicity and general sophistication, this is achieved by grounding assumptions in localized, situated experience whilst also structuring interpretive flexibility enough to be applicable to many decision-making sites within problem situations and across organisations. In this sense, articulating shared guiding concepts as heuristics can act similarly to boundary objects.[35]

Hence, attempts to integrate existing perspectives on collaborative learning, design and leadership activity into simple heuristics with interpretive flexibility is essential to educational practice. Where assumptions risk being erroneous or built of unfounded reasoning, attempts have been made to provide checks and balances to shore up theoretical accounts by opening these provisional accounts up to the transformative action of practice.

Strauss argues social worlds *intersect* under a variety of conditions. Services, where needed, emerge to service these boundaries, technology is appropriated, and technical skills are taught and learned, where other worlds impinge, often alliances are deemed useful resulting in boundaries and subworlds. Most importantly, Strauss identifies the major analytic task as follows; to discover these intersections and trace their associated processes, strategies and consequences.

The literature indicates that analytic perspectives may inherently impede the understanding of systems that involve people. Thus, a different methodological approach is outlined relying on synthetic thinking, drawing on participatory and design research methods to evaluate the role of interpretive schemas and schematic negotiation in learning activity. The objective of this literature review has been to unpack assumptions at work in theory, whilst also reveals the role these play in collaborative learning. An account of how learning that acts to facilitate opportunities to assay framings at work conditioning perception, equips learners to consciously engage with field structure by understanding

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[35] **NB** – *'Boundary objects are objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use. They may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is key in developing and maintaining coherence across intersecting social worlds'* (Star 1989).

how frames and worlds interact. Advocacy for the activity performed by bridging agents, brokers, those who interlope and engage at the convergent and divergent boundaries between social worlds; is evident in the literature, referred to as *brokers at the boundary* in (Fisher & Atkinson-Grosjean 2002), (Hargadon 2002) and (Kimble et al. 2010).

Whilst attempting to build a situated grasp of how these learning environments support general explication and propositions about the phenomena of collaboration, the researcher was implicated into this process. Researchers, like designers, must enter into dialogue with the materials and perception present in their situation.

2.25.2 *Design Generates Frames*

Presently, the design field is undergoing expansive transformation (Dorst 2015a). Design literacy affords access to broad range of professions. Reflected in the recognition, at surface level, of design's value creation potential in business. Yet, the reasoning follows; it's the potential for design expertise to equip practitioners to be adroit at engaging at frame level – their analysis, negotiation, reflection and creation whilst enacting this collaboratively into design worlds that lends it domain-spanning value and the potential to restructure fields.

Buchanan traces this expansion to cultural upheaval, in cultural and historical moments that form a temporary boundary where potential for restructure of assumptions and societal transformation opens. Rather than a dichotomy conditioning human activity, transformation of framings through contestation between old and new framings is an integral part of societal advancement. This highlights why learning how to engage in this practice is fundamental to design activity, to achieve this, rationalising how existing expanded design education might best be organised is critical. This is nothing new, but periodic and opportunistic, a design turn like no other is occurring now.

Dewey discussed shifts away from an old centre of the universe, which;

> *'was the mind knowing by means of an equipment of powers complete within itself, and merely exercised upon open an antecedent material equally complete within itself to a new centre where indefinite interactions taking place within a course of nature which is not fixed and complete, but which is capable of direction to new and different results through the mediation of intentional operations'.*

> (Dewey et al. 2008).

The difference for Dewey was between specialization and use of new disciplines of *integrative thinking* (Margolin & Buchanan 1995) is also explored in (Dougherty 2001). An upheaval, described by Buchanan as the 'new learning' – distinguishes between transformations from old (*paleoteric*) to a new (*neoteric*) disposition. This occurred with Francis Bacon and the introduction of the new sciences, the

consequence was a privileging of theory over practice (Buchanan 2001). In Margolin's discussion Buchanan's distinction between *paleoteric* thinking *'based on the identification of discrete subject matters such as we find throughout the university today'* and *neoteric* thinking, *'based on new problems encountered in practical life and in serious theoretical reflection'*. The objective of *paleoteric* disposition it to *'expand the knowledge of a particular subject matter, often in greater and greater detail'* whereas *neoteric* education's objective is to *'gather resources from any area of previous learning in order to find new ways of addressing the new problems, thereby creating a new body of learning and knowledge'*. Buchanan envisioned doctoral education in design as a neoteric enterprise that could become '*a model of what the new learning may be in our universities and in our culture as a whole'* (Margolin 2010). Arguably, we are in the midst of another shift from old to new thinking, and the need to discern the nature of this change, but also make it a practicable possibility not just within in doctoral education, nor just in schools, but in the kind of extramural learning that characterises contemporary work and organisational life. In my view, Neoteric learning, recognises theory and practice are both practices, the counterweight of this expanded theory / practice composite implies expanded focus on the cognitive aspects of integrative expertise – namely meta-cognitive and intra-cognitive expertise – paraphrasing Dorst – to frame new thinking by design.

An important consideration here is the shift from the assumption of static to dynamic environmental grounds, where human activity continually produces novel conditions. Combinations of human ingenuity and contingency in design situations mean that designers often consider uncountable sets, the product of infinite contingency that can arise through combinations of agents and environments. At the same time, action is governed by *hysteresis* (the dependence of a system on its history), constraining decision-making. Bourdieu saw that hysteresis was a necessary consequence of his definitions of *habitus* and *field* as mutually generating and generated (Hardy 2008). As design activity populates the environment with systems that restructure thought and action, each new design rests on environments structured by the last.

As such, perhaps design requires a different sort of rationality, that acknowledges boundedness and dynamism but also acknowledges that rather than heuristic search, humans have a surprising and infinitely expandable ability to create stories, forms, and concepts (Hatchuel 2001) Hatchuel, whose principle hypothesis is that human agents are limited decision-makers but "good" natural designers (including social interaction one such design area). Instead, proposes that certain sets of concepts and situations are uncountably large, as such are infinitely expandable and in response begins to outline an account of rationality for design, an *expandable rationality*. The claim is that Simon's design theory is restricted to problem-solving within a bounded rationality perspective, which is only a moment in a

design process, suggesting that refurbished design theory should engage with a concept of "expandable rationality" alongside principles of collective action (You 2019).

Review of the literature indicates recommendations that design discourse should commit to radical pluralism as contemporary design problem-situations cut across specialization and disciplines, and that better integrations of theory of practice and production are possible. This is the crux of design methods, yet pressures to institutionalize design activity create barriers to exploring new territories. Design remains poorly understood, thought of only for its potential for commercial application, alternate accounts exist but are often obscured within research communities. Instead, many design management authors reframe design as resource and place for interdisciplinary collaboration, yet still in the service of giving purpose to the creation and planning of products.

Margolin & Buchanan address four broad areas (or orders) where design is applied: *the design of symbolic and visual communication; the design of material objects; the design of activities and organized services;* and finally, *the design of complex systems or environments for living, working, playing and learning.* This is crucial as it concerns the role of design in *'sustaining, developing and integrating human beings into broader ecological and cultural environments when desirable and possible or adapting to them when necessary'* (1995). No priority is given to one activity form, rather act to question how design and learning activity enact (or react to) the social field and vice versa. This thesis concerns environments where these forms of activity interact and are contested through enaction. Specifically, how design and learning activity are enacted to adapt to shifting circumstances. In summary, this unveils fundamental assumptions about design activity, design learning and design education. Importantly this means learning to functionally and quickly discriminate between in-house, root metaphor, paradigm, ideology, and field assumptions in play.

2.25.3 *Design Generates Problems*

Design activity often co-opted to perform a functional role, the caveat is that design activity, particularly within industrial, commercial or business application, is often concerned with instrumental problem-solving but also creating problems to solve. Design education structurally is all too often tied up with this practice alone. The task of creating useful individuals and teams concerns itself with simulating problems that demand solutions, tasking learners to imagine problems to solve or in practice searching for problems to solve with the potential for economic return. Industrial product / service development processes are often caught within this framework, particularly within the vocational learning sector, value creation is viewed as an important outcome of design pedagogy. Design education environments are often seen as resource for creating solutions, identifying problems or often generating problems to be solved. The generation of innovative products, services or even

organizations can disclose fields that can support value creation. However, in the ecological view, narrow consideration of the implications of problem-solving often generates further problems, an insight mirrored in systems practice; Ackoff indicates that the assumption that the best thing that can be done to a problem is to solve it is false, instead suggesting dissolving problems by *'redesigning the entity that has it or its environment so as to eliminate the problem. Such a design incorporates common sense and research, and increases our learning more than trial-and-error or scientific research alone can'* (Ackoff 1999). Design education is often too problem-centred, just as Alvesson's critique of the management literature evinces that gap spotting occludes original problematisation, this may come at the expense of other capacities which reflect design methods concern for problem-setting and interaction between domains.

In the alternate view, learning concerns the crafting of perceptual and enactive schema to equip individuals and groups by extension with the self-orienting awareness and wherewithal to encounter complexity. Prioritising *Wertrationality* (value-centred practices) in education, leads to expanded *zweckrationality* (instrumental capacity). Problem situations are only valuable as venue for sensitizing learners to navigate the internal and external dynamics of problematic encounters whilst rapidly evaluating and realising novel perceptual, ecological fit – the parallel outcome of creating value generation opportunities, provides irreplaceable means to craft and evidence social capital, yet the ends of generating fields for value creation, is secondary. Where problem-solving generates problems, this is likely a consequence of too limited consideration of the structure of situations the problems stem from.

2.25.4 *Design Generates People*

An often-overlooked insight; is that environments within design education are concerned with the production not of products and services but of capable individuals, a far subtler and difficult to realize prospect for design. Equipping people to become fluent interoperators able to transcend information processing to engage in frame reflection, restructure and generation arguably of higher priority to address the mounting consequences of overfocus on the low hanging fruit of instrumental problem-solving. People equipped to organise effective collaboration, independent of domain are still able to perform effectively as specialists, but their added value to organisations is immeasurable. Naturally, these concerns are not mutually exclusive but mutually constitutive. More simply, teaching linear problem-solving process to find linear solutions is displaced by a systemic approach that treats the internal environment of problem situations as venue for learners to encounter the problematic nature of dealing with one another. This activity can be contained within strikingly simple learning situations recognisable in classical education, but the emphasis shifts from producing content to evaluating conduct. The difference lies in how the objectives of learning are framed, away from rules onto moves.

Asking why frames provide interpretive flexibility requisite to learn and form concepts is at the heart of design thinking methodology. There is beauty in the intricacy of human thinking when persons are confronted by a difficult problem. But there is a deeper beauty in the basic information processes and their organization into simple schemes of heuristic search that make that intricate human thinking possible. It is this latter beauty - *'the beauty of simplicity'* that the authors try to convey in their attempts to rationalize human decision-making (Newell & Simon 1972).[36]

Perhaps their most significant contribution was to ask, *'what is learned?'* and to frame psychology's insufficiencies to account for basic human expertise, when solving seemingly simple problems in unstable task environments. The insight this contributes is simply that heuristic search schema that make concept formation possible mask an intricate relational interplay with circumstances that cannot be rationalized simply. Principally, how human decision-makers move amongst others, to orient and make sense out of their surroundings, whilst recognising their inextricable embeddedness is critical to their lasting utility as agents of economic value creation.

Acknowledging these limitations, the research approaches entailed in capturing insight about this process create their own frustrations, specifically by lacking structure and being highly dependent on contingent factors but also the interpretive capacities and bias of the researcher. Furthermore, a great deal of research in this area already exists, a consequence of the situated nature of design research.

In parallel to the main thrust of the study, the research period has been used productively to investigate and publish research from different collaborative settings, but applying the common logic of investigating the boundaries between research and practice.

These parallel research streams (detailed in the next chapter), whose observations inform an overall framework, offer a degree of external validity to mitigate the risks associated with focusing on one organisation. Importantly, the diffuse nature of that heterogenous network, afforded a breadth of theoretical sampling to avoid single, uncritical perspectives. As the research activity navigates within a single relatively diffuse organization, insights derived from this parallel research embedded in research projects, supports a more holistic perspective. Comparable patterns were found, and these were unified by the common frame of investigating collaborative design activity situated at boundaries, pointed towards innovation. These investigate potentials to learn about how innovation actually

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[36] Newell & Simon noted much beauty in the superficial complexity of nature, masked deeper beauty in the simplicity of underlying processes to accounts for external complexity. Noting uneasy tension between domains *'the professions always live in uneasy relation with the basic sciences that should nourish and be nourished by them'*, the authors meant their work to help psychology as a field contribute to education to reshaping learning processes in the formation of expertise.

occurs and crucially how it can be taught. In parallel, the objective has been to engage in innovation of interpretive research, methods and methodologies by applying design-like approaches to the research design process, commensurate with Frayling's (1993) and Buchanan's (2001) vision for research-through-design to support the new learning, echoing Margolin's vision for doctoral design research.

3 Methodology & Methods

3.1 **Study Precis**

3.1.1 *Supporting Research – Design Portfolio Research in Film*

Prior studies formed a foundation that supports the primary study. Participation explored various settings of collaborative innovation in research projects attached to Lancaster University and other partners. This work involved embedding in research teams as ethnographer / film-maker to develop shared narratives through exploring collaborative innovation in co-designed and interdisciplinary research. This represents a significant body of work which explored intersections between creative production, film and research (Goodman 2004), and design documentary (Raijmakers 2006). The resultant outcomes form an expanded design portfolio which applied the principles of research through design (Gaver 2012). Much of this work was undertaken with Daniel Morrell, who played an integral role in the research as collaborator in Creative Direction and Cinematography.

The research films primarily stemmed from work with the Catalyst Project, culminating in an EPSRC funded Telling Tales Grant to develop an interactive narrative system; Catalyst Interactive which distils a period of embedded ethnography in research projects resulting in a suite of 14 research films. Several other projects including formed part of these investigations notably, Dark Matters, an AHRC collaborative investigation between artists, anthropologists of science and mathematical cosmologists which resulted in a nomination as Finalist for Best Research Film of the Year for AHRC Research in Film Awards 2017. A detailed account of these research projects, links to design outcomes and supporting publications can be found in [Appendix A](#).

A second corollary stream of research investigated collaborative research practice focusing on blending methods from social research and design methods, principally, ethnography and design fiction. These

experiments represented application of Research through Design to issues and contexts relevant to digital innovation ranging from pervasive urban computing to machine learning. Primarily, these approaches resulted from blending methods and approaches then evaluating how this restructured the internal logics, propositions and consequent potentials of the narrative shared amongst collaborators and with stakeholders. A common thread was a pragmatic approach to designing future systems and narrative frames by anticipating (not predicting) future states and exploring the resultant implications, a primary concern of Design Futures. These explorations resulted in a high degree of research impact through publication and conference participation particularly with technology industry partners directly concerned with shifting social or market conditions and user perceptions when designing new products and services.

This productive collaboration between the author, Dr Joseph Lindley and Dr Dhruv Sharma explored the impact of methodological innovation applying research through design. This collaboration explored blending methodological approaches derived from social research with expanded design methods. Principally, this took form through aligning ethnographic with design fiction methods to explore the implications of emerging technologies, by situating via proxy. An addendum to this explored early applications of social research in urban settings to explore pervasive systems and way finding in urban setting, a novel research method was developed and applied to a site to derive heuristic design principles for the design of Smart City infrastructure responsive to site and co-designed with habitants (Potts 2015).

Most recently, a paper detailing early findings and theorisation about collaborative learning at boundaries midway through the primary case study engagement with a creative leadership school was presented to the European Academy of Design in 2017.

3.2 **Primary Study – Methodological Research Approach**

Addressing methodology and methods means setting out how a systematic process to identify and investigate the research context, the study was conducted in several phases detailed beneath. A more detailed description of how methods and methodology applied to gather, analysis and synthesis research data supporting research can be found in [Appendix B](#)

3.3 **Outline of the study**

3.3.1 *PHASE 1*

The first phase set about building access, site assessment, ethnographic observation and primary data collection, this ran concurrently with secondary research building critical awareness of research issues as they arose. This phase applied ethnographic methods, adapting principles and practices from prior studies to investigate a situated community of practice emblematic of transformation in the digital economy.

A detailed exploration to search and identify of a significant candidate research context to explore initial themes of *collaboration* and *boundaries*, was followed by an access building phase where rapport and trust was built with key informants. Gaining access is an oft neglected issue in research, the hurdles of access, largely viewed as merely tactical (Renganathan 2010) were viewed as thematically central.

In retrospect, this mirrored the progression and entrance into a community of practice via legitimate peripheral practice in situated learning theory Lave & Wenger 1991). A *legitimate peripheral participant* (LPP) gains access to the practices and artifacts of a field (*legitimacy*) and establishes stake in the field and in the reproduction of its practices (*participation*). To become an LPP, agents may need to draw on their economic, cultural, social, and symbolic capital, which aligns with Bourdieu's Field Theory. Remarkably, participants often diligently guard the boundary of their field (or organisation) protecting internal interests and the cultural integrity of the community. Outsiders may not possess enough symbolic capital to become seen as *legitimate,* even peripheral, participants. Moreover, the task of developing an integrated view of more than one field, involves cultivating so called boundary-spanning competence (certainly a vital component of integrative expertise). As Levina & Vaast (2005) note, becoming a boundary spanner-in-practice requires becoming a *legitimate*, but possibly *peripheral*, *participant* in the practices of more than one field fields. Because boundary spanning requires an ability to negotiate the relationship between the involved practices, it requires the development of an at least peripheral understanding of each practice. Brokers must cultivate legitimacy not only as participants, but also as *negotiators* on behalf of others in a field. Navigating inter-field research or even the bare facts of gaining access to specialised and perhaps even exclusive communities are highly pertinent research issues in their own right. Only when individuals attempt to negotiate access across a boundary are they met with the distinct resistances native to that community. This has important corollaries with ethnomethdological approaches, where breaching experiments are used to highlight how the structures of everyday activities are ordinarily created and maintained (Garfinkel 1991). Breaching boundaries is integral to brokerage activity, especially where

inter-field communities form. It might be argued that these particular structural arrangements, and the competence to learn and lead in these environments is becoming integral to a cooperative or collaborative skillsets required in leadership, but also these stand as the precursor conditions for innovation.

Initial semi-structured informal interviews with key informants and short collective engagements with learner groups within the candidate organisation, were followed by site reconnoitre, negotiating ethical approval and consent from the organisation and specific research participants. Discussions with Managing Director to determine conditions for research enegagement and reciprocal potential impact and risks of embedded research on the organisation.

Primary participatory ethnographic observation within Hyper Island's Manchester hub observing two cohorts of learners and co-workers through a normal learning cycle (28 weeks). Long-form ethnographic observation took place between April and September 2015 (35 days).

3.3.2 *PHASE 2*

The second phase of the investigation was designed as a deep dive into the organisational network. Comprising interviewing with key informants within the network, forming a corpus of 12 semi-structured individual and group interviews, which took place throughout 2016.

In addition, a research engagement at the organisation's headquarters in Stockholm, Sweden where further ethnographic observation of the management structure and collaborator network, which took place during May 2016. This allowed for a detailed investigation of the organisation structure and methodological approaches unique to network. It also provided greater insight into bespoke business transformation aspect of the business and to participate in student recruitment process unique to the Higher Vocational Education Diploma (*Yrkeshögskolan*) system applied the organisation's vocational programmes in Sweden. This model is unique to Sweden in how it statistically matches current industrial demand with education provision, part of wider societal / industrial management and legacy of the Social Democratic Party, based on the principle of socialist principle *'From each according to his ability, to each according to his need'* (Socialdemokraterna.se 2017). Sweden is notable for its highly structured rationalised organising of the capacity of its populous, a legacy of national military service.

3.3.3 *PHASE 3*

A third phase involved analytic process, coding data, interpretive synthesis & grounded theory building. Upon completion of the investigative phases, a systematic process of iterative data analysis was conducted examining two data sources: extensive ethnographic notation (32 separate engagements, 45,000 words) and transcribed interview data (12 interviews, 20 hours, 108,000 words).

The secure handling, storage and encryption of data in preparation for analysis and write up was a high priority, integral to the ethical diligence and integrity of the research study.

Data analysis procedures, using qualitative software packages; First, F4Analyse were used to memo the data and derive a code schema, following procedures of Glaserian grounded theory. This procedure entails successive close reading passes to isolate significant incidents, derive a coding schema and assign this to instances within the ethnographic notation and interview transcript data. This phase gives feel for themes and patterns arising from participatory observation.

Second, coded data was imported to MaxQDA and multiple analytic experiments were attempted find appropriate ways to make sense of the data, this was an experimental and creative phase to examine relational properties of the data, through examining frequency, meaning circulation and concurrence of coded memos.

Several secondary data analysis packages were experimented with to discern effective interpretive strategies. Namely, Gephi and TextTexture (both open-source network analysis and visualization software packages). Analytic processes within MaxQDA were used to assay for patterns and co-occurrences in the data. This iterative pattern search procedure formed the basis of second order thematic coding.

The data was anonymised and 'cleaned' using stopping rules, removing names, extraneous details, spelling errors and issues that may obfuscate or compromise the data analysis. A regressive analysis of concurrence and relatedness was conducted through several iterations, examined the ethnographic data set, the interviews and a master corpus combining the two.

Techniques to reveal relationship in the data and between specific incidents were applied, for example code portraits and code mapping. The outcomes of this analysis are here, a code scheme was developed to reveal patterns in memoing, code portraits were used to show significances, similarities and divergences in the occurrence of codes across different engagements.

Countless other informal engagements, water cooler conversations, rapid design experiments and discussions with industry informants, collaborators and contacts provide an unrecorded scaffold that was integral to the formation of naturalistic and validated perspectives on collaborative learning in communities of practice in the transforming digital economy. Intuitively, this engagement provided habitus, an relational environmental substrate consequent of embedded research, breaching the boundary of the community to critically explore its internal dynamics and assumptions.

The resultant insights stem from interpretive synthesis of this analytic process, to examine observation for relationships that emerged from secondary research. Although sequential in the document,

grounded theory advises against importing assumptions into research contexts. In practice, secondary research ran in parallel with primary investigation, once the observational phase ended, extensive supplementary research was conducted to make sense of the engagement and to produce this thesis, this looping iterative series of enmeshed procedures is commensurate with design methods and provides a internal robustness to the interpretations.

3.4 Research Paradigm

Research, paraphrasing (Kothari 2004) can be termed *'an inquiry into the nature of, the reasons for, and the consequences of any particular set of circumstances, whether these circumstances are experimentally controlled or recorded just as they occur. Further, research implies the researcher is interested in more than particular results; he is interested in the repeatability of the results and in their extension to more complicated and general situations'* a perspective belying the logic of scientific methods.

Expanding this, Berger's sociological perspective is instructive; to *'see the general in the particular'* and *'the strange in the familiar'* (1963). A core assumption underpinning research is the degree to which *polylogism* (the belief that plural, conflicting forms of logic exist within human population, subdivided by some group-based characteristic) and *historicism* (that the nature of human thought and action changes over time) holds, arising from Mises (1949) critique of Marxist theory.

This research surveys multiple interpretive perspectives as means to unpack the assumptions at work in theory of collaboration at boundaries and within the observed communities of practice, primarily social constructivism, phenomenology and hermeneutics. The approach to learning is decidedly experiential and pragmatist in tone, whilst also taking in elements of Gestaltist social psychology and process philosophy, secondary research was deliberately broad to assemble in depth grounding for perspectives on collaboration, rather than limit these perspectives to the researcher's home discipline, which arguably has been achieved exceptionally well already.

The search was for novel perspectives that might generate new directions, inspired by Alvesson's call to problematise the assumptions underpinning fields, this involved the judgement that the only reasonable way to achieve this applying comparative methods. The methodological approach applies social research perspectives to participatory design research and sought to generate blends (or construals) where thematic alignments were noticed in the research territory. Theorisation applied grounded theory principles as a means to eschew assumptions about observation and ensure a critical perspective; this was commensurate given that the study takes assumptive schema, notably Alvesson's (2011) assumptive framework to problematise issues emerging in organisational management research; unpacking *in-house, root metaphor, paradigm, ideology,* and *field* assumptions at work in

primary and secondary sources. Sampling from a common interpretive palette is justified by the strong parallels evident in disparate approaches; to search for these interlinking concepts was extraordinarily useful to the inquiry process. As a common prime epistemic stance, this research assumes flux rather than stasis as being the ultimate grounding condition, a position known as *dialogicality* (Markova 2003).

The research paradigm; *interpretivism*, integral to social sciences emerged as critique for positivist tropes in social science, generally employ qualitative methods. Profoundly, this touches on idealist as opposed to objectivist epistemology which succinctly assumes access to reality to some degree only comes through consciousness in social constructions, shared meanings, language and instruments. Within this context, interpretivism acquired specific definitions as attending to meaning-centred research which problematize positivist ideas of truth correspondence, objectivity, generalization, and linear processes of research (Scauso 2020).

Notably, there were repeated encounters in the organisational network where assertions that *'there is no absolute truth'*. This discloses a certain *alethic* pluralist stance, that truth is inevitably relative to some frame of reference (Baghramian 2015), denoting an epistemological commitment to situativity. The researcher's personal disposition is decidedly sceptic. As such, the objective was not to adopt a particular lens, but to examine ways of seeing and their interplay as integral to systemic perception. However, this does not presume some dispassionate critical distance, unreserved participation tracing resistances at boundaries was a crucial research strategy to surface and reflect upon theories-in-use.

The rationale; given the topic of the thesis - *collaborative activity* – to simply attempt to embody first principles of critical thinking was judged apposite. This critical process captured best by Dewey's as; *'active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends'* (Dewey 1910). This was significant in connecting back to the initial research questionings defines by Alvesson's critique to intervene with the assumptive structure of the field of action itself. To engage in active, persistent and careful scrutiny of assumptions at work in situ, is an attempt to get at the relational work of negotiating meaning required to achieve purposeful collective activity.

There are inevitably assumptions at work in the researcher's own models of the world – founded in assumptive experience – a skew toward aesthetics; spatial, visual or tonal perception comes perhaps at the expense of more rational or affective reasoning. However, the goal was to employ critical thinking supported by effective reflective practice to eschew overly-doctrinal reasoning or at least to recognise when it might be occurring. Theories of personal epistemology often reflect internal psychological frameworks, in contrast, positions based on social constructivist frameworks in which beliefs are

constructed through interactions with others in external social contexts. A substantial body of current educational research applies the platform of social constructivist theories to account for teaching and learning activity, such theories focus on interdependence between social and individual processes in the co-construction of knowledge. Social-constructive theories, although sensitive to design-like activity where artefacts and action are integral, do in theory represent the significance that extra-individual features and relations. These are important but risk falling short or failing to integrate how the psycho-social-material environment is actually conscripted into cognition in practice. This is why recent studies that combine empiric examination of cognition-in-action with experimental studies of function in cognitive science are highly relevant in the formations of explanatory accounts. Examining interplay between external (social) and internal (individual) relations points towards a relational epistemology, which still remains inchoate, however through this scholarship, the main features of a practice-based theory that integrates individual and collective aspects are becoming apparent.

Hence, theory, grounded in observation, that seeks to integrate how (internal) worldview and (external) shared schema interact then are enacted via practice reveals relationships between micro-scale interactions within teams, that over time can have influence at scale. Uniquely, observing how learning situated communities of practice and distributed learning networks with shared approaches are able to restructure macro-activity via conduct and mobility within digital economic industries reveals interesting findings about how neoteric education functions. Learning communities that equip individuals with expertise in integrative practices and cultural formation seemingly can have scalar impacts which can have significant field shaping effects. This is an issue of how cultural approaches propagate and disseminate, enacting extra-communal influence, the generation of cultural and symbolic capital amplifies economic capital. Principles of situated learning and communities of practice; dynamic coordination and intercommunal negotiation are thus evaluated as highly consequent to the industrial dynamics of creator / producer communities.

Fundamentally, this research acknowledges the risk that should these blending manoeuvres and resultant propositions prove fallacious that examining this context holds value to reflect on co-negotiation itself. In contexts where perceptions, assumptions and frames of reference are surfaced and contested so that they might undergo change, this process is synonymous, I contend with active learning and integral to innovation. The objective, rather than to reveal truths, was to unpack assumptions at work specifically within an organisation which is held, by virtue of being distinctive from yet integral to digital economic activity, to be emblematic of wider tropes within contemporary organising. This proposition; conceals the assumption that a singular context can hold as metaphor for broader territory, that singular sites might signify more general transformations. Especially those

wrought by societal and technological transitions which characterise present Western, globalised digital economies.

3.5 **Methodology**

Devising a systematic methodological research approach draws on interpretivist and anthropological traditions, examining ethnography as critical method. These methods were particularly applicable for their attention to boundaries – anthropology hinges on inside and outside accounts to generate validity, synthesising two forms of field research accounts - e*mic*, from within the social group (from subject's perspective) and *etic*, from outside (from observer's perspective). Nested subfields of Anthropology, Ethnography, then Design Ethnography differ principally in their unit of analysis, periodicity, timescale and site, their core focus; generating empathic understanding of target groups. They are all critically methods of *perspective-taking* that afford assay of assumptive schema in play.

Malinowski disrupted anthropology as a field by recognising it risks imposing cultural and political assumptions, to drag anthropology *'off the verandah'* into the field and inveigh *'armchair theorising'* (Singer et al. 1990). A manoeuvre that caused a shift away from exotic cultures toward mundane inquiry, particularly within urban, industrial societies. Design ethnography is purposefully not outside the design process, applying design thinking, expanding beyond participant observation to include interaction and co-creation (van Dijk 2011). Intriguing interrelations exist between anthropological subfields and designerly practices; ethnography is applied widely in design contexts, especially relevant to user, service and co-design oriented research.

Key figure, Jean Rouch contribute to this evolution through co-creative practices such as film-making (Rouch 1975) and (Rouch & Feld 2003). Subsequent intersections between film and research are explored by (Worth 1964), (Goodman 2004), (Arnall & Martinussen 2010). Design documentaries typified by (Raijmakers 2006) hint towards alternate exploratory approaches. This thesis founds its methodological approach in pilot studies which applied methods allied to film-making practices as their principle research method, to enable generation of co-creative *narratives* this gives a distinct practice *narrative-making*. As the study advanced, given the sensitive constraints of researching within organizations, leaving camera equipment at the door allowed application of subtler ethnographic methods – but insights from narrative-building and worlding activities of film-making underpin the research approach.

Corollary research in support of the thesis explores innovation of methodologies and practices in-depth; defining practices of *Shared Ethnography* (inspired by Rouch) applied to urban research (Potts et al. 2015) and *Anticipatory Ethnography in* which ethnographic methods were applied to speculative design artefacts (Lindley et al. 2014) creating a blended shared field. Methodological innovation, especially interoperability of ethnographic and design methods was deeply formative, allowing for problematizations at the conceptual level for practice-based design methods.

Exhaustive attention to active and responsive research methods underpins the research approach (which have been stripped back for space) it's enough to note how conceptually, anthropological methods are especially amenable to exploring *thought-world* and *social-world* interrelationships, their conceptual foundations attend to brokerage across boundaries, hence the choice to apply them here. Appropriately, these methods attend to empathy and necessitate sensitivity to group cultures.

3.5.1 *Gaining Access*

Gaining access to organisations evokes core research issues, about how academic and professional contexts interrelate in organisational contexts; how they reciprocally inform one another, sitting relationally within industrial societies. An ongoing concern surrounds reconciling issue that sit across the frontiers of academic and industry-oriented research, a key boundary.

As Renganathan asserts; many researchers often don't describe their fieldwork practice in their research report (although ethnographic studies often do). Hurdles of access are often neglected or seen as merely tactical issues. Organizations are usually sceptical of outsider perspectives, protecting intellectual property or maintaining integrity of insular cultures, we cannot assume they value academic study. Lewin's dictum *'If you want truly to understand something, try to change it'* (C. W. Tolman 1996) allies proactive research intervention with cultures involved in organizational change.

Researchers generating access require insiders to vouch within a community to create license to legitimise their presence, allowing researchers to build webs of relationships which provide them lateral and vertical connections to people (Renganathan 2010). This research was intuitively structured in this way, by building informal relationships throughout the organisation, ethnographer's build rapport and a sense of shared or purposeful alignment with the organisation's ends, whilst leaving open opportunities for critical awareness building so that novel theoretical insight can emerge. Researchers are insinuated into knowledge networks through this process. Specifically here, through lingering, loitering and chance encounters, then aligning with organisational processes; *'We want you to do this to become part of the organisations reflective spiral'* (McCall 2015), rather than simply observing it, this research mirrored processes of situated learning via joining a community of practice (Wenger 1999), (Lave 2005).[37]

Summatively, ethnographic methods are applied anthropological methods, commonly applied to organisational contexts to making meanings within situations intelligible.

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[37] According Van Maanen & Knolb, gaining access to the research field is crucial and cannot be taken lightly (Van Maanen & D. Kolb 1982). Since ethnographic work requires negotiating environments foreign to the researcher, particular social skills are needed. One must gain trust and acceptance of participants to conduct purposeful research (Wasserman 2007). Wasserman raises the issue that much although much is written on gaining access, very little is written about access as an issue in itself, he rejects the notion that capacity to do ethnographic work is a gift, questioning the assumptions of innate ability determining that this is fatalistic, they contend that ethnography can be taught and that improving the skills of researchers is needed, this means considering how ethnographic pedagogy is developed and its concepts, experience and literature codified. They suggest using ethnographic studies as an instructive framework would allow for the development of an access literature.

3.6 Critical Method – Ethnography

3.6.1 *Ethnography*

In this study, Ethnography, as applied to the research context provides (relatively) systematic forms of contextual inquiry.[38] Establishing clarity about relationship between ethnography and *narrative-making* as an organising concept is extraordinarily relevant to methods applied by this study.

Fetterman interprets;

*'Ethnography is about **telling** a credible, rigorous, and authentic **story**. Ethnography gives voice to people in their own local context, typically relying on verbatim quotations and "thick description" of events. The story is told **through the eyes** of local people as they pursue their daily lives in their own communities. The ethnographer adopts a cultural lens **to interpret observed behaviour**, ensuring that the behaviours are placed in a culturally relevant and meaningful **context**. The ethnographer is focused on the predictable, daily **patterns** of human though and behaviour. Ethnography is both a research method and a product, **typically a written text**'* (Fetterman 2010).

The emboldened words foreground assumptions integral to this practice, yet what remains unsaid points toward potential methodological innovation. Ethnography, literally writing (*graphos*) about groups (*ethnos*) hinges on language, as Fetterman's framing belies, occurring via linguistic modes and discursive concepts. However, in context, action and meaning generation largely occurs in expanded dimensions of embodied activity, that language struggles to capture. Thus expanding ethnography to include approaches, especially design, to different sensory modalities has proven generative (Pink 2003) & (Pink 2009).

Evidently, written accounts only partially capture dynamics within rich ecologies of interaction, attempting to acknowledge this meant attending to pre-linguistic structuring of concept formation and volitional aspects of embodied activity.

Qualitative research attempts to derive insights into subjectivity, implying non-linguistic, non-numerical outcomes, potentially difficult to map to rational logic. Interpretivist strategies struggle with generalisable validity hence limiting their equivalent status to formal rational codifications. What contemporary design research approaches lack in generalisability, they gain in situated subtly, as such,

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[38] It's important to highlight key concepts, partly poetic, partly prosaic, that underpin it. In practice, ethnography is hard to pronounce, never mind attaching stable meanings to. Also, counterintuitively, this ethnography was of an organisation and a group of people for whom ethnographic methods were of central value, yet it remained difficult to articulate to them. An ongoing challenge in the research, was applying general theory to in-house theory, ethnography to ethnographers and exploring design theory about contexts where design practice was pivotal.

the situativity of knowledges places demands on research, hence, generating space for methodological innovation is vital. As perceptual schema, methodologies expand how, why and frankly, what we can know and do in situations.

Noting ethnography's methodological characteristics and application as method applied within other fields, as means to derive insight into experience.[39] As field-based method, this is highly personalisable and robustly multifactorial, proceeding inductively and is conducted to gather and use accumulations of descriptive detail to build toward general patterns or explanatory theories rather than structured to test hypotheses derived from existing theories or models. Ethnography paired to grounded theory are pointed toward discovery and generativity to provide generalisability, rather than proving hypothesis, it assumes that each context is unique.

By implication, ethnography is dialogic, researcher's interpretations and findings are expounded on by participants, through theoretical sampling, grounded theory hopes to establish loops of recursive sensemaking that bolster total validity, whilst conclusions are still in formation. Finally, it's holistic; conducted so as to yield the fullest possible portrait of groups under scrutiny.[40]

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[39] Increasingly prevalent in user-centred, experience-led design setting as compliment to technically-led, interaction systems or computational environments in industry-oriented approaches. Ethnography is a brokerage activity prevalent in organisational research and increasingly transformation. Digital transformation is reliant on generation of subtle insight into intersubjective meaning amongst socio-technical systems, where technically rational analytic business practices are found to render incomplete accounts of system dynamics.

[40] Overlaps with design inquiry are evident, supporting research investigates interoperability between design processes and research methods – to glean insight into frontier sites, meaningfully anticipate and explore ill-structured problem situations whilst also engaging in proactive frame generation.

3.7 **Grounding Research Methods in Practice.**

Given the research context, choice of methods frames the study. Different methods refract understanding, shaping attention, inhering certain epistemological stances, it was necessary to adopt perspectives that anticipate collaborative interaction by default – examining individuals as situated in environments and embedded amongst groups.

Cultural Historical Activity Theory provides an expanded, distributed perspective. In CHAT, tool mediation sits atop activity systems, it can be repurposed as a means to reveal collaborative interrelating as generative knowledge production, acting to make intelligible tensions and conflicts as they occur; the process of creating active representations via mediating artefacts explicates how theories of action intersect. Activity Theory and Boundary Object theory are interlinked, providing robust interpretive schema of the field of interaction (Star 1996), they contain aspects integral to other theories, such as dynamic coordination in communities of practice (J. S. Brown & Duguid 1991). Exchange between activity systems, is conceived as occurring via boundary-object-like entities, hitherto poorly understood classes of mediational objects, these entities following Star make intelligible infrastructure underpinning collaboration.

Later generations implore consideration of how interacting cultural and historical fields shape activity. Appropriately, they regard researcher, research methods and methodologies as contextually inextricable, equivocally, as parallel interlinked activity systems. Implying these methods are integral to any activity context, providing adaptive feedback loops, methodological approaches inevitably require active restructuring to fit with research context. Trenchantly, methods inhere epistemological values, escaping these is challenging.

Unquestioned application of research methods to situations, risks bias, misapprehension of meaning in activity, even irrelevance. In formulating tentative *grammars* of collaboration (Engeström et al. 2015) opines '*Collaboration is often treated as a uniform phenomenon for which we need to find universal laws and prescriptions. Susan Leigh Star (2010) took a different stance, emphasizing that boundary objects are "at once temporal, based in action, subject to reflection and local tailoring, and distributed throughout all of these dimensions" (p. 603). In other words, collaboration is not uniform and boundary objects are no panacea, no universal solution to the challenges of different kinds of collaboration. Boundary objects are shaped and made alive in specific circumstances by specific actors for specific needs*' furthermore Star urges researchers to attend intuitively to the *'strange, weird, and anomalous'* (Star 2010). Stimulus enough to look for experience not securely explainable in extant theory, to expand insight intuitively yet into grounded, robust standpoints. Hence, the rationale; to encode originality and generativity over interpretive validity, intercoder agreement were sacrificed to safeguard autoethnographic integrity.

Summarizing, if narrative-making manifests control and modulates power, warranted methodological or epistemic legitimacy can only emerge from within a community of practice, research stands only to offer critical, reflexive distance whilst mitigating bias – the methodological approach was devised to diligently attend to this, if imperfectly. As Fricker attests an ethics of power is inextricable to knowing (Fricker 2007a).[41]

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[41] Declaring these assumptions before attempting to slough them away in line within Grounded Theory is methodologically diligent, assuming research isn't skewed by latent values or beliefs is foolishly optimistic. The issues undergirding civil societies of who knows and who tells, who gets to speak or cannot, who is remembered and forgotten are as serious as who survives or dies. Questioning what's at stake when epistemic justice faces profound threats, rejoining with narrative theory of organization, organizational entities framed as interpreting systems that manufacture warrant and influence, at no other time have organizational entities held such sway in significantly shaping conditions of physical and psychical environment.

As drivers of transformation, the creative and IO industries disclose and transform worlds faster than societal interpretive capacity is able to make sense of them. Organizations generate economic leverage that transcends the personal, beyond this, fields reciprocally reshape perception and action. As rejoinder to this, individuals must equip themselves with increasingly sophisticated interpretive resources, principally through learning. As Daft & Weick anticipate; *'When an organization assumes that the external environment is unanalyzable, an entirely different strategy will apply. The organization to some extent may create the external environment. The key is to construct, coerce, or enact a reasonable interpretation that makes previous action sensible and suggests some next steps. The interpretation may shape the environment more than the environment shapes the interpretation. The interpretation process is more personal, less linear, more ad hoc and improvisational than for other organizations. The outcome of this process may include the ability to deal with equivocality, to coerce an answer useful to the organization, to invent an environment and be part of the invention'* (Daft & Weick 1984).

Due to this recursive interaction between human generated environments and the adaptive responses of individuals which act to abet and circumvent with respect to them. Societies are irrevocably subject to perpetual catching up, a process that is far from value-free. Group entities not only exert economic clout they amplify influence enact epistemic deformation. Economically rational transformation insinuates and enacts shaping effect onto individuals, with often ambiguously bright and grave consequences.

3.7.1 *Applied Grounded Theory*

Grounded theory advises entering research contexts with methods acting to slough away assumptions, advising no prior literature review, forcing theory to earn its place in emergent situated appreciation of unique situations (Glaser 2014).

Ethnomethodology encourages abandoning theory at the door, instead searching for meaning in practice (Garfinkel 1967), useful to understand work and learning culture within organizations (Rouncefield & Tolmie 2016). Thereby methods ensuring that theoretical emergence is contextually grounded, situating resultant social theory were deemed vital. Dorst (2015) discusses the design field's struggles with memory; integrating, de-situating abductive knowledge is problematic.

In this study, research methods are understood only as perceptual schema, learning systems that aim to derive insight about activity and theories of action participants apply.[42] Methodologically significant, reflected in soft system methodology's (SSM) perceptual shift from viewing the world as systemic to regarding the process of inquiry itself as systemic (Checkland 2000).

This research approach isn't unusual, anticipated by Lewinian Participatory Action Research (PAR) (Reason & Bradbury 2001). There's poignant reasoning behind this, in discussions of Lewin's empiric studies. This state of affairs is well anticipated by grounded theory, set out by Glaser & Strauss, which rely on social world perspectives. As such, participants are appropriately regarded as co-designers of research processes, as conversational partners fundamental to making sense, rather than simply as subjects. The reasoning for the functional elision of the subject / object divide is defended herein; it's not feasible to assume an observer's critical distance, interpretive research is intrinsically participatory and generative. Theories are often co-integral, resting on dialectical constructs, their interpretive efficacy provides them robust validity.

Questioning relationships between activity systems and social worlds and how they nest within one another; social worlds and communities of practice can be effectively co-terminous, exploring overlaps and divergences was instructive, both are systemic theoretical framings aligning around concepts of expanded participation, regarding personhood beyond individual concerns.

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[42] Aligning with organising image concept in (Dougherty 2001) and Lynch's methodological treatise on intelligibility of perceptual schema (Lynch 1960) stimulated by Kepes' (1951) attack on societal fragmentation equates societal sickness, perhaps somewhat with an unhealthiness of vision *'Our distorted surroundings, by distorting us, have robbed us of the power to make our experience rich and coherent'*. Instead, by advocating for naturalistic ideas that couple sensing with environment, Kepes sought to amelioration perceptual fragmentation. Kepes, incidentally, inveighs vocational education in which learners study problems exclusively lifted from commercial sector, instead hinting towards poly-contextuality – generating recoherence via expanded visual, sensory language (Golec 2002).

This provided means to reconcile how theories interact as interpretive schema, playing out across different scales of analysis. The sociological unit of analysis, individuals, aren't fundamental, the analytic unit of studies necessarily tacks back and forth between individuals, group entities and larger contextual infrastructures like organisations. Framing clear arguments for which methods are appropriate; as the study examines how interpretive schemas interact to influence how we design and learn; the desired criteria are potential for generativity and capacity to reconcile different perspectives and scales, this means exploiting value from specific insight about contexts which have generalisable meaning, acting as proxies for other settings.

Contextual research methods need to be simultaneously open, grounded and reflexive. In this regard, the study draws on research methods that exhibit pliancy to context and provide requisite interpretive flexibility. Thus, adapting grounded theory to allow novel social theory to emerge through constant comparative methods was vital. Concepts shared by CHAT and boundary object theory means they're proximal theories (Star 1996), grounded in symbolic interactionist perspective. They fit well with network theories, Actor Network Theory (ANT) deprivileges individuals in favour of socio-technical assemblages of which human groups are part. Their originators were in dialogue, Engeström, Star & Latour collaborated, converging and diverging perspectives, to unpack collaborative contexts, as such these methods are apt.

3.8 Applying Grounded Theory

Anselm Strauss, along with Barney Glaser pioneered innovative methods of qualitative analysis widely applied to social sciences. Grounded Theory (GT) provides productive qualitative methodological approaches within the **interpretivist research** paradigm. (For an expanded account of data collection, thematic coding and synthesis, see [appendices](#)).

Significantly, given thematic connections between Symbolic Interactionism, Social Psychology and Grounded Theory it's vital to recognise the conditions these approaches arose from. Advances in interpretive research methodologies emerged as rebellion to dominant positivist traditions. Strauss wrote extensively on Chicago sociological tradition, especially symbolic interactionism. Strauss' contribution to social world / arena theory is highly relevant here further validating the relevance of Grounded Theory.[43]

Strauss' ideas correspond with social psychology's stance, borrow heavily from continental philosophical positions that took as their basis subjective experience; gestalt psychology (Koffka 1935) and phenomenology (Husserl 1970). Grounded Theory's rationale was to close gaps between theoretical and empirical research, arising from prevailing domains where empiric, quantitative approaches were thought to hold advantage across fields, as qualitative research was seen to lack adequate methods of verification. In essence, the capacity of theories to extrapolate valid generalisations from particular situations. Attention to how theories are derived is implicit to Grounded Theory; whether theory emerges or is forced.

Strauss indicates Grounded Theory means to assemble different elements of sociological theory, positivist and symbolic interactionism to make interpretation of meaning in social interaction integral to inquiry, to get at *'the interrelationship between meaning in the perception of the subjects and their action'*. Presupposing centrality of meaning in human interaction now seems intuitively sensical, however, aspects of technical rationality suppose that rational structures exist independent of conscious perception, that reason and meaning are in some way mutually independent.

As we show, these positions attempt to integrate recognition that experience itself, or that sentient experience is fundamental in formation of rational concepts that theories are built upon, acknowledging reciprocal influences between conscious experience and environment.

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[43] Strauss studied symbolic interactionism under Herbert Blumer at the University of Chicago and along with group of colleagues including Erving Goffman became known as the 'Second Chicago School'. During a storied career Strauss influenced the World Health Organisation (WHO) through consultancy, his impact on social theory is notable, Glaser and Strauss later parted ways exploring different directions for grounded theory).

Contextual meaning, rather than something to be ultimately explained away by explanatory power of rational scientific inquiry, is constitutive of inquiry processes. Typifying these approaches is how testimonial accounts can be evaluated to derive meaning from acts of embodied perception and cognition.

Furthermore, social psychology implores we accede to the cardinality of shared meaning, sociality and environment in decision-making and concept formation. Consequently, these theories valorise intersubjectivity, rather than hindering rationalisation, become decisive to expanding rational inquiry. These insights continue to profoundly impact various methodological approaches to social research.

Before theoretical development proceeded, identifying then assaying a research context needed to occur, tacking back and forth between theorisation and experience was essential, making chronological accounting unpropitious. Given its inherent grasp of intersubjectivity within social groups, ethnography provided ideal methods. Before unpacking ethnographic methodology, we must examine factors guiding the emergence of theory through grounded methods. Basically, social theories face trade-offs between general scope and fitness to context, to achieve both, theory losses simplicity. For theory to have potent generative potential, it needs to locate the equipoise between these factors.

3.9 **Ethnography in (this) Context**

Practically, this meant co-producing sense with participants actively, reflecting and checking if interpretations and conceptualisations of action were consonant with the insider's perspective of their own activity, only then departing to build increasingly sophisticated (and ideally succinct and coherent) interpretive structures to explain situated contexts. Following a grounded approach meant sloughing assumptions, one guiding conviction remained; that participants innate expertise in making sense of their own experience is an invaluable resource.

In this special case; design learning environments, sensemaking activities of 'figuring out' and 'reckoning' often through informal dialogue, are continuously going on. Strategic use of withholding information and the use of orienting cues was repeatedly witnessed. Facilitators made use of *managed uncertainty* to actively provoke transformative learning - not knowing, aligning with Wieck's interpretation, causes sensemaking to occur. The presumption that increasingly work takes place in situations where an assumptive ground isn't fixed, nobody is certain of where they are going and the significance of what they are experiencing. Channelling dialogical approaches which assume change not stability as the basis of social research, noticing emergent patterns. invariances amongst changing circumstances were then diligently pursued both in the moment and via subsequent systematic analysis.

3.9.1 *Questioning Strategy*

Reactively, dialogues with participants in situ, were generally framed as reflection-in-action (Schön 1995). Interviews were approached as reflections-on-action, this approach was founded on the need to focus attention beyond learning content (specifics were not deemed significant) onto conduct (general patterns of interrelation and cognition witnessed in situations were deemed highly significant).

Reflection leant a metacognitive focus to discussions, the research addresses how and why thought and action occur not just descriptive accounts of what occurs. Hence emergent interpretive constructs rely on contingent, on the fly, coming together between researcher and participant.

This meant enabling cooperative activity between observer and observed to collaboratively make-sense of incidents, this allowed for rapid development of heuristic perceptual images; formed, shared and abandoned equally rapidly. This expands ethnography's typically inductive analytic approach to induce value from abductive, synthetic approaches allied to design.

A general questioning protocol allowed for comparative analysis across different events, however, as the research engagement proceeded, this meant satisficing of incomplete perceptual schema, which were then fed back into ongoing dialogue with informants to amplify robust accounts of activity built from themes.

Simply, common open questions formed into core questions, but as insights emerged, these were actively shared with participants, who were invited to contribute and modify shared understanding of events, leading to an appreciative system of interpretations. On reflection, these ill-structured interpretations were extraordinarily useful, they foregrounded opportunities to explore divergences in how participants perceived common situations, often leaving behind thematic commonalities. Introducing conceptual satisficing, as means to actively engage in frame generation about action in situ, to share *satisfictions* (or tentative theorisation about action) allowed for active brokerage between participants.

Although risk of bias and inveiglement in seductive description is an obvious limitation, allowing interpretative synthesis to undergo the same cooperative refinement as design concepts was productive and appropriate amongst a design-led culture. This synthesis in application between ethnographic (inductive) and designerly (abductive) methods may be considered a useful methodological contribution of this study to the field of design research.

3.9.2 *Interpretive Strategy*

In the context of this research, the methodological dichotomy between inside and outside perspectives, set out by the ethnographic tradition provides inroads to ameliorate differences of perspective. In cultures in dynamic collision and collusion, we need to offer strategies to ensure validity of accounts via synthesis of objective and subjective accounts. Ethnography usefully implies relational tension emerging from interactions between the ad-hoc mental models integral to the observer and the observed perceptual schema are significant for social research. Iterative comparative pattern searching strategies applied across dialogue and observational accounts were able to render sense and synthesis beyond immediate moments.

Another significant factor was how curiosity of the participants and stakeholders in the enquiry as it was happening invited cooperation. In the organisation, each participant was actively in midst of the learning act, in actively making sense of their circumstances. Consequently, when researchers enter or are drawn into, the orbit of a group, retaining false distinctions about objectivity is ill-advised. The difference is participant observation actively records and documents, reflecting on the significance of activity, observing interaction amongst groups, attending to what their activities meant to them rather than the purposeful objective internal to the group.

Focusing on the interaction of working models and way they are externalised in practice through various strategies stands as powerful means to understand collaborative activity. It is the conduct and activity of actors in a given moment that gives rise to structure, in other words cultural formation. It also provides a means for social scientists engaged in producing general and therefore mobile patterns of knowledge that can have wider relevance for social activity.

3.9.3 *Incepting Interpretive Feedback*

Through evaluating these fragments of insight, various types of feedback loops are established, from the hyper immediate to the long duration reflection on prolonged engagements occurring across multiple contexts. This interleaves the interpretive intuition with more considered methodological investigation. Eliciting participants to reflect on significance and, to the extent they were able, to apply their own interpretive faculties to make interpretations coherent. By reflecting on participant's reflections on action, not just in the moment but in successively longer arcs of reflection and interpretation, the research began to reveal significant, recurrent patterns distributed throughout the organisation. Bringing these satisfied interpretations back into collective field of activity then reinforces the production of feedback actively throughout the field of activity. Then, other creative strategies emerge to create feedback; eliciting others in the network to engage in comparable activity and then sharing this with one another. Taking partial insight from one situated context and

translating it to another elsewhere in the organisation. In simple terms, opening the research dialogue out, encouraged participation in developing insight. This meant comparing responses, making partial inscriptions, reporting insight legible across different social fields, bridging knowledge from one organisational domain to another. Rather than benign trouble making, once researchers accept their active implicated role in a context and inevitably complex impact of being situated in an environment that is activity interpreting them back, then feeding insight back into the field becomes fundamental to the inquiry and can be very productive. Insight is actively given as well as taken, creating utility. Creating these feedback loops and actively eliciting informants in the process of giving and taking sense was the only really tenable strategy to form tenable understanding about a polycontext in flux.

Defending why this modified approach to an ethnography of collaborative interaction was apposite; The proposition; Why rely solely on the interpretive capacities of the researcher, when the environment is populated with individuals serried in close proximity who are themselves engaged in sophisticated interpretive activity? This recognition that persons who are often highly expert themselves can act as authoritative co-interpreters by virtue of their participation in the organisation's cultural history. Surfacing and comparing these approaches was germane to Grounded Theory research approaches, making room for original in situ theorisations to emerge as part of a progressive sensemaking process. Synthesis that tacks between etic & emic accounts generates internal validity via distributing the sense-making process. As each participants is actively explaining the internal dynamics of a situation based on their in-brought outsider perspectives, this allows the generation of synthesis that can remain intelligible beyond the boundaries of a situated community Researchers are engaged in the pursuit of amplifying patterns that are symbolic, representations that reflect the general in the particular. This occurs through careful framing of an inquiry to the research participants to enlist them in producing actionable insight that can remain apprehensible outside of a given community. Forfeiting delusions of objectivity for expanded participation does not however mean compromising measures to ensure critical integrity.

This mean recognising how diverging objectives and values between researcher and subject bring with them their own incommensurability and potential for schematic clash. In interactions between observer and participant means sustaining critical distance between the organisation's priorities and those of the research inquiry. Evaluating the interactions and mobility of influence within organisational settings in Industry-oriented research faces inevitable threats to validity.

As Van de Ven & Poole point out, there are assumptions at work guiding ideas about how organisations form and change. Steps to countermand the risk of *'self-fulfilling prophecies that may occur when a researcher expects a certain number of stages of development or a certain process'*, there is also the assumption that *'all development represents progress from a lower, simpler state to a higher, more complex*

one' (1993). Their research characterised four ideal type motors serving a theoretical primitives explaining processes of change in organizations: *life-cycle, teleology, dialectics* and *evolution* which operate at different levels within an organisation, often in parallel and difficult to discriminate and evaluate in practice.

However, this assumes agreement between all, which discounts the power dynamics between individuals within them. As Starbuck notes, *'reorientations do punctuate sequences of variations, do activate and broaden political activities, but few reorientations transform organizational structures'*, these highlight the relativity of perception - reorientating activities often *'seem illogical because they violate basic tenets of a current cognitive framework, whereas variations make sense because they modify actions or ideologies incrementally within an over-arching cognitive framework that they accept'* (1983).

Notably, the organisation under scrutiny is subject to these same tensions but their complexity is compounded the fact their activity aims to enact transformation; both within individuals and groups of learners but also to enact organisational change within client organisations. The candidate organisational network's activity focused on modifying behaviours and practices that actually intervene with cultural attitudes to organisational practices and their leadership in other organisations.

Hence there is need to account for the impact of changing power structures between organisations and amongst people. In organisations, even the most rational adaptive shifts are met with affective responses and resistance because change threatens established power structures. The work of organisations is inevitably subject to instrumental compromises, as action generating entities, they are driven by values but subject to the demands and dynamics of business and market practices, organisational structures are inevitably premised on the creation of value. As such robust discussions what is defined as valuable is warranted. Afterall, the candidate organisation's prime objective and expertise lies in enacting personal and organisational transformation through careful consideration of assumptions about group conduct.

3.10 **Innate Interpretive Expertise; connects Research with Design**

The valorisation of participant's expertise was a profound insight, and a stimulus for innovation in methodology and the potential impact of applying design research to innovate ethnographic methods. This deeply embedded capacity held amongst individuals forms a tacit scaffold that underpins the apparent deftness with which participants approach even simple activities. For example, in ordinary daily activity, the complexity of reading a road sign or avoiding walking into the road at the wrong time signifies seamless integration of sophisticated tactical, semiotic and interpretive negotiation, this is significant in revealing how expertise is enacted in ordinary organising. The meshing of interpretive and embodied capacity, changing intentions and producing seamless interaction is a profound source of insight for the ethnographer as it forms the basis for dynamic cooperation.

The ordinary expertise of individuals in negotiating everyday activity is augmented and specialised in organisational decision-making as agents learn to navigate the contours of social structures. The assumption that expertise sits apart from this extraordinary but mundane perceptual adeptness has proven difficult to support in the research literature, hence accounts of expertise formation have need to take account of how ordinary expertise in perception and action are specialised to deal with complex cooperative cultural infrastructures. Understanding how social capital is amassed and enacted through cooperative interaction is vital to explanatory accounts of how learning and expertise formation are enacted. In this research and the supporting publications, we proposed to commute this process to engage ordinary people in the interpretive work usually ascribed to ethnographers and to entrust this interpretive expertise to the public as a user group. In this way, emplacing basic heuristic analysis that re-places accounts of experiential activity parsed into linear, text data (in the form of ethnographic notes and interviews) back into a spatial, networked relationship makes intuitive sense. This transformation inheres assumptions that are not unproblematic but as a foundational proposition, was useful to illuminate novel concepts, it also aligns well with participatory approaches to research.

Researching modal transformations of expertise amongst communities, falls within the remit of narrative studies. It is especially relevant because in the classes of activity that take place in design learning environments, where sensory appreciation of conditions and social interrelationships undergoes multiple phases of translation from various modes of experience which are parsed into form via designed outcomes (diagrams, artefacts or inscriptions) generates novel insights into how design processes enact organising. The learning cohort observed at Hyper Island were developing mastery in collaborative learning, design activity and social negotiation, this transformative activity is of implicit importance to their expertise formation in experience design and leadership of digital organisations. Their activity predominantly entails a kind of co-personal transformation performed via continual ad-

hoc interactions which leverage in-brought assumptions to foster the development of in-house social capital. These specific forms of innate expertise are arguably honed through design-led learning and we should be able to observe this in action through observations of collaborative interaction.

As analysis progressed, remaining at the surface level at first, spatialising and enacting these concepts formed a useful way build a heuristic image of how interactions were conscripted for expertise formation. This was highlights in the primacy of certain themes present in the speech and idiomatic activity recorded both in the ethnographic data and interview texts (which were considered in isolation and then integrated in iterative steps). A strong internal cultural narrative and approach to conduct provided scaffolding that supported individual learning. The specific cultural codes and practices facilitated by the network, formed a scaffold for reinterpreting individual behaviours amongst groups.

It is important to acknowledge the limitations of this approach in terms of validity, however, applying heuristic techniques which amount to procedural sense-making amongst a community is commensurate with situated learning. It provided a more granular appreciation of how expertise is gathered in heterogenous communities of practice. Distributing the responsibility of forming explanatory accounts of experience informally amongst participants functioned effectively to separate subjective interpretations inherent in moments of data capture from traces of subjective interpretation in coding processes. In practice, this meant forming feedback loops between interpretation and practice by placing synthesis in context for open discussion with participants.

In terms of cognition, casting an imaginary volume around a data field, containing the whole within a mutually intelligible frame, has precedents in the precursors of design methods. The technique of defining an arbitrary volume around a situation to bound further meaningful scrutiny of what might be happening inside it is commensurate technique of general morphological analysis pioneered by Fritz Zwicky (Zwicky 1948), a method identified by Nigel Cross (Cross 1993) as a pivotal precursor in Design Methods movement. Cross draws significant parallels between Zwicky and design thinking methods that bound activity within a notional space to explore potential permutations, albeit via heuristic methods. For Zwicky, imagining a bounded volume around the object of analysis provides venue to hypothesise about the the shape and movement of unknown systems (cosmological entities) that could otherwise only be inferred about, not measured directly. Notably, this is akin to Dorst's account of co-evolving problem situations (Dorst & Cross 2001), which assumes an environment in which problem and solution space are entangled and mutual constitutive. This process of iterative bootstrapping towards closer approximations of optimum solutions reveals the connective tissue between scientific and design methods – where entities are open, complex, dynamic and networked. Hence the practices of collective reflection on framing and frame generation are instructive.

Analogously, instantiating a porous boundary around a complex system to focus inquiry is essential in ill-structured situations where forming rational micro-worlds and distinct subset problems is precluded. This demonstrates important consiliences in the formation of design-science methods, typified by Buckminster Fuller (Fuller 1963), which were modified by Simon's concerted scrutiny of ill-structured problems (Simon 1996). Notably, Zwicky's volumes surrounded distal phenomena, here phenomena are proximate but highly systemic and abstract due to distributed perception and sociality with respect to common situations and the distal nature of the problem situations common to design.

March succinctly defines this approach 'Herbert Simon, posits a science of design rooted in (1) utility and statistical decision theory to define the "problem space" and (2) optimization and "satisficing" techniques to search it. The problem space represents *"desired situations", "the present situation",* and *"differences between the desired and the present"* (p. 141). Search techniques represent *"actions... that are likely to remove particular differences between desired and present states" (p. 142). Hence, the representation of design problems and the generation and evaluation of design solutions are the major tasks in design science research'* (March & Storey 2008). An interesting question for designers in practice is; what kinds of activity are not easily representable by this kind of analysis? Are regressions of problems into volumetric spaces representing design situations resulting in solutions inherently only positivistic and deterministic in nature? Design methods holds that analytic regression is ultimately tactically useful but ultimately untenable given the ill-structured boundaries of problem situations. Intuitively then, as design action itself intervenes with not only the problem, but it's perception and the world it is situated in, dialogical approaches which require different kinds of rational foundation able to anticipate continual change are needful.

3.10.1 *Problematising Problem-Solving*

Contemporary design scholarship has long diverged from design science's position, by investigating design as processes concerning framing and frame creating, rather than a purely problem-solving or solution focused activity. This debate is perhaps best expanded by Dorst's investigation of core cognitive patterns underpinning design thinking, asking *'What is the core of Design Thinking?'*. For Dorst, interest in Design Thinking is stimulated by organisations having trouble dealing with *open, complex, dynamic* and *networked* problem situations. Questioning whether the way design activity is structured and taught presently lends itself to this practice, are learning strategies able to fully leverage the open, abductive reasoning integral to design cognition or trapped in reductive instrumentality? The way that design thinking as a process can deal with identifying themes and frames affords a capacity for organisations to radically reorient themselves. In the context of an organisation that engages with organisations to identify and react to potentially existential threats, the orienting capacity that the proper application of methods allied to design cognition is pivotal, but complicated to deliver.

For Dorst, *'for organizations, these really serious and paradoxical problematic situations arise when their conventional problem-solving fails'*. Furthermore, Dorst examines how design thinking broadly operationalised outside of its original context; *'What could it bring to practitioners and organizations in other fields?'*. Dorst sketches a partial answer, setting out to investigate how design practices could *'be enlisted to help organizations deal with the new open, complex problems they are facing in the modern world'* (Dorst & Cross 2001).

Dorst explores at least five different levels that design's framing practices can engage with organisational practice;

1. *As design practices that address problems within an existing frame.*

2. *As design practices that involve framing.*

3. *Where that frame originates from the existing company practice.*

4. *As an adoption of a new frame that has been brought or developed by an outsider.*

5. *As the creation of a new frame through the investigation of themes, in a deeper transformation of the organisation's own practices.*

As Dorst indicates, the last level is where design-based practices and organisational innovation are most intimately linked. This concerns directly the practices built up by design research related to

entrepreneuring, attributed to (Steyaert 2007) and 'effectuation' from (Sarasvathy 2009) deriving principles based on expert practices of entrepreneurship in management literature.[44]

However significantly, recognising how scientific and design methods diverge is thorny in practice, although they share reciprocal sets of common practices. The observed actuality is that rigid problem practices can be highly successful, proximally design problems can be considered solved – based on the success of a product or solution fit, the suspicion though is that this masks a key issue – that design solutioning acts better to speciate downstream problems even when in the immediate moment the solution appears to cauterise the issue. A systemic view reveals that solutions generate problems, yet business practice trade in specificity, abrogating responsibility unseen consequences of emplacing a solution in the world. The principle point of divergence is the type of reasoning entailed with scientific methods reliant on deductive reasoning as opposed to design's application of primarily abductive modes of reason (Thagard & Shelley 1997). Both rely on empiric scrutiny of apparently bounded sets of circumstances, however, each take place in different domains, scientific methods rely on phenomenal stability to assert generalisability, which is lacking actual design settings, given their tangled situativity, hence to problem lies in defining the situation boundary. Instead, the approach proposed here situates design activity at the dynamic boundaries between interacting situations. Although the network maps produced from the text data are flat and contain no spatial data, the representations represent a concept space, revealing networks of relationships.

As this mode of analysis progressed, more sophisticated tools, applying simplistic techniques were applied, being careful to trace changes that might occur as the researcher handled the data. A range of qualitative and quantitative techniques using analysis software was applied in a progressive manner, deliberately treading lightly with careful attention paid to the need for synthesis.

Ethnography is about creating actionable insight within complex circumstance, it explores the internal and external dynamics of social worlds and crucially, their relational properties. As such, is suited to contexts of discovery occurring before axiomatic formalisation, although it is also reliant on axioms derived from diverse fields, notably anthropology, which we unpack herein.

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[44] Recasting classical ideas of entrepreneurship, wrestling it away from instrumental business towards creative adaption, towards a social ontology of becoming. In so doing attempting to couple the scholarship to concepts of recursivity, enactment, disclosure, narration, discourse, dramatization, dialogicality, effectuation, social practice, translation and assemblage (Steyaert 2007). Reimagining entrepreneurship as a conceptual attractor to discuss how worlds come into being and fields are reshaped through collaborative design activity.

3.11 **Ethnography as Brokerage Practice**

Importantly, ethnography is a boundary spanning practice, in that it explores relationships that span social worlds. Usefully, Meyerson introduces the idea of *'tempered radicals'* as *'people who work within mainstream organisations and professions and want also to transform them'*. Denoting that these people *'seek moderation'* in realistic manoeuvres which stems from their appreciation of the internal dynamics and politics of their setting yet have *'become tougher by being alternately heated up and cooled down'* (Meyerson & Scully 1995).

Attempting to characterise 'change agents' within organisations, this attitude is relevant to co-worker participants of my ethnography (learners, facilitators and organisers), this standpoint provided a useful rationale for the researcher's ethnographic stance as interloper. As Meyerson describes *tempered radicals* as 'outsiders within' blending the insight of an insider with the critical attitude of the outsider. *'While insider status provides access to opportunities for change, outsider status provides the detachment to recognise that there even is an issue or problem to work on'*. This speaks to the normative affect of in-house assumptions on being able to distinguish issues.

Ambiguity of meaning in tempered radicalism allows it to work as an organising concept. This allows thinking about how 'tempering' experiences and learning enact themselves in experts in the making and how those experts learn to socially manoeuvre through a given organisational territory. Temper also connotes affect, a connotation of emotional disposition. Radicalism, whether tempered or un-tempered, gives pause for thought about the phenomena of change; whether occurring through incremental steps or as discontinuous sea-changes in perspective. Disruptions to the ordering perceptual logic in organisation can be incredibly destabilising, literature on sensemaking attests to the cascading impact of shifts in the assumptive framework at work within a given organisational environment, which can come from changes in perception or the shock resultant from unforeseen changes in the environment the organisation operates within. Resistance to this, often manifesting as an instinctive rebuke are fundamentally why change programs often fail or are extremely hard to sustain.

Ambivalence is also identified as a key attribute of this type of agent in organisation, ambivalent perspective affords actors to utilise interpretive flexibility; this is synonymous with acting empathically, understanding different viewpoints without strongly subscribing to them, is crucial to brokerage activity. The stance closely mirrors the dialogical position towards situations explored by (Levina & Vaast 2005) and (Marková 2003) in that both change agents and researchers exploring change necessarily engage in dialogue with situations.

This signifies a certain form of intentionality inherent in ethnographic practices where interlopers attempt to maintain objective and subjective positions in parallel; this implies holding open or suspending firmly defining *etic / emic* boundaries. This notion of ambivalence, as in pertaining *'contrary or parallel values, qualities or meanings'* (OED). Ambivalence, a term co-opted into common speech from psychology, means etymologically *'both strong'* formed a core insight from the ethnographic study and perspectives on ethnographic strategy that emerged from it.

Commensurately, it's been important to fully participate in activity within this organisation and to remain in a parallel position where narrative that can capture the *'knowledge and insight of the insider with the critical attitude of the outsider'* and to synthesise into outputs with legitimate utility and validity. In practice, researcher must manage their experience of thinking in parallel, considering plural perspectives and agendas that may conflict with one another, this experience has been a significant feature of the research. It's easy to overlook this significance, but fundamental to the actual experience of it. To genuinely illicit insight means becoming embedded in the culture, risking conflation of research agendas with the internal dynamics of a culture. Ethnographic methods are meant to protect against this conflation, the actual result blends schema internal to the culture with the researcher's own schema; ideally, this produces a third perspective that overcomes the threats to validity presented by each.

'Insofar as ambivalence creates uncertainty and indecisiveness, it weakens that organized structure of understandings and emotional attachments through which we interpret and assimilate our environments' (Marris 1975 in (Meyerson & Scully 1995)). Ambivalence weakens assumptions about the opportunities for action in a given structure, as such it is an important boundary spanning competence. Ambivalence in research Hyper Island meant suspending belief about the efficacy or perceptual fit of particular stances or meanings ascribed to activity, but also whether the shared meaning and activity within the organisation was generally useful or a simply the product of particular cultural situations. Hyper Island's culture entreats inclusion by default, a highly persuasive strategy in group oriented learning, it was challenging to develop perspectives about their entailed theories, to establish critical distance by bringing to bear an array of relatively independent theoretical perspectives as a means to derive critically independent insights that could claim t hold their own validity. This hinges on establishing credibility both as participant and external researcher then effecting brokerage between these distinct thoughtworlds.

Where researchers are tasked with generating ethnographic narrative about a context; they must simultaneously contend with the purpose of the task of interpretation and how that interpretive process can impact the purposes of that context, the prevailing perceptions are have recursive interrelationships. Researching organisations means to distil narratives by codifying organising

concepts into themes which can become synonymous with how those contexts then signify - a synthesis of their spatio-material and socio-semantic dimensions. As Latour opines; inscription mobilises power, amplifying the power of a site, by leveraging power within symbolic economies (Latour 1983). Organisations of this type rely on the social capital they can generate and also how they are perceived externally. This concerns the generation of organising imaginaries that could mobilise knowledge, which shapes that perception. How outsiders perceive organisations external is fundamental to their whether their actualisations survive, a trade of symbolic meaning, the habitus they engender stands as the currency of symbolic exchange which sustains their economic value. The internal trade of narratives is in actual fact how organisation is enacted but also critical to their external cache. Those controlling these narratives hold the power in situations (Busl 2016), a popular view grounded in robust scholarship. By this rationale, co-creating narrative, distributes power. Incisively, narrative-making practices are modulations of soft power, and subject to expertise formation. Leadership relies on this trade of narrative, a symbolic exchange across the internal / external boundary of the organization.

Inquiry into systemic perception in organisations can only be encountered through inquisitive exploration of its spaces and stories in parallel. In this way, researchers participate and intervene in this shared narrative environment, that the organisation generates.[45]

Central to this approach is self-reflexivity and making sense, attending to how particular issues are filled and emptied of the energy of intent as the study developed was crucial. Noticing attractive directions and beginning to trace out ways to deal with situations was fundamental to engaging in research. Marshall unpacks her assumption that cultural systems are generally highly resilient. Identifying the resilience of social systems calls into question whether researcher behaviour is system-reinforcing even if the intention is to be system-divergent or vice versa.

Activity theory proposes that social systems present resistances, conflicts and tension which act as the drivers of social change. This implies regarding the researcher themselves as a system with these properties, this has often been an important issue to reflect on when engaging and building rapport with a large group of highly intelligent, social mobile particpants that ostensibly were simultaneously blissed out and stressed out by their travails. Incidents surrounding these flows between

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[45] Marshall's research legitimises living itself as inquiry, imparting this 'involves seeking to maintain curiosity, through inner and outer arcs of attention, about what is happening and what part I am playing in creating and sustaining patterns of action, interaction, and nonaction' that doing this involves 'seeking to pay attention to the "stories" I tell about myself and the world and recognizing that these are all constructions, influenced by my purposes and perspectives and by social discourses which shape meanings and values' (Marshall 1999) which is by definition critical thinking applied to embodied experience.

organisational, interpersonal and individual self-awareness building practices featured heavily in day-to-day observation.

Taking cues from Lewin's approach to research and organisational change, I placed emphasis on *conduct* not *content*. Given the directives of participatory action research, it was also important to recognise the presence of a researcher as integral in the process of change itself. *For example; I was not interested in whether Hyper Island was still innovative or whether learners were producing innovation, instead focusing on what being innovative meant and how this activity was approached and realised through their collective activity. In other words the change that individual underwent or perceived themselves to be undergoing through their participation.*

A peculiar feature of gaining access is that this ethnographic observation was of a group of participants who themselves may employ ethnographic or at least reflective techniques, be or become sensitive to them and are almost certainly already engaged in experiences and learning allied to organisational culture change, user research and organisational strategy to some degree. Many of the cohort themselves were practicing professionals at a high level in international industry settings, research or business. This had multiple risks, benefits and dependencies that influenced gaining access and building insight about the group. It also meant that in brought assumptions about organisational practice were already densely layered.

Importantly, acknowledging at least that the researcher felt affinity for the identities and methods that were part of the observation. At times it was difficult to abstain from engaging in learning and design activities, it was important to embrace this fact and use these interventions as a means to create breaches in the goings on. By approaching participation at the meta-level of conduct, the observation was able to glimpse evidence of the exchange of meanings that occur through the flows of design learning. The possibility of a common consensus or baseline was precluded, change was already afoot, making dialogical approaches highly relevant.

Further, Marshall opines that interpretive processes (common to research) often become arduous as they have become degenerative or retrograde in some way, rather than active and in situ. This means acknowledging ways that *'self reflective-action oriented'* research approaches applied at work bleed over into life, that research is a necessarily partly personal, partly social process. In this sense, the dimension of affect is pivotal as emotion and reason are always engaged in intimate interaction. The point isn't to explain away poor bounding of life roles but to grant that a particular interpretative faculty is general and fundamental to categorising experience.

This aligns with growing awareness of how a certain professional secularism between work and living is undergoing vast erosive shifts towards *boundarylessness* (DeFillippi & Arthur 1996), but that this

also creates a profound opportunity space. It's vital to maintain keen awareness of how formative worldview and assumptive experience leave their trace in interpretative outputs. This foregrounds how useful an attitude of behavioural flexibility is in the context ethnographic study. Recognising this was transformative but potentially risks traditional measures of validity.

This means not separating academic knowing from the rest of activity but developing cognisance of how intentionality deeply impacts the articulation of insight but also the production of outcomes and by extension the environments these are enacted into. The thematic discussion herein about the role of framings arose in response to this. The core subject matter of the inquiry thus revolves around the role of framing and the conscious process of undergoing renegotiation of these frames as a learning process. In real terms, how this can change can be achieved consciously or cooperatively as a legitimate learning phenomena. The research also foregrounds the role of interacting social worlds and the landscape of fields that makes up contemporary knowledge work. The researcher's ongoing recognition of changing conditions within their own worldview and their membership of different interacting social worlds is an intrinsic part of research activity and would be artificial and disingenuous to try to elide their impacts.

Thus, a key issue in ethnographic studies; explicating and codifying insights that takes place over multiple studies which can span multiple domains extending over significant expanses of space and time. To a certain extent, this means attempting to de-situate situated insight, by searching for general patterns and then repacking these into shareable forms, to generate mobile inscription that can be borne across organisational boundaries. The argument follows that interpretive articulation takes place via a designerly process, this makes use of continual gathering and framing of insight into strategies which take the form of artifacts and inscriptions to enact the sharing of sense.

The exchange format common to research communities is the research paper, yet however multimodal the study, ultimately insight often must be parsed into academic language, which present barriers to access. Continued faith in the integrity, utility and validity of this process remains uncertain, given the surfeit of rich multimodal strategies available to researchers and the extensive way different forms of expression and exchange have become integrated into professional and social life. The academic output parses insight into the specialised community that sets out the conventions of exchange, which may be separate to how other organisations communicate and learn, particularly communities that operate on experiential and designerly grounds. What remains unclear is the best process to manage the design of research and to attend to different forms of representation of insight so that it retains internal efficacy.

A historiography of the reciprocal exchanges between different fields of research engaged in the context of discovery, reveals changing attitudes to research epistemology. Attending to the actual practice of the dynamics of innovation reveals a surprising simultaneous diversity and unity of approaches to concept formation from the most formal scientific enterprise to the freeform looseness of creative industry practices. The suspicion follows that design methodologies don't only apply to the work of designers and those in creative practice, this is integral to the emerging scholarship on expanded design. Learning through designing is emblematic of a common interpretive process that underpins domain spanning general practices of organising. The forms of practice make use of this kind of integrative creativity to explore contexts of discovery are diverse, notably, it is this process of exchange that supports the emergence of the formal approaches that practice fields rely on. This includes an array of practices thought to be outside the traditional boundaries of design-like methods, but general to their internal activity. In the rigor-bound contexts of empiric science practices, the dynamics of social worlds, their practices of inquiry, entailed narratives and interpretive schema play a vital role in shaping their activity.

In a view of knowledge and learning that foregrounds its social nature, this interpretive activity stands as a vital precursor to the process of generalisation and formalisation that a field relies upon. The role of the researcher in this regard is to develop an awareness and ambivalence to different fundamental framings and organising metaphors and to offer viable means to transcend the distorting effects internal assumptions, pointing to new transcendent interpretive narratives. Through this endeavour, the practices of military strategists, clinical therapists, policy experts, leadership theorists, logicians, biologists and cyberneticians are placed within a common field.

3.12 **Unpacking Observational Data**

In the methods explored in detail in <u>Appendix A</u>, analogues to diagrammatic approaches are not new. Bruce et al's *Interacting Plans*, aimed to reveal relationships between social interaction structures and semantic structures using comparable analysis (Bruce & Newman 1978). Visualising the whole corpus as a networked landscape, highlighted semantic relationships in an explorable way. This method explored recently in Marie-Laure Ryan's work on Diagramming Narrative. As Ryan attests *'Narrative is routinely — and summarily — defined as the representation of a sequence of events'*. Narrative is however only one dimension of representation in which others nonlinear, potentially non-representational phenomena are nested.

'If this formula captured all there is to narrative, stories could easily be modelled by the temporal medium of language. But the physical events take place in the space of a storyworld, is a dimension much easier to represent through images than through language'. The ethnographic participation in the network was sequential and situated, however as concepts emerged, vitally, finding ways to ground abstractions from data, meant creating coherent stories that disrupt the sequence of events. As thematic lines arose, these occurred progressively and guided further attention, often via different forms of correspondence and taking place in a distributed way. Themes emerged non-locally, resultant of brokerage between different parties without mutual awareness, forming recursive loops. The researcher acts to transpose emergent insight amongst the network via telling credible stories. This narrative-making process is an intrinsic component to making sense of complexity.

The sequential experience of narrative can lead to experiences of affect which overlap and recur. Further, the narrative, when deftly crafted makes legible causal relations, which Ryan refers to as the cement that holds events in a story, which may connect temporally separate events. The narrative events *'may present a symbolic dimension, or second order significance'* which connotes a semiotic view, *'through which they are woven into networks of contrasts and analogies that transcends the purely local relations of temporal succession'* (Ryan 2007). Networks, are able to transcend linear cognition which are the classic affordance of text, literary theory refers to this as the spatial form of narrative. This methodological approach performs a transformative action upon a text, abstracting in the same way that a text often parses spatial circumstances into a linear sequence. The goal was to see non-local thematic relationships in the text, this was a strategy applied to deal with the complexity of the data set.

This interplay, transformation from one modality to another, is inherent to designerly ways of knowing.[46] Ryan traces this lineage to semiotic origins, highlighting structuralism's emphasis on synchronic systems underlying both spatial and temporal modes of signification (Ryan 2007), referring to networks of causal relations as a spatial form of narrative connecting temporally separate events. However, experience isn't only event sequences, a second order dimensional where semantic meaning interplays with events to form narrative, the progressive formation about assumptions of meaning exists in the second order space of understanding, internal to the reader. Importantly, raising the issue of legibility, diagramming is a compromise between extent of coverage and making legible, narrative acts to close off, bounding attention. Models which are richer in their formal representation are bounded to a degree in that they don't necessarily represent an improvement over single aspects. The boundary conditions of cognition itself inevitably result in perceptually unmanageable clutter, narrative acts to distil semantic patterns from expanded experience, focusing attention. However, when the diagrammatic mode offers sufficient generality and versatility, radical new ways of diagramming narrative experience are seeds of new theory.

This aligns well with prospective approaches in (Kahneman & Tversky 1973) and heuristic approaches to decision making (Kahneman & Tversky 1979). This shares lineage with Herbert Simon's concept of 'satisficing' (Simon 1996). Building vague organising imagery in this way numerically, elides the impact of subjectivity in coding procedures, before subsequent passes of interpretation. Embracing roughness also aligns with trial and error approaches (Pólya 1945).

Expanding on this approach, connecting with observed approaches to learning, we see comparable application of this to practice-led learning, the learner is active agent in interpretation of activity. Schön's frequently discusses Heuristic teaching, or coaching, often finding master teachers engaged in facilitation and learning-by-doing teaching, arguing professional education is primarily heuristic teaching. This has extreme relevance to approaches to pedagogy witnessed at Hyper Island. As Waks observes, heuristic teachers often do not appear to design their learning, instead they are guided sufficiently by their own already formed professional capacity. Summarily, Schön rejects technical rationality, stating the design field is inimical to conditions of control and distance essential to it, rejecting science as orthodox means of reflection on practice, instead placing design inquiry as the core of education (Waks 2001). Schön's conception of design as frame reflection suggests the centrality of the design situation to general education. Commensurately then, research design considering this is essential to pedagogy. This research programme attempts to draw alignments between organising

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[46] Edward Tufte (Tufte 1997) discusses the affordances of visual language on understanding complexity and Kress and Van Leuwen (Kress 2000), (Kress & Van Leeuwen 2001) discuss the multimodal literacy.

concepts found in Dewey, Vygotsky and Lewin then expanded by Bruner, Star, Bourdieu and Engeström, these have been implemented into design methods by Schön, Buchanan and Dorst forming a robust but pliant foundation for future research.

3.13 **Methodological Discussion - Social Psychological Approach**

3.13.1 *Deriving Insight from the Field*

What becomes abundantly clear through situating research in dynamic environments is the demand this places on a researcher's information processing ability. Field research presents distinct obstacles to interpretation, different streams of experience rapidly become unwieldy torrents. Managing complex interwoven flows arising from longitudinal observation is profoundly challenging, it can quickly paralyse meaningful progress and importantly, threaten validity. Objective scrutiny can degrade into subjective coping without distributing the demand amongst the community itself, co-inquiry becomes vitally important, with the researcher acting to manage interpretations into mobile inscriptions.

Classically, scientific observation contends with this through attempts to mitigate influencing factors stemming from the environment, to process the flow of signals to isolate phenomena of interest, by managing the boundaries of the environment. Often the environment itself is used to simplify and control conditions to ensure the salience of observation and vitally to ensure repeatability; the laboratory as an environment typology is designed to perform this work (Latour 1983).

For social science, whose objective is to understand the activity of conscious, interacting individuals, themselves engaged in constant reflexive monitoring, environments play a fundamental role. Rather than elide influence of ambient factors, researchers must contend with the total field, recognising that the environment is an outcome of the activity, the site onto which meaning is enacted. The activity bounds the environment, the studio is the inverse of the laboratory. Inevitably, research is a management task, weaving coherence about relational systems of meaning, parsing from vast, plural experience streams into fine threads of coherent language. To do this the researcher's attention must attend to the venue itself, particularly where the observed involves generative activity that acts upon the environment. This means integrating the impacts of circumstance by attending to environmental factors, finding methodological means to affirm interpretations about environmental complexity because this is emblematic of the activity itself.

Social psychology responds to this task, exploring how behavioural influences of actual, implied or imagine presence of others. Social psychology as scientific, empiric method refers to measurable psychological variables, social psychology relies on controlled experimentation to manipulate independent variables to examine their effect on dependent variables. Experiments, usefully are high in internal validity, their design intends to free them of confounding effects of extraneous influence, to some degree abrogating responsibility for them. However, small sample experiments are low in external validity, or the degree to which results can be generalised to larger populations, this results in a trade-off between internal and external validity. Taking cues from social psychology, field research

sacrifices the stability of variables in return for the self-stabilising effect of an appreciative system with internal coherence.

However, experimental social psychology proper find itself amidst a crisis of replication, as an empiric science, experiments require replication, various studies have shown the difficulty of this is inherent. Importantly, the design field faces comparable challenges, however design methods scholarships strongly attests to the situated nature of this kind of knowledge.

Daniel Kahneman & Amon Tversky highlighted threats to credibility faced by the field, especially with respect to social priming effects, impact of biases and environmental factors on decision-making. Kahneman's proposed solution was to create a *daisy chain* of collaborative studies to reaffirm experimental axioms the field is based on, where fraudulent studies and questionable research methods threatened stability of the field's axiomatic core. Kahneman and Tversky set about renewing psychology and economics, finding that the principles supposed by psychological and economics models that assume humans act as *rational actors* were false. Instead of being predictable, humans are predictably misguided, subject to bounded rationality, hinging on environmental factors. They *proved* that mistakes in human judgement are not exceptions but the rule, they were not focused simply on the inefficiencies of scientific practices, but the fundaments of human thought. The essence of Kahneman and Tversky's tumultuous critical collaboration was to systematically dig out the hidden biases, illusions and fallacies that wrack decision-making by exploring the impact that environment has upon it.

Herein, we make no claim to experimental validity, instead drawing on social psychology's concepts to observe highly dynamic environments to understand interaction. A key voice in social psychology, Kurt Lewin expresses the idea that the psychological environment has to be regarded functionally as part of one interdependent field, the life space, the other part of which is the person.

This fundamental fact is the key note of the field-theoretical approach; expressed as the formula; (*Be = F (P,E)* = F (*L Sp*) or (*Behaviour = Function of person and environment = function of life space*). This insight is fundamental important, Lewin discusses how shifts in this field occur with respect to situations but also with reference to time. Lewin insisted people are influenced by how they view their future not just their social and geographic environs, they are also deeply influenced by previous experience, both of which are not experimentally present.

This view insists that human have to 'plan' to structure the time perspective matching expectations with realistic structuring, noting this task is characteristic of planning tasks in general. Lewin discusses the sociological actuality of being a 'marginal man'; a person who stands on the boundary between two groups, discussing issues of belongingness or rootedness arising from changes in *lifespace*.

Lewin's pioneering approach was to visualise interaction whilst insisting that it was hopeless to link problems faced by social psychology using classificatory concepts, instead proposing a framework of constructs, inhering dynamical properties to represent certain types of interdependence, anticipating changes in psychology and social research as fields that have now become foundational. This was driven by Lewin's reliance of Gestaltist perspective of groups as wholes which have dynamic properties distinct from their elements.

3.13.2 *Re-fielding Design*

Why dig into these historical psychological concepts, where contemporary research likely provides firmer basis of action? The precepts of field theory and group dynamics highlight basic theoretical assumptions that have become deeply embedded, Lewin reveals a landscape of entities demonstrating all degrees of dynamic unity, emphasizing the actuality of aggregates of independent objects acting together to form situations where analysis into parts becomes effectively meaningless.

This leads him to define groups as dynamic wholes based on interdependence of members, via interdependent constructs rather than stressing certain phenotypical similarities or dissimilarities. Lewin acknowledges that classification becomes more difficult when only describing facts based on their effect or being affected by others (conditional-genetic properties) as opposed to in terms of their appearance (phenotypical properties). This typifies a shift away from descriptive classificatory or categorical epoch of psychology, which can be observed in the early stages of development of practically every scientific field.

However, once the basic reasoning for this is understood this has a flattening effect, replacing classification with more resilient constructions, derivations or axiomatisation of laws. Lewin presciently insisted whether a behaviour takes place relies not on presence or absence of factors in isolation but on the constellation (structure and forces) of the specific field as a whole, therefore the meaning of facts depends on position in the field, that different parts of the field are mutually interdependent, as such person and environment are part of one dynamical field.

Fundamentally, the approach forgoes picking isolated facts to later synthesize truth, the field-theoretical approach considers gradual approximation method to avoid the distorting effect of attention to isolated facts, insisting that field theoretic perspectives can and should be essentially correct at any level of approximation. Lewin's field theory sets out Group Dynamics to pay attention to the properties of a field as whole, emphasising degrees of differentiation, fluidity and atmosphere. By understanding the patternings of the total field, it becomes possible to study fundamental social constellations by transposing these into other appropriate group settings, as means to achieve generalisability. Lewin supposes it is beyond question that sociology deals with *'multitudes of coexistence*

of interdependent facts' and as such the empirical space should be recognised as multitudes of facts existing at a given time with certain degrees of interdependence. Lewin, notes how and why sociology has long been reliant on a great number of spatial concepts, indicating that in the field there is a widespread prejudicial assumption that physical space is the only empirical space, which led sociologist to regard spatial concepts as merely analogies. Fundamentally, Lewin insists that better insight into the meaning of space in mathematics and physics leads to the understanding that the social field is an empiric space just as real as a physical one. His view argues that because of the interdependence of factors, psychology could and should be understood topologically, through a language of relationships.

Contemporary developments in sociology that emphasise historical and cultural factors have muted some of Lewin's grander topological assertions as quaintly macro-sociological. However, his emphasis on aggregate entities rather than individual facts remains prescient, valid and vital to user research. The flattening effect of regarding the group field as unit of analysis has deeply influenced subsequent theoretical efforts, notably actor-network and activity theories. This view insists that the validity of social psychology should be judged not by the properties of isolated events or individuals in the field but whether the properties of the group situations as a whole are adequately represented. Thus, the goal of social psychology should be to supply reliable data about the properties of the field as a whole, placing the emphasis on the group rather than individuals. Certainly, it is reasonable to assume that intergroup activities such as learning and design can be meaningfully regarded relationally. Many contemporary sociological perspectives rely on this approach, seeing individual activity nested within wider wholes.

Researchers are tasked with rationalising and making useful what they find in the field. Both Dewey and Schön observed artisans and experts by closely examining their activity specific to a given field, from this they extrapolated insight from these practices to less intelligible higher functions that guide the activity. Schön's approach saw individuals, in constant dialogue with their contextual surroundings including other people, as the basis of expert learning and design. Contemporary views of knowledge also emphasise and extend from this situated, embodied view. The supposition follows that environmental interaction contains indicative traces of general processes that humans use to act purposefully. In this way, environmental metaphor is a principal form of analogous thinking are often used to transpose insight from situation to another. These cognitive tools can have both a concrete and abstract character. Analogous experience provides more intelligible ways to describe and evaluate general phenomena that are not directly sensible, social knowledge often has to be dealt with in this way. Experience is formulated as the ultimate determinant of knowing about the experiential ground against which knowledge is evaluated. In basic terms, this is the essence of both pragmatism and

empiricism. Analogous thinking through this view reveals the relational interactions between person and their situation, and thus provides a potent means to understand learning and design activity within the total field, by allowing synthesis between social and environmental factors.

3.14 Conditioning the field.

The central concern of this thesis is how different types of value are derived from the field of experience. A learning environment, particularly the one under scrutiny, can be conceptualised as a field from which value is extracted. Other general typologies of field, whether literal parcels of land used to generate produce in agriculture or abstract entities such as intellectual fields can be generally conceptualised as the basis for the same; human activity conditions environments so that the conditions are set for the emergence of different types of value. This is a concept that has emerged from a series of perspectives in parallel; field theories have relevance to the natural sciences, particularly in physics but these ideas have also been co-opted by social scientists. Notably Lewin, who extended Gestaltist ideas synthesising this with pragmatism into social psychology and crucially group dynamics. Field theories by continental, particularly French, social scientists such as Pierre Bourdieu were developed to explain social activity's relation to the conditions it generates. Continental field theories expanding a phenomenological tradition of Loïc Wacquant and Maurice Merleau-Ponty borrowing from philosophies of social thought of Max Weber and Edmund Husserl.
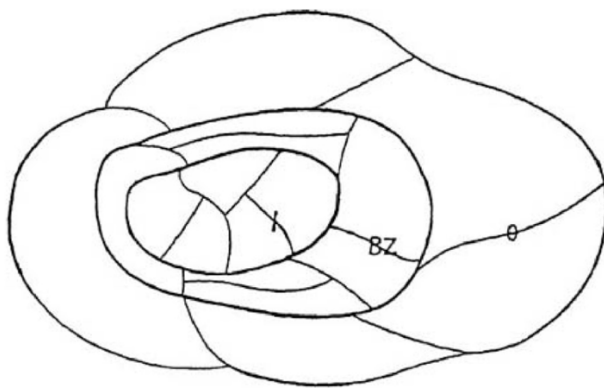
Figure 9 - Boundary Zone between two regions - Lewin, K. (2013) Principles of Topological Psychology (p.120)

3.14.1 *Anthropology from Lewin's Field Theory Perspective*

These themes chimes with Kurt Lewin's observation; *'the objects of all empirical sciences, including the objects of physics, can be experienced no less directly than those of psychology'*. Experience defies systematisation and ultimately the search for a rational grounding for activity, because fundamentally, *'a physically identical environment can be psychologically different even for the same person in different conditions'* (Lewin 2013). Physical fields conversely act as the general interrelational schemes that

permit the unification of understanding of environmental phenomena. Lewin's investigations in social field theory and group dynamics within social-psychology sought to model the relationships between the abstract activities of cognition and physical conditions of environment. The concept of fields is significant to both psychology and sociology. Field theory in sociology examines how individuals construct social fields as environments where individuals and groups interact. Field theory in psychology examines interaction patterns between individual and the total field, or environment. The relationships between the two are explored in depth by John Levi Martin, noting its ubiquity throughout contemporary sociology and psychological thought. *'Kurt Lewin's adoption of this totalistic perspective into social psychology brought field theory into a position where it was relevant for the social sciences and had implications for theorizing'* (Martin 2003). Lewin's representation of the social field has surprising resonances with the etic-emic perspective so important to anthropology, creating a representational territory where inside and outside factors interact.

The diagram above attempts to show how Lewin's field theory view provides a representational means to deal with inside and outside, this directly evokes the concept of the boundary space as psychological entities that relate abstract experience with spatial properties. The relevance for spatial fields like architecture cannot be understated. *'The relation between boundaries and boundary zones is similar to that between points and more-dimensional regions. As we have seen one can sometimes use a point to represent undifferentiated regions. It is clear that in a similar way a boundary can stand for a boundary zone which is not differentiated in depth. One can always proceed later to a more exact representation by means of a boundary zone'* (Lewin 2013).

Furthermore, Lewin explored different properties of these boundaries and boundary zones, discussing their relative sharpness or porosity. Lewin discusses abstract and physical boundaries as interoperable. This perspective is useful to understand relational characteristics of activity, noting that boundaries and boundary zones can have different dynamic properties, acting as *barriers, boundaries which affect communication, boundary zones which can be passed only with difficulty and zones with undetermined quality* (ibid). These boundaries can be material or conceptual, local or non-local, it's important to recognise Lewin didn't feel he was dealing with actual entities but representing patterning general to interaction. Critiques later thought Lewin's theories quaint as sociology progressed and shifted its palette of concepts due to understandable misperception it conflated social and physical entities rather than examining their relations. Lewin's theorisation has retained relevance by becoming tacitly embedded methodologically into psychology and into the practices speciated by group dynamics, namely participatory action research but also by extension facilitation, which Lewin and his cadre arguably stumbled upon through the explorations with the T-group.

The Zone of Proximal Development

'Therefore, the zone of proximal development – which determines the domain of transitions that are accessible to the learner – is a defining feature of the relationship between instruction and development.

Concepts restructure and raise spontaneous concepts to a higher level, forming their zone of proximal development. What the learner is able to do in collaboration today, he will be able to do independently tomorrow'

Vygotsky, L., (1934) Thinking and speech. L. Vygotsky. In R. Rieber & A. Carton (Eds.),
The collected works of Lev Vygotsky, Vol. 1 (N. Minick, Trans.). New York: Plenum, 1987. New York & London.

Cannot do even with guidance — ZPD — Can do alone without guidance

The Zone of Proximal Development

Cannot do even with guidance — ZPD — Can do alone without guidance

The Zone after learning occurs

COMPLEXITY — Confused — Disengaged — LEARNING LEVEL

Path through learning continuum

Diagrams adapted from Shabani, K., Khatib, M. & Ebadi, S., (2010) Vygotsky's Zone of Proximal Development: Instructional Implications and Teachers.

Figure 10 – Zone of Proximal Development (adapted from Vygotsky)

Lewin dealt with boundaries enacted in space to understand learning, examining conceptual and material interlinking. This is also featured in activity theory, Vygotsky made zones and their boundaries intrinsic to AT (and later CHAT) by introducing the zones of proximal development; to denote the relation between instruction and development. Given the emphasis on self-guided, group-oriented and increasingly autonomous (*heutagogical*) learning relationships observed in context. It's worth thinking about how this model is restructured in group learning settings. Bruner was influenced by Vygotsky's concept in the development of scaffolding.

Lewin's view was that psychological knowledge was inherently social but interaction could be usefully represented topologically, because experience takes place within and because of environments with knowable form and shape, and with persistent characteristics. This attempt to mathematically systematise and represent psychological experience in relation with environment is evidenced his conceptualisation of life-spaces. It reveals the relationship between an inside and outside separated by a boundary, which often has its own features that acted like spaces; boundary zones. Even though Lewin's theory now might appear too general to be meaningfully specific, these contributions are durable; that organisms (whether person or animal) are first of all within a phenomenological life-world; that is, the world as it appears to them. This view insists this lifeworld is intrinsically *affective*, stimuli are immediately perceived as desirable or undesirable. Lewin's field theory proposed that organisms are free to move about in the field (Lewin frequently confounded movement within the

field with movement in space, because the two frequently correlate). Finally, that the organism has conception of likely changes in the field, changes brought about through motion or by internal development in the field itself, which may or may not involve interaction with others in the field (Martin 2003).

4 Case Study & Analysis

4.1 **Pilot Studies**

The early stages of doctorate research involved framing a research approach and being embedded in co-creative, interdisciplinary research teams. This approach took in two principle interlinked streams which informed the subsequent primary research - *1. Applying design practices, in this case film-making, as active research methods embedded in research projects. 2. Applying design methods and practice to futures research, also using film artefacts.* Both streams were characterised by attempts to combine design practices with social research methods to derive original approaches. This design research-led approach led to social research methodological reconfigurations and innovation that became integral to the primary study. Although design tools such as film-making were later deemed incongruous with the primary social research site, the principles and epistemological perspectives derived from these studies were fundamental and formative of the perspectives that are the contributions of this research overall.

4.1.1 *Narrative-making as Research Method*

The origin of these engagements was serendipitous. As a practicing documentarian, I was asked to film a workshop, a simple, passive recording of activity about projects, this led intuitively to more active engagement and the development of a practice at the intersection between social research and design practice, specifically applying film-making and interactive design approaches.

The documentary production process entails a designerly attention to content generation but also crucially conduct within situations. The narrative-making and editing process provokes reflection-in-action, this led to a reframing of my professional practice, the formation of an active, bespoke research method.

Applying these practices purposefully to make sense of collaborative activity whilst embedded in research projects involves the formation of coherent narratives. This practice implies weaving threads together from participatory observation in a way akin to applied anthropological research approaches, borrowing principles from a long lineage of anthropology, particularly applied ethnographic (Rouch 1975) and ethnomethodological methodologies (Knoblauch et al. 2008) which happen to be sensitive to film-making. Interpretive methods foreground need to synthesise the researcher's outsider perspectives with the perceptions of insiders. This realisation was pivotal, inspiring the methodological approach; a primary boundary of research is also that of cognition – the *etic / emic* boundary (Harris 2017). Digitization legitimizes video's acceptance as subjective and reflexive form of qualitative data production, methods based on photography and video are now integral to inquiry in major research fields.[47]

Narrative-making is thematically central to organizational theory (Browning & Boudès 2005) connected with sensemaking (Snowden 2003), relevant to the social psychology of organizing (Weick 1979) and narrative methods within organizations (Boje 2001). The sociality that narrative formation entails, which these methods harness, makes them indispensable research tools, yet the complex subjectivity and cognitive acrobatics involved shape them methodologically.

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[47] Including sociology, health and nursing studies, educational research, criminology, social and cultural geography, media and cultural studies, discursive and social psychology, management and organizational studies, political science and policy analysis (Knoblauch et al. 2008).

4.1.2 *Worldbuilding*

The internal logics of time-based media like film and video lend themselves decidedly to being a world-building practice, joining with a rich cosmology and literacy, often creating space for philosophy and radically inclusive social story-telling. Uniquely, the production process parses activity through the camera, the edit suite and ultimately the film-maker acting as prism, refracting the colour of experience into a coherent beam through which audiences glimpse spectra of experience bearing detailed information about the affective and embodied dimensions of experience alongside auditory, visual and textual transmissions. Broadly, these experiments group with multi-method approaches to research and visual analysis. Interaction on film constitutes a proxy for situated observation, parsing perceptions through the interpretive faculties of the subject group but also the film-making team. Producers are trusted to interpret footage, time-based media is suffuse in affective detail, editing focuses attention on discourse and interaction, effectively gathering qualitative capta.[48]

4.1.3 *Schematic Exchange*

As in documentary so also in research; interviewer and interviewee frame one another terms of concepts and conceptual structures that can contribute to an emerging narrative, which the interpreter forms out of elements from their own subjective field of experience (Soini et al. 2011).

Interviewing, as method intrinsic to social research is recast not as descriptive reportage but as a means to illicit insight whether perspectival and perceptual – relevant here geographer, Kevin Lynch used interviewing to both capture an *'image of environment'* and *'systematic examination of the environmental image evoked in trained observers in the field'* to illicit a basic concept of imageability in urban environments (Lynch 1960). *Co-opting Lynch's concern for interplays between internal perceptual images and the imageability of environments, we see strong relationships with social science's concern for mutual intelligibility* (Winch 2008). To understand collaborative interaction necessitates the researcher cultivate then manifest the *inter-view.*

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[48] In the phenomenological sense, Capta is not data as we typically understand data – 'Capta is "taken" actively while data is assumed to be a "given" able to be recorded and observed. From this distinction, a world of differences arises. Humanistic inquiry acknowledges the situated, partial, and constitutive character of knowledge production, the recognition that knowledge is constructed, taken, not simply given as a natural representation of pre-existing fact' (Drucker 2015). Capta represents what is seen, thought and felt, it is 'data of the conscious experience' from a phenomenologist perspective. Summatively, in sensitive inquiry, active listening in context is pivotal, and ultimately data is taken and conformed to the frame set out by the inquiry. The chosen framing; *boundary*, when identified began to influence the frame through which how interactions were cast, providing a lens through which to evaluate experiences, however that is not to say this didn't have some skewing effect on the inquiry.

4.1.4 *Research embedded in Practice*

Applying these narrative methods applied to research projects foregrounded particular themes about how collaboration actually occurs, which are subject matter independent. Applying production processes in order to design and realise outcomes brought practice-based contributions into view with relevance to design research methods. Together, the practice was useful means to embed in complex collaborative research projects, providing a feedback loop to make sense of complex multi-party experiences. For these case studies, we embedded in several projects with a common team and overarching research direction – *citizen driven innovation* (Lancaster University 2015).

Film production involves organising whilst gathering data, designing situations that allow novel combinations of subject and contextual environment realise sensible narrative outcomes that mean something beyond the formal verbal reading, film provides venue for rich multi-dimensional worldbuilding which can be applied in a surprisingly broad range of ways. Interaction design techniques were employed innovate in the way publics engage with public research, creating expanding flexible narratives artefacts that invite decision-making from audiences to tune content to their immediate interests or concerns. The objective to expand how film-worlds could be used and interacted with both within the project as organising strategies but also as part of a continuum of science / research communication underpinned this research-through-design.

Characterising novel design principles derived from citizen and stakeholder engagements, we experimented with the properties of boundary-objects, specifically interpretive plasticity to support intercommunal negotiation and brokerage. This acknowledges how different communities may hold different meanings for common artefacts. These design experiments were explored as means to integrate narrative both between collaborators and across projects, to generate open, networked and complex narrative structures and to explore brokerage as an integral aspect of contemporary research.

Producing films involves formation of coherent *storyworlds*, via interpretive methods, this practice-based research outlines a unique narrative-making practice. Film production blends complex technical processes with sophisticated cognitive faculties to create multi-modal sensory experiences, which are uniquely mobile and shareable objects. Film benefits from an expanded literacy; watching, rather than reading affords a different kind of access, demand on attention and cultural response; people innately understand film and can intuit complex inferences about interaction, in ways which they may not in academic texts.

4.1.5 *In the Edit*

Cognition in editing is an exceptionally sophisticated technically rational and affective interpretive activity. It holds as a significant standalone research approach, as explored by (Goodman 2004), with special relevance to interaction design by (Y. Rogers et al. 2002) and with relevance to multisensory ethnography (Pink 2007). The origins of filmic ethnography stem from Jean Rouch who developed the practice of *shared anthropology* (Rouch & Feld 2003), which insists inherent sociality in forming narrative accounts. Editing expertise implies cognitive activity that blends planning, interpretation and design activity. Editors experience exceptional demands on their cognitive faculties, arguably glimpsing the thresholds of their ability to apprehend and integrate multiple streams of experience (Murch 2001). As Murch reflected, editing practices may reveal clues about general mental syntaxes evident in embodied cognition. Editors are confronted by the boundedness of their cognition, yet via forming a distributed system with an apparatus, cohere fictive, narrative accounts into mobile things, which can act as common information spaces (Bannon & Bødker 1997) or inscriptions acting as *immutable mobiles* (D. Jones 2005). Moreover, the complex technical assemblages of editor and technical apparatus may exemplify a situation where a socio-technical system rather than an individual mind should be regarded as its primary unit of analysis (Hutchins 1995). This says much about cooperative performance in situations where technical apparatus such as digital tools are present.

Existing digital editing environments are complex tools which are examplars of advanced user experience design, yet are often poor at attending to actual cognitive tasks involved. They enact the role as an external adjunct to internal faculties in the organisation of time-based resources. Within capability driven constraints, editing forces certain types of organising yet within this, allow for plurality of creative practices and decision-making styles. The rigidity of interactions within editing software often forces operators to enact decisions performatively and intuitively. Operations which have their basis in material actions, are rationalised creatively to circumvent constraints. These tool-mediated practices condition certain affordances, channelling intuitive decision-making along technically-rational runnels, the materiality of the medium provides an environment that conditions decision-making, often applying skeuomorphic (or mimicking physical object or in this case action). The linear, planar nature of the medium inhered into syntax of cuts, interlinking functionally disjunctive interruptions via cuts to cohere different incidents, encoded into content streams, into intelligible constructs.

Film, video and interactive outcomes are representations that reconcile vast discontinuities of experience, jumping between sites and perspectives, following a subtle tacit syntax often illegible to the viewer. Yet somehow, eventually passing smoothly through the interface of the screen in the visual literacy of actually watching film, audiences are nonetheless able to seamlessly recohere these

fragments and discontinuous jumps into the continuity of experience. When experiencing narrative, we enter worlds that the brain experiences neurologically as just as real as any other environment (Oatley 1999), (Mar & Oatley 2008). Films create an immersive *'believing spaces'* venue for vicarious experiences, notionally causing change in understanding. The art of editing is to make this intricacy disappear, leaving space for highly flexible interpretive experiencing.

Intriguingly, narrative-making and interpretive research align, they can act as venue to reconcile disparate perspectives and experiential difference collapsing lengthy temporal experience into generalizable pattern. Film research, properly reconfigured, represents the opportunity to establish distributed joint fields, that integrate concerns of researcher, participant, producer and public. The notion of joint field, explored in creative production contexts, suggests means for mutual intelligibility to support collaborative envisioning (Nandhakumar & Panourgias 2013). Design cognition, whether producer or coder blend cues from multiples ill-structured cultural and contextual sources, restructuring their environment via congeries of artefacts to share organizing concepts and emerging co-evolving states within problem-situations.

Shooting and editing requires prolonged attention and multiple interventions over time, interspersed with reflective activity to define how to elicit relational connections amongst disparate representations in such a way that will be sensible to audiences. Here, editing as mode of inquiry is conceptualised as a practice strongly allied to interpretive research, specifically the coding methodologies applied in Grounded Theory; thematic insights emerge through active immersion in fields of 'data'.

This relates to Banathy's discussion of Nadler & Hibino's (1990) field types of design (A&B). Differentiating between the *doubting game* played by design experts and the *believing game* played in social systems design. Doubting (field A) involves design experts engaged in thorough problem diagnosis and definition, leading to problem analysis followed by formulation then evaluation of alternatives and display of preferred solutions. Conversely, believers (field B) commit to openness and search for an ideal, through a subjective and flexible approach, seeking deep experiences and expanded purpose, readily listening to participants for directional cues, refraining from doubting, holding that no proposed situation however impossible at outset is to be abandoned.

Believing, in this context, doesn't elide critical thinking, instead, by treating fictive worlds as actual, opens them to meaningful thematic analysis. Incisively, concept formation, intrinsic to the act of innovation, arises via imaginative recombination and blending. This insight, increasingly supported by empiric neuroscience, shows how design cognition exploits predictive, anticipatory structure of human cognition to realize the *yet to be.* In detail, human cognition is bounded and situated, but cognitive environments have the capacity to become unbounded, via design.

At high-level, cognition operates at fundamental, neurological level through predictive error minimization (Friston 2010) which harks models of predictive thought (Hohwy 2013). This view assumes that the continuous process of learning about the world involves *active inference*, which involves at a neurological level, the fielding of micro-hypotheses about differences between expected and actual inputs. Prior events form an experiential field that afford the faculty to anticipate and therefore, plan. Disruption in expectation results in neurological restructuring or reinforcement of structures, or learning. Necessarily, the granular functioning of this should be subject to proper empiric study, however it's sufficient to indicate how the modes of cognition integral to advanced professional practice resonate with research perspectives from empiric neuroscience. The way this innate anticipation and enactive restructuring of the perceptual environment are enacted together signifies important aspects of how design cognition operates both in its mundane and specialist forms, which point to novel foundations for cognition and learning native to design.

Symbolic interactionist Bruner outlines two modes of thought – the *paradigmatic* mode affording the anticipatory power of prediction by setting up and testing hypotheses about the nature of reality, contrasted, the *narrative* mode which acts to organize complex, ambiguous worlds of human intention and action into a meaningful structure. Though complementary, these modes aren't reducible to one another, arguing each isn't an emergent property of the other. Bruner indicates *'each of the ways of knowing, moreover, has operating principles of its own and its own criteria of wellformedness. They differ radically in their procedures for verification'* (Bruner 2009). Therefore, paradigmatic arguments and narrative stories cannot be judged by comparable criteria. Effective paradigmatic explanations accurately predict observable phenomena, effective narratives meaningfully capture shifting contours of lived experience (Adler 2008). Brendel distinguishes between causal explanations (paradigmatic) and meaningful explanations (the narrative), however both are integral to interpret human experience.

It's crucial to distinguish causality and relational perception to achieve generalizable validity (achieved via scientific methods), but envisioning and imaginative construction of inscriptions drives how knowledge generated then mobilized amongst expert communities, each is unable to operate at the exclusion of the other. The difference is that narrative representations, the outcomes of design activity whether artefacts, frames or worlds, act as entities with epistemological status which go on to structure the environment and the causal relations they afford.[49] Inscriptions form the basis of the transactional shaping of perceptions that professional field rely upon to propagate.

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[49] Not in the sense of altering fundamental properties of environment, but the systematic perceptions we have towards them.

4.2 Stability & Change

The restructuring activities common to design operate on perception but also entities that occupy their surroundings, this is subject to radical and rapid change. Hence, Markova's dialogical perspective on social knowledge shifts away from assuming stability to a paradigm which assumes the foundations of knowledge are in constant flux. *'Theories of social perception are based on the idea that humans, in their desire to control and predict the world in which they live, tend to explain social and natural phenomena in terms of relatively stable attributers (eg. Heider 1958, Schutz 1972)'* (Markova 2003). As such, this epistemic framework provides a more apt basis for practices pointed at reframing and restructuring activity, such as Design.

Markova argues it is not that change as a social or psychological factor is ignored, there is vast body of literature and research findings about social change and it's causes. However, critical to Markova's argument is that fundamentally the criterion of the study of change common to existing social science, is the state of stability. Where stability is presupposed, this conditions the research questions and approaches that are consequent. Markova notes *'we do not have theories of social knowledge based on the concept of change'.* Noting similarity to Schön's (1970) argument that the belief in the stable state is pervasive, noting how belief in stable states are central, because they act as *'bulwark against the threat of uncertainty'* (Schön 1970)[50]. Together, these perspectives point to the need to establish methods apt to respond to changing social systems, founded on the assumption of instability rather than stability of phenomena – this means relinquishing ideas of prediction and control in favour of the capacities of active learning and design.

A corollary research stream forming the precursor research of this doctorate explored this very topic; how the shifting future is dealt with especially by design. By exploring the research on how speculative design approaches allow designers to recruit future states as part of the material of present situations, the research unpacked the operations integral to existing futures research, reassembling it. Applying highly situated social knowledge about change as the foundation to support better research into potential futures – the master assumption – that design engages in shaping and navigating toward future states, that the future is designed not predicted.

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[50] *'There's no established institution, moreover, which now feels adequate to the challenges which confront it. Institutions which were developed in the late years of the 19th and the early years of the 20th century find themselves threatened by complex changes that are now under way'* such that *'Consequently our responses to attacks on the stable state have been responses of desperation, largely destructive, and our need is to develop institutional structures, ways of knowing, and ethics, for the process of change itself'*
Schön (1970)

4.3 **How the Design Field Anticipates**

When certainty is exchanged for the assumption of change, what's lost by relinquishing fixity is gained in generative potential. Shifting the field assumptions at work opens up the potential for novel methods and methodologies apt for responding to change. A field particularly well equipped to respond to change has become increasingly relevant to design methods – generally, design futures and particularly the practices of Design Fiction. Whilst these approaches risk compromising stability of workable hypotheses fundamental to research practice (for validity and generalisability) which are the first principles of scientific endeavour, the activity of this specialist field has different objectives. Crucially, design methods are not meant as replacements for rigorous scientific methodology but as complimentary, precursor engagements with the contexts of discovery, this is well acknowledged in the philosophy of science (Lakatos 1976).
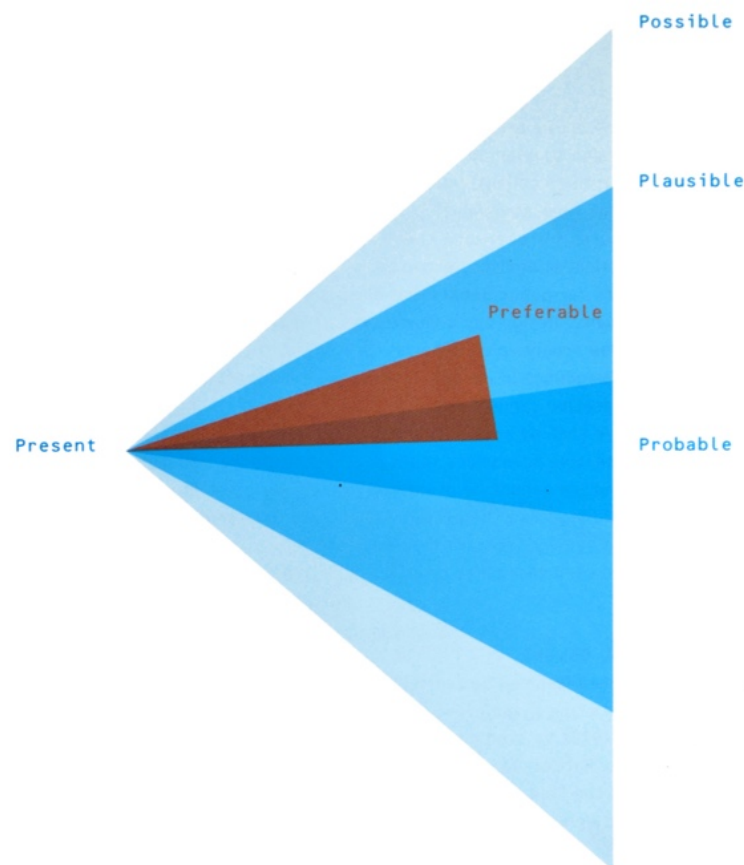
Figure 11 - The PPPP Diagram, Dunne & Raby's adaptation of Futures Cone form (Hancock & Bezold 1994) in (Dunne & Raby 2013)
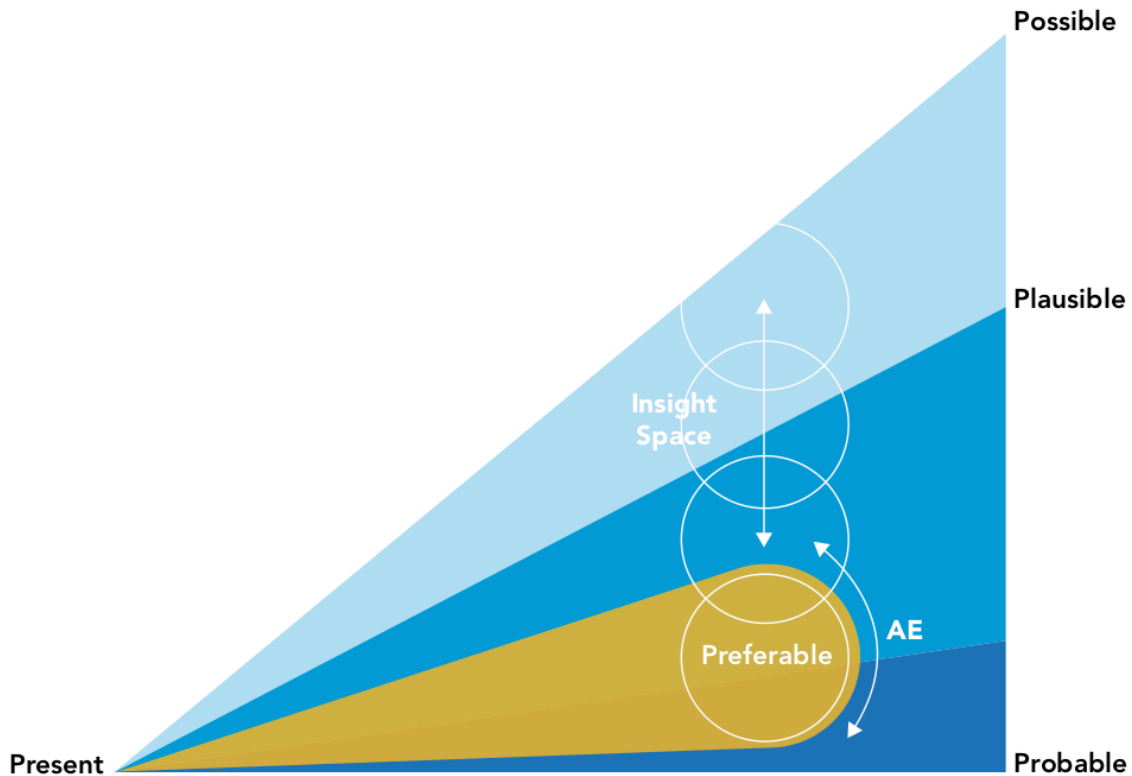
Figure 12 (right) - Anticipatory Ethnography (Lindley et al. 2014)

This parallel research stream explored how to reconfigure speculative design methods by allying them to more orthodox social research methods, in this case ethnography. The *futures cone* stemming from (Hancock & Bezold 1994) represents a futures taxonomy (Henchley 1978) revealing how design methods could be used to meaningfully anticipate (and realise) change. Through several research investigations a novel practice emerged; *anticipatory ethnography*. The outcome of a design research approach, AE was a composite of ethnography and design fiction methods. The principle was to treat future envisioning, especially of design or cultural artefacts as having the same status as situated environments. Equivalent to ANT's (Callon 1984) (Latour 2008) manoeuvre to flatten primacy of relations between human and non-human element in networks, AE flattens time, assuming that social perception towards the future is grounded in changes in the present. In other words, it assumes the future isn't predicted, but consequent of circumstances, function of decision-making and contingency. This manoeuvre was meant to better equip design methods practice towards futures work by grounding it in knowledge and methods translated from legitimate social research. For the tasks of gathering social knowledge, insight and perception are seen to act as the foundations for research into over-the-horizon issues encountered in design innovation settings. The outcome was a suite of robust methods particularly sensitive to perceptions and social knowledge encoded in design artefacts.

These methods sought to ground decision-making in situated insights to frame the *'band of preferable courses of action'* which extends out from the present into this spectrum of possible futures. AE was seen not as a predictive method, instead as means to learn about the implications of design, by situating a future situation (in the form of design artefact, to which film is particularly suited as a venue for narrative *worlding*) in the present and then subjecting this to analysis. By designing situations for participants to experience the implications of plausible technological change then scrutinising their perceptions provides a grounded, if proxied authority to support futures research. This was seen as means to amplify its potentials whilst mitigating some the more fanciful, predictive imaginings associated with speculative design envisioning.

The role of these anticipatory approaches is to apply design methods to create proxies of potential futures situated in the present, then to explore their implications by applying techniques derived from traditional research methods. Design has the potential to temporarily suspend disbelief, to open then explore new fields to examine their utility as potential directions and to generate novel activity to navigate toward preferable states. This plays a *believing game* that hinges on the innate interpretive expertise of individuals to discriminate verisimilitude and likelihood in their action even whilst inhabiting fictive *storyworlds*. By exploring the interplay of meaning in these speculative, temporary fields, the implication of near field decision-making implications can be evaluated. Blending the emergent potentiality entailed in design concepts to facilitate insightful dialogue about future states. Paraphrasing Evans (2010), designers integrate the future as an intrinsic aspect of their design practices. As a means to naturalistically intervene with existing situations through dialogues, design methods that can anticipate the implications of decision-making are an important expansion of the design field and integral to the task of developing theories of social knowledge based on the concept of change itself, founded on the assumption of instability.

The potential advantage of this approach is well encapsulated by this modification of Dunne & Raby's PPPP diagram (*possible, plausible, probable, preferable*). Our contribution makes the addition of a wedge, a course of action, overlaid onto Dunne & Raby's idealised representation of the territory of a problem situation moving from a changeable present outward (Dunne & Raby 2013). The original model assumes the durable stability of the present, and in so doing assumes consensus about the present which in practice is lacking, as with any dynamic system the starting conditions are absolutely critical, any concerted scrutiny of present states will find interminable complexity held in differences of perception and assumptions based on situated experience.

By situating a plausible future in the present in the form of a design artefact then unpacking liminal consequences of achieving that state, forms a reasonable basis to delineate a course of decision-making built from actionable insight that would lead to that state. Simultaneously, by having partially rational

albeit ecologically rational foreknowledge from exploring situated perception affords the design strategist or researchers the ability to engage in limited corrections to courses of action, not based from a fixed starting point but distributed and polytelic circumstance.

Arguably, this relies on a systemic view of the problem situation rather than assuming systemicity of the world itself, the consequences of systemic perception in design situations is after all, systems. Instead, methods of deriving systemic perceptual schema are approached systematically by drawing on core propositions of abductive methods, that design proceeds by satisficing. Speculative artefacts situated in the present provide a meaningful way to deal with social and technological change, without assuming stability, instead relying on the cognitive capabilities of persons to empathise and perspective-take, parsing contingency and complexity into heuristic decision-making that feels authentic, simply via experience of narrative worlds.

Empiric neuroscience exploring why humans are so adept at this process is now reaching a position of orthodoxy in psychology, cognitive and decision-making science and psychology (Mar 2008), (Fauconnier 2008) and (Proulx 2009). Notably, the ways in which abductive inference and environmental factors impact on decision-making has become integral to contemporary understandings of cognition and behavioural activity, especially under risk in contingent (read unstable) conditions (Kahneman 1973). Building on Kahneman & Tversky's work which assumes environment impacts decision-making, design activity requires an additional loop as it engages in the practice of constant environmental restructuring. Thus, in ill-structured procedures, which almost all design is, the procedures of environmental restructuring are of pivotal importance.

Incidentally, these understandings are particularly aligned with approaches common to design methods and have strong cognate principles in experiential learning theory, but also share assumptions with systems theory and agile organising processes. By instituting methods to navigate zones of preferability as actually territories, rather than only imagined states, design methods are usefully positioned to blend differentiated perceptions into joint fields. This insight requires design methods to reorient themselves with the practices of brokerage. Furthermore, this recognises that rather than only a form of specialist expertise, abductive design-like cognition is much closer to everyday cognising, commensurate with social constructionist perspectives detailed by Erving (1959) or Berger & Luckman (2011) but also aligned with design theorists Shove (2007) and Norman (2013) which explore mundane acts of designing. Fields that inure design methods with social research and vice versa, exemplified by design ethnography as an emergent joint field (van Dijk, G., 2011) provide a powerful way to anticipate rather than predict the consequences of decision-making. This subtle shift towards assumptions of change opens design research to intriguing new territories. As methods are further embedded into traditional organising processes, it unlocks their potential to reshape the field

of inquiry across scale – interlinking local and global levels. A simple proposition that; fields in themselves are dynamic and scalar interrelational structures that are fundamentally subject to change, retools design methods to account for their impact, whilst taking care to ground these in situated social knowledge. This is suggestive of expansion of dominant user-centred perspectives, stemming from Norman, adapted by Kling (1977) now finds favour in contemporary organisations, decentring design toward an increasingly situation-centred shift in the design field, which would see design methods as integral the organisation of fields themselves. This is the basis of Argyris & Schön's Double-Loop Learning (1996), but see these loops as much closer to action rather than discreet, sequential processes. This rapid, iterative looping of perception and appreciation able to consider circumstances and mind-states of collaborator (or antagonist) together is a foundational principle of the OODA loop, Boyd's analysis of competitive decision-making. Boyd's framework assumes the necessity of creating advantage by compressing time. To get inside the decision curve of both the co-operative team but also the antagonistic manoeuvres competing operators, to regard this compounded, systemic perspective as a necessary environment for decision-making, but to train do this continually in the rapid flux of contingent experience (Osinga 2007).

Arguably, by inhering knowledge derived from social theory, applying learning from boundary object theory to institute dynamic coordination and interaction, sets out a means to engender wholly new forms of innovation, a cooperative alternate to Boyd's conflictual account. This thesis and supporting research establish means to equip research-through-design to derive practices that are adept to learning in boundary-like spaces, where different thought-worlds, communities and fields intersect and interact.

A simple starting assumption, that each situation contains the potential to act as a resource to explore the implications of further decision-making is usefully generative but also ecologically rational. At each moment of interaction, information concerning anticipation of the prospective impacts of decisions can be elicited, influencing how the problem situation is framed conceptually and may co-evolve. This can be approached simply and may only have incremental impacts initially, but tiny 'angular' adjustments in orientation are amplified as design processes proceed, the framings that expert designers seek guide decision-making allowing navigation. These systemic course corrections share much with cybernetic imaginary of the helmsman, who is able to integrate the present state of a system (tiller, ship, sea state) with potential state (destination) through continuous feedback. Modifications to interpretive schema, (or problem set) whichever way these are apprehended, provide shaping influences upon how particular causal chains are enacted leading to anticipatory modifications of potential outcomes. This shifts the imperatives of decision-making from predictive control to anticipatory dynamic coordination.

4.3.1 *Design Fictioneering*

This conceptual model of the future is not new, it stems from foresight studies and follows a particular spatialisation of time-space into potentiated space. The work on anticipatory ethnography differed in a crucial way by allying traditional methods drawn from anthropology and applying these to speculative prototypes or representations of speculative worlds in the form of design fictions; as film worlds; objects or nested systems of speculative material were treated as though these situations were as *real and actual as any other research site.* The logic of dealing with imaginaries as legitimate sites is as follows; Design fiction uses *diegesis*, it creates diegetic prototypes within *storyworlds*, in the words of Bruce Sterling, to *'suspend disbelief in the future'.* The implication of this phrase is that the *diegesis* of any particular design fiction should describe the future in believable terms i.e., in terms that are suitably mundane as to allow the audience to become 'situated' in the diegetic reality of the design fiction. In this way, *diegesis* serves to *situate via proxy* (Lindley et al. 2014).

Of course, in practice, paths through the territory of problem situations in any sequence of purposeful decision-making are fraught with contingencies and factors stemming from the complex and turbulent causal texture of the terrain it takes place within. An important caveat to this is was apprehended by Woodward who, paraphrasing Plato, warned professionals and scholars engaged in organisation change against the myth of turbulence, concluding with a *'general caution against uncritical or narrowly defined notions of turbulence. To paraphrase Plato, the unexamined turbulence is not worth living with. It distracts attention from real and particular problems* (Woodward 1982).

4.4 Synthesis of Supporting Research

The creative practices of film-making and editing provide apt metaphors for how design cognition is both private and social, deeply mundane and subject to expertise formation. As Norman (2010) indicates,[51] design learning is beset with challenges as the design field expands and design methods mature from their origin in the production of physical artefacts. The consequence of design practice becoming the subject of research are that methods and knowledges inherited from donor fields actuate change to design action itself. Frayling's taxonomy of design research; *for, through* and *about* design reveals subtle complexity in the design field, noting how through transition from regard as a speciation of scientific methods to a parallel discipline, design methods differ from those of science in that *'method may be vital to the practice of science (where it validates the results) but not to the practice of design (where results do not have to be repeatable, and in most cases, must not be repeated, or copied)* (Cross 2007).

Theorists such as Buchanan, Cross, Frayling, Freidman and Dorst have reframed the design field as its situations have changed and as it has changed situations. Schön, who developed his theory much as a social scientist does *'explicitly challenged the structured doctrine underlying much of the 'design science' movement, and offered instead a constructivist paradigm'* (Cross 2007) and in so doing proffers why design lends itself to complexity as a theory built upon the assumptions of instability - *'I begin with the assumption that competent practitioners usually know more than they can say. They exhibit a kind of knowing-in-practice, most of which is tacit... Indeed, practitioners themselves often reveal a capacity for*

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[51] Here in full, Norman outlines the changing role of the design field and designers as their application diffuses *'In the early days of industrial design, the work was primarily focused upon physical products. Today, however, designers work on organizational structure and social problems, on interaction, service, and experience design. Many problems involve complex social and political issues. As a result, designers have become applied behavioral scientists, but they are woefully undereducated for the task. Designers often fail to understand the complexity of the issues and the depth of knowledge already known. They claim that fresh eyes can produce novel solutions, but then they wonder why these solutions are seldom implemented, or if implemented, why they fail. Fresh eyes can indeed produce insightful results, but the eyes must also be educated and knowledgeable. Designers often lack the requisite understanding. Design schools do not train students about these complex issues, about the interlocking complexities of human and social behavior, about the behavioral sciences, technology, and business. There is little or no training in science, the scientific method, and experimental design'* (Norman 2010). Signposting towards the synthesis of this thesis – I have come to regard this this phenomena as akin to the titular process of **Fielding Design**. As design methods and consequently their teaching and practical application become equipped to work in new territories, so novel potentials of design have need to come to light – Consequent of design's facility as a mode of direct intervention with action and structure in contemporary problem situations, the nature of its practices, for example how it derives knowledge whether material, social and environment, also shifts. Reframed as an expanded field concerned with integrative expertise, brokerage and collaborative negotiation, design retains its roots in autership, artisanship and artefacts but takes on new responsibilities which have to do with relational knowledge about change and consequently interrelations between people, groups communities and fields. Thus, by unpacking this mutually constitutive process, I have come to characterise this practice as **Design Fielding**. Through engagement with brokerage practices and the formation of integrative expertise via exploring the intersection between methods and domains, this research explores how design activity enables joint fields to arise, which act to directly respond to incommensurability in problem-solving and decision-making that design practices inevitably encounter and that the design methods movement has traditionally taken the mantle of as its core value proposition.

reflection on their intuitive knowing in the midst of action and sometimes use this capacity to cope with the unique, uncertain, and conflicted situations of practice (Schön 1983 in Frankel 2010).

Whether brokerage at social or technological boundaries in collaborative research for innovation or exploring the ways that design practices can interface with research methods to ground or situate encounters with temporal horizons beyond which indefinite potentials of future lie. Through research engagements at frontiers, this early research allowed awareness building about my own practices as designer, the expanding role and challenges faced by design and expansion of the field of design itself. Revealing a complex territory, this research set in place patterns of inquiry and transformed my understanding of design, beginning with the ambiguous lens; *collaboration at boundaries* resolved meaningful work unpacking how design can function meaningfully at the junctures between fields as an inter-field practice. The pilot studies, although exploring quite different domains, both apply design knowledge to resolve directions upon identification of a joint field, this says something about the nature of the practices themselves and point to clues in how cognition is actually enacted in real world situations.

Practices devised to account for unstable or ill-structured situations, tend to be highly coupled to conditions encountered in environment, comparable to reflective cycles seen in experiential learning notably (Kolb 1984) and (Gibbs 1988) that assume tacking back and forth between internal (thinking) and external (acting) states. In strategic decision-making, Boyd is notable in characterising a tightening conceptual spiral where the cognisor internalises a model of an antagonist party in a dynamic situation and by outmatching their cycles of adaption to achieve supremacy (Boyd 1991), an example where this looping of cognition / action takes in aspects of the cognition / action of others. These kinds of looping cycles are part of a continuum of schema that assume movement across a primary boundary between thought and action, the preposition that transfer occurs from outside to in, notably these are often regarded as characteristically individual rather than collective processes. Even where reflective practitioners work together, their abstractions are assumed to be individual and internal, which then must be brought again into the field of play. An emerging theory must thus prioritise the cooperative aspect of cognition. Scholars of practice, Buchanan and Coyne argue against dichotomy of theory (head) and practice (hand) which falls along these analogous boundaries, declaring theory is actually only a form of practice. By extension, the functional dichotomy of person and group is eroded and their mutually constitutive interrelations are reemphasised. Expanded Design, properly configured, must be situated at these liminal sites, and evaluated on its capacity to equip individuals and groups to perform effectively as the emblematic lynchpin providing the central cohesive source of support and stability in otherwise unstable territories. Through this, we glimpse expanded design's envisioned mandate for leadership but also directives for future design education.

Another Buchanan argues this gets at the limits of approaches derived from positivist perspectives, stemming from misperception of the nature of natural processes (*theoria*) and social practices (*praxis*) which assumes knowledge is contingent and contextual rather than universal, determinate and invariable. This perspective is attributed to the importance of power relations, the instability of interpretations and the recursive nature of human intelligence, where a person's awareness of factors will inevitably tend to change their interpretation of the situation and destabilise determinant variables. These factors introduce *'ineradicable elements of uncertainty, contingency, ambiguity and instability to any attempt to establish theories or laws about human practices'*. Moreover, human practices, unlike natural phenomena are not independent from language *'social practices are partially constituted by the very language that is used to describe them'* (Buchanan, D. 1994). As perceptual schema or social imaginaries, this systemic view sees practices act as standing waves, appreciative loops insinuating thought into a rapidly shifting flux of experience, they allow for meaningful and intelligible generative responses to complexity.

This aligns with the Aristotelian domain of *phronesis*, or practical reason about the ethical, political and historical dimension obtainable only through situated participation in public life, warning against the potential isolation of academic programmes. These arguments attempt to bridge the theory / practice gap and reason why this gulf persists by arguing why natural science models are ill-fitting when addressing sociality and demand reconceptualization. This gives weight to shifts away from hypothesisation and experimental design, towards interpretive methodological territory of case studies, ethnographies, participatory and qualitative research whose purposes are to sensitize and refine perceptual capacity toward subtler nuances and complexities of human involvement, rather than prediction and control. Rather than simply frustrations, the factors of uncertainty, contingency, ambiguity and instability integral to human situations are in fact instrumental to ingenuity itself.

These pilot studies equip the research to produce a stronger account of practices allied to integrative expertise and how learners might in future go about acquiring expertise apt to address open, complex, dynamic and networked situations. Design activity is an inalienably social act increasingly integral to public life, necessitating dynamic coordination, mediation and negotiation. Usefully, advanced design methods act to broker between materiality and sociality but this requires continual adjustment to assumptive underpinnings of expertise formation and crucially how learning is organised and disseminated.

Coalescing a highly distributed, multi-perspective field to aid mutual intelligibility that integrates individual disposition with collective activity is imperative to the design field to equip practitioners to navigate and orient amongst shifting economic domain in turbulent organisational landscape. Habituating design methods with knowledges derived from social theory and exploring their efficacy

within research projects is judged a fitting strategy. Taking boundaries as an organising optic reveals stark challenges faced by collaborative encounter – the horizons of interpretive schema and differentiation between social world manifests severe impasses that stand in the way of purposeful alignment, often falling down the lines of power and politics of social representation. However, learning through observation of these projects recursively shaped this study, providing exemplar contexts to inquire how heterogenous groups collaborate to make sense of complex environments. These precursor studies acted as pilots to reveal thematic issues emerging in collaborative innovation settings.

4.5 **Primary Case Study: Hyper Island**

4.5.1 *Shape of the Study*

Building on earlier investigation in collaborative design research, this study encompasses around 500 hours of direct observation within a singular organisation, Hyper Island. The rationale for bounding the core study within single organisation aligns with directives of interpretive research, the grounded ethnographic approaches applied are responsive to this. By viewing an organisation as situated cultural community of practice allowed the research to explore some of the dimensions of general core themes relevant to collaboration. Situated observation allowed meaningful ethnographic narrative to emerge from this micro-context, revealing cues about macro-phenomena – the research attempts to bridge these two scales, the methodologically individualistic and holistic perspectives with a meso-level bridging strategy.

The candidate organisation operates globally distributed across multiple sites. The research stemmed from a systematic assay of fundamental aspects of the organisation's functioning and approaches, specifically, the learning environments it fields and the methodological approaches it applies. Beginning in situ at a local hub in a distributed organisation, the study expands to explore the overarching organisational structure propagated by its headquarter hub and key individuals within its leadership network. Through informants in their founder, management and collaborator networks, this research derives insight about collaborative interaction through experiential learning. The rationale for focusing on a core case study within this exemplar organisation is; that it was quickly recognised as a highly heterogenous network of networks widely insinuated, through partnerships and by virtue of its network of collaborators into wider activities of transformation in the digital economy. Such a nested activity system with multiple activity contexts, acted well as prism to take a cross-sectional glimpse at an actual state indicative of general organising tendencies and to gather insights founded in diverse prior studies.

Ethnographic researchers are inevitably subject to the same processes of affinity building and *enculturation* experienced by others within a community, rather than compromise objectivity this was seen to support nuanced subjective perception, but steps to maintain critical distance to appraise and judge were necessary. Using their own language, at times this process felt like '*onboarding*' into their network. This aligns with processes of legitimate peripheral participation assumed by situated learning theory (Lave 1991). As the researcher moved from liminal to proximal positioning relevant to the network, this followed the process of situating within a community of practice (Wenger 1999 and 2007). By maintaining focus on patterns of collaborative practice meant focusing on conduct rather than content, the aim was not to judge the fine details of projects but to extract generalisable insight

about interrelating. It was important to show how individual interactions align to constitute the whole.

In this way, occurrences of organising activity were seen to enact the organisation itself. The aim was to trace relationships that span across the different scales of the organisation's activities and operations. Embedded researchers are subject to the mundane facts of being amongst not only knowledge but lived experience. The majority of the research was spent amongst groups of people, this process of affinity building was a critical component of making sense of activity through research, but presents distinct threats to validity.

This means developing research strategies to mitigate against simply perpetuating insider views. To create valid and defensible arguments, throughout this thesis we examine an exhaustive range of critical perspectives as a means to evaluate and validate assumptions at work in the observed activity. However, rather than try to occlude the influence of context, it means acknowledging the legitimacy of this participation and the sensemaking practices of the participants as constituting the organisation itself. As some degree of influence is inevitable, an interpretive research strategy that allowed for tacking back and forth between the particular and the general was crucial. This was seen as formative of the hermeneutic and heuristic process that is commensurate with the theoretical approaches used to underpin the research epistemically.

Reflecting on the research process it is valuable to accept moments of spontaneous alignment between the researcher and the organisation's objectives, but in moments, the research rebuked this entirely. Reflecting on the process of becoming inured to a strong culture that seemed alien to begin with meant pausing to notice anomalies and irruption in the flow of narrative, paying attention to implicit structures and discontinuities was intrinsic to learning the patterns unique to this particular organisational culture and the wider ecology it was situated within, what McClure refers to as *wonder* (MacLure 2013).

These influences have the potential to skew the critical distance that researchers try so hard to sustain. This reinforced appeal to the underpinning logics of interpretive research methods. This meant not ignoring these threats to validity but embracing them as intrinsic and critically reflecting on their impact. Social psychology provides one such framework to understand how individuals interact together to realise shared symbolic worlds, acknowledging reciprocally how these worlds shape individual behaviour. In symbolic interactionism and enactivism, research considers the image of the self in context as a frame of reference to understand interaction with others (Blumer 1986). There is strong philosophical support for this position, discussed in depth.

This process of being implicated into the daily goings-on of a learning environment simultaneously sharpens and blurs vision of an individual narrative, threats to validity stem from being caught up in the complex web of narratives that are highly present in a social space, conflating experience with a critical perspective. Creating a critical distance between observation and critical theory places severe demands on the ethnographer as an interlocutor, entering an implicit dialogue with the situation. Multiple research perspectives discussed herein converge on a simple insight; that the foundation of inquiry itself takes place upon shifting foundations. It is the process of inquiry itself that produces relative stabilities, that are used abductively to support meaningful derivation and theories of learning that provide an measure of order to circumstances that are inherently dynamic and non-systemic in nature.

4.6 **Situating Research in Context**

Querying what an organisation is can be a potent generative strategy, to elicit responses but also activate interpretation. When questioning what Hyper Island actually is, answers varied, but themes emerge. Core framings were recurrent, but interpretations from network of participants evidenced a high degree of interpretive flexibility. It's difficult to differentiate critically between strong brand, intelligent industry rhetoric, voices of experience from present or past staff and alumni. Perception of impact and reputation were prominent the question often drew out an emotive response, answers were high in affective detail. The study's critical stance makes it irrelevant, but reports indicate largely positive experiences but always opinionated and evocative of a singular community.

In their own words;

> *"We are a Swedish company that has expanded in an agile and entrepreneurial way with the opportunities that have arisen for us. Now, we have reached the size where we need the right leadership to drive our mission strategically, commercially and long term"*

Hyper Island Chairman Fredrik Månsson.

> *"It is extremely exciting and flattering to accept this challenge as CEO at Hyper Island. The digital transformation we all experience is very much about people and development and that's where I have a lot to bring. I look forward with pleasure to learning Hyper Island's perspective on education and the competencies of tomorrow."*

Sofia Wingren, incoming CEO 2016-2019 (Hyper Island 2016)

> *Hyper Island prepares individuals and organizations to anticipate and adapt today to the changes of tomorrow. Through partnerships with companies all over the world, we help create dynamic and innovative cultures that accelerate long–term change.*

About - hyperisland.com (present)

Self-identifying as *growth oriented*, operating for 20 years, with 500+ employees, global alumni number over 5000. A collaborator. Rob Schwartz, Executive Creative Director at TBWA in LA, called Hyper Island the "Digital Harvard." (Aziz 2011). Hyper's CEO opines, those claiming expertise today will struggle tomorrow, that un/learning, perspective-taking and resilience to change is crucial and can lead to innovation (Inglee 2013).

4.6.1 *Hyper Island: a microcosm of digital economic activity?*

It's evident Hyper Island as a culture continues to have deep shaping effects on the communities it is involved in and perhaps practices in the digital economy itself, although characterising how process this occurs is thorny. Holistically, the organisational network focuses on intervening with leadership structure either within large, disrupted or of small, disruptive entities that populate the digital economic landscape. In short, Hyper Island assumes responsibility for educating leaders within digital organisations or the professionals within the agencies and professional services that engage in the same. The study hinges on the assumption that Hyper Island as entity has important shaping influences on the digital territory via it's activity, principally in training people and organisational transformation. I'd venture, it represents multiple micro-exemplars of attempts to disrupt formalised processes of learning, infrastructures of institutions and educational frameworks, whilst having to integrate within them. Theorising organisations as action generators (Starbuck 1983) or interpretation systems (Daft & Weick 1984) that self-design (Weick 1977) isn't new, however conceptualizing how Hyper Island enmeshes with its operating field was central. Principally, the organization relies on generating networks of capable interpretive experts, sometimes referred to internally as agents of change.

4.6.2 *Linking Learning & Leadership theory in Digital Economic Contexts*

Contemporary envisioning on managing organisations surrounds integrative capacity, seen as means to achieve flatness and *aligned autonomy*, key concepts appearing in (Bartlett & Ghoshal 1995); perspectives insisting that organizational integration lies in collective action. *'A shared knowledge base must translate into coordinated and aligned action across the different parts of an organization'* hinging on peer relationships based on trust in (Birkinshaw et al. 2005). The research moved towards outlining potential contributions to organizational dynamics, built upon sophisticated interrelating practices. Underpinning epistemic relations at a conceptual level between leadership in militaristic planning and soft power, soft system trends in organizational theory are of enduring relevance and becoming increasingly prevalent themes of contemporary organizing.

Interpreting the accounts of key informants makes intelligible how underpinning theories and concepts inform organising activity, shaping Hyper Island's culture-led learning methodology. This is viewed as valuable in unpicking the foundations of decision-making and the modes of rationality at work in shaping different organizational typologies. A plurality of intersecting and contesting worldviews were ostensible within this culture, yet identifying core patterns in ethnographic data allowed a more coherent organisational image to emerge. The approach to learning extends beyond its

school function into their bespoke consultancy operations, which embed within organisations who commission delivery of learning experiences and digital transformation activity.[52]

Unifying these disparate aspects the design of learning experiences and the cultivation of situations, interpreting this as special classes of situational curation was helpful extricating their operations from those of classic institutional typologies. The emerging Ed-Tech organisation continues to have aggregate impacts of the digital landscape, fundamentally, networked technologies have changed how people learn, and by extension design, organise and lead organisations.

Unpacking how forms of learning and approaches to pedagogy inform this and the interrelationships between learning settings and their contextual physical, economic, symbolic and social environments is crucial to differentiate how these novel forms of organisation differ from familiar typologies, but also what they share, as in what research outcomes can tell us about specific and whether this can be interpolated into generalisable frameworks about organising practices.

Questioning where (or whether) these activities fit within prevailing educational paradigms, brings into focus scrutiny of assumptions, principles and epistemologies motivating learning theories, allowing discussion of the epistemological standpoints these paradigms are founded on. It also refurbishes understanding of organising and organisations in general.

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[52] Bespoke business transformation and learning design at time of writing, accounts for 2/3 of Hyper Island's bottom-line activity.

4.6.3 *Encounters with Hyper Island to Onboarding*

Weeks after moving to Manchester in January 2011, walking the city, I encountered nondescript basement entrance on Little Lever Street. Previous experiences in research foregrounded spatial practices, recent postgraduate research had formed years of purposeful walking practice into a professionalised curiosity, to be heedful and notice place – this disposition is useful in that it equips the researcher to leverage curious exploration, to curate an expert nosiness as a foundational mode of purposeful inquiry.

Walking (with purpose or not) affords important mode of orientation in new territories, blending attention to social *and* spatial factors. Losing one's way engages the faculty to reorient, comparable to losing anchoring in frameworks of meaning, invoking the faculties in a process of sensemaking. Research in sensemaking in organisations generally affirms that studying this innate capacity to sustain stability of meaning is highly effective to surface tacit assumptions. Encounters with urban space foreground the value of perspective-taking, cities and their progressions of interleaved spaces, some open, some hidden, confront the interloper and entreat them to unpack their folded nature. Space, like thought, has a definite explicit component, which conceals tacit apsects..

Movement allows taking-hold of space. In Gibson's ecological psychology; cumulative understanding of form in environment is arrived at via perceiving variants and invariants, transforming information made available by the observer's movement. If perspectival observation is contiguous, so then is the information available spread throughout space in field-like ways (Benedikt 1979). In architecture, the wedge-like volume visible from a given point in space, the space containing every eye-line is called an *isovist*. A shape that shifts with movement tying the perceiving mover to the space. Blending the isovist with perceptual schema offers a useful means to unfold social space.

Questioning whether space has analogues relevant to sociological inquiry isn't new. Certainly, conventional spatial or topological concepts aren't enough to grasp the semantic or affective dimensions of conscious observers. Reflecting on Weber's prime directive - *mutual intelligibility,* the recognition that others in the same situation will each perceive differently, is a fundamental cognitive developmental stage, the subtleties of which are practically inexhaustible. This is especially poignant when entering any sophisticated cultural community, to recognize the advantages and limits of an outsider's view, the distinction between what you know and what others know. We are subject to space, but also engaged in generating social spaces.

Mobility is entwined with making sense, experience, is apprehended sequentially, most sophisticated abstract concepts carry cues of spatial and temporal dimensions, traces of embodiment, movement and narrative progression. Language is deictic, projecting out its own probing temporal and spatial isovist.

To make these traces apparent to co-operators, cognisors produce representations of thought which apply features that are reminiscent of situated encounters, as such intrapersonal awareness has spatial, temporal and conceptual features. Restructure of temporal and spatial progression constitute fundamental modes of organising experiences with respect to one another. Communication is conceptualised as movement of information across space, learning is often erroneous viewed as transfer. An innate spatial 'physics' is fundamental even to prelinguistic cognition. Communication, framed as transmission usually involves mediation processes via symbolic interactions with artefacts. Artefacts act as transmission sites for meaning exchange, environments also afford mediation, which influence action.

For Lefebvre, space is lived, perceived and conceived in a unitary way, continuously and perception is conditioned through this process, building up a spatial triad from the bare fact of space; spatial practices open the way to representations of space leading to the creation of representational spaces (Lefebvre 1991), these stages fold into themselves becoming functionally tricky to disentangle. Social space is produced and acts to accumulate. Contemporary accounts of space are difficult to unpick from Marxian assumptions about society – capital and production, the assumption is that people are subject to agency in structure around them.

Artefacts interlace matters within matter, through processes of signification and inscription, both pliable and illusive. *Photons, bits, thoughts, words* and *plans* are all perceptual models built on spatial assumptions or abstractions, involving compressive encoding of experience into variably mutable forms. Interrogating these personal assumptions reveals how inevitably loaded perception is, reflecting on collaborative activity means unpacking thick layers of assumptions, unique to each person.

Incidents of situated social interaction offer moments to reconsider raw joint action. Visual environments in cities act as scaffolding, traces of evidence of social dynamics they are the venue for. Previous research explored how urban environments; facades and street spaces were recruited to enact sociality, this guided my attention to assumptions about design activity, as a spatial practice. Under scrutiny, spatial and social action support the needs of each other. However, each field is too deep to claim meaningful purview over both, instead their relations are highlighted.

The methods of identifying research site and the methods subsequently applied to it are interlinked. Serendipity lead to the opportunities to unpack a frontier of collaboration and innovation. This 'onboarding' narrative uncannily reflects accounts of situated learning; marginal lurking, peripheral to a community, in corollary social worlds, entering legitimate peripheral participation leads to embedding within community of practice, moving toward centrality (Lave & Wenger 1991). The outcome of proximity and movement; is expertise.

The small sign above a basement door on Little Lever Street, an otherwise relatively non-descript street, east of Manchester's centre, reads '**HYPER ISLAND**'. It evoked a memory of an article in Fast Company; on the *'Future of Advertising'* (Sacks 2011), its strap line memorably, fielded; *Digital natives must teach digital immigrants* (seasoned Madison Ave ad professionals facing existential threats from change towards integrated creative industries) how to *'swim in digital seas'*. Provoking curiosity, the article hailed *'the first creative revolution in the ad industry since the 1960's'*. The prospect that young non-experts could invigorate thickly cultured, cloistered world of advertising was intriguing.

Broadly, this followed the digital native / immigrant narrative associated with Prensky (Prensky 2001) later seen in (Bennett & Maton 2010). This narrative suggested crisis; of vast time-worn organisations and professions collapsing, networks of disruptive actors exploiting incommensurable ruptures in formerly solid institutions, the discourse displayed hallmarks of impending sea-change, cultural shifts worthy of further scrutiny. Transformation of professional structure presciently anticipated by (Schön 1970)'s loss of the stable state and more recently in Susskind et al. (2015).

Manchester's Northern Quarter symbolises re-configurations of business activity and organising approaches corresponding with the emergence of networked culture and the economic cycle arriving after the Global Financial Crash of 2008. The successive waves of transformation are longstanding and multifactorial, written into social and territorial fabric of Britain, scoring visible traces into urban city-regions like Greater Manchester. Dependant on timeframe, these changes; might be viewed as integral to social mega-shifts connected to an *'information age'*; a transformative period fuelled by digital technologies or more recently growth of *'servitised, sharing or innovation economies'* facilitated by vernacular and professional networks. Progressively, these areas bear socio-material traces of shifting professional structures, networked culture irrevocably enmeshes social life and work, toil is inscribed into space.

The self-styled *'Northern Quarter'* is synonymous with ongoing industrial re-patterning of Manchester revolving around digital creative industries. Coinciding with Hyper Island's instituting a hub in Manchester, transposing a site reflecting the culture and community of a larger global organisational network originating in Sweden. Responsible with educating both future industry-oriented practitioners whilst also enabling restructure of partner organisations through consultancy activity occurs by applying a distinct methodology and stance towards leadership and transformation strategy. The core pattern interlinking these activities is counterintuitive – digitalisation rather than reliant on capability with digital technologies instead hinges on culture, a distinct form of organising meant to cause affective shifts; emotional, personal and cognitive changes to ways agents interrelate, share knowledge, work and live.

Casually loitering, peering through windows, rereading the article, checking their website - an affable West-Indian man appeared to clean windows. Asked *'what is this place?'* – he replies; *'I don't really know, kind of a school, but also something else, do you want to look inside?'* Beckoned inside, down stairs into empty basement, with writing on walls, I was met by a person, coincidentally a senior director of Hyper Island UK. We spoke for 20 minutes about what happened there and what this meant, this research is the result of this encounter. This began an engagement which led to researching this organisation. A critical ethnography of sophisticated collaborative culture is core to this thesis, the assumption; that this site is somehow emblematic of wider changes in organising the digital economy and describes how organisation of this type and the individuals it produces become active agents in economic transformation.

Although clearly Hyper Island functioned as school across multiple locations. It had no teachers and didn't seem to resemble typical perceptions of a graduate school. It was evident from initial investigations this was a strong, values-led culture with unusual focus on conduct amongst its members. Personal interactions with participants made this clear, the compelling origin narrative replayed by co-workers, form part of its mythos and strong brand. Hyper Island was ostensibly a learning organisation, but also appeared to have other activities, part strategic consultancy, part culture lab. By attending receptions and client pitches, interest grew in this organisation as a site for research. Meeting cohorts of very personable, disarmingly friendly and undeniably socially deft internationals supported the suspicion of something worthy of scholarly investigation. In an informal chat, it was counterintuitive to reveal the origins of the research methodology stemmed from a military defence context. Through this participant, then Head of Design, I began to develop an image of a singular blend of strategic agency, school and movement for *'digital transformation'*. The strategies and tactics of *'digital transformation'* remained unclear but appeared less premised in technology than personal growth and transformation, these drivers seemed at odds. Clearly, Hyper Island functioned as distributed creative leadership school, its lack of identifiable teachers or discernible agency office environment confounded simple descriptions. Researching further - Hyper Island's **No Manifesto** - *No Grades, No Tests, No Textbooks, No Teachers, and No Classroom* evidenced a learning community which seemed to blend defense research with punk aesthetics to disrupt learning (Erixon 2017).

This provoked genuine curiosity about the future of pedagogy in the information age. Learning organisations after all supply the creative industries with professional practitioners. It seems that new types of organisations would be forced to emerge to fill the vacuum between familiar models of organising creativity and professional practice. The lasting sense was that new territories of work were being revealed as uptrends in digital networked technologies necessitated novel forms of organising, global networks have a transformative even mutative potential, still poorly understood.

Subsequent to this, working in the conventional university sector, I worked alongside a person who acted as key informant who eventually built access into the organisation. The academics and professionals who played key roles in shepherding initial waves of digital collectives, agencies and businesses that set the pattern for the UK's nascent digital industry in Manchester overlapped with this organisation's network. A key informant, a fiercely bright and passionate educator, somewhat disgruntled about disconnects between professional creative practice and conventions of academic research occurring in traditional University Sector. Joining Hyper Island in 2013 as programme leader, aided the research by facilitating engagement at key moments as an essential informant and contact within Hyper Island, offering 'a foot in the door' and the privilege of access.

4.6.4 *Manchester's Innovative Urban Field*

These changes in Manchester, once regarded as rainy post-industrial city in decline propped up by residual cultural cache, lend the study a remarkable context. Economic resurgence following 1996's incident of domestic terrorism, meant far-reaching interventions with the industrial fabric of the city; large red brick mills and dense industrial zones often mixed with dwellings provide cheap and plentiful space, a story common across post-industrial Europe, providing an incubator for successive waves of experimentation with work practices and new industrial organisation. Manchester, emerging from scathing encounters with heavy industry, social experiments in modernist Brutalism, connotations with gang violence, punctuated with the city centre bombing, it's an archetypal post-industrial site in flux. This is Engels' territory, once site of dense slums and 40% infant mortality, just 150 years ago (Engels & Wischnewetzky 2009).

Manchester is less palimpsest, than Petri dish, an unfolding litany of social transformations, spatial metaphor for post-industrial landscapes across Northern Europe. The city's physical and social fabric again shows marks of strain as it reinterprets, wholesale, space as centre for new kinds of industrial revolution, its fourth. Forgo the poetic diarising, this territory sets up a field of play, an important stage for the research to *take place* in. Placehood, like personhood, is founded in a shared assumptive texture that attracts then transforms organisations like this, both *non-place* and *hyper-space*, a symptom of the *supermodern* (Augé 1995).

4.7 Methodological Origins - The Hyper Way

To elicit narratives about Hyper Island's organisation culture meant blending multiple perspectives on the organisation's origins through interviews with founders and core members. Mining interview data for insight into patterns and processes underpinning Hyper Island as singular organisational culture proved an effective way to generate images of organisation, aligning culture and context in vivo generating then validating suppositions about attitudes to learning, leadership and innovation. A formative objective was to figure out how an organisation generates value whilst (or by) enacting its values via encounters at boundaries.

Principle informants were Head of School & Programme Leader, Managing Director UK and a senior Learning Strategist who was joined the first crew in Karlskrona. By extension, this initial access was expanded by founder trio; Lars Lundh, David Erixon and Jonathan Briggs.

Originally, axial themes and concepts were gathered through discussion with informants prior to and during ethnographic observation. Subsequent phases of more detailed interviews followed primary ethnographic study. A phased investigation created a space for an in-depth mutual exploration of identified themes and cross-checking accounts between informants to provide a degree of internal validity. The first phase was ongoing, iterative and informal which allowed rapport building to assemble a workable mental model of the involved networks. A second phase involved detailed engagement with interviewees performing different roles across the organisation.

This progressive approach necessitated reflection at each stage. Applying iterative approaches allowed for the satisficing common to design research, which aligns well with ethnographic and grounded theory methodology. Iteration allowed independent streams of narrative to form, revealing perspectives on common themes. Thematic evaluation of interview data revealed organising concepts at play in the organisational culture. Over the research period, numerous strong relationships have formed and access the network provided was exceptional.

4.7.1 *Deriving insight from initial observations*

Exploring themes and concepts emerging from discussion provides foundational data to synthesise themes, grounding development of coherent theory of action. Blending insider perspectives with the researcher's outsider view provides the research with coherent images of the organisation. Necessarily partial however, care has been taken to stabilise and generalise unbiased critical accounts of events.

This research distils extensive discursive notes, transcripts of interviews and anonymised ethnographic observational data gathered from within the network. Through intensive analytic processing, key

patterns and tendencies are identified which meant unpacking leads, treating key insights as points departure to explore origins and implications of entailed concepts.

Synthesising discourse with gatekeepers and formative contributors within to identify concepts guiding organising practices, detailed assay of the entailed assumptions, theories and methodologies in play supports an independent, critical formative image of an organisation that exemplifies digital economic transformation.

Designing research processes to make cultural patterns intelligible, the methodological approach draws on grounded theory. Tranches of semi-structured interviews were conducted concurrent with ethnographic observation, followed by reflective interviewing. Questioning patterns and conversational guide were used while interviewing, these were derived from embedded ethnographic participation and used to expose emergent themes to scrutiny.

Applying research methods to generate internal validity, meant constant comparative sense-making of varied narrative versions of events, supplemented by extensive thematic research. Narrative research methods align with accounts in (Boje 2001), (H. J. Rubin & I. S. Rubin 2011) and (Browning & Boudès 2005). Making personal narratives explicit revealed cues about perceptual schema of insiders. By using ethnography to elicit narrative streams, the researcher's interpretations enact brokerage activity. Synthesising of narrative streams reveals shared meta-narrative commensurate with each perspective but expanding a critically valid external view of events.

4.8 Research Ethics

The first principle of the research was to protect participants from potential harm and treat their information sensitively. Discussion enabled sense-making of formative concepts, sharing became part of reflexive processes meant to build internal validity to support grounded theorisation founded on analysis, evaluation and synthesis of anonymised primary observation with respect to reviews of secondary and tertiary research.

Ethically, the strategies of radical transparency and diligence were fundamental, as an experienced educator and researcher, boundaries, identity and values were prioritised throughout. Guidance on social research ethical best practices from Lancaster University and the British Educational Research Association was diligently observed.

Fricker's research into epistemic injustice was front-of-mind throughout (Fricker 2007b). The ethnographic research collected no personal data, disregarding anything that could compromise the trust afforded. Instinctively, conducting research *'to maximise benefit and minimise harm'* (BERA 2019) embodied personal foundational beliefs and values on the sacrosanct nature of learning.

Mirroring the open access provided by the organisation, radical transparency about purpose of the research and preventing disclosure and leakage of data beyond immediate investigation also helpfully it provided potent means to sense-check formative insights.

The genesis for Lewin's social-psychological approaches stemmed from incidents of mediation in the Civil Rights movement. In Lewin's view - content was immaterial, instead conduct patterns were focal (Crosby 2013), focusing on situated interaction the *where, when, how* and *why* rather than *what* made the data amenable to generalisation, this culminated in situated insight whilst protecting the content of interactions. This was useful in an organisation often discussing sensitive material and working with clients under non-disclosure agreements.

Applying principles of participatory action research approach, also Lewinian contributions, effectively blend participation, action and research often to enact organisational change (Lewin 1946, Lewin 1948). Open discussion of perceptions and co-investigation was encouraged, generating volumes of insight which had to be distilled into cogent interpretations. The objective; robust contributions in an epochal moment of disorienting change, overall, this form of learning appears to support integrative or collaborative expertise as means to approach uncertainty.

4.9 Organizational Narrative

4.9.1 *Founding Conditions*

Analysing the visual environment and language of Hyper Island's, interesting lines of inquiry reconcile different definitions of growth in an organisation that has scaled from the founder group, to highly situated pioneer groups to a complexly distributed global network.

Hyper Island, seemingly premised on facilitating personal professional growth in tension with transformative demands placed on organisations, informants observed how this tension shapes its narrative. Focus on self-led individual capability notionally acts as a strong cohering force to countervail constantly expanding and decentralising organisational structures. Their strong brand presence, the interface outsiders first engage with, was strongly influenced by founder Erixon who states *"No, we have to be a thing and we have to make it and it has to be, you have to be proud of being part of it"* (Briggs 2016, 21). Whilst Hyper was still inchoate, the founders recognised that without framing the organisation as a movement, it might have languished within a university-type institution, as this was then Briggs' professional background.

Tying with early choice to locate the first school in an unusual architectural site; an ex-prison in Karlskrona, South Sweden. This building's architecture; cells and large shared spaces shaped initial methodological approaches, before the *'military leadership piece'* arose. Consequent of being close to Sweden's largest naval base, its foundation was coincident with softening of Sweden's heightened military posture at the end of the Cold War.

These are key examples of environ shaping subsequent methodology, this typifies a serendipitous alignment of events, which process philosophy, refers to as a concrescence [53] (Whitehead 2010) where interconnected circumstances give rise to events. Whitehead's ontology was topological, addressing

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[53] Defining this *'focus on concrete modes of relatedness is essential because an actual occasion is itself a coming into being of the concrete. The nature of this "concrescence," using Whitehead's term, is a matter of the occasion's creatively internalizing its relatedness to the rest of the world by feeling that world, and in turn uniquely expressing its concreteness through its extensive connectedness with that world'* (Whitehead No Date, IEP). Organisations come about because of their relatedness to the world they're situated within. Whitehead contributions to ontology in formal relational logic are of more than casual significance here; the field of formal spatial relations **mereotopology** *'seeks to use topological means in order to derive ontological laws pertaining to the boundaries and interiors of wholes, to relations of contact and connectedness, to the concepts of surface, point, neighbourhood, and so on'* furthermore *'Ontological conceptualizations or categorizations can now be defined quite generally as systems of complete boundaries which partition a given domain into objects or regions or elements of different sorts. More generally, they are systems of boundaries which generate, from a given whole as starting point, another whole with more or fewer or different parts. The framework of mereotopology is surely not sufficient to provide a coherent formal expression for all distinctions which are of importance for the general theory of conceptualizations and categorizations, but for the purposes of cognitive science… however it can provide a uniquely fertile starting point'* (Smith 1995).

relational systems of boundaries, process philosophy provides a robust canon of theorization about boundary conditions, conceptualization and categorization.

Without overreaching and treading unequipped into formal logic, Whitehead systematized disparate concepts about the nature of spatial relations and their underlying logic. In the formation of tentative grounded theory about how activity and circumstances collude, this touches on notions of how fielding activity occurs and its significance. This strongly relates to Boole's exploration of universes of discourse which subsequently is revealed as the fundamental underpinning of both digital systems and ultimately, the basis of social world and boundary theory.

Briggs argues that *'making it a thing and pointing to it'* is common in innovation, arguing these initial decisions, however simple, were later recognised as forward thinking. Briggs discusses particular conjunctions of people & place, that founder Lars Lundh who was strongly involved in the Swedish labour movement perceived Karlskrona as *'challenged by the changes that were happening because of the demilitarization after the fall of the Berlin Wall and I think he wanted to do something about it'*. This context provided fertile environment for interactions between founders; entrepreneurial, brand savvy Erixon, socially conscious Lundh and Briggs who professed puzzlement with the emerging multimedia economy, reportedly, this led to an *'alignment of stars'*. This took place within nation whose geo-strategic resources had suddenly reoriented in the wake of Cold War arrangements, the southern region of Karlskrona historically and culturally was strongly operationalised militarily so that subsequent reprioritisation of strategic assets became indispensable. Once these unusual starting conditions aligned, Briggs argues the first students that arrived on this *'weird island'* acted as *'a propeller'* that pushed forward the founder's intentions, the methodology arose collaboratively and was strongly related to place. The 'Island' aspect refers to this original site, a listed military prison building in Karlskrona, a city founded in 1680 when the Royal Swedish Navy was relocated from Stockholm to assert dominance over the Baltic Sea.

In the first instance, Briggs argues, because they had some great stories to tell, this acted as an attractor providing early momentum, Briggs' puzzlement about how the multimedia landscape would change different domains, apprehending these early technologies held vast disruptive potential. This admixture of business, education and political factors was pivotal in seeding subsequent activity. Briggs' regards Hyper itself as a form of organisational innovation, noteworthy to recognise that service design had yet to emerge as a significant design methodology, yet Hyper's innovations lay in cultural change within a socio-political and socio-spatial environment.

At this founding point, *digital* was far from ubiquitous, Briggs characterises a *'deep amateurishness'* of people acting to change something they felt was important set in tension with countervailing forces in

a search for certainty from people with an urge to *'bottle everything and turn it into something to make a billion dollars for somebody'* (Briggs 2016, 27). Here we see generative tensions between certainty and change between activity systems. Briggs disagrees whether the intentionality assumed of innovation is either possible or desirable, the founders shared a certain *'political concept'* differing from politics common to 'start up' cultures, more akin to social innovation.

Briggs' language is interesting, he discusses a conceptual framework called *'Jobs To Be Done'* (Ulwick 2005) and notes how different people have jobs to *'recruit things and situations for'*, noting how he personally recruited Hyper Island as space for *'thinking and experimenting'*. Lundh recruited the situation to *'pay back to the town he grew up in'*. Erixon believed iconoclastically in the blind ambition to re-shape design education in the context of emerging digital worlds. Relevant to understand the conceptual origins of this network, but also how tacit conceptual schemas, either brought from or reacting against a disciplinary social world, intervene with collaborative intentionality, framing negotiations that generate socio-cultural innovation.

4.10 **How starting conditions and narrative shape organizations**

Organisational scholars, David Boje (Boje 2001), Maurice Yolles (Yolles 2007) and Karl Weick (Weick 2012) comment on narrative's role in making sense of complex circumstances that organisations represent; *'In organisations, storytelling is the preferred sensemaking currency of human relationships among internal and external stakeholders'*. Furthermore, Boje observes in natural organisational settings, stories are fragmented, terse, discontinuous, polysemic and multi-authored and often omit large tracts of taken for granted (assumptive) information. Stories have real significance and an efficacy in their production and exchange across the network that makes them a principle means for sustaining and propagating culture, acting as vehicles for transmission of culture, especially amongst complex networked knowledge organisations. Boje identifies how collective accounts form precedent for individual assumption, decision and action. In this way, they act as the institutional memory system for organisations (Boje 1991).

Hyper Island's initial circumstances align with these narrative perspectives; how crucial insights are shared amongst informants. Drawing out narrative for scrutiny, to serve as a resource for reflection is a research priority. A narrative process draws on organisational memory to move narrative from a particular, tacit and partial status to a general, explicit and synthetic stance. Hence, conditions encountered in this research fit with Boje's concept of *antenarrative*, defined as, processes by which retrospective narrative is linked to living story. This implies a faith that a fragmented polyphonic story will make retrospective narrative sense in the future. The role of the researcher in this case is to knit together coherent narrative and to make narrative insight transmissible and mobile. Ideally, creating stable frameworks that capture value from activity. Antenarrative is what Boje calls improper storytelling, a wager from which a proper narrative can be constituted (Yolles 2007).

A crucial manoeuvre that Hyper Island's founders also needed to arrange circumstances into meaningful activity leading to the formation of their organisation. Interpreting that the founder's sensitivity to antenarrative conditions in anticipating how networked culture would present existential threats to existing macro-structures. Anticipating that institutions and organisations would be found wanting not only in their ability to respond, but also in their ability to enact structural change rapidly enough and then sustain that change.

Reportedly, this insight came from the founders collaborating on a design brief, finding that modes of response were becoming irrelevant and the professional behaviours they could produce were poor fit to what they were being asked to do. Moreover, the solution focused brief they were working on seemed irrelevant response to the larger design challenge. This reframing process and denial of straight solutionism is common to experts and often means defiance of clients who likely have different

epistemic frame that revolves around getting the job done in specific, predetermined ways. In brief, Briggs mentions the task was to develop interactive content for CD-ROM, at the time, there were multiple successful examples, however, the trio anticipated growing irrelevances of the medium which fundamental mismatched how knowledge was organised in the burgeoning digital era.

This research engaged in challenging processes to retrospectively reassemble streams of narrative into coherent versions of events. To create a meta-narrative making sense of their current activities, to provides insight into how they might respond to future challenges; creating coherent images of the present conditions as basis for required reorientation of strategic priorities. When negotiating access, members of the organisation requested that this research *feed into the learning spiral of the organisation'* to build insight about circumstances now facing a mature organisation that again anticipates need for change. The indicated desire is *'I think we want to have an impact and influence on education. So, if this could in any way shape or form, can help other researchers or scholars, through your papers and your work and see that and inspire them, now then we would really be happy for this to be acknowledged that Hyper Island has been involved with your work'.*

So, sensemaking engagement of organisational narrative implies research activities; thematic analysis of multiple narrative accounts and then interpretive synthesis parsed through the researcher, acting to produce intelligible shared narrative. Exploring starting conditions and examining key incidents provides dynamic situational image, allowing research to understand reciprocations between structure and action that still have ramifications for the organisation today. This narrative assay provides a grounding field out of which new theory can emerge from observation.

Specifically, how a neophyte organisation grew out of growing realisation of deficiencies in design practices, education and leadership provision. Then how the unique socio-political, temporal conditions afford a niche for innovation to occur, how these opportunities for change were sensed by parties cooperating with the founding group, then how the resultant network reveals insight into how new institutions emerge. Strong initial motivators; creative and business potential identified in 'the internet', emergent digital technology and the potentials in networked societies.

Precursor signs were interpreted effectively by the core group anticipating how these were arranged in particular forms, within ante-narrative circumstances. Series of alignments can be traced between close interpersonal networks, in this case collaborating professionals, local conditions in a demobilised military town, changing political climate in Sweden and global socio-technical events. Factors that cannot be pre-engineered only perceived as socio-environmental conditions. Anticipating novel affordances in digital networks signified potential in still nascent digital economies. Alongside this,

reconfigurations in Swedish societal and political landscape after the Cold War combined with prevailing agendas of an entrenched politic class.

The Social Democratic movement in Sweden reportedly viewed engagement in higher education to signify of social inclusion, a desire aligned to broader societal values; realisation that standard university education was neither appropriate nor warranted for whole populations. Lack of advanced vocational training in Sweden, identified by the political institution at the time made for unique formative funding conditions, out of which the organisation sprung.

Efforts to realise a more egalitarian society through learning led to the agenda of higher education provision across Swedish society led to realisation that existing university systems of higher education provision might not be relevant to everyone in society. Further realisation of lacks in advanced vocational education played pivotal roles in fielding formative conditions, an ecological niche that the founders were able to exploit - a view corroborated by multiple narrative accounts.

A thematic pattern, present in the data; the tension between personal growth (self-actualisation) and the scaling the organisation from a small concern into the present distributed, global entity. The collective action of this organisation, ironically, has created conditions that present considerable new challenges and threats to its future operation. Hyper realised its own conditions, a situation where their unorthodox claims have reached orthodoxy.

There now seems to be a demand to diffuse the values and working processes across a business that began as a highly situated, local culture, that has transitioned to a global network today and is now entering into new phases as a more diffuse infrastructure with multiple interfaces, moving towards increasingly highly decentralised decision-making structure. Ensuring the culture's continued salience through these phase shifts is presently a crucial strategic priority. Management discusses concepts of purposeful aligned autonomy, however admittedly struggles to assert their sources.

This research finds an organisation once again in the midst of important structural adaption. Through interviews and observations, stakeholders give the impression that fundamental changes are occurring within the network. Briggs and senior management in the UK, independently identify re-emergence of conditions of transition to new phases, which this research intersects with.

Separate discussions with senior management and strategists compound this suspicion. Marking 20 years in 2016, after operating within successive salvoes of social change driven by technology, amidst the 'digital revolution' (sic), suffice to say societal change in this period have been epochal. The exact nature of these changes requires detailed discussion, often analogised to societal change arising with

moveable type, digital era change is fundamentally domain-spanning beyond technological determinants provokes problem-shift, recasting organising practices.

Observing Hyper Island leads to counterintuitive stances on what 'digital' means. *'We try and create learning experiences. Which we see as quite different than training people. So, we don't train people on tools. We try and create, it's more of a mind shift about what digital is and then how you can apply the work'* arguing that Hyper bridges boundaries between change management and creative leadership training; *'To facilitate a group of professionals on their own learning journey'.* Specifically, *'we work with clients that want to increase their knowledge and understanding of digital and how it works'.* McCall describes how two thirds of Hyper's operations are with business clients, the remainder via school network. Typifying, McCall describes counterintuitive experiences training leaders within a large internet search company *'how to be digital, but digital is a mindset and 50% of their workforce are engineers'* (McCall 2015).

Interviews with senior management teams delineate distinct phases in the organisation, their present moment represents a horizon of organisational transition. Discussions with Maria Distner (Swedish CEO) and Charlotte Sundaker (Global Interim CEO) further highlight apprehension of flux within the company, provoking exploration of new modes of learning provision, via online, blended learning.

At the time of writing, a new CEO is in the process of joining Hyper, tasked with steering this phase transition and creating financial resilience to weather scaling. A Swedish professional CEO, incumbent from Education First; which began as *Europeiska Ferieskolan* (European Holiday School – EF for short) another global education provider. Founded 1965 in Lund, Sweden by young Swede and is now a multinational (with a presence in 112 nations, with 500 offices and 43,500 employees. Headquartered in Lucerne, Switzerland). Hyper's journey internally is often analogised to life-stage; reflexive baby, curious child, truculent teenager, now stable, hopeful young adult.

Giving insight into scaling of entities emerging in the education sector, signifying emergence of new institutional actors, both highly decentralised and situated, employing networked technology as proxy for 'place' is presently pertinent. This flux of new institutions and professional structures with their own programmatic logics and cultures forms part of macro-scale social change, education being a particularly telling environment where these changes often occur first.

Essential tensions witnessed seem to stem from these circumstances - Hyper Island is a dense networked culture, engaged in creating innovation and cultural change within organisations as they adapt to new socio-economic conditions. They're equally keen on ensuring responsive agility internally as it is ties with their self-perception of advantage in their value proposition, however

scaling organisations often stultify as structure over-asserts action potential (DiMaggio & Powell 1983).

Incisively, reciprocal tensions between changing socioeconomic territories, that to some degree they have been instrumental in creating and their own internal structure, is ongoing. Observing that Hyper Island is a culture of people engaged in producing and sharing narrative accounts on a moment-to-moment basis. Engaging with this flow of stories around the organisation, reveals how this is crucial to how change is enacted. Reports of situated practices shared amongst individuals and groups, stakeholders have noted however that this happens informally and that there is real difficulty in creating structures that capture the value of activity in more formal ways. Mining experiential exchanges for insight, the outsider status that researchers hold allows them to engage in situated *narrative-making*, forming and sharing accounts divested from business operation.

In then Managing Director for the UK, David McCall's words, when asked *'where is the culture? where can I get at it?'*, McCall's response is lucid and telling; *'You know, we try not, we don't try to write it down, but at some point we might have to as we grow, because it is in people's heads, and as we grow that's dangerous'* – revealing a desire to maintain agile fluidity and avoid fixity. Following further along this track, a prevailing question in organisational literature is to ask *'Where is the knowledge?'* McCall responds; *'It does exist but it is in people, not written down. And that is a danger for growth, because you can't then grow'.* McCall alludes to orientation *'so people have to take 6 months to actually find their way in Hyper Island and that's not great if you're bringing people on board'* thus *'it takes longer because nothing is written down and there are some assumptions'* but this means that because *'nothing is written down, you can then make it your own as well'.*

Reliance on knowledge implicit to members has distinct advantages but faces difficulty in scaling. This is commensurate with concepts of intercommunal negotiation, which was witnessed to a high degree within the culture. Highlighting the role of inscription processes is resonant with Actor Network Theory approaches, which imply that power is produced through processes of inscription. For McCall, perhaps indicative of a wider trope within what remains a highly fluid network built on its ability to react responsively to change *'So that's our fear, as soon as we start writing down, then it's just what we believe today'* asking what about different perspectives both in individuals and contextually at different sites *'but then it is written down. When does that writing change and evolve to allow X to make it her own?'.*

The implications are resounding and formative of an image of organisation from grounded observation and theory commensurate with this. *'No, that's our fear of writing stuff down, we have a real*

fear of writing stuff down at Hyper Island, because then it becomes law. And we don't want it to be law, we want it to be fluid. So we should write it in sand. That's the trouble' (McCall 2015).

This illustrates crucial imperatives for design research, to create dynamic structural processes that can harness and make insight mobile within organisations; referred to by Dorst as the design field's memory problem (Dorst 2015a). Responses to this challenge remain elusive, particularly difficult in the nested networks of expertise within diffuse and progressively decentralising organisations.

Instructive themes emerge; processes of orientation within organisations and processes of inscription. Inscription that is required to remain fluid and dynamically updated, synthesising advanced design theory imply addressing frame reflection generation conditioning activity is advantageous over formal planning. Fluidity is evidently held as advantageous, a further theme is the malleability of strong cultures, need to contextualise approaches to given situations, to situate approaches at a local or even personal level. This is difficult to codify into rules, instead negotiating heuristically allows ecologically rational decision-making.

Investigating the culture's development, the implicit and explicit values and methods employed, Siflverberg discusses unique combination of initial personal and spatial relationships instrumental in formative development of what became Hyper Island. The account is anecdotal, but there is internal validity to narrative images of organisations, when these are narrated repeatedly throughout prolonged engagement. Remenyi et al (1998) contend that story, or narrative description, is valid if the resulting narrative adds some knowledge. White (1973) describes story as process of selection and arrangement of data from unprocessed historical records in the interest of rendering that record more comprehensible to audiences of particular kinds, by inserting a sense of perspective and purpose (Dalcher, D. in (Khosrow-Pour 2008).

Founder David Erixon, resonates with this, that peculiar architectural conditions of this first site had important impacts on subsequent uses of space and place-making in practices employed. In this way, spatial affordances effectuate distinct methodological innovations. This was *forcing us to rethink how to engage with learning, people and space – introducing new room set-ups and interactions between participants, open and collaborative learning spaces, new technology solutions and furnishings'.*

A bold claim, ties together the spatial conditions with the strategic responses of organisations *'We buried the autocratic teacher, the master in the classroom, and gave birth to the facilitator – the person responsible for staging powerful learning experiences and for engaging on a personal level with both individuals and teams in order to boost the learning outcomes through reflection and harnessing the intelligence of the collective'* (Erixon 2015). Strong values at work within this organisation, Erixon's stance is characteristically iconoclastic.

4.11 **Ideography**

Discussing rhetoric, it's valuable to touch on the concept of the rhetorical ideograph. In relation observational data from Hyper Island, also relevant for its relationship to public discourses about innovation. Ideography provides means to understand how meanings are encoded in discourse but play fundamental roles in framing practices. These aid in abstracting patterns from complex interactions witnessed across Hyper Island's sites. Ideography is vital to understand how framings work within a culture, the linguistic, visual and sensory environment enacts culture in important ways that can be decoded with respect to espoused values, examining ideographic coda inscribed into an environment either in formal or vernacular forms, holds important relevance to activity theory, where tension and conflict in meaning is thought to hold potentials for changes in activity systems. In boundary object theory, word concepts are thought to enact as boundary objects.

Leigh Star's original work, the notional entity; the state of California gathers activity, acting as nexus for spatial, temporal and semantic dispositions towards a board spectrum of activity within diverse organisations. The ideograph *California* manifests sufficient interpretive flexibility to cohere activity across collaborating parties, without necessarily requiring consensus. Different dimensions of this territory, its meanings, culture and history, demography and geography are a shared social imaginary, yet with absolute, concrete presences. The 'state lines' and jurisdiction (literally; *place where word of law can acts*). Interpreting, Star's observations, does Hyper Island and inscriptions of its espoused values generate interpretive flexibility enough to enact aligned autonomy across a highly distributed and heterogenous network organisation? This is a matter of mobilising local framings, whilst situating global assumptions.

An ideograph is defined as *'one-term sums of an orientation'* or ordinary language terms that are *'the building blocks of an ideology'*. Ideographs represent a broader orientation than common symbols representing a whole sum of meanings, and a *'unique ideological commitment'*. This can be used to indicate the connotative assumptions in a word, for instance; <freedom> in reference to American political discourse or <equality> and <rule of law> in British legislature. These terms are so intrinsic when used in the context of a social world they take on a poignancy, they may also be divisive resulting in the formation of a boundary – the associations made between a group toward an entity with respect to an ideograph define its semantic shape. For example, the affective significance of the word *'freedom'* used in the context of the United States, dependant on disposition and assumptive grounding of audiences of this word, its meaning exhibits radical interpretive plasticity. Substantive grounding for interest in this is evident; ideographs present around Hyper Island's community are powerfully suggestive.

Ideography in this way can act as boundary objects; terms *leadership, membership, team* and even *Hyper Island* have strong connotations which take on new meanings dependant on position relative to its culture, these are individual but exhibit strong coherences that are indicative of particular framings. In the wider spatial context of a global business, the concepts Sweden and Swedish-ness have strong connotations with respect to framing what functional concepts mean; *work, wellbeing, meetings, creativity* and *teamwork*. These alignments and divergences in meanings create a nexus that is largely coterminous with social worlds.

A master ideograph is perhaps *digital,* outside the culture this commonly is suggestive of binary computation or a signifier of informated societies, yet within the culture this takes on new meanings. A director in the UK was vociferous about this; stating clearly that digital has different meaning for us than it does for other communities; certainly, more a set of values and attitudes to collaboration responsive to contemporary information infrastructure than anything specifically technical. Hyper builds its present value proposition through its learning offering but also consultancy functions embedding within organisations to enact shifts to their framing of what digital actually signifies in practice.

Discussing their client work on leadership and cultural transformation within a primary digital search organisation, informants noted being confounded by how narrow the view of the implications of the concept; digital was within the organisation; mainly cohering around engineering functional concepts, yet Hyper Island's role is self-described as curating reframings of these intrinsic concepts to guide cultural and structural change. A key example of *problemshift* through intervention with meanings and their functional connotations in action.[54]

McGee explains that ideographs are *'high-order abstraction representing collective commitment to a particular…goal'* (p. 17) and that they function as a *'vocabulary of concepts that function as guides, warrants, reasons, or excuses for behavior or belief'* (McGee 1980). Decoding Hyper's semantic environment, whilst being mindful for contra-dictions between its ideographic and activity landscape provided a powerful heuristic means to make sense of it.

In the ideographic process, formally, a form of discourse analysis, angled brackets < *x* > serve as accepted academic convention to isolate candidate terms for clarity. The brackets symbolically form a frame that guides attention towards semantic coherences with relevance to given activity systems. It's

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[54] Digital, etymologically in its first concept, pertains to fingers and the action of a hand. Only later taking on the meaning of using numerical digits and the process, begun with Leibniz to convert logical structures into binary representations. See (Bloomberg 2018)'s discussion of ambiguity of digitisation, digitalisation and digital transformation.

evident how this allows glimpses into interpretive schemae of individuals situated in culture. Thorough analysis of speech and behaviour patterns falls under detailed analysis of ethnographic data, suffice to say, ideographic stances contained in speech and action are useful to reveal guiding concepts and organising images.

There's strong case to argue that values are entangled with decision-making at Hyper Island, this is something actively supported within the organisation. Ideographs are analogous to *ultimate terms* (Weaver 1985). Weaver asserts that understanding the power of values, through this mode, reveals interconnections between rhetoric and ideology. Within ideographs there are structures of public motives that are patterns of political consciousness which have the capacity to control *'power'* and to influence the shape and texture of each individual's reality. In this view, for ideographs to function, there must be a public framework that is agreed upon and shared by the whole community. Coherences and divergences around these key terms are notable to study. Via interviewing, it was clear how a strong semantic substructure inheres values and dispositions within the culture, these stem indicatively from shared narratives about what the culture means, its theory of action and crucially its cultural origins.

This collective language is constitutive of social narrative for public action, and is likely to have different meanings in public and private spaces. Ideographs, live in expert discourse but also in everyday talk of communities representing a *'unique ideological commitment'* (McGee 1980).

The data set was amenable to discourse analysis, this is a useful tool to isolate key patterns in speech, yet outside of scope herein. Basic analysis of the linguistic corpus was applied, although detailed discourse analysis is a fascinating research direction, suggestive of cultural informatics, this would certainly be complimented by detailed sociometry (following Moreno's ideas about patterning of social networks). It would be interesting to compare what is spoken publicly and what is written, examining the difference between forms of talk and vitally, the differences between formal and vernacular speech about the organisation.

The method of heuristic textual analysis herein assayed meaning circulation to isolate themes and to create points of validity through triangulation within themes emerging from ethnographic notetaking and interview transcripts. Sophisticated analysis approaches applied by discourse analysts and data scientists, was precluded by the researcher's capability but more importantly focus. The relative amateurishness of the research analysis research was justified by prioritising more pragmatic interpretive approaches, sophisticated situational interpretation was privileged over analytics, satisficing adaptive in situ. In line with grounded theory and social psychology's directives, the research focus is not on content of exchanges but on collaborative, cultural conduct as a guide for

activity. This way of thinking is extremely valuable corollary to *'getting at'* general shared meanings within given cultures rather than specific utterances.

For Weaver, the conscious life of humans revolves around *'some concept of value'* and when this concept is withdrawn or forced into competition with another concept, persons suffer an intolerable sense of being lost. Individuals must locate themselves in *'ideological cosmos'* to coordinate their activities and the greatest cruelty which can be inflicted is the deprivation of a sense of human tendency (Enos 2013).

Tending towards basic values and relatively stable anchors provide a way for individuals dealing with rapid change to orient their activities. Comfort and confidence to act within Hyper certainly emerges from partaking in its shared ideological cosmos of values and dispositions towards collaboration, these inhere respectful diligence placed in the value of the utterances and acts of others.

The highly specific disposition contained in the shared phrase declaring *'feedback is a gift'* is indicative of a particular reverence for intercommunal negotiation as the well-spring for concord and the value of statements from an individual about another's apparent conduct is held highly. The application of Johari Window model internally is instructive (see [appendix](#)), where feedback enables movement across the interpersonal arena, moving from a *place not-known-to-self but known-to-others* to an intelligible position *known-to-the-self and known-to-others*. There are various possible transformations within this schema. Interesting to note where this ideographic coda sits within the total shared semantic field, presumably, there are flows of shared knowledge from the *en masse* culture acting upon novitiates as they move from legitimate peripheral participation to full membership of the collective community of practice. Ideography, spoken or inscribed, plays an intrinsic role in the learning experience in this regard.

The attention of this thesis necessarily has to expand its understanding beyond purely linguistic exchange as much of the significant activities witnessed were enacted in the experiential, embodied domain beyond language; basic factors of spatiality movement, presence and visibility, whether something was seen or hidden played important roles. Following Garud, the prime forms of knowledge flow within organisation occurs through *know-what* (learning-by using), *know-why* (learning-by-studying) and *know-how* (learning-by doing). In collaboration, different modes of knowing become crucial; *know-where, know-when and know-who* play a pivotal role in group experiences (Garud 1997).

Thematic coding strongly evidenced spatiality generally and subcodes indicating; *attention, perspective* and *guiding* behavior were prevalent. However, this isn't about mapping out internal territory as a space, Lewin seems painfully aware of this fallacy in setting out topological psychology, which

deliberately conflated psychological and physical properties only for the 'methodological advantage' these concepts confer to embodied agents. In field theory, any movement within the composite *physical-social conceptual* field corresponds to a topological path. Frame of reference is crucial, that a *'field of contemporaneous events'* must be defined differently from each point of reference. Lewin troubled assumptions about behavioural stimulus. Lewin's principle of contemporaneity, field theory's fundamental heuristic, insisted common situations appear differently with respect to different frames of reference, this confounds application of empiric scientific variable measures, reconfigures attention towards novel relational systems; *constructs*.

4.11.1 *Orienting Metaphors*

In interviews, a key informant evoked a metaphor; developing a Compass, suggestive of self-orienting activity to give direction in shifting grounds, by developing attention to conduct towards others in collaboration and eventually in activity that restructures the perceptions of collaborators. Spatial metaphors were recurrent thematically, they seem to fit with an image of practices that revolves around using values as anchors and stimulus for decision-making when contextual environments are in flux.

Following Schubert & Maass's discussion of the spatial dimensions of social thought, it's clear why this is the case; the results (of multiple studies) converge in the insight that much of social thinking builds upon spatial cognition. This makes social cognition susceptible to influences from spatial cues, and vice versa. The authors devote their attention to exploring this fact, many such links are cast between social and spatial thinking (Schubert & Maass 2011).

Indicatively, this is a central concern for social psychology in general with important relations to the history of sociology. Crucially, emerging from the field of cognitive linguistics retaining important interlinking with concerns for language however; a common theoretical approach that is important for Schubert & Maass is the *embodied cognition* approach. By which they do not mean particular theories or hypotheses, but '*the assumption that perceptual and motor systems are not simply input and output modules for a central, "higher level" cognitive modul that does the actual cognition. Instead, the embodied cognition approach assumes that perceptual and motor systems – their general function and their states – shape higher level cognitive functions. In the words of Wilson (2002), it is "the idea that the mind must be understood in the context of its relationship to a physical body that interacts with the world" (p. 625)* in (Schubert & Maass 2011). Affirming a central need emerging from social psychology to attend to relationships between person and environment, departing radically from other forms of cognitive theories in asserting that the body's action-in-the-world itself is primary underpinning formative of cognition. This affirms a theory of action that foregrounds activity and movement in all of its forms as

enacting cognition. Hence, the attention of this thesis traces out significances in observation, this meant differentiating from ethnography which literally attends to language but not isolating it as singular dimension of meaning. The attention to deeds, rather than only words, methodologically is imperative to making sense of design cultures who revolve around collaborative acts of making sense.

Awareness of tendency towards certain ideographs and metaphoric framings they imply helps explicate ways that individuals orient through mediation of their surroundings. Ideographs act as basic units of narrative sense-making, revealing inscriptions of stance toward situations, in situations. Fundamentally, they demarcate significant ideas, which then assemble into interpretive schema, acting as potent indicators of deeply embedded organising concepts. They afford the speaker agency to deal with situations where contextual anchors are unstable. This allows us to trace basic values, donor concepts and how these can reappear in new contexts.

Ideographs that emerged to respond and offer orienting structure for groups in chaotic conflict perhaps lend themselves to be applied to the contingent situations found in organisational change. Rapid fluxes in digital economies create unstable ground, continually producing contingencies, design can act to anticipate and ameliorate instability, but also generate it. In the context of innovation, where contingent settings prevail, orienting concepts proliferate. In observation, these frequently appeared as spatial or temporal metaphors.

Important cues in observational data corroborate this, thematic incidents emerging from open coding pertaining to spatial orientation, position, direction and movement recurred throughout analysis. Their prevalent standing, although observation was parsed into words, attention to acts still remains prominent. There appears to be overlaps with codes concerning the body or embodiment, whether external physical or internal sensory. In gathering understanding about how embodiment is functionally intrinsic to design learning, assaying relevant conceptual frameworks reinforces this suspicion. Hyper is definitively a culture of action, the academic component of the taught courses means that cohorts were continually engaged in producing reflective and critical texts, in the forms of formal reports which (precluding incidents of individuals reading one another's work) are only reviewed centrally by assessing individuals. In practice, generation of inscription was informal, continuous and highly vernacular part of pragmatic and affective activity. Written utterances, drawings and declarations of state of mind were common, actively deploying a rapidly changing visual surface of the studio environment, these vernacular inscriptions form important representations of the action at given moments. Reading and photographing these was important and often poignant research strategy, a barometer of collective perceptions and assumptions.

4.11.2 *Semantics in Space*

An informant's perception that socio-political conditions in Sweden *'fertilised the ground'* for collaborative innovation and links to processes of mobilising a culture were highly indicative. Hyper Island signifies the encapsulation and export of Swedish soft power. As Briggs opines, this was almost accidental, but has subsequently revealed itself as transformative. Briggs, reflecting on this, surmises that planning for innovation is often hopeful at best and often doomed to failure, foregrounding the value of serendipity. In innovation circles, lip service to innovation rhetoric and extrinsic value in proclamations of being innovative are prevalent, albeit often at the expense legitimate value creation. Imagery of innovation emerging from stakeholder discussion, impresses that innovation in practice is often accidental, but always circumstantial. Briggs concurs strongly with this view with respect Hyper Island's origin.

Clearly, intentional agency over situations is the objective of design cognition, yet the suspicion that rather than simply knowledge being enacted, the focus shifts to the way knowledge interacts and is integrated. As Freeman and Sturdy note, contemporary scholarship is radically re-conceiving the place of knowledge, paying particular attention to forms that knowledge can take. Specifically, that knowledge is embodied in people, inscribed in documents and instruments, and enacted in particular circumstances. In their study of health and education policy, the authors apprehend an essential interdependence of different forms, illustrating ways in which knowledge is mobilised and resisted, this highlights problems of processing and transformation of knowledge, particularly in policy (Freeman & Sturdy 2015). This highlights knowledge's spatial and temporal character, the ways it moves and acts in a field amongst rather than simply within people. A trio of *embodied, inscribed* and *enacted* knowledge and their interactions are foregrounded.

Can studying how an organisation emerges, which purports to deal with and cause substantive change through design, learning and technology ground insight into this process? If observation can support inquiry into assumptive interplay at work, then how can this provide a framework with generative potential to differentiate novel foundations that differ significantly from existing research perspectives?

At intersections between design, learning and technology which are often framed as primary agents in generating societal change, often the image of change is vague. This study attends closely to this suspicion that rhetoric and practice of innovation, although mutually constitutive, diverge in important ways. The study aims to stand in close quarters with actual moments of design-led learning in cutting edge cultures pointed towards innovation, to witness first-hand how the ideographic commitment to innovation is actually enacted.

In a basic way, a thematic pattern, might run contrary what we apprehend innovation to be. Although literature on innovation is sophisticated and well furnished with diverse perspectives, the emergence of inter-networked society continues to have deep impacts on what it means to learn, lead and design. Definitively, being able to sense arrangements of conditions, cultivating abilities to anticipate their movement towards other states seems to help create conditions where novel responses can occur. Learning in this way is equivalent to wayfinding, an activity of orientation not acquisition, collisions between the spatial and social dimensions prevalent in general in learning environments and in specific forms in collaborative design learning points towards new sets of *locative-enactive-perceptual* theories of learning, that might in practice serve as learning theories-in-use. The formation of schematic preparedness entering into design learning situations, likely dictates their success, the objective of design education is to bring about these internal transformations to equip learners to enact this.

If particular situated alignments in spatial, social and technological factors have impacts on activity beyond conscious intentionality and innovation in practice is often semi-accidental, how might we learn to amplify, expand and better notice these? This thesis endeavours to show, with reasonable validity, how central value proposition of contemporary learning intersects with ability to integrate circumstances, to orient not just in the world but within and across social worlds. Providing orientation within the vast, disorienting variegations of space propagated by networked digital technologies. Requisite knowledge to achieve projects has long since been beyond the scope of lone individuals, such that knowledge about coordination is inevitably supra-personal, held amongst groups, apprehensible only via collaborative interaction represented via infrastructural apparatus. Relational integration between persons, allying intersubjectivity with metacognition allows for limited transcendence of cognitive boundedness whilst also risking interpretive bias, however through this process potentially allowing shared assumptive schema to become intelligible. Knowledge about rapidly changing environments isn't acquired but oriented against.

This suggests the formation of ad-hoc relational blends that transform places and people into expanded cognitive entities, which equally have need to be rapidly assembled (and then dropped) (Weick 2007). These play an undeniable role in the process of cooperative cognition. Rather than damaging personal agency; continuous deracination of group assumptive concepts and spatial structure actually augments their resilience. Observation holds that experiencing this in learning environments engenders robust interpretive flexibility and is formative of integrative expertise. Notably, boundary territories, populated with slippery boundary objects require specific competences; empathy, epistemic charity, heuristic judgement, perspective-taking and brokerage.

Figure 13 - Example Visual Environment - Stockholm Headquarters, Staff area.

4.12 **Brand Language & Visual Environment**

An image facing shared co-working areas in Hyper's Stockholm HQ (below) - a piece of copier paper with printed pink letters; *'We are growth oriented'*. Someone designed it, printed it, marked it with an official stamp and stuck it strategically to this wall. Instances such as these became emblematic of tensions at work within a dynamic learning organisation.

Only one instance of this image was observed but it is significant. The interplay of formal and vernacular inscription is interpreted as formative in stabilising and translating the organisation's cultural fabric of values into the physical setting. The visual language of Hyper is strong and ever present, bumper stickers and statements of the brand values were freely distributed to learners, you can trace the influence of this strategy through ways that learner participants begin to mark their own tools, materials and identity with it. Given Erixon's fondness for punk aesthetics, this forms a primary layer of environmental reconfiguration that accretes around, then conditions, organising activity.

Punk aesthetics have their origins in the radical spatial politics of certain art movements, notably the Situationist International (SI), the Fluxus movement and tracing further back, to the potent operationalisations of absurdity in the Dadaist movement. Alfred Jarry, principle agitant in the

emergence of surrealism, discusses feelings of revolt or fear that accompany the arrival of novelty; *'It is conventional to call "monster" any blending of dissonant elements. I call "monster" every original inexhaustible beauty'.* Jarry was concerned with inculcating different social structures through parody *ad nauseum*, radical social change arose from highlight irresolvable conflicts in meaning, in other words relational tension. Jarry was directly concerned with social innovation, couched in the language of the time, providing an enduring prototype for punk aesthetics applied by Hyper Island. Processes generated by subversive movements employ a dual nature, to at once deprivilege hegemony of meaning in existing power structures, then to provoke the creation of superseding imaginary worlds.[55]

Several key concepts emerging from these movements which were thinly veiled attempts to bring about radical spatial politics and revolt against apparent power structures that appeared absurd to the movement's proponents, perceiving growing irrelevance to rapidly changing social arrangements. The concept *detournment* (associated with the SI) literally means *'rerouting or* hijacking' (Debord & Wolman 1956). The commonplace interpretation in French means misappropriation, forming subversive techniques aiming to destabilise meaning, changing the dominant connotations through cheap tactics, often through pranks and guerrilla manoeuvres, hacking expressions of media culture, turning them against themselves, *detournement* is seen as opposite to *recuperation*, a sociological concept where radical ideas are integrated or commodified into more socially acceptable contexts.

Across all sites, on foam board or in picture frames, there are epithets employing the design style and colourway of the brand placed strategically. During a busy admissions day at the Stockholm headquarters, written in black ink on the mirror *'this shouldn't be the only time of the day that you reflect'* and an address that links to the company's team building methodologies through material restructure. This evidences how learning theories are enacted onto the physical sites, concepts are enacted through inscription throughout the network. The bumper stickers and decals and their memory linger after groups have engaged in interventions. Hence these acts embed the culture and learning theories into the visual environment, the very fabric of the space, but also impinge onto the personal symbolic environments of individuals. This visual substrate acts as a form of pointing, drawing attention to situations and framing them in certain ways, schematic prompts crucial to enacting design.

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[55] This pertains directly to the relationship between the general and the particular, this was founded on an expansion of metaphysics to include the anticipatory imagination; *'Pataphysics will be, above all, the science of the particular, despite the common opinion that the only science is that of the general. Pataphysics will examine the laws governing exceptions, and will explain the universe supplementary to this one; or, less ambitiously, will describe a universe which can be – and perhaps should be – envisaged in the place of the traditional one'* (Jarry 1911).

Figure 14 - Written on bathroom mirror, Hyper Island HQ, Telefonplan Hägersten, Stockholm, Sweden

An allusion to reflective practice, inscribed onto the bathroom mirror symbolises how learning at Hyper breaches into the realm of the self, the rules and norms of the culture are quite unusual but quickly become part of behaviours that inductees apply to their own meta-cognitive practices. This attention to interpersonal relating was foregrounded in each interaction with its members. Overwhelmingly, each person I spoke to was deliberately present, attentive and listened actively, but more importantly partook in a shared narrative held in the joint field established by the power relations in the community of practice.

4.12.1 *Breaching into the Culture*

Delving further into the data, the interpretation was that these inscriptions act as breaches that reveal how boundaries between personal and professional life become blended at Hyper Island and by extension in contemporary organisational life. Threat or disruption to meaning was quite common occurrence, it had both strategic import but was also crucial in leveraging tactical operations. Observing how change to schedules, task or time coordination were used to encourage preparedness and agility in the face of challenges was notable. One informant discussed how, disrupting schedules or *throwing out* routine was a useful tactic, interpreting this, whether tacit or explicitly understood, the objective was to engender restorative responses, the formative of adaptive learning behaviours. Numerous incidents indicated a common shared perception of society as turbulent and increasingly rapid in its rate of change. A perceptual image arose of need of learning to create a semi-stable redoubt within turbulent environs, that change was foundational not exceptional, informants seemed to conceptualise their environment as tumultuous, yet via affinity building around distinctive cultural norms, within this *'weird island'* acted to stabilise their ability to grasp how to respond.

Revolving around tension between the need to develop relevant professionalism but also to develop personal capacity to cope with change. A recurrent theme emerging from coding the observational data was the concept of doubt in knowing. Asked to reflect on original purpose of the learning theories and cultural structure, Briggs independently apprehended the same; *'Doubt, the learning to live with the chaos, that doubt, I think it's an extremely important part of what Hyper Island is about. It's about teaching people that it's okay that we actually don't know'.* Doubting stability of a situation was a common assumptive concept, belying the stance of permanent anticipation, that today's stability will inevitably be compromised.

The strong influence of military leadership concepts remains intriguing, it frames Hyper as situated in a dynamic environment, in a *theatre of operations* where attention to environmental cues crucially determines operational success. Attending to social and environmental dynamics was top-of-mind amongst informants *I think then a big part of Hyper Island has been the development of an approach to leadership and group dynamics and that came out of the Swedish military'.* In discussions of Group Dynamics, the centrality of encounter is demarcated as principally significant. The influence of military leadership thinking in Hyper remains intriguing, by tracing the origin of this, we can directly trace the influence of Lewinian Group Dynamics.

Hyper's culture ostensibly highly values collectives and groups, founded on cultivating empathy towards others. This is encouraged through active listening practices, reflection and impression sharing, further extending connotations of *Hyper-ness*. Whether this is deliberate is open to scrutiny,

but observation recurrently affirms how these cultural values are distributed extraordinarily well across a diffuse, networked business, it's these narratives, *good stories* that bear much of this. Each informant was asked to relay their perception of the origins of Hyper Island, to report their sense of the values encoded in their experience of it. These diffuse forms of organisational narrative seemed to actually act as a stabilising relational system which acted to perpetuate these cultural norms without need for articulated doctrine beyond basic values which codify assumptions about the world.

Breaching, developed by Garfinkel, meant to make commonplace scenes (read emplaced assumptions) visible. Acting to disrupt activity to reveal how the structures of everyday activities are ordinarily created and maintained, characterises ethnomethodology (Garfinkel 1967). The use of breaching techniques in observation are useful to researchers as method for embedded research to make these assumptive structures intelligible whilst acknowledging the disruptive presence of observers.

Onboarding into the culture was an important part of understanding how underpinning concepts inform the common-sense activities of informants. Breaching experiments are planned and deliberate breaking of a social norm, in this case cultural norms common to this organisation. Researchers, after performing the breach, record reactions of those present, reactions they exhibit are part of a repairing process.

Unconsciously, participants rationalise the break to maintain their sense of stable social order. Used as research technique to apprehend the social psychological workings in cultures. Notably, Hyper is a highly heterogeneous social community, its social spaces act as supranational territories for schematic exchange. In Manchester, foreign nationals outnumbered native nationals, the largest groupings of foreign nationals outnumbering local participants. Although this was less marked in Sweden, because of advantageous educational incentives for nationals. This made for recurrent incidents where individuals importing their own organising concepts about time and space into cooperative conduct ran into epistemic conflict, this meant shared cultural norms were recursively renegotiated causing learning or hindrance. The prevalence of these incidents was evident in the coding scheme that emerged in analysis evident, the cooccurrence between #STRUCTURING and #TEMPORAL / #SPATIAL clusters was evident. Hyper curates learning environments which in practice foregrounds occasions where conduct negotiations are prevalent, whilst offering a stabilising shared set of cultural values and norms that equip individuals to mediate conflict and contestation. Furthermore, techniques to surface these assumptions and develop shared charter of values and expectations in their stead was observed and was a fruitful means to work with assumptions whilst stabilising new shared assumptive schema.

Recent research on boundary object theory explores how certain concepts held amongst communities, take on different meanings when enacted amongst diverse communities yet retain enough interpretive flexibility to be recognisable to both. Brand et al discuss situations where certain descriptive concepts encoding values, in their case, resilience in the field of ecological science, perform the role of boundary objects (Brand, Jax 2007). There's distinct relevance here, within Hyper Island given its distinctive heterogeneity, the challenges to cohesion as it scales from highly situated experimentation space to an international organisation, value inscriptions provide a cohering attractor. Notably, instances where learning within the network was framed as a form of protective resilience were common. Afterall, individuals inherit or contest these values, then take these forth emplacing or contesting them in their future workplaces, regardless, imprinting of these assumptions persist beyond exiting the culture.

A troublesome aspect of researching Hyper's culture is that trying to reveal how participants made sense of their activity implied blending the researcher's awareness of independent theories relevant to research with the theoretical approaches and assumptions in use within the culture, also based on their own specific theoretical grounding, the risk of conflation was significant. In this way, the researcher is presented with a kind of *double bind*, where their own preconceptions meet with the participants. The *double bind* concept stems from Gregory Bateson, where two conflicting demands create dilemma in communication. Bateson integrated anthropological and cybernetic ideas to examine forms of social control. A double bind is kind of a loop that usually occurs in communicative system characterized by different logical levels, an example of schematic incommensurablilty. Bateson argued that double-binds in situations were a necessary precursor for change, occurring when individuals cannot confront an inherent dilemma and thus cannot resolve it or opt out of the situation. Bateson also explored this concept in the context of evolutionary ecology, seeing humans as subject to the same demands of ecological and environmental niches that the rest of the natural world was subject to. Interesting to see how loops of cognition and action present threats to personal development, yet are also the basis of most learning theories. The reoccurrence of this kind of internalised contradiction in communities is also a significant to Kuhn's (1962, 2012) work on paradigm change in scientific communities, which Schön set out to complement for the practice domain in his doctoral work *The Displacement of Concepts* (2001). Hence, establishing an independent, evidence based foundation to evaluate theories-in-use was vital to retain critical validity.

Garfinkel clarifies the methodological problems for researchers *'that members have a practical rather than theoretical interest in their constitutive work'* that the researcher is always in a double bind over the necessity to minimize the unexamined use of common sense, whilst maximising the examinability of the participants. Breaching experiments aimed to disrupt this bind, by creating extraordinary situations to better conceive the common sense of the participants situations. Concurring with

Garfinkel's ethnomethodological perspective, Ten Have (1990) notes, in the techniques of conversational analysis by constraining the research only to what is said, the objective is not to present idealised, decontextualized version of social life, but *'to capture the everyday use of commonsense strategies as accurately as possible as participants forge them'* (Gray-Rosendale 1999). The organisation itself generates and applies theories of learning and design and engages in reflection itself to make sense of its activity, this is quite apart from the frameworks of analysis applied to evaluate them.

The research methodology relied heavily on this mode of inquiry, as sense emerged, however partial and contingent, this was integrated into ongoing conversations I had with members, using my knowledge of the culture to reflect this back into a sense-making process with different people and at different locations within the network. Where the developing version of events differed from the personal viewpoint, I paid attention and this was reflected in directing lines of enquiry. The study began with many informal conversations with informants at a decentralised group (Manchester's Northern Quarter School) and was followed by sustained period of participant observation of their activity. This was supplemented in the later stages of the research with dialogue with key strategic members, partners and founders (either at the Swedish hub or internationally), the process of sense-making was conducted *with* members not *on* them. The concept of breaching informed by Batesonian concepts of integrating in complex communication systems shares much with the canon of sensemaking, which apprehends that disruptions in equilibrium are met by conscious and unconscious restorative attempts to maintain equilibrium. As Garfinkel's work highlights; the *precariousness* and *maintainability* of social reality exhibits enormous resilience, as easily as the social norms are broken, they are repairable (Carr 2012). In other words, encounters with resistances were a critical aspect of the thematic evaluation.

As incommensurability mounts, the tension to shift to another equilibrium also mounts, in development terms, double binds can result in psychological trauma, Bateson apprehended this working with veterans. Applying this understanding in ecological terms, Bateson ventures beyond a certain stressing point, the pressure to realign presents a threat to survival, the double bind also exerts the evolutionary pressures that cause ecological change. Bateson's synthesis between anthropological and cybernetic concepts allowed him to translate ideas about social structure into ecological ideas.

As an organisation that certainly wears its colours on its sleeve, their declarations carefully balance tensions between personal capacity and instrumental aspects of learning. The organisation is densely networked and appears conspicuously flat, where hierarchy exists, this is coincident with responsibility for specialised networks within the business, there is a traditional management and strategic structure but there is evidence of continual efforts to de-layer and decentralise and increase horizontal relationships. This was however in tension with an overarching growth-oriented directive; even as the

business grows, the focus is on personal growth and responsibility, co-workers are given dispensation to be entrepreneurial and explore potentials arising from their roles.

As mentioned, in the formative stages of the organisation, the relationships between founders were fundamental, cofounder David Erixon strongly advocated creating a branded movement, as founder Jonathan Briggs reports; *'Lars was working with David Erixon and David was just the right person to take on the challenge of setting this thing up in Sweden and David believed very strongly that the thing you had to do was to brand it. You had to make it a thing'.* Briggs notes how the conditions of his UK academic background would also have shaped the resultant entity, which became Hyper Island; *'I think if I'd done it, it would have been a course somewhere and we'd have put it somewhere and found a home for it and it would have been in two rooms in some university somewhere, because that's the sort of thing I had come from. David said, "No, we have to be a thing and we have to make it and it has to be, you have to be proud of being part of it." I think that was very early on and very forward thinking of David. I think between the three of us we had the right mix of things, later on the military, the leadership piece came into that because that wasn't there in the first instance'.* It is worth noting, that impact of leadership think-tank UGL not originally part of the starting conditions. However, Briggs indicates the significance of *'an approach to leadership and group dynamics that came out of the Swedish Military'* which was very influential and *'catches the Swedish bit of what we were trying to do'.* Delving further, the conceptual basis of UGL's leadership programs (*Utveckling Grupp Ledare or* Understanding Group and Leader) was once a core part of onboarding within the organisation – this program interprets military leadership concepts based on Lewinian group dynamics and research on T-groups into a Swedish social democratic rationale. This was pivotal to understanding the assumptive basis for the methods applied by the organisation – the key conceptual operant; *distributed leadership under stress.*

Notably, however *'we brought in that leadership and group dynamic that's festive'* - denoting an inversion of social structure, festive in the sense of carnivalesque in Bahktin's concept. Certainly, there is a keen sense that education in Hyper Island is meant as emancipatory and the atmosphere makes use of humour, ludic exploration and ritual but with a lightness and informality. The sense of inverting ready-made truths and trivialising hierarchy is strongly present. Bakhtin's framework insists on familiar and free interaction between people, enabling eccentric behaviour, misalliances between separated categories and perhaps most indicatively, transgression, which in a modern context means intervening with normative structures in search for different expressions of meaning. Bakhtin felt these categories signified creative theatrical expression of life experiences in the form of sensual ritualistic performances. The social practices witnessed at Hyper seem to draw heavily on this logic, creating spaces where speculative situations and perspectives can be explored, this shares commonalities with Situationist International (SI) ideas of detournement applied to innovative

situations within learning environments or towards subverting institutional structures. In the sense of scrutiny of commonly held assumptions to derive more robust ones through exploration of the self-amongst-the-group, it is apparent that the shared objective of these learning methods is to engage in structural change through metacognition and reflection; rethinking and redoing is facilitated so that assumptions can be surfaced and acted upon.

This overtone of subversion and iconoclasm is addressed in David Erixon's evaluation of Hyper Island's methodologies, Erixon states *'Hyper Island was set up 20 years ago with the blind ambition to re-shape design education in the context of the emerging digital world. We started off with a pretty punk manifesto: No Grades, No Tests, No Textbooks, No Teachers, and No Classroom. We wanted to bring new ways of doing things into (what we felt were) a very linear, conservative and institutionalized (power-knowledge) domain. Having been brought up listening to the Sex Pistols, my belief was for radically new things to emerge old structures first had to be destroyed'.* Erixon affirms that 20 years on, it is time to revisit this and restructure again. Discussing inherent intricacies of bringing two vastly complex topics of 'design' and 'education' together. Furthermore, asking about how these concerns are able to anticipate 'futures' makes this severely challenging, the complexity of challenges faced by learning institutes to restructure themselves to equip future workforces remains pressing. However, writ large, this manifesto frames the question; *'What is the future of Design Education?'*

It is notable that Hyper itself arose from collaborative partnership, the assumptive backgrounds of each founder blended to produce an innovative form, not the result of an implicit individual creative process, the blending of specific entrepreneurial, academic and political stances at a certain place and time in Sweden, framed by a shared apprehension about the emergent digital ecosystem its potential impacts on education and work formed a joint field enacted into an organisational network. This alignment acted to frame a particular problem situation, the resultant innovation was admittedly serendipitous, but continues to have impact. It follows that Hyper arose through a process of alignment between collaborators situated in a highly specific temporal and spatial context.

Founder, Lars Lundh, who had lived in Karlskrona and witnessed the decline resulting from demilitarisation after the fall of the Berlin Wall and wanted to do something about it, motivated by a *'huge social conscience about helping the community he had grown up in'*. Briggs argues this context provided *'a very fertile environment'* stimulated by Lundh's provocation *'We should do more, we should make more things happen'*. These macro geopolitical factors had far reaching impacts on southern Sweden, which traditionally had *'a very strong military training tradition'*, a de-prioritisation of national service also meant a need for social reorganisation and regeneration. When asked whether prevailing political conditions in Sweden, with its strong social democratic movement and unions were vital formative influences, both founders and key methodologist affirm that Hyper could only

have formed in Sweden, framing this as '*a redeployment of talent*'. Briggs was '*puzzled*' by the '*was happening to the whole emerging multimedia economy*' admitting '*it didn't make sense for any one discipline to try and own it and Lars agreed with me*'. Erixon was working with Lundh and was '*just right person to set the thing up in Sweden*' by making branding a focus, because simply '*by making it a thing and pointing at it, it becomes thing*'. In this way, simply framing the nascent vision within a brand entity became fundamental to establishing a joint field for exploration, offering legitimacy and a set of values '*that people could feel a part of*'. Briggs offers '*you can see that in a lot of innovation*' and that a specific alignment between their situations and disciplinary backgrounds gave shape to the resultant organisation. Different starting conditions would have perhaps in something else or even fail to provide the requisite spark. Subsequent methodological innovations resulted from the challenge to realise this vision. Briggs says an '*alignment of stars*', a conjunction of three things within certain situation acted as a powerful attractor. '*Very, very quickly*' were joined '*by a whole raft of people*', because '*we had some good stories to tell about on a weird prison on a weird island in the middle of nowhere*'.

Evaluating origin stories reveals the importance of narrative, encapsulated within brand concepts as a means to gather attention, shape activity and most importantly harness social capital to enact influence. Briggs admits the excitement this generated and the nascent community it attracted drove resultant developments '*they became a propeller that pushed forward what we were trying to do*' then '*we handed it over to them*'. Briggs notes an interesting divergence between his narrative and the present organisation's narrative '*they would de-prioritize digital because 20 years on, digital isn't a thing anymore. Digital is everywhere*'.

Briggs argues Hyper's structure has shifted considerably '*they're not being driven by the same point of change*', political and conceptual imperatives have changed, and relevance has shifted with time. Having a '*single minded North Star*' that Erixon represented is not the focus now, but that this was appropriate to its present state '*because it allowed those of us who are involved with Hyper Island to become, to allow Hyper Island to reflect our own interests and needs*'. Briggs comments the diffusion of the network has resulted in significant localisation, the experience '*is not identical, it has common elements but there's not an identikit*'. Briggs expresses that if he had a fear, it would be that the present iteration is '*looking to certainty*' rather than a '*embracing deep amateurishness that we should celebrate*'. This describes an interesting tension within the organisation between fluidity and fixity which says much for general approaches to organisational innovation. That the countervailing force to '*look for certainty*' and '*want to bottle everything and turn it into something that can make a billion dollars for someone*' admitting a particular political alignment with Lundh and skepticism towards '*whether this is generally possible or even desirable*'. This illustrates tension between implicit intrinsic values oriented and

extrinsic economic value oriented imperatives of innovation, that *'there's definitely a political concept'* that those exploring entrepreneurship and start up culture *'their politics is often extremely different'*.

4.12.2 *Task field in the JTBD Framework*

Briggs argues this tension is only a good thing, discussing a framework called 'jobs-to-be-done' (JBTD), Briggs uses this as a central organising schema to think about task concerns in relation to their environment. Arguing different people have different jobs they 'recruit things' for, this is a particular interpretive schema that is worth scrutiny. The framework concerns implicit motivators and how particular situations are conscripted to achieve goals. This approach stems from *'customer centred innovation mapping'* (Ulwick 2005), this approach to innovation focuses on mapping tasks into discrete processes to determine what individuals are *'trying to get done at every step, rather than what they are currently doing'* arguing that actions are always a means to an end, which may or may not be consciously realised, motivators of actions thus may have different levels of intelligibility and that revealing this can be used as source of innovation. This approach regards jobs as processes and that innovation emerges from mapping stakeholder perspectives to create value in a number of ways. The relation to Weber's discussion of means or end oriented versions rationality is remarkable.

Digging down further reveals a particular epistemic stance *'that all jobs have a universal structure'*, these process steps *'defining what the job requires; identifying and locating needed inputs; preparing the components and the physical environment; confirming that everything is ready; executing the task; monitoring the results and the environment; making modifications; and concluding the job'*. The framework of jobs-to-be-done, indicates how intentionality frames situations and shapes their conceptual structure and that this can result in entities like organisations. The researcher, approaching a relatively mature, well organised culture, attempts to retroactively make the framings that lead to this intelligible, for the value it has for research into organisational innovation. A cognate hypothesis follows; that framings shape the approaches that condition perception towards activity and generate task fields, which are themselves assemblages of factors amongst groups situated at times and in places which lead to decisions that define both the structural conditions but also affective dispositions out of which distinctive organisations arise. Simply put, framing guides perceptual structuring which in turn shapes task fields, tasks in aggregate form the operating conditions of organisations - their internal field of operation, which in turn can lead to change in the fields of practice participants are involved in. Consequently, as the organisation's action generation proceeds, it's influence is amplified and propagates out (principally here through the habituation of outgoing clients and learners who go on to transpose their framings and learning into their own settings, but also through routes such as storytelling, marketing and coincident interactions) potentially influencing the perceptual structuring of other towards their own task fields within their field of operation, manifesting change over time in

communities of practice, through their participation and perception of action of the organisation. The cycle of influence is reciprocal and synergic across the organisational boundary. Particularly, as in this specific case, members of the organisation are defined by their ability to sense and anticipate change in the wider industrial, technological sectors but also in the activity, sociality and disposition of people within their own networks. A core insight here stands; as the scalar relationships between frame and field; enacted framings can lead to changes in fields (of the task, the organisation and consequently practice itself). Hypothetically, this describes the titular 'fielding' activity.

This approach describes the need to 'establish a field' where the task is enacted and analysing steps for cues to innovate, this framework relies on how particular environmental fields interact with personal motivators. The chains of jobs or tasks become the focal site for innovation, implying the searching of this field for opportunity to elicit value creation. These suggest a process view implicit in task structure, a cyclical approach with discreet steps; *define, locate, prepare, confirm, execute, monitor, modify, and conclude* (Ulwick 2005).

The key insight of Ulwick's model of innovation and creativity revolves around building awareness of what individuals are trying to accomplish through a task, the authors build an entire process around the development of innovation from task analysis of the perspective of the enactor, asking who the 'target' of value creation in a given activity system is and that this necessarily differs from perspective to perspective. This model of outcome-driven innovation draws on anticipating desired outcomes by framing tasks as 'means to an end' where tacit motivators derived from task processes are used as source of innovation. Interpreting Briggs interest in this model as an important means to assay situations whilst reconciling the impact of implicit motivators. In this view, the task, or purposive activity interacts with a field of activity. As such, Briggs reflects that each founder recruited the situation for different reasons; Briggs as *'place to experiment'*, Lundh *'as a means to pay back'* and Erixon as means of '*developing a platform for radical change'*. Interpreting this; situations are recruited to express implicit motivators and importantly values, which interact with the environment they are enacted into.

Consequently, Hyper Island was *'recruited'* by this researcher to examine issues pertinent issues relevant to transformations occurring in the digital economy. As the the feedstock for digital industries, the production 'talent', individuals with expert competencies fit for digital industries especially 'leadership' qualities. The implicit motivation was to reveal insight into processes relevant to the crafting and performance of expertise in contemporary learning environments. Remarkably, the value of design expertise as a key competency is increasing rapidly as organisation shift to 'digital' largely as this activity of digitisation, digitalisation and digital transformation means organisations call upon models allied to software design, involving product design, service design and human centred

approaches as means to create better fit for increasingly digitally literate consumer bases whose awareness and literacy about available goods and services has swelled radically. Just as application of computer science outcomes and processes has been amplified by the mass adoption of computer technologies, the field has become increasingly diffuse component of all academic fields, industries and professional domains, so to has the application of design-led methods. The success of human centred approaches to technological development has been aided by the dual requirement for sensitising research processes but also the ability to develop and bring to market digital products. This not only conscripts design-led processes into the very fabric of contemporary organisations in original sense of artisanship of original modes of communication, product or servitisation, but design practices, abetted by development stemming from design methods research into the nature of complex problem solving, have expanded to provide the foundation of new problem solving and framing approaches but also are increasingly conscripted as the basis of the organising logic used to organise organisations themselves. This has led design processes and consequently design professionals into new territories. Digital transformation is typified by organisations applying processes that blend logics borrowed from leadership, innovation and organisational theory with methods allied to design in its expanded form. By being explicit about these motivations acts to mitigate or at least make explicit the researchers own assumptive biases based on observation about the changing nature of design.

Importantly, research activity into technological development and innovation are far from value free. To recruit means implicitly to assemble resources, to gather a situation in a certain way, setting thought into action conditions certain framings and a certain structure of intent. The concept of technological frames has strong lineage in information systems scholarship and is evidence of successful application (and development) of sociological concepts in technological organisations Orlikowski and Gash (1994) argued that social cognitive perspectives on information technology offer particularly important approaches to examining and explaining the development, use, and change of information technology in organizations. They hold that although technological frames are individually held, they are also social phenomena, in that mutual understanding shared by individuals undergirds enactment of a social reality. The authors note *'assessing incongruence and inconsistency in frames and eliciting deeply held assumptions, expectations, and knowledge poses a number of methodological challenges'* but highlighting assumptive discrepancies through analysis of artefacts, observation of action, and through the analysis of metaphors, imagery, symbols, and narratives is highly valuable to elicit insights can provide important clues as to people's implicit understandings, values, and concerns (Orlikowski 1994).

Approaching activity at frame level lends researchers the capacity to distil insight into how certain contesting framings are enacted, their implications and crucially how to generate new ones. Drilling

down into the implicit motivation at work in any given enterprise reveals much about how narrative organising occurs and conditions activity. Briggs argues attempts to organise and systematise innovation are risky, affirming that what motivates him is the *'tension between the group and the self'*. This asserts the centrality of a boundary – the relation between self and other.

Observing these visual artefacts at multiple sites and spaces created by Hyper Island, this accompanying visual language is ever present part of the environments, something akin to a value-centred brand entity, whose activity patterns are absorbed and enacted by members of the culture, whether learner or collaborator. Looking through this quasi symbolic / material territory that at once conscripts and conflates values and environment into the generation of value provides a significant general foundation to evaluate the activity of organisations at work in key transition sites in the digital economy. Critically, organisations not only generate new products and services, to do this they generate certain ways of thinking and acting, and consequently they structure, and are structured by individuals and are undergirded by socially constructed, held and shared phenomena.

4.12.3 *The Role of Context – Active Environments*

The contextual environment within Hyper Island is complex, constantly undergoing restructure, reflecting the ongoing social enactment of frames. Within the spaces generated by the organisation, a certain aesthetic and declarative tone of voice is apparent. The use of specific signifiers, typified by plural examples where the logic of a movement is enacted onto the space – this is ingrained into action toward preparing the environment. For example, a palette of colour coded paints, a brand specific colourway is used to paint key structures in their buildings. This forms a thickly coated visual environment, populated with codified sentiments aligning with brand style guidelines, but more importantly declarative value propositions written in cheerily affirmative tone of voice are highly evident. This constitutes the fundaments of a visual culture that significantly contributes to and forms the scaffolding of a soft doctrine, internally referred to as the "Hyper Way".
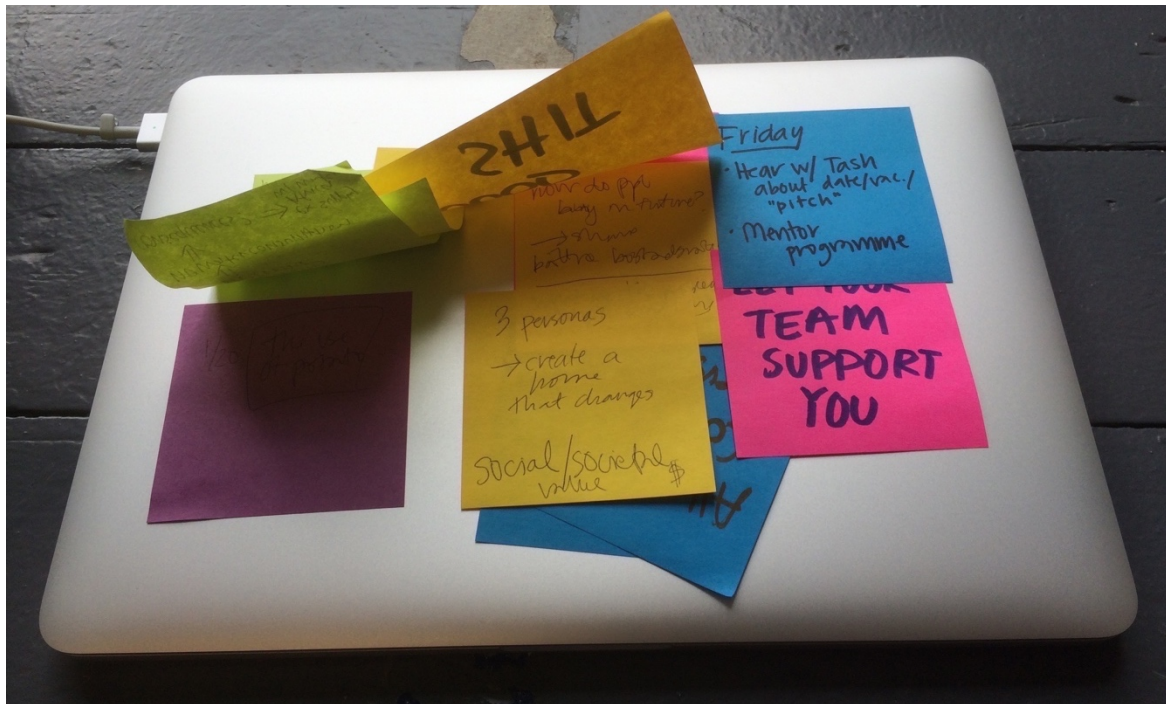
Figure 15 - Laptop used as a site for the physical restructuring of shared cultural learning.

This highly visible, flexibly curated, lucid visual environment evidently acts to guide and shape interaction by subtly inscribing value statements into space, in this way the environment enacts a gentle yet coercive soft power of the shared methodology. This manifests a particular semiotic environment, members of the community adopt and appropriate these symbols onto their own things, this language layer is certainly open to interpretation rather than being closed, forming a vernacular sign layer unique to each space, but holding feature common across multiple sites. Critically, the tone

of voice of the organisation is both persuasive and ostensibly worthy, in the sense that declarations prove difficult to refute, pointing to the value of prosocial, value-led approaches to collaboration.

Team members and learners were observed to be consistently equally enthusiastic in earnestly pasting the brand, stickers and notes onto personal devices and even onto their own bodies. This evidences the strong feelings of affinity building, facilitated by co-workers felt by crews as they are embedded within the larger culture, this process was very effective in inducing genuine feelings of belonging as learners came to feel increasingly part of a highly situated yet global network of collaborators. This activity was tantamount to the formation of a community of practice around the core experiences and methodology of the organisation. Interpreting observation, this formal layer of brand language was a pivotal site for interactions but also tied into other more vernacular layers of organisational speech and the conscription of the environment to the task of dynamic coordination.

Notable in observation was how values, organisational narrative and organising concepts were negotiated with regard to this and other layers (with visual, symbolic and artefactual aspects), these were notable for their unique tone of voice, interactions around this joint field of inscriptions felt earnest, honest not cynical, acting as a function of community formation around commonly held values but also a means to partake in narrative-making around the shared organisational narrative and also acted as venue for enacting and contesting shared value common to the network. In some ways, the narrative of the organisation (as movement, business and methodological canon) performed in ways akin to a boundary object as defined by the scholarship in this area, in providing a bounded way for heterogenous communities to align around a common space with conceptual and physical aspects, whilst retaining requisite interpretive flexibility to support dynamic coordination and intercommunal negotiation across a distributed network. Both in the true spatial sense of multiple sites involved in the global operations of the business, but also temporally in the sense of a fast-moving organisation with many collaborators coming and going, each partaking the common strategic priorities and tactical activities of the organisation as co-workers, clients, learners and collaborators move across the network.

Ascribing the concepts of joint field or boundary object to this performs as useful optic to understand how complex collaborative activity is enacted spatially and temporally. However, with relation to existing literature on this topic the candidate organisation provides a distinct means to understand how shared cognition occurs in organisational life. In an organisation that, by its own admission, struggles to formalise processes with regard to its own internal methodology and organising concepts. By actually leveraging this difficulty, reticence or unwillingness 'write things down' lest 'they be set in stone' the organisation affords itself important degree of interpretive flexibility necessary to sustain competitive advantage but also maintain its protean public image and reputation.

This could be seen as an advantageous tactic to support agile organising, by having clear brand demarcation and strong relational structures, meanings can be recombined, shifting accordingly with prevailing changes in socio-technical environment. From a semiotic perspective, relative stability in the syntagms and syntagmatic relationships allowed a high degree of paradigmatic fluidity where issues, topics, technologies, spaces and people can be fluidly exchanged. This perhaps goes some way to explain network robustness in rapidly changing environments. Commensurately, strong redundancy in communication (high in predictable information patterns) countermands the impact of entropy (the presence of highly unpredictable information patterns). This speaks to how symbolic innovation forms a critical part of dynamic coordination and in turn yields insight into how narrative based sensemaking processes occur. Highlighting the role of conceptual schema in organising networks, by enacting robust anchoring via structured signification affords plasticity in exchanges of meaning. What emerges from this analysis is insight into a critical phenomenon; how framing enacted onto environment can provides a pliant, light-weight scaffold to support meaningful collaboration, to conceptualise this, relational properties rather than fixed definitions become highly significant. In turbulent environments, immutable structure quickly loses coherence. In such situations, which seemingly are rapidly becoming ubiquitous realities for complex organisations, the appropriate stance must contend with situational flux not fixity as an epistemic starting point.

This resonates with David Erixon's original intent of making Hyper a *'thing and pointing to it'* as a means of creating a movement, formation of a bounded culture supported by its own visual, symbolic and cultural language that operates essentially to display and enact core values. The acts of authorship of things are determined by concordance between the network, in practice shared organising concepts are enacted onto individuals principally via the affective, experiential dimension. This process of flexible concordance also implicates participants into aspects of authorship, coordination and ownership via shared activities. Participants are implicated enacting the relational patterns, whilst locally rewriting the culture to their own context, ensuring relevance and ecological fit.

It's significant how the instantiation of these organising concepts, that together form the organisation's shared schema or framings-in-use have formed into complex composites over time which continue to condition the sense-making and crucially, narrative-making activity of the organisation. These framings have been deeply influenced by the starting conditions, shared envisioning of founders and layered influence of subsequent contributors. Also, critically framing have cohered from the various circumstances and pivotal situations occurring in the local environments where the organisation has been emplaced. Consequently, this composite of durable framings further shapes this ongoing narrative-making process. The accounts of their formation and instances of symbolic innovation that has sustained the organisation in a highly dynamic environment are

reconstructed retrospectively and are evidence of collective sense-making that act to stabilise a highly heterogenous and fast-moving distributed network.

As the studio spaces undergo constant restructure, furniture shifts, teams attach to spaces and favour certain corners, each iterative cycle of a job-to-be-done, 'recruits' the situation differently, teams are constantly restructured and disrupted, partly to reflect the dynamic environments common to the associated professional domain but also act to constantly engage individuals in the process of affinity building and the renegotiation of conduct. Notably, the soft power enacted into the space and through the activity of co-workers holds influence but did not preclude contestation and critique, it only acted to formed venues onto which individuals enacted their own composite interpretations where their own personal schema met with the organisation's. Framed as an ecotonal boundary, a space for contestation these tensions between interpretive schema and their interplay can be seen as highly generative. As the organisation reconceptualises itself through successive waves of digital transformation, to maintain sufficient interpretive flexibility and sustain its own relevance in a changing landscape, the enaction of a fluid, soft doctrine achieved through schematic negotiation and narrative-making is a critical aspect of the organisational action generation. The processes of symbolic innovation and narrative-making enacted onto environments fielded by the organisation, by the core network and participants is critical to meaning-making. This visual, artefactual, symbolic layering activity can be interpreted as a critical site of exchange, or more accurately a boundary, for innovation.

Remarkably, for a course concerning digital innovation and technology, lo-fi prototyping and the activity of social rather than technological renegotiation was highly visible. The Post-It note is ubiquitous, covering all visible surfaces, constructions rarely stay for more than a few days and are subject to constant mobility, restructure and erasure. This is general to most design studio / agency environments, and its rapidly becoming the de facto typology favoured by non-design organisations pivoting to agile teams and applied methods allied to expanded design. However, the intensity of interaction and the degree of attention to these assemblages is remarkable, likely a product of heightened attention to interpersonal conduct (group dynamics). In turn this activity is a composite of digital technology processes (advanced software design), design methods (design thinking) and Swedish (Social Democratic) principles.

The waste bins are often filled with this debris of provisional ideas and structures that represent emerging systems, blue-prints, ideation exercises and illustrations encapsulating certain experiences and social situations attest to the process of ongoing dynamic coordination. The visual surface of the studio is continually sloughed away and renewed. Regarding this in archaeological terms; these artefacts undergo constant restructure, this could be interpreted to represent a form of socio-material midden. These piles, stacks and wall displays contain rich insight about the changing collective

psychological state of the studio as the learning path progresses. This is also where the learning operations are realised, learning becomes extended out of the purely abstract and internal domain of personal conceptualisation out into the shared environment, restructuring it. This aligns with experiential approaches allied to Dewey and Vygotsky, as developed by Kolb and Schön.

The research interest in these layers of inscription thematically is that they represent the interface between personal internal learning and interpersonal shared forms of learning and exchange which characterises the organisation's approaches. This is common to many contemporary learning environments, which sets up ways that the insights here can be generalised to the activity of other learning, designing and organising settings. In a rather hackneyed motif, common to architectural and urbanist scholarship, the polytelic scaffolding potential of environments is often referred to as palimpsest. In computational terms, active environments function in ways akin to rapid access memory or in cognition, the working memory of individuals but borne onto a physical site to enact a kind of shared cultural memory. This brings the issues observed squarely into the domain of distributed cognition.

Sapsed and Salter, discus *intercommunal negotiation* (Sapsed 2004) in highly differentiated communities of practice, which synthesizes Star & Griesemer's notion of the boundary object as artefacts of practice that are agreed and shared between communities, yet *'satisfy the informational requirements of each of them'* with Brown & Duguid's extension to business tools of *'shared documents, tools, business processes, objectives, schedules'*. In this way, boundary objects enable collaborative work, supporting this inter-communal negotiation described in Brown & Duguid (J. S. Brown & Duguid 2001). As *'each social world has partial jurisdiction over the resources represented by that object, and mismatches caused by the overlap become problems for negotiation'* (Star and Griesemer 1989).

As discussed, Boundary objects are supposedly weakly structured in common use, yet strongly structured in individual site use. In the context of Hyper Island, there are quite definite infrastructural artefacts integral to acts of cultural conduct. Incidents of how these durable aspects of a visual and material language were fundamental to the highly mobile, rapidly reconfiguration of the physical spaces; items produced as project activity proceeded were significant evidence of this structuring activity.

As the study stemmed from interest in boundary object concepts, it was hard to not notice the role of boundary object-like artefacts within the organising environment. However, what is perhaps novel is to shift attention away from the artefacts themselves in their own right and to prioritise their restructuring potential on the environment itself. Noticing how individuals learn within Hyper Island, adapting Brigg's concepts about innovation; learners were seen to actively *recruit* their environment

into their organising and learning activity. If members recruit situations to both internal personal and external collaborative ends, driven by their task structuring, this activity leaves traces of interaction as it reconfigures the environment, these traces have consequent restructuring effects upon individuals. Although too early to claim with certainty, the emerging suspicion is that learners establish a field of action between their body and their environment (which is constituted of the space, their tools and other people) to enact learning. This form of learning relies on restructuring activity and the generation of frames, a specific restructure of percepts. Remarkably through the ways in which collaborative activity is framed, this is evident in the environment as product of group interaction, but consequent in changes to the individual, experienced as learning change.

4.13 Closing Experiences

Hyper learning experiences are characterised by multiple cycles of group formation, reflection and termination. Hyper cohorts, importantly by the end of their learning path will have likely worked closely with the majority, if not all, the other members of their group. This observation formed a large part of the discussion.

An organising image arose; for *n* size group of people, each person will have an *n*-1 set of impressions of each of other group members, this will have had important impacts upon their own self-concept. *For example;* In a cohort of 100, there is thus a set of 100 (n) x 99 (n-1) = (nn-1) 9900 impressions. This produces a vast and complex *field* of interpersonal relations; a vast, largely tacit, affective domain which is fundamental to the formation of a place. Accordingly, changes in personhood were mutually constitutive with the formation of place. Notionally, this mode of learning operates through the restructure of place as venue for assumptive restructure.

This vast and emerging mesh of relationships was attended in a continual way throughout the observation period. Although imperfectly structured, partial and contingent leading to the formation of subset social worlds, in-groups and variance between individuals. This culminated in final encounters where the emotional intensity experienced by participants was palpable. Moments where this space of affect was deliberately noticed and attended to were continually observed. In the closing moments of the observed cohorts learning cycle, the emotional impact upon participants was profoundly intelligible and quite affecting. In a key incident; the final team termination which formed the closing experience of the cohort's studio component, facilitators arranged the group into two lines facing one another, the group was asked to regard each person in front of them in silence for one minute, before saying goodbye and moving one step to the left. Every individual stood in front of every other in silent encounter. This was a profound incident emblematic of the depth of interaction

over an extremely intense period of in-depth collaboration and rapid group formation, reflection and termination.

This observation reflects the significance of the affective domain to contemporary learning experiences, the role of heedful interrelation and embodiment in reifying relationships within a community of practice. What this revealed about importance of the intergroup conduct and the affinity formation undergone by a group is significant, where participants are encouraged to reflect on bare facts of their interaction, separate from the specific content of their work. This observation resonates with Lewin's account of the elaboration of Group Development with the field of social psychology, coincidentally a critical moment in the emergence of facilitation practices. Reflected in observation and the resulting data, this mode of learning is highly enmeshed with affective considerations. In the data, situations pertaining the thematic #AFFECT were prevalent, providing insight into the nature of restructuring activity. The outcome of interrelation (and the methodological strategies seemingly designed to support this) was not just acquiring professional knowledge but active negotiation in the affective domain leading to the development of interpersonal expertise and to some degree personal transformation in light of encounter with different thoughtworlds. This arose from interactions amongst groups as they negotiated and reoriented their boundaries and thus their membership of enmeshed personal and professional social worlds.

Each individual, throughout their learning path will have worked in groups or built some form of relationship with many others, through this, the group had undergone formation of lasting bonds, a recognition that learning had emerged from amongst the group. Interpreting, this was evidence that the learning relationship had shifted away from learner / teacher polarity to intergroup peer interaction and thus interpersonal and intercommunal negotiation. These incidents are indicative of how the role of interrelating in learning environments might lead to reorganisations of the assumptive worlds of individuals. The value of this is held in how the environment becomes venue for learners to encounter and encompass the diverse perspectives and contributions present in a given set of people, rather than the structure of learning content per se.

Allport's contact hypothesis denotes that groups that share spaces over time will likely engage in the resolution of conflict (Allport 1979). Conflicting framings are blended and new organised arrays arise, the learning experience in this view, is about the potentiation of intergroup conduct. Roger's model of learning asserts that learning occurs only when threats to self-concept are allayed (C. Rogers 2012). Resistances to this soft power approach to generating learning value were strongly evident, encountered through continuous reflections on interpersonal relations within shifting groups, stress and tension were integral, this process seldom occurred without conflict, although attempts were made to equip persons with strategies to make contestation constructive. Consequently, it could be

reasoned from evidence that the principal competence of Hyper alumni are not held in the technical literacies in design, strategy or coding, they ostensibly rely on professionalisation of interpersonal conduct; learners equip themselves with capacity to become leaders in their field through the experiences of navigating the intricacies of social dynamics requisite in becoming members of a community. This sets out a strong case for models of design and learning activity to include consideration of affect and group formation, this aligns well with theories of situated learning.

Discerning a conceptual basis for this means developing a grasp of how dynamic encounters within networks enact learning. In set theory, a *sheave of sets* captures the idea of associating (or gluing) local information to a common topological space to derive global information, where multiple intersecting sets form categories with common and differentiating features. The goal is not to analogise to social complexity to topological mathematics, as Lewin attempted to do, but to highlight the highly complex relational structure of interacting groups. Bringing attention to the complex relational structures that occur amongst groups, relational features that arise where a common local space becomes venue for novel affective renegotiation between highly heterogenous groups. Even a cursory sociometric analysis reveals deep complexity, although analysis yields knowledge about relationships, synthesis is requisite for understanding how these relationships enact learning. As such, drawing on basic perspectives from topological psychology provides a means to examine group structure, then the task becomes unpacking how overlapping or relational properties of categories, where common and divergent assumptions are grouped together can result in generative innovation. This highlights, and to some degree blends, the dual concept of social and technological generativity. In Zittrain's sense technological generativity indicates *the ability of a technology platform or technology ecosystem to create, generate or produce new output, structure or behaviour without input from the originator of the system'* (2006), here in the form of innovative recombination of framings. Co-opting Erik Erikson's (1950) concept of psychosocial development, generativity concerns the capacity, will or care to pass learning forward, creating the conditions to guide future participants within a network. Psychologically generativity is concern for the future, but also a precursor innovation within an ecosystem.

There is robust research that examines how the formation of groups impact potentiation and measurable creative and economic success factors in creative communities. Notably, Uzzi & Spiro studied the structural and relational aspects of creative communities deriving the quotient Q that defines the connectedness, coherence and embeddedness of a local network in its global environment – they hypothesise that a *small world network governs behavior by shaping the level of connectivity and cohesion among actors embedded in the system'* (2005). Uzzi opines the *goal is to have people recognize that success isn't just based on internal talent and knowledge'* that *success is partially derived from relationships with other people, through whom they get access to expertise and capabilities beyond themselves'* (De Soucey,

2007). Applying social network analysis and complexity theory, Uzzi models innovation and creativity in diverse industry domains by examining closely *'how individual capabilities are limited and transcended through the network'*. This construct unpacks statistically parameters of network-environmental embeddedness and interpersonal connectivity to reveal a parabolic relationship that reflects the ratio of new blood versus industry veterans. A *'bliss point'* is evident where a high ratio of Q occurs at an equipoise between the stable, conventional and fresh, novel capacities of individuals composing groups within creative communities. By which we might read ratios of novitiates and core participants or commensurate with situated learning and boundary theories - insiders and outsiders. Moreover, this hinges on the degree to which incumbents recruit their former collaborators and serve as brokers for new combinations of production groups. Simply, surplus closeness breeds staleness, surplus interlopers diminish the transformative impact of networked clusters. Conclusively, innovativeness is multifactorial; creative capacity and likelihood of economic success in organised groups is supra-individual and contingent upon relational dynamics, interpersonal relationships and environmental embeddedness both within and across domains.

Significantly here, a conceptual framework that deals with the sum of the affective interconnects between an interacting group is an important way to understand not only network dynamics and their likelihood of success but also how co-operative learning interaction might act to restructure individuals within a group in ways not explained by traditional pedagogical epistemology. At high level, the bonds and affinity act as *social glue* which is a persistent structure residual of continuous formation and de-formation of groups. This experience of continuous restructure of perceptions and assumptions in light of ongoing collaborative interaction has important impacts on expertise formation. Consequentially, individuals carry forth their experience of complex social negotiation. Arguably, it is these relationships that hold learning value and are motors of organisational learning, because of the distortive tensions placed on personal assumptions in light of experience of other world-views but also the demand to sustain personal social orientation with respect to the actions and perceptions of others amongst a group. More significantly, the process of developing and sustaining a resilient system of values and competencies robust enough to enable activity amongst individuals with diverse thought-worlds and within social-worlds, each with their own distinct assumptions and practices, has its own characterizable learning value. Then, by learning to foster, renegotiate then sustain the relational properties of groups in other contexts, and perhaps then apply this expertise to instantiate new forms of organising in other settings, is pivotal to this form of group learning, but also pivotal to successful leadership.

This account exemplifies the formation of integrative expertise; at a formal level, individuals borrow structures and strategies learned in their experience then apply these principles to new settings (their

efficacy is evidenced by the persuasive impact of this relational intelligence and integrative expertise can have on how other organisations adapt these practices). This accounts for anecdotal evidence that practices developed within the culture propagate and are applied to new organisational settings, which acts to amplify the social capital of individuals but also the cache of the organisation within its operating field. More assiduously, how individuals adapt their experiences to derive their own approaches based on these shared methodological principles.

However, evaluating outcomes of this kind of learning; a basic taxonomy is apparent;
Three levels of general impact were observed from anecdotal accounts of alumni progression into professional practice. Each stage occurs with less likelihood, but has increased potential significance;

1. *Individuals commonly are able to apply frameworks and principles untransformed directly into new settings.*

2. *Individuals then take in these schema, applying them to reframe their own assumptions about their professional practice, transforming their capacity to apply integrative expertise in new settings.*

and

3. *Individuals are able to integrate or blend both of these stages, to enact change on their own assumptions and practical activity form wholly novel instances of collaborative organising that are able to enact change on their field of operation, that have restructuring consequences on the organisational setting and potential reshaping effects on the industrial fields they go onto interact with.*

This aligns somewhat with existing frameworks of expertise formation, but emphasises the potential impacts not only of design expertise but the requisite social intelligences underpinning something like integrative expertise. This account is formative of a reframing of how design management and leadership can integrate understanding of how learning occurs amongst groups. The supposition is that group learning occurs in collaborative settings through brokerage and schematic co-negotiation, this in turn has consequences for organising practices within organisations. There is a wealth of research that provides a conceptual grounding for continual expansions of design practices, particularly in fields corollary to cognitive science, distributed cognition science and increasingly empiric neuroscience. This emerging contribution aligns with Lawson's framework of acquiring design expertise but requires certain modifications to better suit the observed patterns of collaborative expertise formation. Notably, co-opting Dorst's ideas about the innovation of frames in the expanded design field.

4.14 Acquiring Design Expertise

Prevailing frameworks of design expertise formation, for example, Lawson & Dorst's (Lawson 2014) are sympathetic to boundaries, commensurate with situated learning theory amongst communities of practice. The core objective of leadership in design education is to enable state change in individuals, building competency from lower to higher levels, this focuses on individual competencies, often discounting interrelational competencies, integrative expertise fundamental to managing situations occurring amongst groups, observation affirms the fundamental importance of these considerations.

In this framework; novices consider objective features of situations, as given by experts then follow strict rules to deal with problems, advanced beginners regard the situational aspects as important, becoming sensitive to exceptions in 'hard' rules. Heuristic maxims are applied to guide activity within problem situations. There is then a radical discontinuous change in how competent problem-solvers work, they select relevant elements of situations, forming plans to achieve goals arising from these situational features. Selection and choice can only then be made on the basis of much higher involvement in the design situation than in earlier stages. Problem solving at this level involves the opportunity-seeking and expectation building. Lawson suggests here affective consideration become evident in emotional attachment and feelings of responsibility alongside sense of hope, risk and threat. Problem-solving processes then take on a trial-and-error aspect, interspersed with reflection. Proficient problem-solvers begin to recognize intuitively important features of design situations and can plan accordingly, reasoning courses of action from here. Here Lawson's framework deals effectively with attention to situational features and attests to the significance affective factors seen in changes that occur with expertise formation. At the lower end expertise focuses on problem-solving, only later including the activity of problem-framing based on situational and affective considerations.

Lawson's framework then describes how high-level design expertise concerns intervention with professional structuring itself - *experts* respond to specific situations intuitively, performing appropriate actions with immediacy. Reasoning and problem-solving at this level are indistinguishable from action itself. Masterful design introduces unease; masters see standard ways of working applied by experienced professionals as contingent rather than natural. *Mastery* is indicated by deeper involvement with professional fields as wholes, reflecting on success and failure. Masterful attitudes require an acute sense of context, typified by openness to subtle social and environmental cues. *Masters* enact appropriate actions more nuanced than experts. Beyond this, *Visionary* design activity is conceptualized as a process of *world disclosure* – visionaries expand domains they work within, as such, reshaping field boundaries.

World disclosure acts to re-envision how things could be, redefining issues as a means to open new worlds or creates new domains. With relevance here; world disclosure operates at domain margins *'paying attention to other domains as well, and to anomalies and marginal practices that hold promises for a new vision of the domain'* (Lawson 2014). This framework is relevant in that it foregrounds the intercommunal nature of integrative expertise and its commensurability with boundary theories. Lawson's framework is also characterized by a expanding sensitivity and awareness of field dynamics, in other words the structuring of conceptual categories and intellectual communities, an expertise marked by an expanding competence in boundary crossing, which is importantly distinct from the specialism that comes from deep experience of a specialist field. Notionally, an awareness of syntagmatic relations supporting domain specific expertise to deal with particular paradigmatic permutations.

Lawson's framework provides a potent structure to reconcile individuating differentiations to disposition occurring in learners, it sets out what occurs but says less about why and how this occurs the way it does. What's notable here is the stepping up from problem-solving, to problem-setting, then via world-building practices, design activity is able to have field shaping effects, or at least gathering design expertise permits expanding awareness of field structure. Based on observation, the objective is to unpack how changes in the group, reflected simultaneously in representational activity onto the environment and the affective disposition of individuals results in learning, to derive a more ecologically rational account of collaborative learning. Models of design and by extension design expertise are inherently path dependent, often following linear trajectories akin to development taxonomies, there is however a dearth of models that consider group expertise formation, in other words how expertise flows amongst (is distributed across) and is consequent of relationships within a group.

In the formation of sustained communities, these relationships have definite temporal extent which shapes the formation of alumni networks which then goes onto have impacts on the communities of practice (scaled across workplaces, industrial sectors, domains and fields) its members participate in. Strong anecdotal evidence to the effect that Hyper Island's methodological techniques, when applied within organisations by alumni, go on to have persuasive impacts on donor organisational contexts, incrementally restructuring organising practices. Over time, this is seen to be a crucial way that Hyper Island has impact on organising practices in the digital economy, which then determine decision-making in an ongoing way that can be shown to have sustainable, scalar impact. These residual relationships and the flow of interactions and collaborations that result from it, could be mapped conventionally using sociometry, for example through the alumni network or ongoing career paths. However, to go beyond this to inquire how and why these changes in disposition have qualitative

impacts on fields of concern would be productive and have relevance for the economics of innovation, but are beyond scope here. The formation of coherences in these networks and the way these leverage affinity building, assiduously developed amongst closely interacting teams. The process of facilitating this through learning experiences that foreground integrative expertise formation are of exceptional relevance when studying future learning communities. These competencies have general plasticity that extends beyond proximal relationships, relationships are subject to attenuation over time, but relational expertise, as a form of organising has lasting repercussions. Although only informal, observation of ongoing cooperation or decay of relationships that occurs in cohorts attests to this. However, observing practices that carry definite traces of this distinctive methodology and disposition toward learning now appearing in seemingly disconnected sites within the larger industrial networks attests to the circulation and popularisation of relational approaches to learning and leadership. In this way, this organisation exemplifies the propagation of organising practices that because they value interrelational qualities, can go on to have persistent field-shaping effects.

The recurrent incidence of conflict and concord reflected in thematic relationships in the ethnographic data attests to this interplay at work. Internally within the candidate organisation, there is certain reverence attached to the process of group formation, reflection and termination which is remarkable. These spaces and incidents of exchange were protected and often protected from observation, for good reason.

Important foundational theoretical models for Hyper stem from experiential learning, such as Kolb (1984), but these are complemented with theories about group development, interpersonal and intercommunal negotiation; the Johari Window (Luft & Ingham 1955), Elias Porter's strength deployment inventory (1964), Susan Wheelan's Integrated Model of Group Development (2005) and Rosenburg's Non-violent Communication (2015) were prominent examples of how externalisations of the internal affective domain were integral to the development of leadership expertise within this organisation. Each of these consider very seriously the relational boundary between the self and others, the principle means to achieve this, is feedback.

4.15 Scaffolds, Spiral & Loops.

Much of the visual annotation deals with the process of change directly, accelerating change is very definitely the leitmotif of Hyper as an organisation, emblematic of approaches to learning emerging in response to the digital economy. Conceptual models of learning feature heavily, *'the well of knowledge'*, *'the feedback cycle'*, *'the learning spiral'* and cyclical processes *of 'do, reflect, generalise, apply'*, each implicate distinct topological assumptions and are suggestive of spatial reasoning. Many of these concepts stem from the developmental psychology of Jerome Bruner, which are in turn traceable to the influence of Lev Vygotsky.

Bruner coined the terms *'scaffolding'* to describe the way structural way learners build on perception of information in their environment, which is highly relevant given the interpretations distilled from observing learning situations. Underpinning these models are assumptive principles which provide cues as to their conceptual founder sources, whether structural, constructive, systemic or ecological. Although, in practice, these assumptions were often loosely coupled to their conceptual origins.

As we have seen, cycles and loops are fundamentally important to both learning and design theories and corollary fields that describe systems, such as cybernetics, originating with Wiener. General systems theory (GST) has had important domain spanning impacts, via Von Bertalanffy (Checkland 1988) but notably Bateson (1972), who applied it to socio-ecological systems, to Vickers (1968) applying it to system practices in institutions. Checkland's (1981) research applied soft systems practice to management of sociotechnical systems. Of cybernetics and GST, the later was more weakly associated with military applications.

Later, Ackoff was instrumental in displacing the field of operational logistics he helped found based on incommensurability he encountered in applying hard principles to systems involving people (2005). An interesting example of a core participant disrupting their own field based on encountered incommensurability by generating another built on assumptions differing from the original that arose through exploring the implications of the original framings. This threshold or inflection point that marked changes in systems fields was encountered in a comparable way to the divergence of design methods from design science; analytic, technically-rational approaches were found incommensurate to highly complex sociality native to design situations. The systemic view of situations that has emerged in systems theory is highly relevant here, but operates on very basic unifying principle; *feedback*. The systematic, machinic origins and systemic, ecological generations of systems theory are unified by exploring the implications of the foundational assumptions of feedback. It's important to note that feedback as applied to hard and soft, or open or closed systems are deceptively similar, but their implications radically diverge in practice.

In the contemporary digital economy, the implications of this dual conceptual structure of feedback are diverse and far reaching. Arguably, Schön, a disciple of pragmatist Dewey should properly be thought of as a systems thinker, his model of expertise formation hinged on a systemic process; reflection-in-action, in other words - personal-situational feedback. Looping processes are fundamental aspects of computational thought, but evidently underpin the most advanced expressions of learning theory, but also remain critical assumptions to design, organising and leadership. In contemporary fields of user experience design and software development we see cognate hybrids of both processes, it is important to distinguish these functionally discreet processes to avoid conflating and misframing processes with distinct differences. Moreover, the preponderance of topological dimensions and relationships in theory and their close relationship to mathematics; whether linear, networked, cyclic or volumetric relationships in rationality and decision-making are worth reflecting on, their persistence carries traces of the strategy of abstraction, performed on embodied experience as a means to generate representations, the transformation of events into ideas.

Bruner proposed the concept of the spiral curriculum (recall that the term curricula connotes paths or courses), a spiral is a curve emanating from or returning to a point, a loop stepped upwards in the temporal dimension to denote change through recursive iteration. Quadrant models used to differentiate and represent different categories were prevalent, as spatial sets to zone and represent relationships. In observation, representations of different assumptive domains were present in the frameworks and design models applied to categorise features of complex situations.

Looking into the actual design processes, insights were also codified, as ideas were represented and externalised to share them within groups, often particular incidents or insights from a particular process were evaluated retrospectively 'group learnings' or 'research findings'. This delineated principles and things to consider during a particular design charette, often captured as collective value propositions; statements that codified assumptions shaped courses of action or interaction within groups, these schema or framings were critical to decision-making often offering a way of looking at problem-situations. Individual contributions writ large were often hung together creating a dense textual environment. As this framing of problem situations progressed, plural attempts to represent abstract concepts emerge, blends of temporal and spatial representations and ecologies of artefacts performed work to delineate a service proposition or the details of a system of platform. Mappings of imagined scenarios or personas were common, these show movement from provisional to concrete as durable mappings were cohered, codified as roadmaps, service blueprints, conceptual models or vision statements.

The processes of team formation, reflection and termination process were a source of considerable emotional duress as relationships coalesce, deeply formative of cooperative (and/or contestational)

relationships. Team names were often important aspect of collective identity negotiation and often encapsulated situational details whilst also becoming durable representations of identity.

Conflict and crisis appeared as significant thematic code in the ethnographic data, relations within groups or intergroup were often fraught with tension and highly emotionally charged. At one point a large mural image was constructed that detailed a particular worldview, a timeline of events concerning key technological and social innovation that led to the current moment, at a certain point the present moment was treated as a horizon with speculative concepts, visions and projections written down creating a time-based mapping that revealed much about collective ideas of progress, their aspirations and projections of society. This occurred as a collective activity, with participants adding their own significant events. Many personal inscriptions of provisional models appear, clusters of points and lines, grouping and relationships. This occurred at a personal and collective level, with anonymous scribbles, shapes coalescing into diagrams becoming increasingly resolved and appearing as totemic representations of core concepts. These datum were redolent of emerging framings-in-use.

A common representation was 'the line of visibility' determining the boundary between the production and management of a service system. Often representations of the design process would appear, and then specific details of a given project were mapped on top. Ad-hoc representations acted as ready reckoners for organising practices which implemented time and space diagrammatically were highly prevalent with vernacular project planners, timelines, calendars populating walls as markers of key dates or events. Often clusters of ideas were joined together with physical connectors or drawn lines. Walls and whiteboards are conscripted into enacting a ground onto which figurative details were arranged, then thematic relationships and connections were annotated. What first appeared chaotic ideation was quickly subject to visual organising, neatness seemed to coincide with the degree of provisionality of ideas and a means to deal with uncertainty at especially frenetic or uncertain moments. Instilling visual order, through clustering, shaping and coding via colour, theme or chronology was a common practice used as means of anchoring and offering temporary certainty enacted into the shared environment. These externalisations emblematic of mutual organising were key phenomena around which the research was organised.

Dennet (1996) refers the cognitive process of bootstrapping which seems particularly relevant to design activity. If taken as practical, empiric evidence of cognitive operations producing embodied traces, an important distinction being that thinking is happening simultaneously internally within each individual but also collectively amongst members of the group. This collective creativity is perhaps best exemplified by individuals producing a representation whilst watched by other members of the group in situ, then through verbal and embodied process of clarification checks, questioning and physically directing attention to features, new interpretations would emerge to form the basis of

new directions. Crucially, the environment was implicated into the cognitive bootstrapping witnessed amongst collaborators. Dennett's quandry was whether complexity could arise from *'skyhooks'* (sources of design complexity that do not build on lower, simpler layers) or were bounded to *'cranes'* (structures that permit the construction of entities of greater complexity but are themselves founded solidly *"on the ground"* of physical science). From the perspective of the individual at least, the sources of complexity are other people and the environment. Perceptually, higher orders of complexity that emerge through enactive recombination, notionally at least have the potential to be transcendent *'skyhooks'*, structures that are actually rooted in the emergent potential of the environment itself when enacted as extensions of a shared cognitive environment.

These inscriptions revolve around value statements and aspirations, values to be inscribed into services as they are created, these framings; reminders of purpose and declarations of needs contextual to the status of a design process; *'no pivots today'*, *'start with why'*, *'what people mean by culture'*, *'nothing at Hyper is someone else's problem'*. More involved, larger scale clustering and sorting activities were observed, with ideas reshuffled and sorted in categories for instance *'problems, barriers and opportunities'* or *'hindering and helping'*. A consistent indicator of the collective values was the word 'feedback', this process was fundamentally important to the collective activity, this process whether visually or verbally enacted was applied to generate and sustain alignment of intentionality in shared activity.

There are aspects of this that revealed a balkanisation effect in certain groups. Examples can be classified, there were localising practices to acted to aid embeddedness like how to make an English cup of tea or directions from locals about significant local events. Signs that refer specific to national cultures and manners; missives about where to get a particular cuisine that a group of nationals might be missing or how Norwegians value being on time, these were evidence of contestation and mockery of behavioural patterns alongside sharing cultural values. There were declarative statements transferred from the core Swedish culture are ever present such as *'fika'*, but also statements of the organisational values *'team is everything'*, *'trust the process'*, *'lead the change'* and *'real world ready'*, these were simultaneously gently mocked and held in high esteem. These signify how individuals were internalising schema, becoming inured to a shared culture, whilst forming one, marvelling at seeing themselves change whilst finding their new shared identify both a deep point of pride and mild ridicule. In this way, the values enacted into the space were quite literally represented, exchanged and internalised as part of pertinent phenomena of learning (or enculturation) via group formation. Derision, mimicry and humour provided important means for groups to ground their own experience and adapt overarching propositions, localising or situating values through enactment to make them

personal and meaningful – evidence of interpretive plasticity of all important cultural signifiers integral to a boundary crossing community of practice.

The brand materials constitute and demarcate the organisational environment itself, forming a base layer of the least mobile signs, the white walls become sites for murals and illustrations, often heavily typographic and entail value statements and peculiarly, blends of technological and natural forms. It is interesting to regard this as a categorical system operating simultaneously as paradigm and syntagm.[56]

Syntagms are orderly combinations of interacting signifiers forming meaningful wholes, sometimes referred to as chains. Evidence reveals that written examples often contain value choices and chains of meaning, but these often relate to proximal signs. There was consistent evidence of an ongoing dialogue, where these signs are modified, responded to. Often individuals would restructure someone else's clustering, modify or add. Syntagms are often defined as sequential and therefore temporal, such as in speech and music, however many of the visual codes represented spatial relationships as drawings and diagrams. These were often blended together to form complex networks of meaning (which incidentally inspired the analytic processing strategy to reveal circulation meaning through the data).

There was strong evidence of an intergroup argot but also consistent evidence to explain the meanings of a given cluster. Often the design activity itself was enacted collectively around a cluster, making and remaking, making effort to explain intention and externalise provisional concepts representing them in a legible way. In terms of thematic patterning, walls and windows, horizontal surfaces were often occupied and used to share insights within and beyond the group, sizing of images ranged from intimate and became bolder and larger as ideas solidified via feedback and reflection. Floor and desk spaces were often used more intimately within a group to deal with more tentative, less stable framings.

Each design cycle culminated with presentations, often adapted into experiential activities involving a group guiding their audience, for instance mocking up a service interaction. Evocations of emotive human scenarios and interactions were a constant feature, the affective aspects of given experiences are

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[56] Syntagm concerns combinations and positioning, whereas paradigmatic relations concern selection or substitution of certain elements in given meaning structures. Syntagmatic relations are possibilities of combination, paradigmatic relations are functional contrasts - they involve differentiation. Paradigms and syntagms provide structural context within signs to make sense, they are also attempts to construct meaning, providing anchors in the environment as meaning is negotiated and place-making transpires. The value of a sign is determined by these relations, structural forms through which signs are organised into codes. The paradigm is a set of associates signifiers and signifieds belonging to a defining category, paradigmatic relationships concern choices to include a value at the expense of another, they can be regarded as contrastive.

often used to communicate value of an experience where a prototype might fail to convey this experiential information. Balancing of value-rational and instrumental concerns was critical to learning and personal development.

Beckoning and directing of awareness and activity featured heavily in observational data and was assigned several thematic codes (represented as #); this represents the importance of managing the flow of attention in collaborative design activity. Constant modification of visual and spatial configurations in the environment was witnessed, necessarily integral to this was the ongoing mutual process of causing of movement around then shaping attention within the space. The studio represents a rich ecology of signs, thousands of post-it notes acting like a canopy over the bare spatial structure, a landscape devoted to directing attention. Movement, orientation and disposition were complexly related.

Paradigmatic and syntagmatic analysis treats signs as part of a system, exploring their functions within codes and subcodes. The coding methodology of the researcher is superimposed onto the constant activity of heuristic ordering and organising that groups of learners intuitively engage in. The methodological application of coding is a structuralist approach but was observed as a more naturalistic activity engaged with constantly by the cohort and management team. Building awareness of common codes was an important aspect of interpreting meaning from the studio. Jakobsen emphasises that the production and interpretation of texts depends of the existence of codes or conventions for communication (Jakobson 1971). Instances of inscription remain arbitrary until a code provides a framework within which signs make sense. Instances are granted the status of sign once they function within a code. Evidently, participants' codes differ from those of the researcher, the facilitation team were often witnessed regarding clusters and moving around the space reading the walls, effectively evaluating the status of shared schema held in the group via the shared physical environment.

Clearly, this an important mode of reckoning the status of a given design activity at a given time, and the ongoing heuristic review of these clusters provided continual feedback about the status of the group and provided interpretive cues for shaping the learning experience. In this way, the physical environment provides venue to assay shared mental goings-on. This enactive activity presences in some ways a joint field that holds important knowledge about the abstract mental processes and content inherent to knowledge work, but this requires continual inscription and interpretation. As such, the visual environment serves a significant function in the learning environment, evidencing surprising consistency of value statements that aligned broadly with the overall doctrinal values of the organisation's learning methdology. This occurred in parallel to value consistent schema which evidences the degree of alignment or divergence between network and participant.

The general tone was supportive and exploratory, representing benign values that clearly representing the collective values of the group as well as provisional externalisation of ideas and the continual negotiation of individual and group identity. Inscribing rules as a means to circumvent conflict and resolve tension was common, directives to *'respect personal space'*, *'be open, simple, voice your thoughts'*, *'have a growth mindset by pushing yourself and others out of your own boundaries'*, *'be on time'*, *'use your emotional intelligence'*, *'see no boundaries'* and *'value each other'*. Heuristic principles extrapolated from research were also widely distributed throughout the space forming a configurable structure clearly highly significant part of the learning process.

A figure - ground relationship was significant in the visual environment, certain utterances were durable, the movement of signs was a highly political act in some cases. As the cohort progressed certain items became durable anchors, representing key insights or events, forming a ground, the flexible figures that were embedded on top of this ground showed a high frequency of change. The clustering of items in the visual environment forms clouds of meaning and evidence a high degree of perceptual organisation as a means of making sense of activity. The holistic visual patterning broadly follows a loose principle of *pragnänz*, a Gestalt concept that states that *'the simplest and most stable interpretations are favoured'*. The constant restructuring activity reveals significant insight about how learning and design coincide. Individual-group-environment relations require a specific kind of literacy in reading the environment and actively curating its status to reflect provisional states in a given design situation.

The visual environment in this way was a constant measure of the density of interaction by literally reading the environment reveals how ongoing heuristic evaluation that space supports learning, the surfaces in the environment are used actively as a means of restructuring causal texture. This represents a remarkable hermenutic phenomena of tightly coupled co-structuring of internal and external framings. Following Emery's epistemological directive, knowledge was enacted and externalised, rather than abstraction flowing from the teacher-learner relationship, the environment was used actively as means of framing and forming interpretations on the fly. Design activity produces a highly mutable relational system of codes comprised of signs, the generation of a boundary domain where highly structured local cues are reframed in looser interdomain ways via sociality around inscription. This sign network flows reciprocally to and from them personal lifeworld into the shared domain. Resources are configured and made use of provisionally to restructure meanings that guide activity. Necessarily, much of this codification itself appeared to be below conscious, verbal articulation. This seems to align with enactivist accounts of activity where *'Organisms do not passively receive information from their environments, which they then translate into internal representations. Natural cognitive systems are simply not in the business of accessing their world in order to build accurate pictures of it.*

They participate in the generation of meaning through their bodies and action often engaging in transformational and not merely informational interactions: they enact a world' (Di Paulo et al. 2010).

Often particular sentiments and directives were writ large by the facilitation staff, placed in the environment or shared on common social networks and groups. The use of a mutable environment to externalise and share provisional ideas was constant, this activity evidence constant framing and reframing of problem situations, often issue or project specific but certain incidents were codified into more durable sentiments that were shared amongst the group. Assessment of learning often occurred when provisional ideas were solidified into formal presentations to the whole group, facilitation staff, industry leaders and client groups.

The physical environment as a whole should be evaluated as a rich semiotic infrastructure, a *semiospher*e, which was unmistakably present at each site. Signifiers of the organisation's brand interface act to communicate values externally but also acted as a means to mediate doctrinal values and principles common to the culture. This was evidenced by individuals making these instances part of their own personal sign system and identifying them as part of the group. As such, it also points inwards and serves as constant reinforcing network of signification that identifies the values common to the spaces and signify participation in the culture, however this points away the internal / external dichotomy towards learning phenomena where meaning-making and place-making coincide, but this is a polychotomy arranged around a territory of highly varied boundaries – this is aptly captured by the statement *'yes, and…'* a commonly used collaborative idea generation strategy encountered within the organisation and the first principle of improvisation, or perhaps even more pertinently, with reference to expansions of rationality *'both, and…'*.

Visuality lends itself to recording, yet other sensory modes were as important, sound was a significant means of conveying meaning. Conversation was constant and richly textured, taking place in many languages, with English as the lingua franca. Certain songs, videos or sounds were used to unify the emotional experience and recall significant events forming a symbolic cultural currency. Physical movement was constant with dancing and physicality featuring heavily to manage energy levels and attention, incidents in coding pointing to the body were significant and prominently reflected in ethnographic thematization.

Observational data attests to these insights, the environment provides another way to examine the complex arrangements in situ. Often standing as the first point of contact with the organisation, primary chains of value propositions are very clearly a primary interface with this culture, encountered first visually and textually opening to flexible narrative chains encountered through legitimate peripheral participation. Moving more centrally to the actual activity within the culture, the social

process of environmental restructure amongst groups stands as the primary mode of learning. The immediacy of this interaction and paying attention to this environmental process and how it functions remains illuminating and points to rethinking more generally group-oriented learning occurs in practice. Usefully, this perspective provides a generative frame through which to peer at organisations. This complex organisation, functioning as a multi-layered global network appears as prismatic, changing its nature from each individual perspective whilst revealing semi-stable patterns to be drawn out through consistent observation.

4.16 **Visual Analysis**

During ethnographic observation, it was hard to avoid the visual presence of Hyper Island's brand language. Examples of the visual environment of the organisation; this section gets to grips with what can be seen, the visual environment at Hyper, which is a highly significant counterpart to what is said and done. The organisation's values are clearly stated, they populate the space and follow brand style guide, they unify with the online brand presence of the organisation.

Some key examples include;

> *'LEARN FOR LIFE'*
> *'TEAM IS EVERYTHING'*
> *'LEAD THE CHANGE'*
> *'REAL WORLD READY'*

These brand materials create a semiotic texture, a landscape of enacted values. These memes in becoming form a very present visual, sensory culture. Stickers adorned with slogans on laptops and smart phones were ubiquitous. This signifies brand mobilisation and the transaction of values as intrinsic to identity formation within the culture. This appeared to operate as a kind of value signalling and virtue signalling, this could be viewed as evidence of exchanges forming a fluid symbolic economy within the organisation.
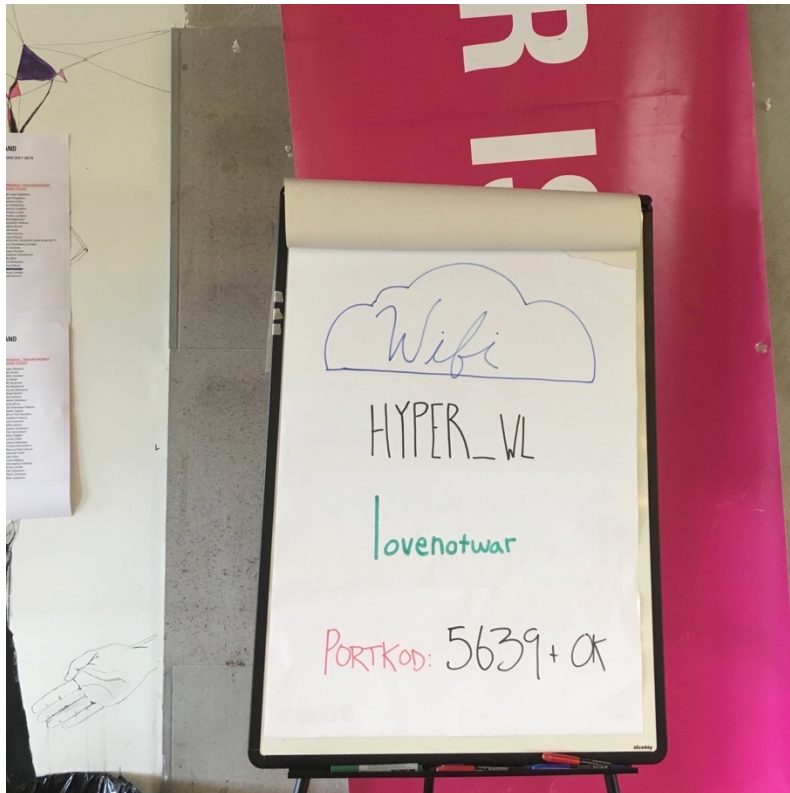
Figure 16 - Inscription of network values at Hyper Island's Stockholm HQ

4.16.1 *Value Creation Networks*

Signifiers are also present that subtly articulate tacit relationships, exemplars of how values in the culture are transacted and enacted; for instance, the WIFI network password is the same at all sites; *'lovenotwar'*. This is a subtle symbolic emplacement belies a value system, whether deliberate or incidental these environmental cues reveal how systems of values are embedded into the territory of the organisation.

Analysis of the visual environment reveals important clues about the culture and how it's enacted through the visual environment, this attention to the casual texture of the environments within Hyper Island. Bruner (1976) discusses the role of scaffolding in learning experiences, the observation affords an interesting potential to translate Bruner's concept to encompass considerations of the role of environment, does this suggest the concept of environmental scaffolding to compliment Bruner's ideas, this apprehension is commensurate given Hyper's emphasis on a learning spiral originating with Bruner, which expands on Vygotskian concepts.

It's important to consider how multimodality often escapes ethnographic notations of activity, text and speech as generally ideographic content are often privileged. In design learning environments, sensory or embodied *capta* are highly significant, this presents dimensions of interpersonal conduct beyond ideographic data as highly significant and is often *'where the action is'*.

The visual surfaces of a space are fundamental structural elements of design learning, in the lived experience of a learning environment and in studio environments in general, there are all too many dimensions of content and conduct for orthodox research methods to capture completely, this attests to the polycontextual, polytelic nature of contemporary problem situations. Professional experience of film-making and media production indicates the increased potential offered by immersive media to researchers a means of capturing spatial, aural, visual, embodied activity. This is enormously challenging in practice and highly reliant on interpretive abstraction integral to the process of narrative making. Although the research period began with looking at various sites of collaborative innovation contexts through an actual lens of a camera and the organising logics of an edit timeline, the particular affordances and constraints of Hyper Island made it less appropriate to interject with the apparatus of a film-maker, however the cognitive practices and logics of film were particularly germane to the research context and informing the methodological approach and attention to narrative-making.

Table 1
Contrasting Filmmaking and Research

Dimensions	Filmmaking	Research
Orientation	Evoke feelings	Evoke knowing
Goals	Tell a story	Explain or predict
	Evoke social change	phenomena
Transmission methods	Visual	Primarily text
	Music	
	Sound	
	Text	
Target Audience	Diverse groups	Specific research community

Figure 17 - Goodman (2004) from Filmmaking and Research: An Intersection

The adeptness of narrative-based sensemaking to responding to the affective domain was of particular relevance. The learning environments within Hyper Island are held in a certain reverence, there were multiple significant incidents pivotal to assess to gain a grounded understanding of the learning experiences that occur within the organisation, but their nature was initially deemed too sensitive for observation. This is revealing of the prevailing values of Hyper as a culture, the researcher was interpreted as an interloper in a transformative learning experience. The research process involved building affinity and trust over a long period to manufacture licence and access, this insight is critical to understanding tacit epistemological stances integral to organisations. This inevitably meant using

unobtrusive methods of participants observation and eventually becoming integrated into the flow of the learning experience itself, so as not to disrupt its internal integrity. Consequently, everything that was gleaned from observation resulted in trust building, but also passed through the narrow filter of interpretive notes. Notetaking however provided an agility; although generalisability often comes at the expense of accuracy.

In the second phase of research recordings of semi-structured interviews provide direct records of informant's perspectives, which was integral to making sense of activity. The status of the researcher shifted slowly via hard won affinity building from interloper to interlocuter, in that the researcher became integrated into an ongoing dialogue. This aligned well with descriptive accounts of situated learning amongst communities of practice. This meant devising research approaches sensitive to the dynamics of the internal culture, which was at once exceptionally open and profoundly guarded about a perceived sanctity of the processes of enacting the learning experiences. Evaluating the epistemological stance from cues observed in organisational practices was telling, it revealed the centrality of the encounter as a primary logic, which belies how the internal methodology is informed by client / patient / learner centred approaches associated with social psychology notably Lewin, Rogers and Moreno all of which derived systemic approaches to human situations underpinned by topological, relational and sociometric concepts respectively. Adapting a grounded approach to research whilst anticipating Lewin's influence on participatory action research ensured the methodology reflected the collaborative participatory nature of the observed context.

The researcher began, as time passed, to assemble clusterings of insight and used each moment of interaction to found these in experience by exploring them with participants to examine their responses and to modify the research assumptions. In this way, internal validation became an intrinsic part of the research process. The researcher was involved in searching the environment framed as a problem situation to examine the conduct of participants in the flow of collaborative interaction, by feeding provisional learnings from research into that process, the research was able to conceptualise and acknowledge how its own presence altered goings-on whilst engage in a continuous process of reflecting on practice and validating understanding as it progressed.

The tension between tacking back and forth between noticing openings for incidents of themes for close observation whilst attending to the need to abstract events on-the-fly occurring within those incidents into the form of notation was challenging but also profoundly generative. Noticing how perception shapes the structuring of events within time and space is a crucial input for ethnographers. Furthermore, observing how meaning-making processes are enacted into environments, as a means for bare space to be continually mediated into being as place. The introduction of immersive capture devices points to interesting directions for situational analysis in these contexts. Being able to (easily

without cumbersome or even noticed apparatus) capture spatial data such as gaze direction or position within a space would be invaluable for understanding group activity. On the other hand, being able to simply log key events or incidents in time would be a useful means to study collaborative interaction, examining short durations with a high frequency of incidence, perhaps across multiple sites for comparative analysis would be a useful counterpart for longitudinal embedded ethnographic study.

5 Synthesis & Framework

5.1 Synthesis of Findings

The outcomes of detailed situated observation, a systematic literature review and the application of a systemic methodological approach reveals compelling cues about the nature of situated collaborative learning. The process of gathering and analysis of data produced research findings that support interpretive synthesis followed by attempts to reassemble an original explanatory understanding. Multiple passes using different analytic techniques were used to derive patterns and insight from observation and interviewing, the objective, aligning with the research questions was to inquire into then deconstruct the assumptive landscape underpinning both theory and theory-in-use evident in collaborative activity applying singular methodological approaches which prioritize highly situated, design-led, group-oriented learning settings.

The following sections first gathers these findings, reconnecting theory with observation, then reconstructs these perspectives into a novel configuration. An original synthesis which pulls forward findings from the case study is presented blending insight and interpretations derived from primary and secondary research.

To reveal patterns beyond direct participant observation and interviewing, analytic and interpretive methods were applied to search for patterns and relationships in the data, these along with key incidents were used as entry points. The emergence of a coding schema and memoing of incidents arose in parallel, this supports the general foci of attention taking place in the organization, but also provided different perspectives through thematic relationships, which were effective in shifting assumptions about activity.

As qualitative research necessarily requires researchers to assume a reflexive stance in relation to the research situation, participants and data under study. As the researcher becomes immersed in the participants world, reflexivity facilitates understanding of the impact of their own subjective influences on the collection and interpretation of data. In the positivist paradigm, this subjectivity would be viewed as counter-productive to search for singular verifiable truth. the interplay between researcher and data is crucial to the interpretive research and the generation of knowledge that reflects human experience.

Memoing, as methodological strategy, is commonly associated with grounded theory, but use of memos is relevant to most qualitative approaches. Through use of memos, the qualitative researcher can foster deeper engagement with a research setting, establishing an intense relationship with the data, which enables heightened sensitivity to meanings contained therein. Memoing is part analytic, but also synthetic, fundamental to conceptualizing and clarifying a research topic (Birks 2008).

Although this is not a quantitative study, there are techniques within grounded theory that highlight relational signals and allow inference of patterns, from simple term frequencies and co-occurrence of themes across incidents quite sophisticated relationships can be derived. The relational code mapping provided rich imagery of relational patterns, forming a heat map of situational association present in longitudinal observation.

For example, incidents concerning explicit boundary-type activity were not overly prevalent, most were contained in discreet incidents or dialogue about activity. Yet boundary issues were much more pronounced in the actual interfaces the organization itself had with other entities like communities or interlopers from industry entering the space, this was central to the group's experiences but not explicitly articulated. Primarily, the shift from transfer across an internal-external boundary represented as a dichotomy towards a more nuanced, co-structured environment, the research site reframed as polycontext, where where many interfaces and boundaries coalesce within a space was evident, boundaries in these environments appear polychotomous, inherently not resolvable to the single boundaries of the inner and outer spaces of individuals.

Thematically, indicative cooccurrence of themes in observational data, incidents involving *#organisational culture* and *#organizational communication* were strongly concurrent with those of *#group dynamics.* This was also strongly associated with instances of *#identity/role* negotiating activity. The codes associated with *#organisational culture* was strongly concurrent with incidents ascribed the code *#emotion/empathy*, which in turn were also strongly connected with associations with *#group dynamics.*

Group activity, which was a prevalent feature of the observation, curiously was closely associated with *#License, #Value/Values* and *#Stress/Crisis/Conflict.*

Other prominent clusters pertained to relationship between #emotion/empathy activity and the incidences coded with *#Value/Values, #Stress/Crisis/Conflict* and *#Body/Physicality/Sensory.*

There were also notable associations where co-occurrences of the code *#spatial* with matters concerning *#Envisioning/Blending/Metaphor, #Narrative* and *#Emotion/Empathy.*

Instances to do with time *#temporal* were most concurrent with organizing behaviors. Pedagogical incidents *#pedagogy/learning* were most closely associated with *#group dynamics, #organizational culture, #industry interface* and remarkably *#emotion/empathy.* Interestingly, although this may simply reflect the researchers skew of attention, the most frequent incident in the code scheme were *#Group Dynamics (322), #Discreet Incidents (305)* and *#Envisioning / Blending / Metaphor (302).* Closely followed by issues judged to pertain to *#value / values (284),* then *#organisational culture (268), #spatial (253)* and *#industry interface (252).*[57]

Counterintuitively, concepts of interest often were played down in the data, appearing in other forms – boundary object and boundaries were only mid-level features and mostly associated with codes in their own cluster; for example *#modality of communication* and *#narrative* and *#model/prototype/tool*, but also with *#envisioning/blending/metaphor.* A working interpretation of this is that issues that are intuitively important in organizational setting, especially in practice settings aren't often directly attended to and articulated, they can remain as tacit issues and only are made explicit though their appearance in other relationships. Incidents pertaining to boundaries didn't appear in discussion of boundaries, they appeared in high prevalence of issues pertaining to group negotiation, attention structuring behaviors the relevance of external barriers, for example interfacing interactions with external industry influences, but perhaps most significantly in the overwhelming prevalence issues pertaining to the thematic cluster #AFFECT. This pertains to the learning value in co-negotiation of identity and role via sociality, where experts must orient themselves with respect to the prevailing professional structure. Interestingly, this orientation occurs seen to occur in a laissez faire, self-organized manner in UK contexts, whereas Sweden's approach view this as a matter of centralized planning.

Synthesis of these first order findings was supported by multiple iterative passes and attempts to resolve pattern in observation and dialogue with/within/about the organization. Distilling these into

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[57] Detailed breakdown of this coding, memoing, thematic clustering and co-occurrence patterning can be found [here](#).

short interpretive synthesis on key themes; issues pertaining to place, mediation through tools and ultimately the technologies of the self and affect are discussed, resulting in treatise about how co-structuring activity appears integral to group learning. Then building on space and place, discussion on the scaling influences consequent of learning networks which pertains to the boundaries or interfaces an organization has with its surrounding environment which we can interpret specifically here as system > environment interaction or intercommunal transaction.

Finally, synthesis points to expertise formation and consequently forms of expertise then how these interlink with a landscape of tools and learning strategies but diagnostically, revolves around co-structuring activity enacted onto the environment and critically, upon one another. Socially enacted representations accompany both design and learning process, not the actual articles of learning transfer or outcomes of design activity, but the artefacts that enable shaping of the simple activity of encounter and dialogue, to build acumen. The effort to make contingent concepts mutually available generates situation where greatest learning seems to occur in practice. The modes by which communities of practice can invite external influences into their community, in effect forming interfaces or boundaries, whilst retaining their distinctiveness and internal cohesion are revealed as all important. The ability of individuals to discriminate and not inherit in-house assumptions too readily is significant, assumptive perspectives often remain tacit, yet can have persuasive impacts on world-view. Hence a strong internal culture is integral, in this case supported by attention to group development processes. Pedagogy in this realm is about presenting influence whilst equipping learners to engage in perspective-taking, orienting amongst rather than simply acquiring knowledge. After discussion of these principal findings of the study and their second order interpretations, perspectives are presented codifying explanatory understanding of how the form of learning and expertise formation occurs in situations like these and crucially how it might differ substantively from other modes of learning.

5.2 **The Role of Space in Collaborative Learning**

In short, the study characterizes how group-learning phenomena might differ in critical ways from classic pedagogical approaches. The organization in question makes explicit that it's epistemology of learning lies in experiential learning theory, however observation indicates supplementary learning phenomena might be at work in these situations, as yet unarticulated. Collaborative learning via design activity appears to rely on schematic negotiation and this is achieved via active restructuring enacted onto the environment. Dynamic social representations of knowledge enacted at boundaries of social interaction, above and beyond the acts of designing outcomes, act to co-structure individual perceptual schema and by extension, the assumptive schema of others within a group, the output of this process is a highly adaptive form of learning, an integrative expertise outwith disciplinary specialism.

Attention to group-development strategies foregrounds collective approaches to metacognition, usually presented to be individual practices that take place before, whilst or retrospectively in support of personal expertise formation. These reflective practices remain relevant in the development of integrative expertise, however the shared cognitive and environmental aspects of this form of learning are significantly different from reflective metacognition often associated with experiential learning, to some degree the findings extend treatise of reflective practices sensitizing these to accounts in situated and enactive interpretations of learning activity.

Detail about how the organization's internal methodological approach arose was elicited from interviews and was evident in models and tools applied in context. These have important source connections to social psychology and the human potential movement but also counterintuitively are related to application of distributed leadership in defense contexts, a linkage which reveals correspondences between conflictual and co-operative modes of interrelating, here, these are seen to be mutually co-constitutive. The case study suggests that innovations integral to the organization itself were consequent of certain geographical, political and social factors, conceptualizing alignment of these circumstantial factors is integral to understanding how organizational innovation occurs.

Blends of these two approaches and the tension emerging from conflicting frames is generative as perspectives amongst collaborators are highly likely to be incommensurate, this fosters a generativity that is able to sustain relevance, but presents trenchant challenges to organizing learning in organizations. Responding effectively to contestation, conflict and stress as integral factors in dynamic coordination supports the potential to learn strategies for congruent cooperation which leads to fluent interoperability within teams and enables purposeful intercommunal negotiations across boundaries. This occurs in a scalar fashion, at first in the micro-settings of heterogenous groups then gradually at

greater scale between communities of practice and disciplinary fields, this forms the core phenomena for further scrutiny.

5.2.1 *Expanding the Boundary; from Interface to Territory*

Boundaries, if perceived as interfaces where mediation occurs cannot only be represented as only surfaces but as occurring at sites, particularly after looking closely at the nature of the transactional and schematic negotiations that take place within them. Boundaries are in fact domains with spatial dimension and their own specialist practices. Asking what distinct activities occur there and why, means bringing together cues from the secondary research literature review with primary observation. Brokerage activity was identified as a useful theoretical optic, it is characterised in theory as distinct form of expertise formation; an integrative capacity, which is arguably pivotal to collaborative learning but also subject to expertise formation. Interoperability between domains requires this integrative expertise, which is tantamount to empathy-building and perspective-taking. Evident in literature and observation, as a primary boundary, collaborative exchange within teams through acts of playful interaction and heedful interrelating is seen as a key determining factor of innovation, but the integration of contextual factors provides venue critical for meaningful collaboration, an architecture of situations, not wholly decouplable from the environments it takes place in.

As social action realises differentiation, the boundaries that result require not only reciprocal internal / external translations, but also collaborative transformation between collaborators, acts of brokerage enacted onto spaces, resulting in place-making. These were observed in practice as highly situated and contextual responses that actively recruit the environment into both pro-active making sense and retrospective sense-making. The loss of sense, an impact of contingent events and ill-structured problem situations was seen to be a driver for learning, Weick's account of failure modes in organisations, particularly in contingent situations where tightly coupled heedful interrelating was crucial for operation are particularly relevant to understand environmental schema in flux.

Consequently, the proper functioning and epistemological foundations of this form of expertise (and how to learn it, teach it and research it as properly scrutable phenomena) are decidedly relevant to many collaborative practices, but likely sit outside present epistemological paradigms for education and to some degree considerations of design methods which are collaborative in nature, but the involved knowledge transformations are usually imagined as individual and internal, only then moving out into transactive space.

Clues about the features of integrative expertise are already extant in design methods research. Arguably, as the design field expands it is also experiencing flourishing in participatory applications through co-design, service design and social innovation. However, threads drawn from other fields,

the sociological, social psychological, cognitive and systemic theoretical perspectives explored herein are necessary to equip practitioners to remain ahead of what Feyerabend termed value incommensurability (Hsieh 2016). In epistemology and the philosophy of science, both Feyerabend and Kuhn were concerned with incommensurability between rival theories or paradigms — that is, the inability to express or comprehend one conceptual scheme, in terms of another. Thus, shared schema and their effective exchange are pivotal to future learning, leading and organising.

5.2.2 *Boundaries, Domains, Orders & Paradigms of Design*

The legacy of practice scholarship typified by Schön, lies in attempts to bridge a Great Divide between theory and practice. Functionally, there is division between the objectives of academic and vocational education, in the observed organisation; the experiential methodology native to the global institute sits in tension with the need in the UK to reconcile with the postgraduate UK Higher Education learning frameworks and accreditation by an academic partner.

Industrial practice and academic research communities are often framed as at odds. There is detectable wariness of argot and lofty ideals of academia, which in turn is met with suspicion over motives and the validity of thinking toward industry professionals. Industry and academia, imagined as two separate worlds, suffer from the perception of differences in periodicities and tempo of work patterns, economic priorities and disposition to knowledge. In actuality, the reality is often one of partnerships and relationships within personal life-space forming blends of research and business contexts. Certainly, research is not only the preserve of academic institutes or entrepreneurship only the domain of business. There are however, key schematic differences between these communities in general, many of which dissolve in practice, but require shared schema and common concern to circumvent. Proximity relations are a key concern for innovation theory, born at the intersection between industrial and spatial economics. Basically, the spatial dimension of proximity is combined with the relational or organisational dimension. A key assumption about collaborating communities or disciplines is that they may have schematic differences delimiting their capacity to interoperate, either to fully leverage one's experience and expertise in the context of the other or at a deeper level generate a joint field that leads to innovative activity for both. More likely, functional practicalities like differences in factors such as tools, variation of operational languages and information systems create friction and hindrance. In addition, mutual membership of social worlds and cultural spheres of influence, the impact of social capital is pivotal, as such conceptualising the role habitus plays on the structure of fields of association is significant.

As argued, social research that specifically addresses boundaries and the conditions of liminality and integration is apt to support brokerage activity conducted in the expanding design field, especially in

situations of design education, where assumptions about situated activity play a critical role. Design practices and methods, as they expand their domains of application are increasingly called upon for learning, leading and organising activity, hence the relevance of schematic negotiation between social entities of different scales is essential, but underthought. Moving towards what Buchanan refers to as *fourth order design* (1992).[58] In this taxonomy of design where different stages for design are mapped, giving specific domains for design; 1. *Graphic* 2. *Industrial* 3. *Interaction* 4. *Environment* which are commensurate with its general concern for 1. *symbols,* 2. *things,* 3. *action* and 4. *thought* (Buchanan 2001).

Another perspective on comingling of domain and paradigmatic approaches comes from Gasson's discussion of design paradigms. Contemporary design methodology diverges from the rational problem-solving program in crucial ways that surround the nature of an emerging problem as it becomes more complex and unbounded. This is concurrent with observation; this approach indicates that design situations exhibit features which confound traditional approaches to rationality and problem-solving. Design activity often entails designers (or cross-functional teams applying design methods) reconciling arrangements problem situations with other *unboundable* activities in ways that challenge problem-solving-oriented rational perspectives. Gasson foregrounds two different *paradigms of operation* for design; design as the (individual) solution of organizational "problems" and design as the (joint) construction of socio-cultural artefacts. These two perspectives recall schematic and socio-cultural approaches in theory, the objective is to reconcile individual with collective approaches.

Within this creates a matrix of four approaches or perspectives in dealing with complexity and uncertainty;

Rational perspectives view design as functional analysis, reducing complexity by applying scientific reductionism and assumes little uncertainty as the problem is seen to be unitary and well structured. *Bounded-rationality perspectives* that view design as problem-solving, this sees the problem-solver as able to reduce the problem to sets of well-structured sub-problems. This reduces complexity, which eventually reappears as reductionism. S*ystemic perspectives* that view design as problem-setting, which see complexity as an unavoidable yet not undesirable aspect of problem situations. Uncertainty is reduced through negotiation of problem scope and achieving consensus in defining a system. Consequently, this means apprehending system boundaries; complexity is managed rather than produced via a joint exploration of shared system definitions. *Emergent perspectives* view design as

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[58] *"the fourth order of design is the design of the environments and systems within which all the other orders of design exist. Understanding how these systems work, what core ideas hold them together, what ideas and values that's a fourth order problem"* (Buchanan 2001).

evolutionary learning. They see uncertainty and complexity as natural and significantly, irreducible. Complexities dealt with through learning-through-doing which rely on 'reflective action' but can only be managed short term through the definition of intermediate goals which are acknowledged to be partial. Significantly, as Gasson notes *'In the longer-term, uncertainty may be viewed as productive, as it leads the individual to engage in reflective learning'.*

This matrix of domains is differentiated by assumption about relative structuring or formedness of problems and the degree to which situations are penetrable to analyticity or reliant on synthetic thinking. Gasson's perspectives are useful in reassembling a layered view of integrative practices and consequently their associated process of expertise formation. Dorst describes practices as deliberate and coherent sets of activities intended to achieve something which combine ways of seeing, thinking, and acting. Models of practices are often viewed as layered containing statements concerning *Why, How* and *What* (2018). These practice domains are not mutual exclusive; however, they do provide a means to evaluate the design activity employed within a community, but also underscore the impact of setting – these domains are nested and integrative, lower orders face meaningless and damagingly narrow width of concern without higher levels. Yet higher levels, missing the bite of application and the granular grasp of lived, material situations without grounding in lower level activity.

Decoupling from higher / lower orderings and dualisms is important, place and meaning-making are often coincident and are a polytelic and relational consequence of contingent encounters between persons in situations engaged in polycontextual activity (coordinated multi-tasking or lots of different sources, tasks and sites at the same time). Engeström finds, in conditions where problems are new and there's little reason to expect that solutions can be quickly turned into codified, repeatable procedures, these give rise to horizontal expertise where practitioners must move across boundaries to seek and give help, to find information and tools wherever they happen to be available. In the world of work, horizontal expertise and boundary crossing happen at a fast pace (Engeström 1995).

Expansions in the design field, the action of fielding design, reassemble prior conceptualisations of design to concern interconnections between environments and thought, in other words; schematic enaction. As such design education retains specific depth and specialist conventions of practice, local to each community of practice, whilst at the same time has general domain-spanning applicability. This finding has reciprocal implications for educational institutional practices in general and the paradigms that are used to organise societal learning provision.

Golsby-Smith regards Buchanan's work as a widening of the domain for design, '*a widening of the influence of design outwards into the surrounding medium - the life of organizations in the modem world, or of governments and communities*' (Golsby-Smith 1996). These expansions, denote a dual

transformation; of the design field, but also the considerations of designers, arguing that '*fourth order design is less about specific domains, and more about the way in which designers work and how they take accountability for the success (or failure) of their actions*'. Analogues of this reflected in the work of Gasson (2006), Banathy (1996), Lawson (2014) and Dorst (2015) aligning understanding of professional expertise formation with issues of different scales of change whether at organisational, community or societal level.

	1st Order Problems of Communication Signs	2nd Order Problems of Construction Things	3rd Order Problems of Action Actions	4th Order Problems of Integration Thoughts
Signs	Words Symbols Images			
Things		Physical Objects		
Actions			Activities Services Processes	
Thoughts				Environments Organizations Systems

Figure 18 - The Orders of Design (Buchanan 2001)

Hence, as the purview of design expands, so does its responsibility, just as architects or engineers accept liability via contract or tort, they must also consider '*economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability*', here professional and ethical responsibility is highlighted. However, artisans (and designers) have more tenuous responsibilities that are difficult to trace beyond the design act. We observe that as design learning reaches orthodoxy outside of its classic boundaries, defining the responsibility of designers into its use, continuity or ending phase (MacLeod 2017) is highly problematic. Designers commonly abrogate responsibility at the close of design activity and the moment of launching. By enacting conceptual systems into the world whose implications are poorly understood, fourth order design situations, we exist within worlds consequent of this. Expanded consideration is difficult to reconcile with temporal demands and need to organise value creation placed on cross-functional teams, especially in business, where the latitude of space afforded in education is neither guaranteed nor seen as significant.

5.2.3 *At Scale –Organizing the Design Field*

Summarising, these approaches create effective blends of what Banathy referred to as Type A and Type B design activity, which is used to map out an image of an expanded design field, directed to toward conscious evolution of social systems, by design (1998). Banathy insists that opportunities for different forms of learning (self-learning, group learning) are crucial to engender the adaptive capacities latent in society (read; communities of practice).

The Design Landscape
adapted from Banathy, B.H.(2013).
Designing Social Systems in a Changing World, Springer.

An image of interaction
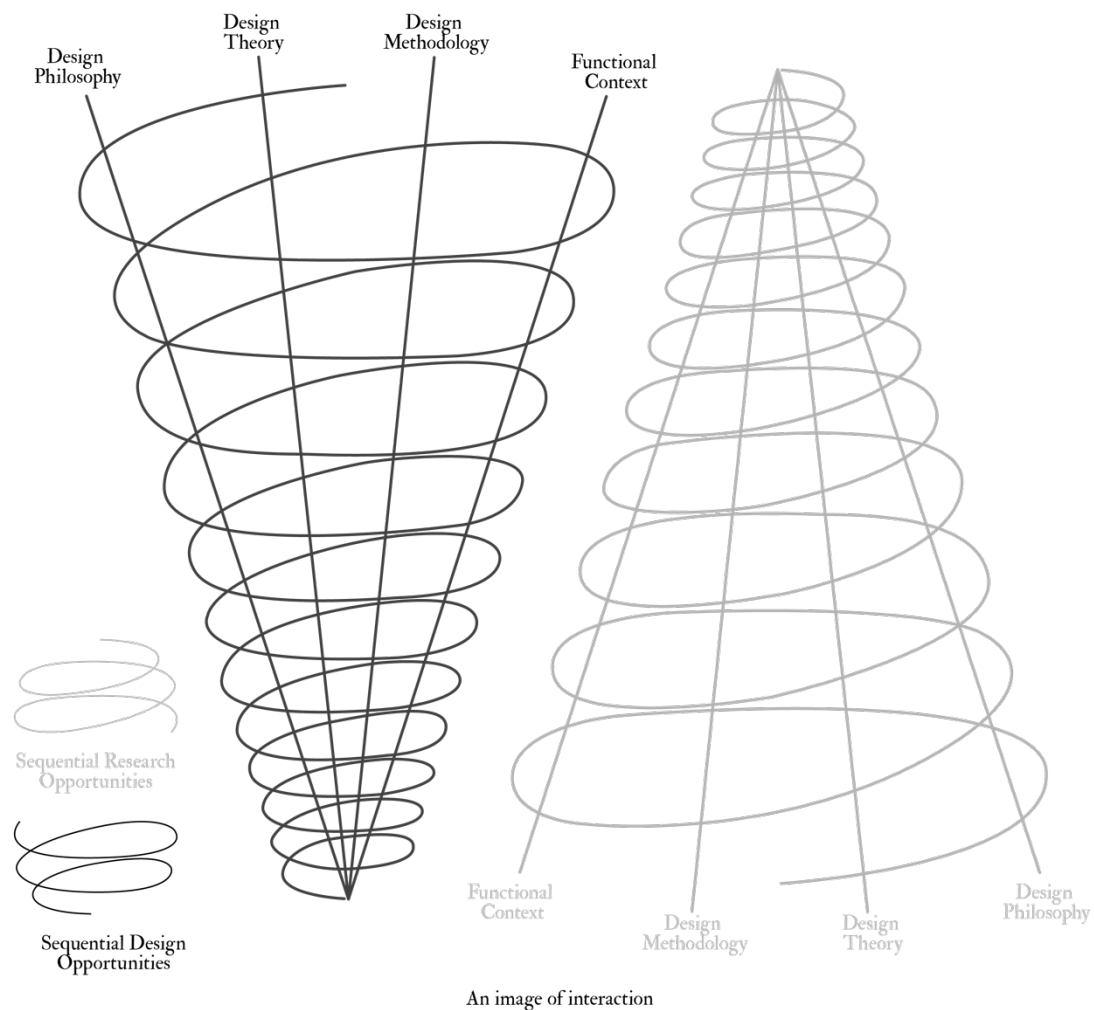
Figure 19 - Banathy's Design Landscape adapted to reflect research practices.

Characterizing how the design field is organized is crucial, setting up potential to characterize novel epistemologies and learning paradigms apt to equip expertise formation in the design field as it expands.

Arguably, design approaches accrete around specific cultures using them, yet methods inhere their local values and biases, mirroring them. Success behaviours in the context of a community are internally defined, gradually mirroring the practices of members is tantamount to participation and learning, the outcome is membership and change in action (the route of participate is the active form of sharing or partaking, to *part-take*). This demonstrates the value of enculturation simplifying the principle of situated learning theory. Lave argued that this learning is unintentional and situated within authentic activity, context and culture. However, overreach in group formation results in a sealing logic, closing the system's boundary to influence from its environment. This spectre of balkanization haunts teams who fail to consider the skills of interoperation and intercommunal negotiation, this is the antithesis of meaningful collaboration and anathema to agile responsiveness needful periods of rapid organizational change or societal transition associated with the digital economy. Ongoing processes of Digital transformation were characteristic of the economic cycle the research took place, the drivers of organizational transformation and renewal of expertise in workforces is a core prospect of education, both for markets and individuals competing within them. The seeds of the next economic cycle are present in the values and consequences of the last, often underlying factors suppressed in a paradigm become the source for the next, clearly transition toward more stable ecological footing and sustainability will likely succeed digital as the master framework for social and economic change.

Banathy's discussion of design inquiry is fundamental here, the image of design where designers operating in specific fields apply specialized knowledge and activities to situations, which are seldom of interest or readily understood by outsiders to specific subfields. Field-specific design inquiry is often conclusion-oriented, a disciplined mode of inquiry, concerning revealing knowledge about domain-specific design attributes, characteristics, perspectives, beliefs, values, approaches, methods or tools. Every specialized field uses design as every human designs courses of action meant to change their circumstances. The expanding design field, as a relatively nascent scholarly program, concerns this general phenomenon, organzing *designing*. Paradigmatically, design activity as scholarly field acts as counterpoint to scientific methods and to some degree a counterpoise the less desirable impacts of scientism. Ultimately, as it has been shown, design-like activity can been seen as fundamental to human organizing, integral to the mundane activity of highly specialized scientific communities, design acts as a lingua franca for organizing cooperative human activity. Design can act as an intersystem mediator operating at a systemic level. As such, Chick & Micklethwaite's (2011) schema is instructive, suggestive of nested domains of organizing; *Design is to design a design to produce a design.*

A caveat to this organizing activity is a utopian view of design as savior from technically-rationality masks evident threats consequent of placing too much responsibility squarely on the shoulders of design methods and designers, expressly without granularity about how they are trained, what they are actually doing and taking on the mantle of evaluating the consequence of action. Bringing different forms of activity into proximity is essential to avoid hegemony of singular approaches, which in turn curtail the potential for innovation.

5.2.4 *Field A & B*

Banathy asks the key question; *who should be involved in design*? - the expert or those affected by the design, provides opportunities to distinguish two *field configurations of design inquiry*, it also gives a strong image of the expanded design field. Banathy refers to these fields as A & B.

Field A configurations encompass architecture, planning and environmental design of habitat including various fields of engineering, law, medicine and economics, notably the involvement of those affected is increasingly emphasized. These fields are professional domains where expert knowledge in design is primarily essential.

Banathy advocates a general need to acquire design literacy to become informed consumers of systems designed by experts. Even passive participation society requires some design literacy, to navigate within social systems, which are the outcome of expert design activity.

Field B configurations encompass the variety of social systems, including education, social services like government and community agencies. Ongoing trends in design management place primary roles on designing to those who serve, are served or are affected by the design of these systems; with each becoming the notional 'user designer'.

These fields differentiate via their generic assumptive approaches to design, Banathy discusses Nadler & Hibino's approach; distinguishing between a *doubting game* played by design experts and the *believing game* necessary to social systems design. Experts focus on in-depth problem diagnosis and definition leading to detailed problem analysis, followed by formulation and evaluation of alternatives consequently 'revealing' preferred solutions, hinging on detachment, objectivity and rationality. The doubting game is a consequence of rationality; experts feel those who do not employ these systematic methods as sloppy or irrational, noting the prevalence of this approach has yet to yield solutions to pressing societal issues. Conversely, a *believing game,* associated with field B commits to systemic openness to search for ideal, a highly subjective and flexible approach grounded in deep experience and purpose – cooperatively opening to external influences refraining from doubting.

Discussing this continuum of generality-specificity of design methods, Banathy evokes a pragmatic image of interplay, a *'fields within fields'* image of design, where specific applications draw upon both domain-specific and general insight from design domains. Putting forward the idea of levels of abstraction, at most basic concerning novelty itself and *'how things could be'* moving up in specificity and granularity to substantive and domain-specific insights about design. Clearly, design activity is diverse, apparent in mundane and specialist settings and a product of social and technical environment.

Directly addressing the generational continuum of design methods and movement in systems thinking from hard (logistic, instrumentally rational) towards soft systems (sociality, value-rational)[59] perspectives, echoes the perspectives that gradual shifts in worldview toward open, co-evolutionary, dynamic, values and ethics aware approaches to designing social systems are steadily displacing overly rational-scientific perspectives on design, or at least providing some badly needed conscientiousness. However, the hard-soft dichotomy is too neat a prospect, reconciling the needs of technical and social infrastructures remains a pressing need. The call for design that resolves dualist dichotomies anticipating a polychtomy of design that is apt to respond to polytelic problems situations in polycontexts.

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[59] Instrumentally rational (*zweckrational*), that is, determined by expectations as to the behavior of objects in the environment of other human beings; these expectations are used as "conditions" or "means" for the attainment of the actor's own rationally pursued and calculated ends.

value-rational (*wertrational*), that is, determined by a conscious belief in the value for its own sake of some ethical, aesthetic, religious, or other form of behavior, independently of its prospects of success (Weber 1978)

Weber argued the more the value to which action is oriented is elevated to the status of an absolute intrinsic value, the more "irrational" in the instrumental sense the corresponding action is. For the more unconditionally the actor devotes himself to this value for its own sake, the less he is influenced by considerations of the consequences of his action. On reflection, this distinction feels a bit too neat, looping these two definitions together. Dewey denied that practice creates two separate kinds of rational behaviour, arguing that actions cannot be explained by isolated motives. *'rationality is an affair of the relation of means and consequences, not of fixed first principles'* (Dewey 2008). Dewey, notably, was scornful of dichotomous reasoning.

5.3 In Observation – Self as Space

In observation, certain tools and practices were seen to afford means to presence the negotiation of interpersonal differentiation, this was exemplified internally by conceptual frameworks like the Johari Window (Ingham & Luft 1955), but also evident shared reflections and feedback giving practices. By spatialising the relations between domains within the self with respect to the perceptions of others, strategies like these prove especially useful in dynamic coordination (see appendix C). Interpreting, schema that spatialise the *self amongst others*, imagines personhood as domain with internal structure which can be explored or rearranged. This blends spatial / proximal and relational / organisational factors in a meaningful way, placing configurational and relational factors as primary design considerations. As Hillier opines *'space is the machine'* in that by attending to the lived use of infrastructures means that design practices (in their case architecture and urban design, but here in much closer focus the architecture of situations and encounter) are progressively shifted to a relational view so that both in their formal and spatial aspects, design practices *'are seen as fundamentally configurational in that the way the parts are put together to form the whole is more important than any of the parts taken in isolation'* (2007). Affective interaction was observed as transactional, yet the valued consequence was mutual restructure as transformation. In practice, this appears as a reverence for interaction, shown in acts of mutual respect, active listening and sometimes slow, sometimes sudden tick of self-realisation. Routinised situations designed to encourage noticing behaviour towards these features of the self with respect to others were characteristic of methodological approach of the organisation.

Research findings corroborate how spatial factors were integral to the conceptual restructuring work formative of group learning, not only did the design learning activity imply a reflective conversation with the materials of the situation (*individual, schematic*), but an enactive dialogue through the situation where the material environment was recruited into the mutual restructure of perceptions of team members (*collective, socio-cultural*). The success of these encounters was delimited by degree to which trust was established and stages of group development achieved within a group. This process was often both time consuming and emotionally exhausting, but with the corollary outcome of lasting affinity and robust relationships, however this endeavour did not always succeed. The insight that collaboration hinges on configurational and relational dimensions of human activity.

5.3.1 *The Tool Landscape*

Communication and networked technologies act to collapse classic spatial relations. In practice, digitalisation effectively collapses secure distinctions of spatial and temporal dimensions of experience as these can equally mediated by any numbers of virtual or vicarious means, certain aspects of

embodied experience remain functionally difficult to mediate. Space and place are subject to distortive transformations, networked technology continually opens to surprising new potentials for interaction that blend proximal and distal experience.

The kinds of group practices observed either facilitated via the organisations methodology or equally often emerging spontaneously were most significant in the observational data. These incidents were highly significant forming part of routinised and improvisational learning situations mark milestones within group learning processes. As such, blending of physical and conceptual tools was common, many professional perspectives bringing their own professional approaches into the space took the form of frameworks or procedures, often in the form of canvases or digital tasks, but equally delivered as methods workshops that step through procedures experientially to be populated by learners. These might be considered examples of *toolforthought*s or second order tools which are seen as necessary to deal with thought in practice (Shaffer & Clinton 2006). There's strong lineage of this in design methods, notably (De Bono 1985), contemporary digital estate given over to issues of design practice is suffuse with frameworks and toolkits to support this. However, remaining sceptical of the ability of toolkits alone to scaffold and enable integrative learning, these tools often only include procedural information concerning how, but not why. Synthesising, learning is enacted through embodying a procedure into an environment amidst a team, enacting the procedural experience of a tool situated in an encounter, educes learning.

This evidences how tools create venue to unpack concepts into place so that they can be acted on together with others; hence becoming mutually intelligible rather than remain abstracted mental processes, procedures provide a scaffold for enaction which require both venue and other minds, the purpose is often to surface assumptions-in-action. Process-like conceptual tools and frameworks provide scaffolding to enable inter-mental brokerage, however these tools are only vessels to be filled with the *'materials of the situation'* whose sources can be radically diverse and because of their disparate nature, difficult to integrate into sensible decision-making. The intuitive, tacit nature of design expertise is normally explained away, in observation, this appears to concern in-situ blending of highly heterogenous sense data, concepts and circumstantial details by actively recruiting the situation and other persons contemporaneously. Collaborators recruit their setting and one another as scaffold to support temporary coherences, for example to support envisioning. In this way, abductive inferences, or intelligent guesses about the structure and bounds of problem-situations are enacted onto the design situation.

Recurrent incidents in observation reveal how envisioning was enacted out onto the physical fabric of the learning environment, rapidly shifting structuring and restructuring activity was prevalent and featured heavily in memoing, this construction of the environment wasn't only for representing

information, it seemed akin to the practices of place-making, harkening the tidying and organising behaviour described by Shove (2007). A profound example this kind of situated envisioning practices is observed by Nandhakumar (2013) in games development settings. Here, the desks of developers and certain distinct shared artefacts (concept books – strong candidates for centralised boundary objects) become venue and source for emerging feature of products, especially important where experiential and functional consideration are of equal importance.

5.3.2 *Social Technologies*

Although many tools and digital analogues for physical spaces have emerged in recent years to support dynamic coordination and brokerage, following Sapsed (2004), the factors that make co-presence a gold standard remain difficult to articulate into distributed organising and collaboration technologies, this is where insight about the dynamics of boundary objects and spaces becomes integral as future design considerations to create interactions and HCI better suited to actual situated cognition. Likely, research into enactive cognition represents the most promising avenue to support human computer interaction as it enters its third paradigm, which highlights elements once considered marginal, referred to as *situated perspectives* (Harrison 2007)}. Likely, this in part because distributed technologies funnel much of the sensory and embodied modalities integral to situated designing (movement, manipulation, gaze, plasticity of material environment) into limited skeuomorphic affordances of clicks, gestures and touches but more significantly impact of presence and the particularities of boundary phenomena.[60]

The potential for future design environments to leverage this routinised and improvisational co-structuring activity is intriguing. This behavior isn't only personalization behavior, but at least in the context of these observations, formative of learning or at least evidential traces of it occurring – learning and place-making are co-occurrent. Participants were seen engaging in continuous place-making activity, which might be interpreted as procrastination or coping strategies, in practice, in search of how learning was occurring, when not via traditional pedagogical situations, this deeply improvisational activity was integral to explanatory descriptions of learning activity.

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[60] Leigh Star was keenly aware of technological apparatus and big data standing as a boundary for interaction, framing it as an issue of infrastructure, means asking *'methodological questions about studying infrastructure with some of the tools and perspectives of ethnography. Infrastructure is both relational and ecological—it means different things to different groups and it is part of the balance of action, tools, and the built environment, inseparable from them. It also is frequently mundane to the point of boredom, involving things such as plugs, standards, and bureaucratic forms'* (Star 1999) argued these issues were penetrable to ethnographic methods, but require proper scrutiny of studying the design of infrastructure to highlight its paradoxes via ecological analysis and questioning the epistemological status of indicators.

For collaborating groups tasked with the design of experiences and services, the impact of how digital technologies force kinds of interaction by being reliant on functional mediation via computational tool environments is all important and instrumental to their design. The systemic difficulties of integrating situativity and sociality in information systems remains significant and increasingly prevalent. As the outcomes of user experience design often result in mass information systems which are progressively integrated into mundane experience of billions of users, this is likely to have trenchant consequences for how tasks are constituted in everyday activity. Consequently, these design infrastructures are difficult to predict and control, which is starkly visible in the current political and economic environment. This places onus on designers and exceptional responsibility on the so-called *'creative class'* to consider how technological interaction recursively influences social and physical space, how it's perceived, and the meanings ascribed to it.

Design processes apply systems design practices, enacted through interfaces, Digital Experience Design (and by extension UX) directly concerns design activity concerning mediation across boundaries; user-centricity directly addresses how perception and assumption about function directly impact the potential for and qualities of interaction. As digital economic transformation advances through phases of *digitisation, digitalisation* and *digital transformation* (concerning the organising practices of designing, learning and leading with respect to conditions within digital environments rather than specific technologies per se) the primary impact of digital technologies is how they manifest alterations to affordances, access to information, knowledge, goods and services which radically transmutes environmental conditions and the largely hidden infrastructures that support it. Relative scrutability, the legibility of environments is not guaranteed, as networks create porosity of social worlds, they also close around critical systems.

Design activity engages in active restructuring of resources and concepts by recruiting the environment as a blend of both agent and venue, this necessitates updating assumptions about how collaboration operates and crucially disposition toward place and space to avoid schematic incommensurability. To achieve complex tasks prevalent in the digital economy, specialist expertise in technology, systems and experiences needs to be integrated - each of which manifests boundaries with distinct cognitive / enactive capacity to manage necessary internal, interrelational then intercommunal negotiation to coordinate. As Schön notes, design is *worlding* activity; *'designers construct their design worlds not only through the shaping of materials but through interlocking processes of perception, cognition and notation'* (1988). Expanding this, design activity and the architecture of situations are mutually constitutive *'conversations within situations'* or continual, recursive dialogues with circumstance (literally *what stands around*).

Research into how organising activity in sites which are emblematic of a diverse array of collaborative horizons at different scales better equips negotiations at nexuses between interlinked fields, each with their own internal dynamics, conventions and expertise formation, a consequence of localised cultural practices, framings and worldviews. A natural next step for expanding design methods, is how personal and collective schema are bridged, blending internalised, personal cognitive practices such as frame analysis, generation and reflection with externalised interpersonal activity upon collaborative problem situations (without resorting to dichotomous inside / out reasoning). The chief shift in assumption required to sustain this line of inquiry is how crucial elements of design cognition occur amongst rather than inside people. Hence problem situations are just that, primarily situational, rather than only held in abstracted perceptual constructs about situations, they may be enacted through brokerage across internal and external dynamics of actual situations, this means expanding the unit of analysis to include different scales of human organising. In this way, site, setting and participant schema for design profoundly condition the activity that may occur. This is subject to a greater degree of technological and environmental determinism than methodologically individualist accounts allow for, however accounts for how material and environmental affordance comingle with interpretive plasticity allows a finer grained grasp that supplants determinism with subtler relational, ecologically rational image of the design situation.

Pannabecker (1991) argues against the persistent notion in technological education that technological impacts are simple to comprehend which has mistakenly allowed the field to interpret technology in the context of society and culture, but also contributes to simplistic and inflexible views of the relationship between technology and society. This argument queries at an assumptive level; were technology and society not assumed to be distinct categories, the notion of technological impact on society would dissolve, were the term impact eliminated then so would the notion of technology and society as opposing forces.[61]

How applied organising metaphors dictate conceptualisation in subtle ways is unpacked by Turner (1998), Lakoff (2008) in cognitive linguistics but within design methods for public policy innovation by Schön (Ortony 1993) and importantly by Orlikowski & Gash (1994) to make sense of information technology in organisations. These are often conceptualised as frames or interpretive schema or

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[61] Whether Hegelian inside-out or Marxian outside-in the processes designers follow align with the application of a hermeneutic cycle. Hermeneutics provides a framework to talk about understanding and interpretation. Proceeding through a circular checking, which transmutes assumptions about how design activity might unfold, what worked or failed in the past or how we perceive our activity or a setting through primary experience or secondary activity like reading (Kidder 2013). General design practices that allow practitioners to undergo activities to check assumptions and expand our understanding, becomes more or less specialised dependant on setting and community.

construals (conceptual blends). These interlinked perspectives are formative of a robust supposition that linguistic-conceptual and material-physical environments have distinct reciprocal impacts through schematic enaction.

This implicates need for schematic reconciliation between systematic (hard) and systemic (soft) factors, especially those sensitive to sociality AND material infrastructures. At the sharp end, HCI and interaction design devise functional interfaces and logistics which become venue for interaction but also sites for design. At the softer end, digital management must anticipate how people cognise and organise with reference to these sociotechnical infrastructures, approaches able to anticipate value but also sensitized to values. Misapprehension or failure to integrate hard (systematic) and soft (systemic) considerations lies at the heart of schematic incommensurability.

Most importantly, these however, recommendations need to be practicable, common sense and amenable to be learned at each level of expertise, not remain in specialist domains of research investigation.[62]

Networked computational resources and interfaces with information infrastructures are already functionally inextricable from sites of learning and design. Cognition in the wild must reconcile from multiple partial sources and ill-structured situations where contingency reigns to abduct temporary stabilities to support decision-making. Both experiential education, most design models are built on assumption of cycling from experience to abstract conceptualisation and back again; as metaphors for cognition these share much with systems theory, which assumes adaptive behaviours rely on creating perceptual and functional feedback loops within the flux of lived experience (so called *appreciative systems* (Vickers 2012) sit at the heart of Soft Systems Theory).

To develop an explanatory framework to explain how theory differs from observation of practice, the factors to do with schematic perception are most important, many of these theories see the individual as the irreducible unit of analysis, dealing with what each thinker is doing, rather than activities they're doing amongst a group. The outcome of this activity is vital to designing, it is about giving object entitative status (or bringing them about), which then needs to be enacted onto the

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[62] This research is testament that much of this is already extant and well expressed in theory, the difficulty is to bring these into the grasp of practice, to form part the foundational *practical sense* of design practitioners in the expanded field. As Bourdieu explores definitions of habitus and field have change as a necessary consequence of their condition – a change in one necessitates a change in the other. Generational change, dislocation of habitus, social crisis and field restructuring are all terms closely related in Bourdieu's discussion of social phenomena and how they change over time. Bourdieu notably sets *sens pratique* against *hysteresis* (the dependence of the state of a system on its history). Hysteresis becomes relevant in times of dislocation and disruption between field and habitus, 'in particular, when a field undergoes a major crisis and its regularities (even its rules) are profoundly changed' (Bourdieu, 2000: 160). The tension between past states and unbounded generativity governs possibility, intellectually brilliant, but too obscure for most in practice, who negotiate this tension intuitively.

environment somehow; usually via forms of various interfaces and tool environments, making tacit action mutually intelligible, first within a team, then later to test groups, eventually upon publics.

As this action proceeds design meanings move out of mind onto place, dependent on predeterminant constraints. These interfaces as boundaries for interaction take on place-like characteristics, platforms provide infrastructures for social interaction, acting as the task field for *inter-mental* coordination and *inter-action*, which means the transformation of sociality, this lends a wholly novel character to digital transformation as practices of integrative organising and enacting to achieve meaningful collaboration. BOT is relevant here; boundary objects concern how socio-technical infrastructures manifest requiring distinct organising practice, an understanding integral to how organisation organise and interact

5.4 Re-placing Space.

Experiences from retail, media, entertainment and consumption of public space increasingly rely on mediated blends support by information infrastructures and experienced through a variety of interfaces. Hence, reconfiguring how different forms of space are dealt with in the design situation is crucial. How work and learning environments are organised is also very much an object of design which face radical transformations. Sources present in the design situation deeply impact how industries and economies yet to emerge will form and interact.[63]

Dourish & Harrison discussing interplay between space and place, reflecting on the impact of collaborative systems, insist that spatial structuring moulds around us, guiding action. Given their corporeality, humans are highly skilled at interpreting and structuring space for individual and interactive needs. They argue space has implicit features grounded in; *relational orientation & reciprocity, proximity & action, partitioning* and *presence & awareness*. They differentiate space from place, charactering place as cultural phenomena. Sense of place - communally-held sense of appropriate behaviour, and context for engaging in and interpreting action – is intrinsic to social cognition.

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[63] Habitat, as venue for action or place where attention is directed are now as likely to take place within simulated computational / communication environments, stored and recalled through interaction with digital systems as not. Increasingly, in design and learning situations, experience of space is likely to functionally blend or be supported by some aspect of computational environment. As (Harrison et al. 2007) envisions, gradually, this boundary is moving towards more subtle embedding in place explored in (Weiser 1991), (Weiser 2002).

Indicatively, Ofcom (2018) estimates the average British person uses a mobile device for 2hrs 28mins (roughly 12% of daily waking time). Codecomupterlove (2019) estimates 3hrs 23mins for UK adult respondents, with variance between 2-4 hours dependant on age group. Overwhelmingly, this doesn't acknowledge time spent using other forms of computing / communication devices for work, navigation, gaming etc. There is wide variance globally, but adoption generally follows economic development. Suffice to say FOMO (fear of missing out) a psycho-social phenomenon characterised by (McGinnis 2004), identified by (Herman 2000) remains a powerful social motivator, as increasingly access to knowledge and services translated via digitalization. Thus also, DOMO (danger of missing out) emerges as a pernicious implication of digital transformation for certain social groups, (for example older persons or those with relatively limited economic means. In tension, trends towards divestment from overuse of devices, yet interdependence of physical and computational spaces in social functions as a trend continues unabated. 1/3 reportedly monitor screen-time, indicative of a general push back away from overemphasis on digital interactions. Therefore, considering impacts on the experience of place is crucial, notable commentators, such as Dourish et al. call to re-place space with respect to the impact of digital environments; not to make analogy to spatial interactions within systems but to reframe them legitimately as place yet without extent, a form of experience with its own integral affordances yet not separate from normative worldly experience.

The formation of these social differentiators presents new marginalising factors, sharpening social boundaries whilst simultaneously expanding possibilities for interaction at a global scale, delocalising. For context, the international telecommunications union, estimates just under half of the global population have online access in 2017 (ITU 2017). The 21st century is marked by various unique social-spatial transformations, most notably the global transition to predominantly urban living conditions around 2007 (United Nations Population Fund 2007). Equally radical change in global literacy rates, as OECD estimates indicate; form 12% in 1820 to 42% in 1960 to 86% in 2015 (Roser & Ortiz-Ospina 2016).

Understandings of place develop within cultures; their learning is fundamental to assimilation and socialization. Inducted members of all cultures learn norms particular to environments; when new systems or tool environments are introduced, technological adoption is that adaptation reoccurring as social space reorients around a feature of that environment, this process is continuous and scalar. People undergo enculturation into the workplaces and organizational environments they're re-situated into, norms differ across places (Harrison & Dourish 1996). Distinctions between space and place have design implications for collaborative environments, sense of place not only structuring of space act to frame behaviour.

Non-spatial environments exhibit placeness too. Digital platforms propagate enculturating factors, simultaneously, the gradual action of networked technology and widespread access to internet deracinates (decouples) communities from local space. These mutual drivers of enculturation and balkanisation have transformative impacts, networked technology decouples socio-cultural influence from space. Tools specific to organisations and communities also instil enculturating differentiations, tool environments and organising practices are formative of the distinctive boundaries between social worlds. Furthermore, organisations and professional structuring propagate distortions to disposition towards social action and personal schema. Recalling Polyakova's treatise on professional deformation (2014) which explores shaping influences driven by the organisational environment itself, factors seen to delimit agility and hinder mutual intelligibility, which Dewey referred to as occupational psychosis (Merton 1968).

The view that Placeness is rooted in evolved behaviours, demanding capability to creatively appropriate resources to meet needs, aligns with ecologically rational view. In practice situations, Djulbegovic (2017) reminds us of the ongoing great debate between normative (*ought to*) and actual (*actually do*) rational decision-making is indicative of a broad territory of different forms of rationality. Dourish & Harrison warn analogies to real worlds are unhelpful as non-spatial places are real worlds; populated with real people engaged in creating real forms of activity. Critically, what's lost through failure to acknowledge co-constitutive dualities of space and place, boundaries between spatial and non-spatial environments impose conceptual difficulties in situating activity. Problems at this boundary are likely consequent of assumptions that conflate structured space with sensed place, whilst seeing technology and society as distinct entities.
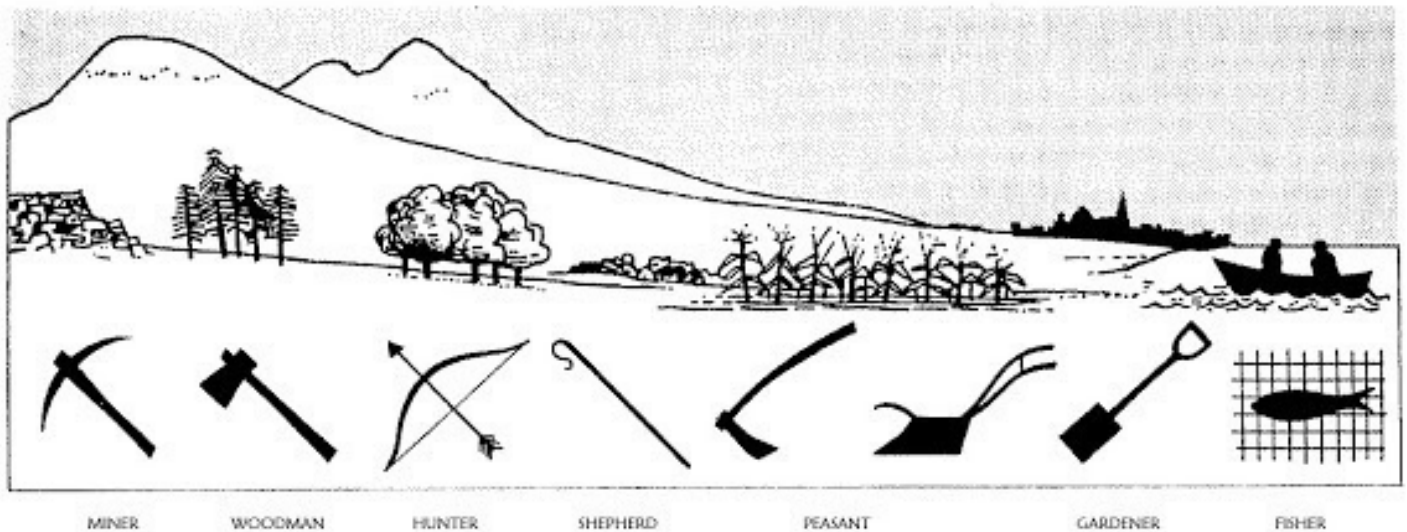
Figure 20 - Geddes, P. (1923) The valley section from hills to sea.

5.4.1 *Technological & Environmental Determinism*

People are evidently shaped by their environment, however, classical determinism has steadily acquiesced to more complex socio-material arrangements. An image of environmental determinism is typified by Geddes' Valley section (Geddes 1925) who apprehended; *We can discover that the kind of place and the kind of work done in it deeply determine the ways and the institutions of its people.*

Deliberately simple, biologist and urbanist Geddes called attention to environments role as primary social determinant. Environmental and technological determinisms fell out of favour as they are perceived to damage individual agency with respect to societal apparatus. This simple diagram conceals profound ideas; conditions shape action potential, exerting evolutionary pressure, although too simple, it still resonates.

Geddes' idealised nested, relational image, suggests symbiosis where habitat reciprocally drives action; territory gives region and city affording action giving identity and thus place. Human agency provides a counter tension, amplified by processes of conscious design, bringing unintended implications. Presciently, Geddes saw assemblages of organism, function and environment as pivotal to human settlement and the civilising economic processes. This represents developing social evolutionary theories arriving at social ecology (Small, 2004).

Thompson insists, Valley Section models are complex, combining physical conditions - geology and geomorphology with biological associations - with naturalistic occupations; *miner, hunter, shepherd* or *fisher*, coupling them to human settlements arising in response. Geddes credo *vivendo discimus* (by living, we learn) aligns with Dewey. Rather than determine, social, material and environmental factors reciprocally interlink.

Notwithstanding Geddes landmark contributions, what becomes apparent is that Geddes' Valley section is a simple and potent relational schema. It is a representation of how synthesis of spatial and conceptual domains works. As a functional way to comprehend how design activity is enacted, but also how professional domains make contact with their domains of action it functions beautifully. Unfortunately, it is static and now appears simplistic, it was a powerful way to connect activity, and therefore practices and fields, in this case architecture and planning, with place.

Professional structure acts reciprocally upon environmental structure through synthesis between material and conceptual circumstances. Design acts simultaneously in the field (material situation or setting) but also on the field (domain of concern). Rearranging situations (systematic) whilst renegotiating perceptual schema (systemic) occurs in general design activity (across internal / external boundaries). However, in the special case of collaborative interactions this entails inter-mental coordination, mutual restructuring between collaborators, mediated through shared environments.[64]

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[64] Incidentally, the significance of spatial theory in general in the expansion of design theory are foregrounded. Both Donald Schön and Kevin Lynch were attached to Urban Planning within MIT. Lynch was a student of Frank Lloyd Wright, synonymous with the principle of site sensitivity and worked closely with Gyorgy Kepes who worked in advanced visual studies and was interested in perceptual schema to derive a pattern language of vision. Schön was concerned with civic responsibility and the impact of schema on policy generation, his doctoral work Displacement of Concepts was meant as a companion piece to Thomas Kuhn work on scientific paradigms, aiming to give an accurate look at the dynamics of invention. Schön's ideas can be regarded as an expansion of Dewey's Theory of Inquiry, expanding insight on the foundations of practice based learning and experiential education.

5.5 Deixis – Orienting in the field.

If as situativity and enactivism asserts, thinking is coupled with action and movement, reasoning is reliant on spatial and temporal concepts. Cognition blends these via construal to achieve a variety of sophisticated abstract conceptual dis-*positions*, conflating linguistic and embodied schema.

A supposition follows embodied cognition is generally *deictic* and prior to linguistic understanding. Thought is embodied and spatial first, traces of this are evident in language. Language acts are diectic if their semantic meaning is fixed but their denoted meaning varies depending on time and/or place. Attending to the role of situatedness means discussing *deixis*, defined as language that cannot be understood without contextual information, as below;
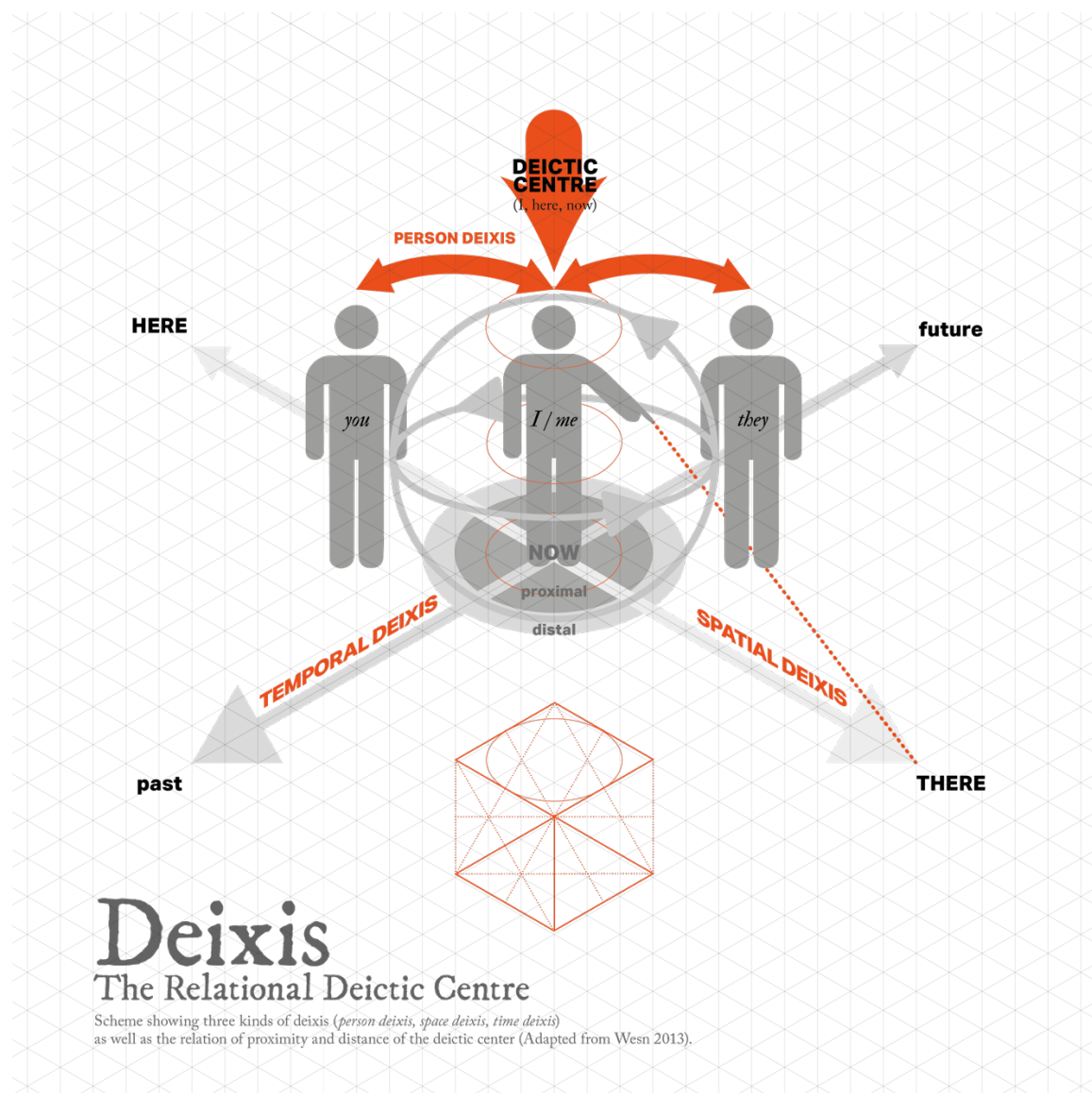
Figure 21 – *Representing Deixis*

Adapted from illustration by (Wesn 2013) building on the work of Lectures on Deixis (Fillmore 1971)

If human language is inevitably contextual and deictic, and so is learning. It follows as a general principle that language is founded on spatial foundations. Humans are uniquely equipped to blend their embodied presence, whilst being able to anticipate based on experience. There is growing consensus within contemporary cognitive science that as general unified principle, thinking operates via active inference to achieve error minimization, narrowing the gulf between anticipated outcome and actual outcome. Minimizing prediction error corresponds to minimizing free-energy (Hohwy 2013, Friston 2010). Systems view applied to biology (Lagerspetz 2001) defines life as reciprocal relations between *umwelt* (the world as it is experienced by a particular organism) and its environment, the interfaces between, ecotonal boundaries, are sites where exchange takes place.

5.6 Aspect – Orienting in Time.

Strong evidence of embodied directedness foregrounded in observation of collaboration is also evident in psychology, in studies of pre-linguistic infant development. Parsing Wagner's ideas about this into context explains how the spatial and temporal origins of abstract concepts can be explored through aspect. Aspect is fundamental to cognition, as a category, present in syntax, expressing how an action, event, or state, denoted by verbs, relates to temporal flow, aspect is temporal deixis. Aspect deals with internal constituency of actions, events, states, processes or situations.

Wagner points to a vital component of aspect, *telicity*. Telic predicates describe events with inherent endings, Atelic predicates describe events without such endings. These are relevant to attention directing activity; design learners constantly engage collaborative attention shaping, using language and embodied action in directing attention in space and flow of events equivocally. A strongly observed feature of how collaborative design expertise is formed and enacted is how collaboration implicates novel configurations of aspect and telicity. Attention-guiding to aspectual environmental features is pivotal in modification of evidence traces present in a group task field.

Modulating one another's attention was observed as a primary means of collaborative exchange and difficult to do via mediated technology. Insight responsive to how collaborative learning implicates physical environments to mediate concepts is thus highly significant to design learning and design methods research. Leadership in this view takes on another character, rather than abstract leadership qualities, leading involves mundane acts of guiding, and creating representations that are mutually

intelligible about dynamic circumstances, distributed leadership stems from how group members guide the attention of others in their group.[65]

Relevant here, telicity suggests how awareness is situated in time and space, whether dealing with abstract or physical entities, these are functionally blended, especially where yet-to-exist outcomes are focal to activity, as in design processes. Design models account for cyclical iterations of different phases of activity but are arguably poor at specifying the nature of how this occurs, especially collaboratively. Advancing design methods has need to integrate awareness of field relatedness, how specific design actions occur and are then reintegrated into collective activity. Design models are often frustratingly background independent, giving sparse guidance about embodied factors.

Learning concerns movement and therefore change across field(s) of attention, experienced simultaneously as mental and physical aspect. Design activity acts across this boundary, action occurs through bringing forth intent via materializing. These interactions are intuitively tied-up with state change from certain stable positions in time-space, novel configurations that aid future-oriented actions, some acts are specific in duration, directed toward incidents, yet others are more generally focused towards conduct, patterns action in general. Given differentiation and equivalence between concepts and action, between past and future, here and there; deixis in these settings has to marshal attention about things in becoming; that implicate the emerging design (mediating artefact) or changes in an individual's ability to enact those changes (mediation) or how the group acts together (community) in how learning to design occurs. Crucially, the venue for this occurs via the environment. We can point at events and make a point, design activity often blends conceptual and embodied cues. Tacking back-and-forth between specifics and generalities becomes increasingly seamlessly. Masterful designers are often called out by learners to make processes explicit which externally appear inscrutable (Lawson 2014). As *'Design knowledge is knowing-in-action, revealed in and by actual designing. It is mainly tacit, in several senses of the word: designers know more than they can say, tend to give inaccurate descriptions of what they know, and can best (or only) gain access to their knowing-in-action by putting themselves into the mode of doing'* (Schön 1992).

Difficulties to distinguish between here-and-now and general envisioning, often action integrates telic and atelic directedness, actions that do-for-now and do-for-good. This fluid tacking is also strongly indicative of group integration, as collaborative cohesion increases through contact, so does ease with

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[65] Wagner examined infant's representations of telicity with DIRECTED MOTION events such as tracking or pointing. Directed motion events are internally complex, consisting of several component parts: a FIGURE moves from one point (the SOURCE) to another (the GOAL) in a particular MANNER of motion. They are amongst *'core event-types in language, and are deeply integrated into grammatical processes'* (Wagner 2009).

complex telic blending. By reattending to embodied activity as fundamental to cognition places the impetus back onto how sense-making actually takes place in situ, in the moment. Treatise on sense-making and reflection often frame it as retrospective process, reflection in action attends to the readiness and presence at hand but often remains internal only becoming part of group conduct via efforts in deictic, aspectual and telic language and action to mutualize understanding. People exhibit innate expertise in this learned from everyday embodied experience, but expertise formation for application in design situations represents significant implications for design learning and leadership. Simply, orienting and attention directing behavior is more nuanced (thus subject to refinement) often pointing to local or non-local sites, physical resources but also inevitably draw on temporal resources, sited in spatial or non-spatialized networks, human relations, memory, awareness or insight, immediate fields of action but also fields of practice. It also invariably implicates framings and diversified perception held amongst groups either present or distant. This is confounded by the need to consider the territory of assumptions that shape action, unique to each participant but also tightly coupled to organizational structures and communities of practice. Finally, perhaps most significantly, design activity deals with the *yet-to-be* by calling on the present situation and plural past states to bring about artifacts, systems and perceptual schema that are in a process of becoming and have yet to *take place.*

5.7 Diectic & Diegetic

This has important implications, as these framings are quite different than those usually ascribed to design learning. As a central research contribution, assumption checking, via use of grounded study set out by the research questions are used to discriminate between what we observe in actual activity and frameworks applied to conceptualize (and consequently to design, plan, organize and lead) that activity. This research has brought fascinating divergences and surprising novel relational arrangements into view.

Thinking has a diectic, embodied character not fully reducible to mentation, this is not novel and this suspicion has long heritage; Cole & Engeström (1993), Hutchins (1996), Clark & Chalmers (1998), Gavriel (1997), (Ascott 2000) and Menary (2010) distributed cognition has a long lineage, especially connecting these issues to sites of design education. How anticipatory inferences are made amongst people, mediated by technology to bring about novel environments that feel authentic to embodied experience. Thought-action are mutually constitutive and diectic, they are also reliant on capacity to actively infer anticipated states. To bring about a design, especially an expansive infrastructure blending services and experience, design activity is diectic but also diegetic. It requires orientation within the world, but also creation of designed sub-worlds that have their own coherences and verisimilitudes that readily allow analogization across boundaries. Dependent on this relational fitting and capacity to navigate these coherences determines the success of enacting them. Design activity, especially in learning situations, will have representational and non-representable elements, it hinges on deixis; directing action and attention of collaborators to features of embryonic diegetic environments, those whose existence is only to bring about scaled instantiations of patterns set out at micro-scale in the design situation. As such, getting assumption about the world right is reliant on negotiating schema amongst collaborators, derived from meaningful grounding in actual situations.

This research makes effort to unpack the features of domain relatedness discussed above, to explain learning in terms of frame and field relation, to reassemble from the deconstruction of assumptions based on observed acts of collaborative designing, learning and reflection a new appreciation of how heedful design activity actually brings about changes in the world, whilst avoiding heedless action and the consequence of fetishized product development and problem solving.

The ability to abstract sophisticated representations from experience then use these as aid to decision-making is important to design, this discriminative ability builds upon innate capacity to derive anticipatory inferences that are successful in as yet encountered novel environments. The supposition is these are related faculties, quite different from the heuristic search thought to be central to design cognition in Herbert Simon's information processing era.

The operative assumption; in any effort to outline a learning framework of distinctive features to describe how collaborative learning in practice might differ from existing theoretical accounts should expand out from ordinary acts of cognition which are refined through experiences and expertise formation. Theory grounded in experience should feel authentic to embodied experience of learning activity, but might have counterintuitive implications. Such a view establishes strong coupling between how we learn to perceive environments and how we act upon them, which specific kinds of expertise formation should refine through learning. In these situations, simple practice-based ways to distill more complex theorizations into experiential learning are needed.

5.7.1 *In observation – Place Learning*

Place is established of foundational significance to cognition in general. Foregrounding the role of place both in scholarship and observation brings attention to experiential learning theory. Bruner's (1978) concept of scaffolding, expands Vygotsky's social constructivist concept of the zone of proximal development which acknowledge the role others play in guiding learning through progressive removal of structured guiding. Bruner's research concerned how knowledge is organised through different modes of thinking (or representation), that learning encounters progress through three stages; *enactive* (action-based), *iconic* (image-based) and *symbolic* (language-based) arguing that learning of complex material can occur at any age as long as instruction is organised appropriately (Bruner 1960, 1961).

Given the deeply situated nature of knowledge, learning certainly has spatial (or *platial)* aspects. Observation points to how learners, when working on ill-structured problem-situations without fixed outcomes synthesising partial or incomplete information go about learning. Most significantly within groups, learners seem to engage in structuring evidence as representations of their internal assumptions about a situation, often inherited from past disciplinary, institutional or community settings. These internalised ways of looking are coupled with modes of representing which are used to display their way of perceiving the situation to one another, this can result in contestation where these representations fail because of their qualities but more likely because it represents schema that clash with how others frame the present state of the problem situation, or the represented aspects of it. This activity is often rapid and increases in fluency and resolution based on time spent attending to and cultivating a crucial quotient of trust through group development and integration activity.

Observation showed learners were reliant on one another in structuring and granting license to their contingent representations, which in turn formed the cascade of decision-making that led to final, more complex coherent representations. These were often sophisticated micro-worlds representing potential products and services which often communicate subtle reasoning and envisioning about how the real world would function with the instantiation of the micro-world. Often, the form of final representation, whether a pitch, prototype or design outcome was used as venue to project the outcomes of design activity onto a bounded aspect of the world or consequences for a group or community. In ecologically ration terms, the objective is often to demonstrate fit with assumptive, perceptual or actual situations. Learning in the observed context was seen to be highly reliant upon structuring behaviour, guiding and directing attention to aspects of representations that are built in situ. Learning appears as reciprocal structuring, the physical (and various tool) environments were heavily conscripted in this structuring behaviour. The most notable consequence of this intense structuring work was how it altered the environment, evidence building rapidly restructures the study environment but also the attentional environment of particpants, the material presence of the

environment was seen of intrinsic importance to this form of learning. By extension, this rapid exchange of provisional representation operates to mutually restructure collaborators themselves, this was notable and recurrent. By engaging in collaborative design activity, especially where outcomes were unclear and problem-situations poorly bounded, again the consequence was quite profound impact on the collaborators themselves. This was strongly evidenced in shared reflections that accompanied retrospective reviews at the conclusion of charette periods such as sprints, these experiences were often reported as quite demanding or taxing. A key determinant of success seemed to be openness to restructure, which naturally seemed concurrent with establishing greater trust and psychological safety. However, the potential for schematic clash is heightened where shared lingua franca was not extant; in the form of either modes of representing, shared tools or cultural codes recognisable from past shared communities. The likelihood of clashes seems strongly associated with willingness to perspective-take – over insistence on particular inherited ways of seeing, unless already common amongst the group was a recurrent causative factor and source of tension.

Furthermore learners, with properly framed efforts to integrate and instruction first acquire high-level tools and frameworks that allow them to engage in activities in ways akin to the professional communities of practice they may wish to join. These provide access to ways of seeing, to see situations through a particular framework, which inheres it's own assumptions. Learning led by industry professionals at a cursory level involves inheriting tools and frameworks as ways of looking at situations. As this progresses into further depth, what learners seem to acquire has little to do with knowledge, although anecdotes and experiential narratives seem to successfully code ways of looking at situations. Learners, through ongoing and regular perspective-taking, appear to acquire the schematic assumptions of both experts but also one another. This activity both placed heavy demand on the material conditions of the environment but also the affective aspects of the persons in collaboration. Taking on schema and experimenting with the representations they make possible (at first contained in tools common to a community) allowed an unpacking of inhered assumptions. Representing personal assumptions exposes them to modification and challenge, which can be most uncomfortable, but potentially transformative.

By experiencing perspectives from experts, learners recruit not only this instructor, but as this support is progressively withdrawn, increasingly relied on one another, using their environment actively, often ingeniously to structure representations of the state of a problem-situation. In this way, as observed by others, problem-space and solution were seen to co-evolve, but not abstractly, this action was often inscribed actively into the space, the learning environment and orientation within it was observed as fundamentally agential as it was used in the activity of co-representing. In turn, this is suggestive of expansions to Bruner's scaffolding to reflect this, to include environment factors as integral to

collaborative learning but also to see collaborators as integral features of the novel territory learners encounter. Without these opportunities to encounter new ways of seeing, perceptual schema which are the consequence of each collaborator's assumptive world, learning is forced into a much less robust pedagogical situation that relies only on acquiring new information and knowledge.

To reflect qualities of the learning activity observed means beginning to reassemble sense derived from longitudinal, holistic observation, the objective is not causal constructs but intelligible patterns and heuristics about how meaningful collaboration occurs in situ, specifically in design learning activity in settings like studios. Factoring this, the role environment plays in providing scaffolding for learning aligns with contemporary perspectives about knowledge's situated character. Framed as bare space, leads to the perception that knowledge has only simple material dimensions as a storable and transferable resource. Whereas a place-centred view connotes knowledge arising out learning encounters with space that engage in processes that pertain to sociality and meaning-making. Counterintuitively perhaps, the consequences of this kind of activity, is place-making. Arguably, the formation of communities of practice is likely highly reliant on this kind of shared experience and schematic exchange.

Returning to literature, Tuan (1979) provides help to make sense of this. Distinguishing between crucial aspects of space and place; space is abstract, without substantial meaning, only indicating extent, whereas place indicates how awareness of or attraction to certain sets of spaces acts on thought. When somewhere becomes a place, this occurs through space acquiring meaning, or coming into relation with conscious experience. For Tuan, meaning is derived via two means;

> 1. *Through the fullness of direct experience in all of its dimensions through the senses.*
> 2. *Through indirect and conceptual ways, mediated by symbols.*

These two forms of inference are interlinked and difficult to distinguish in practice. Technological interfaces overlay perception of distant or abstracted resources, mediated through technical apparatus, which would be otherwise unperceived into an activity setting, fall under this second definition. Knowledge about extemporal or distal events, the status of systems or representations of physical phenomenon, are indirectly inferred by technical apparatus but become integral to the field of action, knowledge is experienced as features of a changing environment. Especially in self-led learning, as much observed design activity was, the management of this information environment is critical.

However, as opposed to knowledge in its raw state, conceptual tools allow thinkers access to affective, semantic dimensions of knowledge; its relational character accessed through schema, making schema apparent for negotiation is no mean feat. In certain cases, experience entails embodied performance

which is resistant to representation (Thrift 2007). Dealing with isolated or static knowledge resources here results in meaninglessness in all but highly controlled situations. Embodied activity and active communication are fundamental important because they act on the relational characteristics between knowledge and setting, hence meaning-making activity is integral to or co-terminous with place-making.

This necessitates changes to the general epistemology we apply to learning but also the specific, fast and frugal epistemological stances we apply in situ. Cognition in action, especially in collaborative situations requires active synthesis of sensory, conceptual and affective modalities simultaneously. This implies making use of active inference, to derive highly sophisticated but provisional blends of aesthetic stimuli, the flexibility to weather contingent factors is what lends this type of learning activity a unique robustness. This activity is resistant to description in classic accounts of rationality, abductive inference relies of environmental and interpersonal scaffolding activity. The environment, by representing partial internal states of collaborators provides a relatively stable substrate to satisfice temporary stabilities in a continuously changing sets of circumstances. However, these representational traces are effectively meaningless without the presence of collaborators to interpret and reinterpret them. Learners use one another to keep hold the co-evolving problem situation, this reflects the tenuous nature of learning through ill-structured problem-stations in communities with strongly structured cultural conduct where assumptive schema may be hidden, but could become mutually intelligible.

The concepts *grip* and *grasp* are useful to understand multi-modal, performative aspects of interaction between space and meaning.[66] Contemporary theory reveals a landscape where the complex relational character of knowledge means simple distinctions aren't always tenable. Tuan inverts the ordinary

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[66] Performativity in non-representational theory explores experience of practices resistant to classically rational accounts. Vision, touch, olfaction, hearing, proprioception, the fields of environmental sensing that bodies are capable of, including temperature, balance, vibration are pivotal to embodied activity and feedback loops with environments have critical impact on decision-making. Certain experiences resist rationalisation; atmosphere in houses, feel for a surfboard in swell or grasp of windswept rock-face typify this, feelings of having grip on a cliff or skilful carving through breaking waves but also feel for a material or the social dynamics of a user group require expanded accounts of rationality. Abstractions, which give vicarious grasp of distal or imperceivable phenomena, the magnetic conditions on the solar surface, how forces and vast emptiness between a nucleus and an electron shell within atoms give materials properties or form or integral coherences within an equation also form conditions active as schema within individuals and only in certain special situations shared amongst communities often reliant on complex apparatus or shared language. In collaboration, this feel is likely to be unevenly distributed, practices that make these schemata mutually intelligible and subject to negotiation are critical, this entails performing representations of expertise so these tacit schema can be learned about. Without this action grounded in certain situations could appear meaningful or without meaning, dependant on experience. Representations can be achieved technically or through classic pedagogy but remain meaningless without prior work to obtain certain conceptual framings underpinning them. Designing for experiences means providing environmental scaffolding and aesthetic patterning enough to grasp tacit features of design situations. Feel for world in its sensorial fullness and abstraction sits in parallel to feel for the game, understanding the contours of different forms of capital, human relations, group dynamics and fields of practice.

understanding of primacy of space and place. Place indicates primary two things; spatial location and position in society, studying status belongs to sociology whereas location belongs to geography. Tuan argues human relationships are prior and basic and that spatiality is abstract, inverting the classical appreciation, social relations generate spatial positions. What might this reemphasis of relational characteristics of position mean for design learning activity?

Collaborative designing and learning necessitate blending of abstracted and embodied, aesthetic and conceptual experiences; design implies both *intra* & *inter* individual acts of representation. These involve meta-cognitive practices like reflection, but also inter-cognitive practices like mediation. Place provides the venue for negotiation of meaning. In epistemology, concern for *the prospects of human knowledge must work hand in hand with cognitive science* (Goldman 1986), furthermore, actual worldly affairs *'are made pliable, wieldable and therefore amendable to human use through technologies of representation'* (Cooper 2015). An expanded design field means devising schema that account for how activity reconciles technical, affective and ecologically rational action. Design learning environments provide venue to actively reframe ecologically rational schema. Consequently, this means reframing the epistemology of design learning.

5.8 Third Spaces

Soja's *third space*, has important implications for learning theory, by strong coupling of social and physical concepts. Helpfully situating activity in territories; *urban, national, international,* whilst anticipating territories experienced through networked technology that transcending these boundaries. Extending Foucault's (Foucault & Miskowiec 1986) then Lefebvre's (Lefebvre 1991) attention to how social space is produced and power inscribed into social life, third space expands these theoretical inquiries into practical worlds where this kind of activity is enacted.

Soja refers the meta aspects of social space in philosophy to distil a focused application which acknowledges the impact of virtual or imaginary spaces acknowledging how, theory is contingent on circumstance; *'There are many such transdisciplinary perspectives, or as Lefebvre described them, as "ways to thread through the complexities of the modern world"'*. Soja synthesises the spatial triad, a triple dialectic between *spatiality–historicality–sociality* to call attention to a critical awareness of place, which assumes all forms of culture are continually in a process of hybridity.

Soja's *thirdspace* concerns creating inclusive spaces where change and otherness can be enacted, to enable contestation and re-negotiation of boundaries and cultural identity, as *'space of extraordinary openness, a place of critical exchange'* (Soja 1996). [67]

Soja's thought stems from Lefevbre, aligning with Vygotsky's sociocultural tradition, clearly stating that *'the social dimension of consciousness is primary in time and in fact. The individual dimension of consciousness is derivative and secondary'* (Vygotsky 1979). Like Tuan, Soja inverts the normative assumption that shared awareness has primacy over individual perspectives. Vygotsky emphasises relations individuals have with social reality, the assumptive premise that learning is a social process taking place between people, this conceptualises learning as internalisation of social interactions and relations.

Learning takes place via social interaction in specific contexts, internalised by persons. By internalisation, Vygotsky doesn't mean copying but transforming external interactions into new internal forms to guide personal action.[68] *'Internalisation does not directly mirror the external social*

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[67] Differentiating history, sociality and spatiality, implies revision of traditional geographical dialectics of historicality (*firstspace* perspectives focused on the 'real' material world) and sociality *(secondspace* perspectives interpret the 'imagined' representations of the world) inserting a '*thirdspace*': spatiality. This concept, an artificial dichotomy designed *'to open up a distinctive new interpretive realm'* where these dichotomies are discussed and restructured (Soja 1996).

[68] Vygotsky examined child development.

relations; it is a transformed reflection' (Hedegaard 2001). Implying that learning development occurs first between others and then within the self. Participation in an *intermental* processes between persons proceeds *intramental* change, these processes are integral to formation of personhood, but also expertise formation. Notably, this implicates transformative translations rather than transfer across a supposed inside / out boundary.

To summarise, differentiating between constructivist and sociocultural theories, when applied to learning spaces; both are concerned with activities people engage in to learn, constructivist theory suggests attending to the learning and mental representations of individuals while sociocultural theory is concerned with learning as an act of *enculturation* (S. Scott n.d.). Concerning learning development, researchers (Gutierrez et al. 1995), (Gutierrez et al. 2016) advance the idea that primary discourses (from home, community and informal social interaction) and secondary discourses (from within learning, cultural or institutional environments) intersect forming a third space, providing means to integrate prior learning and experience (Scott 2013).

5.8.1 *In observation; Collaborative learning environments.*

This direction considers learning settings such as studios; the primary case study context as third spaces. This invites consideration of how organisational agents expertly curated these experiences, by design. Many observed incidents were mediated experiences structured to apply methodological approaches distinct to the organisation, courses of learning instilled certain framings, either from common methodological resources or crucially brought in by industry experts, once these framings were instilled, progressively a more open exploration of these schema occurred. These seem to function by facilitating situations that engender enculturation, processes imparting values and cultural dispositions within learning groups, then facilitating interpersonal exchanges to engage in schematic negotiation. Reasoning for this was not explicit but remained tacit, explored through practice, based on success of previous iterations, changing the specific of problem situations. By encouraging the use of sophisticated interpersonal relating and supporting conduct to negotiate complex situations allowed learners to derive meaning from problem situations.

This harks Golsby-Smith's (1995) concern for fourth-order designers of moving the boundary of the task to encompass issues of *'why are we doing this task?'* and *'what does it tell us about our identity and value?'* then as consequence the scope of the task expands to consider connected systems and activities so that the outcome integrates into useful and viable patterns and not as fragment in the world. Finally, the 4th order designer widens the scope of these practical tasks to include people involved in creating and using the design, this inclusion is meant to protect against decisions made in isolation but developed in discussion to engender a growing sense of purpose and commitment. Certainly, the influence of industry experts and facilitators sometimes delivered knowledge via classical pedagogy, although experiential, learning experiences that appeared to induce enculturation (and ideally expanded awareness of it) were predominant.

Notably, given cultural heterogeneity of the group, although often narrow socio-economically, the significance of intergroup influence was notable. The difficulty was to prevent the cultural logic within the group from becoming self-sealed (Gray 2016), for enculturation to open and include rather than regress into balkanisation. The differences between collaborators meant the space certainly was one of contestation. However as group and culture formation proceeds, collaborative expertise emerged but presented the risk that these newly formed shared schema and social bonds obscure the influence of external schema, derived through engagement with external participants. Encouraging deep research alongside engaging with external stakeholders, the way the learning interfaces with external communities and publics emerges as a primary boundary, an outward facing perspective. The demands of *in-group* group formation potentially preclude the inclusion of other *out-group* voices, sessions often in classical pedagogical settings (talks and workshops) bringing in different perspectives

encouraged challenge and perspective-taking, a vital propositional counterpart to situational learning. Dialogue between in-group and out-group perspectives, creating porosity in the internal / external boundary of the studio stood as the most potent learning format, however time constraints and the demands of interpersonal negotiation often prevents deeper intercommunal engagement.

Simple rituals as experiential patterns, beginning with adopting everyday practices, like breakfast or the ubiquitous Swedish Fika were observed as significant aspects of group formation and intergroup knowledge sharing. Shared equipment and organising choices such as calendars or team communication platforms were highly significant, there was high incidence of guiding activity in the data. Prevailing activity often simply attended to trialling different approaches to interpersonal connection, which supported confidence building. Developing the capacity to build empathy for one another was prevalent and clearly evidenced by the lasting bonds and group cohesion witnessed, which often lasting well beyond the boundaries of the space and the learning programme.

This was not without incident, a consequence of emphasis on group development meant incidents of schema clash and contestation were common, shown in the data coding as *#stress /crisis /conflict,* incidents pertaining to this subcode (280) connected with subcodes for *#emotion/empathy (528), #value/values (405), #body/physicality/sensory (244) and #license (78) (which pertained to social influence)* was grouped through axial coding in an overarching thematic cluster #AFFECT *(1565)* which was emerged in the data along with the cluster #ACTIVITY (1535) as the two most frequently labelled codes and largest clusters, potentially indicating its significance in the ethnographic observation, although frequency doesn't necessarily correlate to significance. The learning facilitated by in-house programme staff was predominantly directed towards equipping learners with interpersonal skills and approaches to contend with and master the social negotiation inevitable in this form of learning. Building capacity to perspective-take and respond empathically to situations on personal, professional and network levels, was strongly witnessed. I judge that this emphasis on interpersonal and intergroup relations provides this kind of learning environment a distinct advantage over classical pedagogical settings. The sense grounded in the observational data was that as different forms of boundary emerged in the activities of the learning environment and that these were being actively conscripted as the agent of and venue for learning.

This was reflected in the third most prevalent type of incident recorded in the ethnographic observational data, that of structuring where *#structuring/restructuring* (107), *awareness/perspective / guiding* (160), *#narrative* (195), *#boundary/barrier* (86), *#boundary object* (99), *model/prototype/tools* (241), *#modality of communication* (213), *#brokerage* (75), subcodes grouped together in analysis as a thematic cluster #STRUCTURE. This activity occurred first at perfunctory levels; joining WhatsApp groups, finding local sim cards, exchanging phone numbers, proceeding towards more subtle or

sophisticated interrelating - softening of regional dialects, laughter at difference and similarity and crafting shared humour. Activity focused on structuring ways of looking at situations within the space appear significantly in the observed interaction.

Axial coding was a profoundly useful qualitative research technique to reveal relationships in the data, this involved relating data together in order to reveal codes, categories, and subcategories grounded in the participants' voices and actions in the collected data. Axial coding was a potent means to construct linkages between data, by relating codes (categories and concepts) to each other. In grounded theory this combines inductive and deductive thinking, however given the degree of active participation in the setting, often this took the form of abduction, by sharing and reflecting upon with participants incidences of emerging insight. This practice was fundamentally important to deriving judgement based on observation as sense-making with participants recursively updated the researcher's awareness of meaning in the situation, which had significant impacts of the accuracy of subsequent engagements. Sacrificing raw objectivity in favour of subjective insight into meaning-making in situ leant the data collection an authenticity and a degree of robustness via internal validation strategies. Taking this observation data as the basis for expert interviews with key informants external to the setting but internal to the organisational networks formed a second iteration of sense-checking to provide the possibility to triangulate the emerging grounded theory. The objective was not to isolate causal constructs and falsifiable hypothesis but to create robust situated insight to form the basis of generalisable theory.

The incidents focused on reconciling strong differences between personal mundane practices like time keeping practices, cleanliness and most importantly experiences of work, with those focused on managing the shared space were frequent and seemed to form the foundations for discussions that quickly erupted in dialogues about epistemic differences experienced in familial or cultural settings, in different organisation or different communities and fields, assumptions brought from outside. As such, even without incidents of formal domain specific pedagogy, learning was promoted simply through the need to quickly share and negotiate differences in worldview, this created generative tensions – misapprehension brings emotional stress, but also provokes sense-making activity – causing forms of learning quite distinct from knowledge transfer.

Evidentially, the group intensively *inter-enculturate* one another within a guiding scaffolding of cultural conduct set in place by the organisation's distinctive methodological approach. Subgroups and affinities based out of nationality, professional identity and shared experiences formed rapidly, mutating progressively via group formation and social experiences. Rapidly, shared experiences amongst team members became dominant in signalling communication, guiding ongoing affinity formation, defining lasting relationships.

Anthropologically, affinity building was crucial and intense, generating fabrics of trust operating in lieu of consensus on working practices. This provided a sense of common purpose, there was a conscious awareness of social position and the ethics of particular epistemological positions, attending to privilege attached to the in-group experience. Over time as individuals bonded, the culture became more bounded, the temporal intensities of activity further isolated groups from external interaction, internally referred to as the *Hyper Bubble*. The etic/emic boundary formed as individuals formed their own subculture based on shared experiences, the emergence of a distinct shared identity was strongly evident. Each cohort, referred to as a crew, quickly created cultural coherences for themselves that made them quite distinct as social group, seemingly intuitively, in recognising a degree of rarefied status and shared experience created a shared bond with alumni who had experience with the organisation.

A certain mentality or framing of the world, synonymous with a 'Hyper Way' granted participants licence and a familial affinity with alumni they had yet to meet but had shared an experience, so that they were able to readily connect with an expanded global alumni network. This was evidenced recurrently, the shared field of their experience providing a ready-made foundation and sense of place within globally distributed industry sectors, by virtue of alumni already embedded in either specific cities with clusters of innovation activity, within established industry organisations or by establishing collaborative enterprises and networks of their own.

Modulations of the dynamics of organising groups is addressed in organisational studies, herein the research examines these observations with respect to learning groups and networks. Typically; Van Maanen and Barley (1984) describe emergence of occupational communities as people brought together through shared work experience, these communities can serve as powerful reference points for individual identities (*know-why*) and related social interaction (*know-whom*), in turn influencing future work behaviours like career progression. This aligns with Strauss' social world imaginary which forms the basis of situated learning and the communities of practice view.

5.9 Summary

Hyper Island conscientiously and adeptly provides cultural patterns through organising learning activities and environments, these form heuristic patterns that acted guide attention to interpersonal conduct. Much of this is derived from artful devised and intelligent development of a distinctive learning methodology and value-centred world view, this in part resulted from strong organising concepts and spatial influences in response to the early emergence of networked technologies, the internet and the digital economy set in place by an intriguing group of collaborating founders and subsequently a network of significant collaborators. In a bricolage manner, important schema were tacked onto essentially a good question about the incommensurability between the likely impact of the digital era and responses from education and business. The impact of military strategic research about leaderless teams under stress remains an intriguing factor as does the impact of Swedish social democratic values and the influence of practitioners associated with the human potential movement, group dynamics and the cultures of facilitation. The coalescence of ideas forming such a distinctive organisation, relies in part on serendipitous innovation alongside concious adaptive sensing of environmental circumstance and prevailing change, the organisation's metier is the assumption of rapid change.

An organisation that sustains values that hold conviviality and sensitivity to interpersonal conduct highly, means integrative expertise and integrity arguably was emphasised above specialist expertise, which was consequent of collective activity on industry problems. Through learning situations designed to give opportunity to manage the generative tension resulting from collaborative activity, supported by forms of dialogue and dialogic activity that act as venue for shared reflection, experiences seemed to both inculcate values and certain interpretive schema whilst fomenting these productive tensions and encounters were evident through the period study. This is deemed to be a highly significant and distinctive mode of learning worthy of research scrutiny. Arguably, the degree to which the organisation consciously charted a development path or was enacted as an adaptive response via a distributed network of expert collaborators is subject to discussion. An intriguing insight lies in the degree to which contributors within a complex knowledge generating organisation can conceptualise how the organisation functions and maintains competitive advantage. Similar to explorations of contemporary scientific practices, locating where the action actually takes place is thorny. The use of changing of temporal and environmental parameters to disruptive effect was witnessed, causing individuals to restructure and rally around changing objectives, by introducing unexpected yet carefully managed disruption, caused learners to react adaptively to change. This seemed directed to a tacit priority meant to engender comfort with contingent circumstances, this evoked a useful robustness that assumes change rather than stability, guarding sequences of events,

creating moments of surprise and applying playful secrecy was a profoundly effective strategy, and a source of constructive frustration. Stacey & Nandhakumar, from the investigation of games development processes would perhaps frame this as encouraging *chaordic* organising (2009), recognising that interpretive experts tend to subvert formal organising quite naturalistically, as a means of reinterpreting strong structuring in terms of personal disposition and competence. Although timings of learning experiences were highly structured and regimented, keeping temporal sequencing unintelligible until specific moments effected collaborators who developed coping strategies, the tacit supposition being that this evokes the capability to anticipate and manage change.

Synthesising these factors, an image how combinations of self-mediated and facilitated learning supported by heuristic coaching that emphasises group conduct and interrelation differs from and may confer distinct advantages over settings reliant on classical pedagogy and knowledge transfer. A driving supposition is how these observations might ground development of novel design-led design methods that anticipate improvisation and ineluctable contingency, but also to delineate the strategies required for effective learning and application. In other words, unpacking consequences of acknowledging the advantage of adopting dialogic basis for pedagogy and the epistemology of education following Emery and Markova directives. This forms the basis for a meaningful response to an expanding need for application of robust approaches to wickedness in professional vocational education.

Observation denotes that distinctive forms of learning are occurring here, this synthesis attempts to explain how and why this occurs, but also how to respond. To make sense of this, the research draws together seminal perspectives from the history of social research that effectively integrate spatial perception, mutual intelligibility and perceptual restructure. These are evaluated and repurposed to derive and capture in a framework an explanatory understanding of how this form of expertise formation equips individuals for situated co-exploration of ill-structured problem situations, by encouraging managed encounters with instability.

Reconnecting with the titular premise, this setting is emblematic of progressive fielding of design methods approaches to learning with relevance to specialist vocational education in general. The integrative forms of expertise that result appear apt for leading and organizing in new territories where complex collaboration is the default, not the exception. The findings appears to corroborate with the desirable competences of robustness and resilience useful to navigate the contours of contemporary problems situations encountered amongst teams. The consequential findings offer explanatory understanding of how design-led learning activity is enacted and how this might differ from existing accounts, and in turn suggest alternate accounts of rationality and epistemology needful to organize

future education, whether within formal institutes or as extramural learning within the lived domain of everyday working practices.

Finally, the culminative activity over time of a learning network that (ostensibly) produces suitably equipped professional practitioners and leaders who share common schematic practices is shown to have consequential effect on the organizing practices of related industries. The success of certain approaches that privilege group conduct is seen to have scalar effects that amplify the influence of communities of practice, whilst fostering ongoing potential for interoperability.

5.10 Framework - Explanatory Understanding of Design Learning

5.10.1 *Representing in Ambit*

In crucial ways, visualising metaphorical relationships makes patterns intelligible, so they can be 'borne across' enacting brokerage between interacting parties. Acts that support mutual intelligibility are enacted as representations onto shared spaces – it's suggestive this process results in reciprocal co-structuring of individuals (schema change or *frame-making*) and the learning environment itself (*place-making*). In these active environs, the objective is to convince, persuade, guide and direct attention to features of that environment but also to show or hide apsects held in each participants disposition and assumptive image of the world. The consequence of this continual process of social / environmental inscription is co-structuring; collaborators shape one another's attentional environment and by so doing, both effect and experience adaptations. At the boundary of encounter, learning occurs. Space as venue for this enaction consequently becomes place, that is, inscribed with meaning.

Time-organising and space-organising were strongly present aspects integral to this co-structuring. The relational systems revealed through this process aren't necessarily inherently spatial in nature, they may convey relationships abstracted within activity systems or reflective of internal states. Stories are ways to bring those states, the cultural and historical perspectives, sourced in the past into present experience, but also to project intent forward. This answers a core need fundamental to meaningful collaboration; to engage in the activity of fostering mutual intelligibility alongside self-knowledge.

Narratives are social-technologies that organise attention in time, presencing the temporal dimension of experience, but this require modes of representation that are amenable to being enacted onto space, otherwise they remain objects of perception. Narrative-making is an important general practice for learning. In observation, time was mostly used to organise action, yet, shared storytelling is a powerful second order means of organising and framesetting. Temporal manoeuvres, foundational to storytelling practices involved embedding in form and critically in space – a process of world-building.

Designers represent their abductive understandings through making, but this activity isn't exclusive to artisans, making doesn't only concern design outcomes, it concerns the mundane, processual activity of making sense. There are aspects of this tied seemingly to organising space, as meaning-making occurring in situations results in place, and place is critical to the formation of community. Lave's vision of cognition-in-practice, understands learning as unintentional, the consequence of involvement in authentic activity, context and culture (Lave 1988). However, the sociality involved in social representation is highly intentional and structured, its objective seems to be to curate the causal arrangements in the mutual environment, building out shared authenticity, context and culture. The

pedagogical relationships here are complex, but peer-based. Cognitive apprenticeship *'supports learning in a domain by enabling students to acquire, develop and use cognitive tools'* the resultant expertise can be applied outside and inside the learning environment, this *'advances through collaborative social interaction and the social construction of knowledge'* (Brown et al. 1989), it appears that capacity for empathy and perspective-taking strongly supports this need.

Developing learning theory to interpret observational data that reflects an explanatory understanding of activity in design learning environments, means making sense of how learners navigate and orient themselves with respect to learning environments by rearranging materials, concepts and each other. Clearly, organising behaviour in time and space have distinct but interlinked purposes.

To do this, the concept; *ambit* is useful to grasp how distinct aspects of design learning practices actually occur, whilst being sensitive to contemporary organising practices. Ambit, meaning *'going around'* defined as scope, extent, range or limits of influence in circumstances, the bounding of an entity. Ambit connotes conceptual, material and physical surroundings by defining what is encompassed.[69] Ambit is useful to understand relational activity within a bounded field, addressing aspect and extent of both place and sets of relations. Unpacking this concept provides a useful basis to consider circumstances and meaning in parallel.

5.11 Kevin Lynch applied to learning

5.11.1 *Perceptual Form of Urban Environments*

A profound example from the history of social research explores relationships between perceptual and actual territories. An early proponent of mental maps, adding an interpretive spin to their positivist origins, Lynch inspired environmental psychology as a field. Kevin Lynch's seminal inquiry into perceptual form of environment was foundational to the landmark text *The Image of the City* (1960) in which a method is described that enables gathering of perceptions specific to individuals to surface general *'perceptual images'*. Lynch's pioneering studies are an example of how features of perception can be shared amongst groups.

Lynch conscripted participants into active interpretation of urban environments. By blending representations of their perception, Lynch synthesized sophisticated general representations of how people perceive and conceptualize their environment, evoking relational systems comprising both

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[69] Variously; a space surrounding a house, castle, town, etc.; the precincts, liberties or 'verge'. A sense of confines, bounds, limits of a district but also the extent, sphere, of actions, words or thoughts (OED 2018).

individual perception with environmental features in awareness. These elements *'paths, edges, landmarks, nodes, and regions – are the building blocks in the process of making firm, differentiated structures at the urban scale'* (Lynch 1960).

Lynch succinctly applied concepts which demonstrates lucid ingenuity in representing complex phenomena significant to planning and architecture, simply through consideration of perceptual form of urban environments. Through user studies of Boston, Lynch derived *'perceptual images'* as schemata; representations of how inhabitants internalize environments. Lynch's methodological innovation was comparative evaluation of multiple perspectives of territories to derive shared patterns and divergences. Psychological study of relationship to urban space allowed Lynch to derive relational systems of conceptual primitives, urban patterning distilled into simple forms.

Figure 22 - Adapted from Lynch - *paths, edges, districts, nodes and landmarks* **(Lynch 1960)**

Diagrammatic representation abstracts patterns derived from environmental perception of archetypal features; *paths, edges, districts, nodes and landmarks*. These typologies distil built environments to functional features, the brilliance was apprehending how these primitives sit across the boundaries between form and awareness. The forms are recognizably features of built space, Lynch's second-order interpretation accounts for place-learning; *wayfinding*.

Looping back to Lewin's topological psychology, Lynch's taxonomies create a relational schema between perceptual features and physical environments, revealing general shared perceptual features is the goal. In so doing, Lynch makes an analogy across from features of places with features of perception, whilst building equivalence with the language of networks and systems. Harking Moreno, Lynch applied the logic of encounter not only between people but people and place; urban environments materialize the collective action of social groups.

The prospect here is that concepts stemming from Lynch might be adapted and reassembled into explanatory understanding of activity apparent the case studies which might indicate the occurrence of phenomena that differ from prevailing perspectives. Inquiry into this assumptive grounding reveals something about the episteme that guides cooperative activity, underpins learning whilst also

providing steps towards an explanatory framework for activity in the expanding design field. An assumption is that if relations within environments are foundational by virtue of being situated and enactive, that expansion of these relational properties might be integral to the structuring and interplay between the formation of organizations and professional formations too, drawing a straight line through Lewin, Lynch and Schön.

Wayfinding is first how people locate themselves within space, whether natural, perceptual or artificial sites, but in its second order also how we perceive encounters with the form, material infrastructure and socio-technical apparatus that emerges from collective sociality. In expanded form, Wayfinding is active orientation not just of the physical but orientation with respect to social space. Lynch abstracts perceptual form to derive insight about how that orientation occurs. Distilling these insights points towards how people learn to orient themselves, how people become inured to space, but also by extension to their social milieu.

As we have seen, if ascribing meanings to space results in place-making and if the perception of place is prior to its actual physical relations, are their correspondences between how people learn to participate in community of practice settings and how they come to be familiar with their surroundings. Especially where this activity occurs in environments subject to rapid change and contingency, such as at boundaries between communities, expertise formation is synonymous with the structuring of social space, both in first and second order form. This synthesizes understanding derived from schematic and sociocultural theories mapping this out onto actual experience.

Wayfinding isn't just locative, it involves a process of becoming inured to location, through the generation of perceptual images, a variant of mental map that has both physical and conceptual features. Wayfinding relies on *waylearning*.

Critically, this means bringing Lynch's work of perceptual schema to bear on factors relevant to observation of design-led learning situations. This means producing synthesis that integrates Lynch's spatial perceptual attitude toward *habitat* with Bourdieu's socially relational account *habitus*. This is commensurate with Tuan's dual appreciation of place as having relational connotations for both position in space and social structure. The form of learning occurring in the observed setting seemed to be akin to recognizing features in a landscape although this landscape wasn't a persistent structure co-present for all.

The territory learners were becoming inured to is notionally the schematic structures of their collaborators, the dynamics of an organized group and those of external influences (facilitators expert or user perspectives). Learners were seen to very rapidly form a composite social world, where exposure to an array of assumptive schemata from influences internal and external to the organization

via encounters with facilitators, industry perspectives and each other. This places distortive pressures on internal worldview, whilst intervening with the structuring of perceived identity, status and membership of social worlds. In the reciprocal adaptive responses that result, this entails decision-making activity that occurs with respect to partial and incomplete knowledge, occurring in rapidly changing environments working with persons of different stripe on ill-structured problems. The consequence of structured uncertainty is robustness. The bare facts of getting to know a setting are enactive, by systematically becoming inured to then gradually enacting fluent movement within it both cognate to the experience of learning, but also experience expands knowing, reductively movement equates to learning. This is intuitive, but when it concerns some of the subtler configurations of space and meaning making in terms of enactment of schema it takes on a substantively rehabilitated, and generative character to rethink expertise formation, bringing the somewhat aloof theoretical propositions of experiential or situated learning theory into sharp focus.

With relevance to both accounts of sensemaking, the loss of sense evokes attempts to make sense. For Weick this occurs as retrospective formation of narrative and for Snowden's Cynefin framework, placemaking is integral to sense-making, Cynefin after all translates as *habitat*. Lynch concerned his research with characterizing legibility as a composite of perceptual and physical features, in sociological terms legibility connotes intelligibility – the prime concern for Weber – mutual intelligibility not just of one another but social milieu and environ – the blend which this research has termed *ambit* – the relational characteristics of which are the reframed epistemological basis of this fundamental process of learning.

5.11.2 *From knowing it to getting it*

Learners, especially non-designers, progressively equipped with core aspects of design expertise, learn to recruit their environment to enact learning, they also learn by the process of sensitizing to configurations in the architecture of situations. Group learning encounters involve orientation with 'materials of the situation' in order to enact orientation within their social milieu. Paraphrasing Nandhakumar, collaborative envisioning practices distinctive to games development restructure the environment, creating a joint field between material and cultural features, often by employing some form of boundary object. These practices; *surfacing, capturing* and *formalizing* help to translate resources from broad fields of cultural and software production into the development process. These practices enable collaborators to *'get it'* – in Nandhakumar's terms as part of shared envisioning, in their research, a shared interpretation of the experiential dimensions of a game's design, a joint field that assembles the field of cultural production with the arena of specialist creative production to derive a joint field, in their case games development (2014).

Analogous activity occurred within the case study, cooperative learning involved high incidence of representing, directing and structuring attention, this involves active recruiting of the environment, projecting into temporal and spatial dimensions to enable sophisticated organizing which is both diectic and diegetic. Comparable to Nandhakumar, collaborators engage in narrative-making, frame-setting and world-building activity for one another's benefit, as an aid to expanding mutual intelligibility. This is differentiated in the observed setting, rather than actions oriented to shared design outcomes, what participants in this study are 'getting' is feel for the dynamics of the community of practice they're joining, as they become inured their expanding awareness recursively enacts a scalar restructure their self, group, community and field. This is a reciprocal adaption, and an alternate account of expertise formation which differs from learning invariant features of an environment aligning with perceptual structures. Collaborators use invariant features to anchor themselves whilst navigating changing circumstances, whilst becoming recursive agent in those changes. Arguably, collective action, involves acts of shared cognition, irreducible to individuals, where person + environment formations become significant as the functional unit of analysis, individuals are active in restructuring one another and the field of play, the consequent outcome isn't only designed outcomes but also a unique form of locative expertise.

In this case, *feel-for-place* connects intrinsically with *feel-for-the-game*. As Bourdieu's theory of practice indicates, this practical sense (*sens pratique*) is fundamentally important to design expertise in digital transformation. Synthesis of observation is indicative of learning phenomena that differ from traditional pedagogical relationships founded on learning as transfer and acquisition. What distinguishes group-oriented learning situations applying design cognition AND group dynamics are their sensitivity to relational intelligence, learnings equate to rapidly orienting with respect to changing material and social situations in parallel. Seen in cognate design methods research, this glimpses what is meant by navigating the features of problems situations.

5.12 Reframing Lynch - Perceptual Framework as Learning Theory

Lynch draws attention to perceptual features common to experiencing built habitat, abstracting these to explain experiential activity of place learning and orienting to territory. Lynch's perceptual schematic map refigured potentially represents a general learning theory with relevance to observation, capturing how people learn about place. Reframed here, my contention this has strong generalizability to situations where learners encounter novel environmental arrangements and then implicate those environments to support emergent understanding. This expands Bruner's learning scaffold concept to include features of environments.

Lynch's elegant distillation of extensive research studies elucidates how through encounter people become inured to environment; representing *how we learn about space to enact place.* This deceptively simple diagram provides strong conceptual framings that strongly capture how learning occurs in design environments, where alignments of physical and mental features are intrinsically important to support learning. Lynch mapped features of perceptual images, blending place specifics into general conceptual maps.

Significantly, the model reconciles external resources and structures with internal experience, blending causal environmental structure with causal structures of cognition in moments of perceptual experience. This representation manifests boundary space between environmental features and perceptual patterns emerging through experience. Here, Lynch distinguishes participant's perceptual images, representing them according to structural qualities; *'the manner in which their parts were arranged and interrelated. There were four stages along a continuum of increasing structural precision'* (p.88).

5.12.1 *Wayfinding as Learning*

Of absolute significance to this thesis, the simplicity of Lynch's meta-schema belies its depth, coopting the pivotal insight of Lynch's study, is significant to interpret observation. Interestingly, Lynch's model is generalizable to different spatial forms and is scale independent, as relevant to hamlets as urban agglomerations. Proposing such a relational systems affords general parity between regimented, planned urban environments (like Boston or a university campus) and informal, vernacular environments (like Argentinian Barrio or Jakartan Kota) In impermanent sites like festivals or even moments of civil unrest and disorientation, where the visual environment of the space might be seen to provide ideological anchoring and group signaling cues. In fast moving, contingent situations where rapid flux is inevitable (think crisis or conflict situations or incidents of rapid socio-technological change) refurbishing our understanding of how human reorient themselves with respect to ambit. Accounts of sense-making in reaction to loss of sense are thought of as retrospective and acts of metacognition such as reflection are backward looking, the challenge is to define their enactive present or speculative future counterparts – those elements of thought which enable reactive response in practice as aid-to-decision-making, in this regard Boyd's treatise on real-time conflictual decision-making loop the in-situ *observe–orient–decide–act* (OODA) comes into play. In this regard, it is perhaps Boyd's not Bruner's conceptual spiral that may form a more apt foundation to build the epistemological stance upon which future education relies. Lynch reveals how network-like patterns interface habitat with perception, deriving perceptual categories with broad applicability to thinking about place, also applicable to networks.[70] These constructs are useful to conceptualize how psychological states relate to actual environments, creating examples of a joint fielding. The task then is to synthesize a mode of new thought that makes imageable this processes of learning adaption to ambit, one agile and light enough to take into these highly dynamic fields. The suspicion is this lies in extant research which we now attempt to reassemble, an sensibility commensurate with fast and frugal ecological rationality.

Furthermore, these relational patterns share common underpinning with how complex networks are conceptualized to map out relational territories. Lynch perceived analogies between physical and perceptual features, to derive patterns bearing resemblance across between internal and external features. The simple sophistication in Lynch's diagrams underlines dual analogous relationships by

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[70] Lynch's schema shares organizing concepts applied by Moreno's sociometry, indirectly relating it to topological psychology. The language of network relations used to conceptualize digital environments, the descendent of this field are applied to shape algorithms and data science fundamental to contemporary social networks. Together these approaches represent powerfully general understanding of part perceptual, part material systems and how their design is enacted, seen as reliant on continual negotiation and management of group relations and mutual perception.

developing representational cognates as meaningful to perception as they are to actual structural patterning. Lynch's diagrams are synthetic in that they span subject / object boundaries, allowing inquiry considering perception and space as mutually constitutive, rendering the boundary between environmental and perceptual structures as 'legible' in their capacity to become 'imageable'.
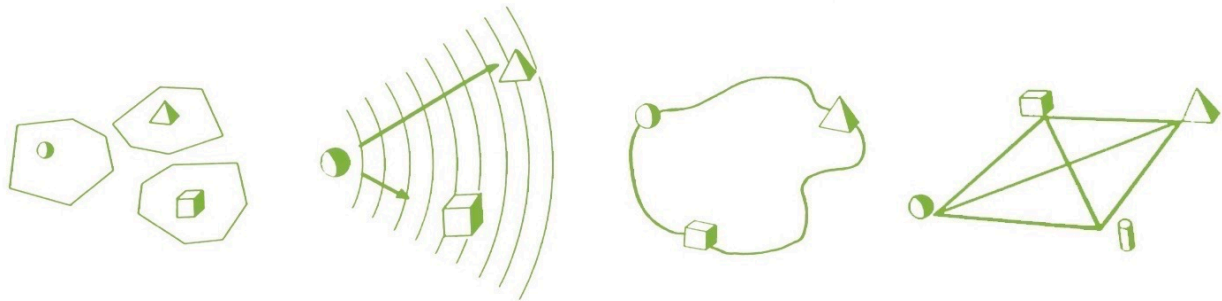
Figure 23 – How place learning takes place - The process of Wayfinding adapted from Lynch (Lynch 1960)

This model captures progressive maneuvers from *disjointed* to *positional* to *relational* and finally *fluid* appreciation of place, each stage reflecting steps of processual learning about territory. It describes cognitive process of familiarizing and orienting within new territories; space or *wayfinding*. Lynch regarded Wayfinding as poorly understood but fundamental phenomena, crucial to viability, efficiency and survival of mobile life, defined as *'a consistent use and organization of definite sensory cues from the external environment'* (Lynch 1960). Consequently, wayfinding is recast as a pivotal learning phenomena. Lynch's midcentury formulation have need of updating with respect to developments in other fields, especially if concerning co-structuring of rapidly changing variant and invariant features of problem situations, cities exhibit an obduracy over time whereas the in the real time setting of a studio, a highly dynamic multi-party learning environment the cadence will be entirely different.

Implicating imageability as foundational to learning, defined by Lynch as *'that quality in a physical object which gives it a high probability of evoking a strong image in any observer. Imageability constitutes the shape color or arrangement which facilitates the making of vividly identified, powerfully structured highly useful mental images'*. It's relevance to design learning activity is fundamental, design rationality is viewed as an orienting form of inquiry. Imageability of territorial features is seen to be germane to mutual intelligibility of assumptive concepts and also relationships in a territory of inquiry, a field.

This is where expansions of Lynch become apparent; coopting social research into perceptual schema of urban habitats, substituting these for bounded but dynamic psycho-social-material arrangements of design learning environments. Whether designing products, services, experiences or blends of these, orientation within a problem situation occurs in parallel to orientation within the design environment itself whilst also becoming inured to the social milieu collaborative design occurs in relation to,

although occurring at different rates, systemically, these are nested processes. In context of design learning environments, Lynch's concept of representing perceptual images leads to evaluation of the qualities of environments that make them amenable to imageability, the way this supports purposeful activity, whether simple navigation or schematic negotiation is of absolute relevance. Imageability of environments is akin to learnability, the degree to which tacit and explicit knowledge structures become knowable and crucially mutually intelligible, so they can be acted on by groups, in that case habitants. This foregrounds relations between circumstantial features and developing perceptions, but also the sense of habitat or inhabiting, the root of concepts connoting dwelling are the same as those that indicate possession to have, hold or possess, evident too in the word habit. The Latin *habitus* meaning *'condition, appearance, dress'* originally is the past participle of *habere* which reveals pertinent conceptual relations *'to have, hold, possess; wear; find oneself, be situated; consider, think, reason, have in mind; manage, keep'* there are valid reasons for this consanguinity. Readily being able to perspective-take and reconcile perspectives that may be value incommensurable is an essential aspect of this, literally to hold something of another worldview confers advantage, even power.

This means developing continuously updated parity between inscriptive and conceptual features. To develop enactive approaches to design learning theory, questioning whether these respond to the demands of coordinating task environments with a high degree of situativity wherein multiple perspectives and complex relational systems intersect. Lynch's schema suggests rich landscape of modes of representing internal and external detail, in parallel, as situational learning occurs, learning is reframed as orientation. This activity reconstructs setting, and as this process loops again, the environment provides the scaffold for learning about variances in psychological disposition.

5.12.2 *Perceptual Schema & Soft Systems*

Lynch's spatial syntax applied features of relational systems, coupled to setting yet interdependent with perception. In soft systems theory, the world is perceived as not inherently systemic, perception is systemic, which conditions perception of systems. In this view, there are reciprocal relationships between how we perceive and what we design. Questioning whether these perceptual structures exist a priori to what we build, as inherent features of biological apparatus is tantalizing, certainly ecological rationality assumes an evolutionary fit between perceiving and perceived environment, this becomes problematic in synthetic environments that analogize imperfectly to natural perceptual settings. At least, how we perceive and how we design are mutually constitutive. Lynch's ideal model represents how perceptual theories aid learning as functionally becoming inured to abstract social and technical arrangements that lie beyond the bounds of normal environmental perception.

Figure 24 - Soft System Methodology's perceptual shift in systemicity.

This systemic structuring of perception and environment in tandem makes Lynch's basic relational language suitable as the basis of learning models. By hinging on environmental features which are founded on their ability to sustain clear and generalizable features of material situations so they can support abstractions about those features of experience. Adapting this model to account for observed activity points towards novel theories of learning, decision-action loop type design models blend abstract and physical processes, assuming tacking back and forth between cognitive and physical environment. Parallels between perceptual imageability and soft systems theory are evident, both seek relational understanding between the perception of systems and their design, to support purposeful decision-making and interventions. Whether used to evaluate to qualities of urban form an in turn to better support the fields of practice in architecture and planning or to evaluate the features of complex problem situations such as services or infrastructures to support the fields of practice in design, there are systemic parallels.

Soft systems theorist Ackoff's professional training as an architect provided sensitivity to design which meant he obtained a profound feel for how systems, problems and design are elegantly connected. This perspective holds that there are multiple approaches to encountering problems, that problem solving is as likely to generate new problems. In Ackoff's treatise on Idealised Design, isolated problem-solving is viewed as problematic, to create lasting change they must be dissolved, stating that problems can only be dissolved through design, this means *redesigning the system that has it, so that the problem no longer exists'* (Ackoff et al 2006).

The contention; if perceptual systems are formative of perception of systems themselves, changing those perceptual systems alters the systems we can perceive. Furthermore, perceiving activity alters perception, enacting commensurate effect on the problem and solution space. Dorst views this as co-evolution of problem-situations (Dorst 2001).

It's intriguing to suppose whether this orientation occurs prior to Engeström's master tool – *language*. Ability to orient with respect to environment, although immensely expedited and articulated by language, is not reliant upon it. Notionally, early evolved co-operative behaviors relied on directing the flow of attention whilst displaying awareness of the object of attention. Ecological psychology assumes fit between perception and environment as prime evolutionary driver. Instead of interpretation first, orienting oneself is enacted prior to interpretation, just as negotiating is enacted performatively through purposeful movement to guide attention. social representations draw upon different interpretive schema and symbolic interactions, fluency is developed experientially, then interpreted conceptually then linguistically.

A fluent orientor isn't only reading a space and parsing its meaning, suggestively, something more fundamental is occurring. It's important to stress, orienting isn't sematic, the raw embodied performance of place-learning occurs whether or not space has meaning, the imperative is to orient quickly for the utility it provides. Space affords venue for learning, the perceptual faculties enabling movement don't rely on knowing the languages present in that space. Language affords the meaning-making aspects of design, by codifying space into material structure, but space affords language acts the venue to be extended and arranged, meaning is contextual and referential, only then is restructure possible. Configuration of memetics relies on a substrate, the space onto which it is configured, again this view of learning conceptualizes enactive co-structuring not of knowledge, but schematic perception alongside the architecture of given situations.

Conversely, language arises from orientation itself, fundamental aspects of language lie in its deixis and telicity, which affords speakers the capacity to organize concepts in time and space. Parsing language occurs via orientation with respect to territory, whether physical or conceptual. This means language is composed referentially to physical space, then fielding subsets of abstract symbolic spaces, for example mathematical notation, language is ultimately a relational system of perception, a view that aligns with Quine. Orienting within respect to symbolic infrastructure is achieved comparably regardless of medium, however information environments mimic environmental affordance through symbolism, stretching the natural perceptual fit assumed by ecological psychology and its respective rationality. Aspects of evolved perceptual systems refined by culture are inherently spatial, basic concepts; *anchoring, home, familiarity* (and their opposites) are spatial concepts reflected in language, not created by it. Acknowledging this opens cognition to the enactive, locative features of interrelating.

These domains beyond language grant access to ancestral cognitive domains, potentially prior to formal logic or language, implicit to biological systems.[71] This implies different forms of rationality are applicable and fundamentally, sensitive to context. Aspects of purposeful pragmatic decision-action loops may even appear irrational, this highlights how rationality as applied in the field is far from simple, instead forms a varied territory. As Djulbegovic (2017) argues, rationality has many faces; commensurately there are ways in which the rationality native to humans performs poorly, but the extensibility of the more fluid ecological rationality means humans are able to design more apt,

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[71] The fundamental adaptive responses underpinning purposeful functioning of organisms embedded in their lifeworld, organisms as discriminators and differentiators able to move towards valuable resources and intensify, even cultivate them (Uexkull 1982).

highly structured logical systems as outrigger to their native perceptual and conceptual abilities, however heavily this relies of scientific principles of falsifiability, the projection of rationalities are subject to design, to reestablish ecological fit. Furthermore, as March argues most models of rationality assume calculation, however in most situations calculated rationality, which assumes intelligent individuals calculate the consequences of actions for objectives is not pragmatic, action is presumed to be connected consciously and meaningfully to personal goals and future outcomes, to be controlled by intention. However, seminal developments in rational choice theory are interested in different kinds of intelligence, systemic rather than calculated, this supposes knowledge in the form of behavioral precepts evolves within a system and accumulates over time across people and organizations without current consciousness of its history. Consequently, sensible action is taken without full comprehension, this characterizes models of adaptive, selective or posterior rationality (March 1978).

Language about space is sophisticated, as Buchanan notes, linguistic framings preoccupy design theory. Logics of reading and literacy are often back-applied to space. In the intellectual canon of spatial theory; Victor Hugo, Walter Benjamin and Debord, parse space as variants of legible text, analogizing walking practices to reading and space being subject to a form of literacy. The epistemic potentials change when we assume the reverse, that our master tooling stems from inalienably embodied factors founded on orientation means proposing how learning might operate in comparable ways, enabled by language, but stemming from the basic spatial orienting capacity at which humans are exceptionally adept. Certainly, these capacities are responsive to training, in this reframing spatial and social literacy recasts the skill of 'reading the room'. Leadership of heterogenous teams in complex organizational settings arguably hinges on social, relational intelligence.

Orienting with respect to a cultural territory with its own codified features, is enabled by learning general symbolic patterns as a syntax, grammar and vocabulary of collaboration. Threats to mutual intelligibility are approached through schematic negotiation which rely on proximal experience. When meaning-making fails, this evokes a fundamental imperative to make sense which can result in hermeneutic (or interpretive) expertise, but approaching this relational complexity requires specific form of coaching, with general relevance in group-oriented education. Avoiding back-metaphor, this points towards fundamental aspects of learning as orienting, rather than literacy. Situated learning theory acknowledges this – learning begins with peripheral participation, raw proximity leads interaction that enable expertise formation within communities of practice, which are sophisticated distributed territories, with their own spaces, grammar and syntax. The journey from obscure to intelligible is analogous to the transformation from peripheral to central participation, but contrary to situated learning which assumes learning is unintentional, this form of learning is comparable to

becoming inured to place, consequent of mundane naturalistic interaction, but also subject to expertise formation.

Suggestively, this characterizes the fundamental role of boundaries in design learning environments, interfaces present in these take the form of tangible encounters provoking perspective-taking and active restructure. The objective to problematize assumptions in practice involves synthetic thinking, collaborative design activity implies continual generation of conceptual blends of material, intellectual and territorial concepts. As such, this points to the value of rehabilitating field concepts from Sociology and Social Psychology for the explanatory value they offer to design methods, a means to circumvent abstracted methodological and linguistic models, by suggesting assumptive schema more fundamentally grounded in knowing-in-action and experience. Expertise formation results from learning about environments through participation, design learning leads to capability to actively intervene with professional structures and systemically redesign them. This involves expansive maneuvers that widen the concern and scope of design activity. This was strongly evident in the case studies; insight into how circumstantial environmental factors and active conscription of a share cognitive environment influence the decision-making, the consequence of which is the formation of expertise, of practices but also the development organizations and ultimately of a singular learning culture.

As the consequence of action in designing learning cultures. Institutes, by developing distinctive methodological approaches that focus on interrelation, equip the individuals they generate to become increasingly embedded within other communities of practice, but also to enact brokerage between these communities. Creating blends of social worlds and enabling hybrid collaborations, the consequence of this over time reshapes field structure, this may be experience partially at a personal level, as agents are often simply fulfilling personal goals and objectives, however the culminative outcome may be systemically rational. Agents are coupled together by systems of shared values and practices, if those values and practices prove successful with respect to their environment, they'll propagate, recursively enacting transformative change to organizing practices. Anecdotal experience of alumni networks, reports from industry informants and narratives elicited from interviewees attests to the impact relatively small independent organizations can have. Education that equips people to rapidly orient to shifting demands, which means they can act as sensitized perceiving agents that are able to generate situated response within complex problem situations, is seen as highly desirable within the creative industries, but increasingly within wider interpretive professions, management and team leadership, this reflect expansions of the design field. Learners often go on to become central to organizational entities in their field, as agents able to enact single and double loop organizational learning. Individuals carrying distinctive capability to enact schematic negotiation, to reflect on

framings and generate new ones are able to enact systemic change in the structure of fields. This is commensurate with existing models of design expertise and attends to expansion of the design field. Although this is an explanatory account of observation, it requires further validation, this account is a perspective on how situated learning interactions have culminative effects, but points to the titular activity of *design fielding.*

Learning cultures through participation, act as sensing and perceiving systems, learning institutes with porous boundaries (via flows of people and brokerage activity across interfaces with other organizing systems) are able to act as appreciative systems (P. Checkland 2000), (Hudson 2019). Vickers apprehended that a grasp of systems requires the participation of not only the observer, but also that of the subject (Vickers 2012). Institutions act as environments able to influence perceptions, where their system boundaries are perceived to be open they will through consequent interaction with other systems reshape entities in the field in parallel to reshaping their own field of operation.

The centrality of feedback to this culture, both at the interpersonal and systemic level, has enabled it to enact a form of open methodological innovation. By curating interfaces with industrial and academic participation, creates an agile learning culture, through executive operations which embed learning environments within other candidate organizations it further enacts open innovation (Chesbrough 2003), although not necessarily of design outcomes, products and services but in the generation of social capital, which Bourdieu defines as *'aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition'* (Bourdieu 1983). This is viewed as conferring instrumental advantage, possessors engage in deliberate construction of sociality for purposes of cultivating this resource (Portes 1998). Notably, Bourdieu's critique is sceptic of altruistic intent, this is as likely to be exploited to generate systematic inequality than generate emancipation, hence values are pivotal. However, this goes beyond creating porosity of organizational boundaries, but actively deploying brokerage, creating learning environments outside of the institution's walls, inside other organizations and communities of practice.

Critical interpretation of 20+ years of activity in a singular learning network, stemming from the founder's original perception of incommensurability in design learning methods to deal with impending problem situations brought about by digital and networked technologies. This anticipation of future states along with incidental alignments of political, economic and geographical factors led to circumstantial yet fortuitous form of organizational innovation that has managed to sustain competitive advantage through openness and resistance to formalization. As this network scaled, expanding through successive sites, influences of collaborating parties, cultural and methodological developments have acted to restructure traditional learning relationships and subvert institutional

arrangements whilst being subject to orthodox frameworks. In synthesis, this research's suggests contributions; expanding educational paradigms to reflect different epistemologies and rationalities to structure the priorities of future education.

Specifically, by opening to influences from proximal fields; stemming from military leadership's attention to group dynamics to later include the influence of early facilitation culture in T-Group-esque sensitivity training whilst also anticipating changes in organizing practices necessitated by networked technologies, the organization has enacted reshaping influences on its operating field. Through this, the learning organization, operating at various sites and via multiple fronts, has manifested a methodological advantage which this research attempts to critically evaluate.

5.13 **Lynch on Learning**

Crucially, although Lynch doesn't allude to learning theory directly, his model belies an easily interpretable general learning process, reliant on interplay between perceptual environmental schema and the environment itself. In his model, place learning emerges from spatial and temporal experience, the physical and causal texture of the environment are interfaces into a learning continuum that influences how learning about place proceeds. The frame-structuring process of orienting begins with grains of awareness; progressing from attention to basic, prominent features, developing integral granularity and spurring connections becoming more coherent before fixing in place flexible models of environment that can be navigated fluently, this state equates to perceptual expertise in a given field. In this way, physical territory is analogous to the intellectual territory of a field.

In place learning, when wayfinding reaches an advanced state, creative approaches to navigation become possible, the resultant flexibility of perceptual image allows the habitant-learner to experiment creatively orienting with respect to their surroundings, finding novel routes and fluently exploring. In knowable, relatively stable environments, this fixity becomes an anchoring platform that allows for creative interpretation. As fluid perceptual images begin to align with environment, way-finding consequently becomes more exploratory and creative.

An environment's amenability to imageability combined with heterogeneity in features and resources makes its spaces amenable for creative exploration. Some territories are more learnable than others, some more sparsely featured or richly patterned to the point of being disorienting. The degree that spaces are amenable to reading, referred to as their *legibility,* defined as the degree to which its parts can be recognized and organized into coherent patterns, relates to their imageability. Lynch borrows from literacy of printed forms; *if it is legible, can be visually grasped as a related pattern of recognizable symbols.* In a legible city the parts and wholes would clearly relate through scale and amenable to *easily identifiable and are easily grouped into an over-all pattern;* they thus *afford* movement and knowability in parallel.

In terms of professional training, planners and architects must subsume spatial and social insight through learning models of their user's ability apprehend space to then design them effectively. Developing effective professional learning involves consideration of when to preclude or override their own basal acuity, cultivating sensitivity to materials, hidden service infrastructure or mass flows. Training necessarily expands this acuity, professional capacity-building concerns cultivating acumen to rapidly make good judgments. Professional learning inevitably creates contextual responses tuned to other structural or aesthetic considerations than those necessary to lay-users. A classic distinction has

been attention to configurations of consumption rather than attention to production arrangements. Intuitively, certain framings may become more dominant, possibly overriding the sensitivities originally possessed by lay-learners, occluded by their professional training and interlacing boundaries with below-the-line concerns. An interesting question of professional training concerns how experts retain, cultivate or even capture sensitivity to how others apprehend environments, user researchers as brokers gather insights into the mismatches between formal planning and situated action (Suchman 1987). Such adaptive reconciliation is increasingly seen as source of innovative learnings (Leonard-Barton 1998).

Lynch does discuss learning stating this process *'begins with hypothetical forms that explain the new stimuli conceptually, while the illusion of the old forms persists'* … *'long after its inadequacy is conceptually realised'* (p.11). This highlights that schematic exchange is difficult, although through repeated experience, entire patterns of perception are exchanged, learners have achieved an image which will operate successfully in the new situation, his model applies to learning how to design environments as well as how to navigate them, these capacities seemingly overlap. It does raise the issue of durability of hypothetical forms, suitable for long duration environments less so for situations in high flux. There's tension evident between propositional learning (the classic architype for academic institutes) and situational learning (which is associated with professional, vocational or practice-based settings) although both Frayling and Buchanan express qualms with this distinction, declaring; all learning is fundamentally a practice.

What remains to be explored here is the applicability of these insights to learning in design environments, where territorial features might be technical and interpersonal in the sense of material or social coordination as well as environmental. In classic learning relationships, teacher inducts learner through imparting propositional knowledge, in contemporary learning theories, learners are often reconceptualized as shifting their perceptual schema towards alignment with more expert individuals, to their cohort or even the professional environment they are learning to be a part, through being situated and via legitimate peripheral participation (Lave & Wenger 1991). In his discussion of building a field in computer games development, Squire alludes to learning as alignment of schematic grids by association between learners and practicing professionals. Yet, the dispositions learners orient towards may not be intelligible to learners as they participate (Squire 2007).

Conversely, in consultancy-led organizational change processes, the consultant aims to facilitate shifts in conceptual framing through problem-setting, by altering framing, meanings change, which then enables processes of cultural and environmental restructuring to make change possible. Often this process fails to 'take' with schematic facing difficulty in propagating, to replace durable patterns, likely this is because how organizations are purported to work, their structures represented and how workers

actually work are inevitably different. Humans are intuitively improvisational, hermeneutic being and are ecologically rational rather than technically rational. Change consultancy, in this view creates conditions for change in meanings through exploration of assumptions and framing that are the basis for lived decision-making, which sensitizing process is more likely lead to change in relation to the internal operating field and eventually, if sustained, change to the external field of operation. This is akin the a process referred to by Dorst as Frame Innovation (Dorst 2015b).

Lynch's diagram captures uniqueness, which I propose is fundamental to understanding how learning processes take place in collaborative learning or working environments, rather that learn about the spatial landmarks, learners orient themselves within the territories of communities of practice, to other environmental cues which may be cultural, social or relate to how a domain's field is organized. Field territories aren't fully perceptible, as they aren't co-present, but their associated environments express their features and are formative agents for their participants. Indicatively, learners are not dealing with persistent environments with stable, lasting physical features they are encountering a rapidly shifting territories of practices, meanings and fluid identities. The larger questions of situativity are; *Is it possible to begin to analogize from one situation to another? Is it possible to derive propositional knowledge about situativity?*

To contend with this Quine contended that distinctions between physical and psychological 'objects' are problematic. First, that distinguishing primacy is tricky yet *'the myth of physical objects is epistemologically superior to most in that it has proved more efficacious than other myths as a device for working a manageable structure into the flux of experience'*. In other words, persistent structures such as physical features or affordances in the environment provide anchoring stability more likely to be shared than internal schema. Second, that explanations are ultimately pragmatic, as their function in science is to predict future states in light of past ones, so the rationale for choosing explanations is the degree they *'expedite our dealings with sense experience'*. As such in scientific methods, physical phenomena and conditions are stabilized to aid generalizability and replicability. Quine's holism appreciates that rational systems support their own internal propositions, in this view every change to the system, if rational, is pragmatic. In design situations, this proposition is somewhat reversed, decisions that are pragmatic, in that they understand knowing as inseparable from agency, are in fact rational, ecologically at least.

The value of synthetic thinking that is prioritized in design-led education, especially outside of orthodox design practices has need to explain its value, a matter of articulation and integration - *'The need for design to articulate what it is, and how it can contribute, is more critical than ever. Without a more rigorous definition of the discipline, it will be that much harder to involve design in the bigger picture which includes research, collaboration, and learning about the world'* (Neiderhelman 2001).

However, in the sociality integral to design under scrutiny here, as the object of design activity undergoes changes, so does the internal dispositions of collaborators towards it; the consequence of this synthetic action is scalar modification to the shared design object, to the disposition of collaborators and to the environment, which is the sum of (*the design + those who interact with it*). Hence, the question remains, where are the sources of the requisite stability?

The movement from isolated awareness of features, connecting paths then negotiation of flexible routes ending in reconfigurable mastery of an environment represents not only patterns of place learning but a learning model. As Seely Brown explores dynamic coordination, we are discussing learning as a radical form of dynamic orientation. The model illustrates how we learn to deal with environments, how we situate our understanding, the task here is to adapt perceptual schemas from the urban field to an intellectual field. Such learning ability must simultaneously integrate specific features with general perceptual patterning. People can learn to improve their place learning ability, consequently they professionalize this competency, they can also learn to better sense the features of an intellectual field. The motivation here is to understand the rapid variegation of environments and communities associated with networked era and the digital economy. As Strauss indicates, social worlds and hence communities of practice although multifarious, do have common discernible patterns.

5.14 Summary of Observations

5.14.1 *Environmental Scaffolding*

Synthesizing observation, an expansion of Bruner's concept of scaffolding in learning situations is warranted and relevant to account for group-oriented learning activity, especially in design situations. Although rather than only assume tacking across inside / outside boundary, learning from Boyd's treatise, an appropriate learning spiral exists inside of situations themselves and importantly must be sustained amongst co-operators. In collaborative activity, interrelation is supported by scaffolding not solely by cognitive apprenticeship with an expert or teacher figurehead, although this remains significant. In the observed setting, facilitation and coaching strategies played an important role in sequencing experiences and curating learning environments, importantly this restructures traditional learning relationships, acknowledging relationships between self-led (*heutagogy*), extramural *(life-long learning)* and group-oriented experience of learning. Although deriving new thinking does not invalidate classical approaches but extend them revealing new territories and potential for interrelation.

In context, facilitators play a pivotal role in shaping the learning environment and managing external and internal perspectives, so that conditions are amenable and authentic, and that learning is imageable and can be actively grasped in self-led or group settings. Assiduous scheduling organizing both sequences of time and spatial experiences was recurrently witnessed, this acted to provide structure enough to create venue for exploration of the *self-amongst-others* and engagement with schematic negotiation amongst teams comprised of highly heterogenous assumptive schema, through encounters with ill-structured problem situations donated by external stakeholders and expert coaching, which represented important interfaces with academic and industry settings lending crucial authenticity to the learning environment.

Instead, an account of how learning arises co-structurally through negotiation and making activity within the shared task field, activity which was often seen to actively implicate the material arrangements in studio setting itself. This was supported by broad range of cognitive tools, frameworks and highly distributed resources. Most importantly, a strong methodological approach focusing on aspects of group conduct equipped learners to engage with tensions, stress and conflict necessary to building the requisite social intelligence to manage sociality beset by contingency. An active engagement with sets of living values and ethics was an important aspect of this as it attends to the significance of affective concerns in learning, rather than eschewing this as pastoral matter external to formal learning. Teams engage in dialogue through their environment, as designing occurs, collaborators involve their environment as scaffold to support exteriorization, blending

conceptual and material traces which become increasing instrumental to support ongoing cooperation. The consequence of this co-structuring is dispositional change in collaborators, models of shared cognition are useful to unpack this form of activity.

5.14.2 *Sharing sociocultural knowledge, Social Construction & co-structuring*

Susan Gasson explores design as the sharing of sociocultural knowledge through acts of social construction and representation, this account aligns well with observation *'the acquisition of knowledge by design teams involves both shared cognition and distributed cognition'*. The schema for shared cognition is illustrated below, a representation of how shared meaning can be viewed as the extent of intersubjectivity between agents in a collaboration. This is placed next to Furniss's model of distributed cognition, which evidences multilevel and scalar nature of interaction around shared task field (adapted to reflect activity in observation). This representation of sets of schema in interaction highlights that negotiation spaces emerge from interrelation, that potential for schematic alignment occurs, but the model is mute on how this occurs in practice, the objective is to open out the extent of shared cognition in practice. The role of collaborative intersubjectivity is signposted by Gasson *'design depends upon intersubjectivity for effective communication between team members to take place'*. To reveal clues about this Orlikowski & Gash (1994), examine assumptions in different interest groups through hermeneutic analysis, referring to these intersubjectively-held mental models as *"shared technological frames"*.

Flor and Hutchins (1991) found that collaboration between technical system designers necessitates *"successful in sharing plans and goals, create an environment in which efficient communication can occur"* (1991). *Affirmative of the notion of how organisational environments and sets of values interlink Orlikowski & Gash (1994) indicate 'because technologies are social artifacts, their material form and function will embody their sponsors' and developers' objectives, values, interest and knowledge regarding that technology"* in (Gasson 2006). Gasson effectively draws connections between distributed cognition in Hutchins (1990, 1991, 1995), Orlikowski's grasp of framing in technical settings (Orlikowski & Gash, 1994) and Star's application of boundary objects to understand distributed collaboration without consensus (Star, 1989), highlights the relevance of understanding how collaborators interoperate in professional settings. However, how these accounts reflect on naturalistic organisational settings of experienced specialists is one matter, how to organise general design education to equip individuals with the integrative expertise to make this activity conscious and purposeful in practice is another.

5.14.3 *Models of Shared and Distributed Cognition*
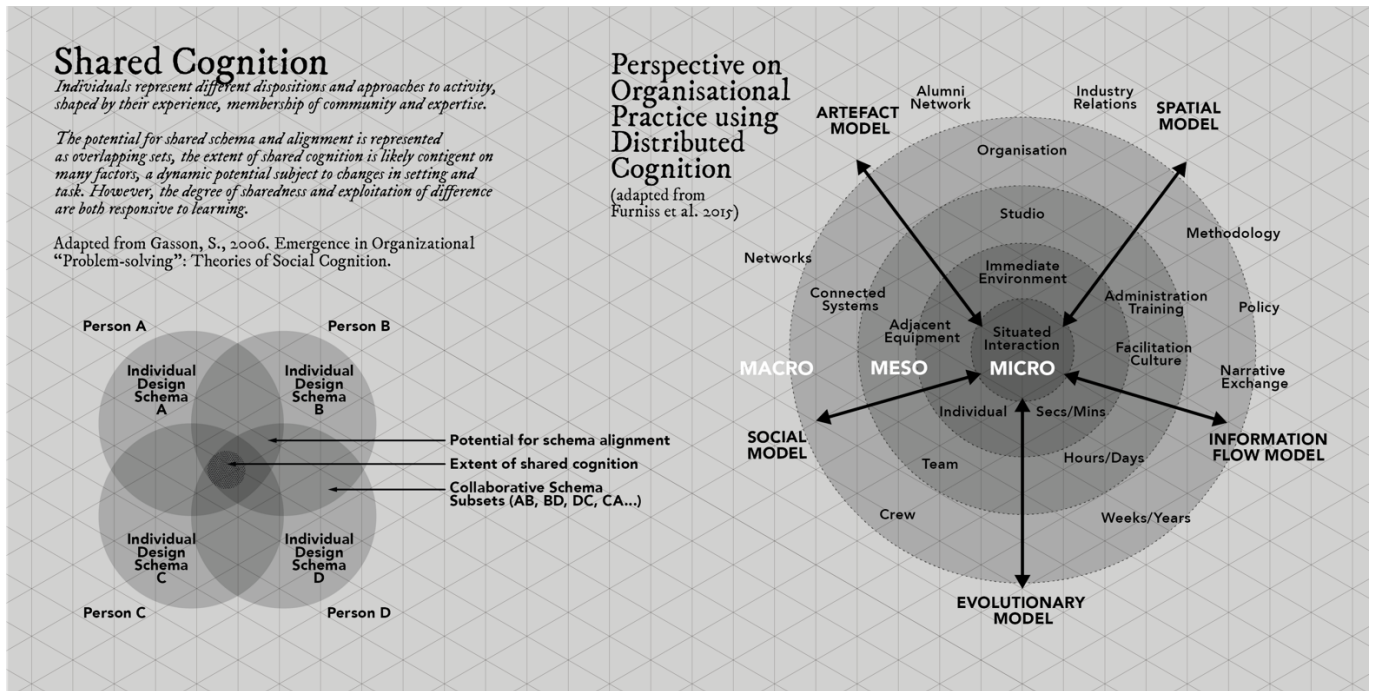
Figure 25 – Alignments between models of Shared & Distributed Cognition.
Diagrams adapted from (Gasson 2006) & (Furniss et al. 2015)

Importantly, Gasson's model of shared cognition reflect the immediacy and situated nature of schematic negotiation, but is somewhat independent of context, whereas Furniss's model evidences the multi-dimensional and scalar nature of situated interaction with technical systems. We can see here how informational, spatial, temporal, artifactual and social flows at different scales condition micro-level interaction. This model also accounts only for operation already designed functioning, situated technological apparatus, the complexity of designing systems or by extension learning to design systems is potentially severely challenging and not accounted for here.

Analysis of Pata el al's (2014) concepts reveals how group and self system interrelate to effect learning (fig a), an ecological perspective drawing on aspects of dynamic coordination, namely enculturation and appropriation of patterns (cognitive apprenticeship) shown in (fig. b) this research affirms suspicions of how interaction boundary interfaces between systems of different scale are crucial in enacting learning. Pata's model of the relational structure of cultural and cognitive niche formation (fig. c) provides a potent exemplar of how distributed cognition plays a role in collaborative learning environments. Examining the how learning functions in Massive Open Online Courses (MOOCs) online communities, but this model appears background and format independent, which this research argues is a problematic assumption.

Fig. a.   General abstraction interpreting Pata (2014) Relational construct of Group and Self in constant exchange and generation of experiential patterning
Fig b.   Coupled system of Collective and Epistemic Distributed Cognition
Fig. c.   The distributed cognition – pattern-finding, chance-seeking and ecological enculturation loops

Adapted from Pata, K. and Bardone, E., (2014, June) Promoting distributed cognition at MOOC ecosystems.
In International Conference on Learning and Collaboration Technologies (pp. 204-215).
Springer, Cham.

Figure 26 - Group System & Self-System in distributed cognition - adapted from (Pata, K. & Bardone, E., 2014).

This aligns well with Nandukumar's (2014) image of emerging joint field between cultural and domain specific knowledge. However, what the joint field schema does well is integrate the physical and informational environment into this scalar psycho-social system. Thus, a synthesis of Nandukumar's Joint Field schema with Pata's schema of Group & Self system potentially provides a fuller explanation of the observed whilst also interleaving consideration of relations in the socially abstract with the enactive aspect such as place, embeddedness with the effects of technical factors such as informational environment or medium of exchange. The aspects of becoming inured to place, hinted at by Lynch, whilst recursively enacting onto the learning site explored through observation of collaborative learning herein. This points to a cognitive, enactive description of group learning that is contextual and sensitive to both the socio-cultural and spatial aspects. The rationale for this, hinted at by Lynch's perceptual schema as learning theory, is how relations across micro, meso and macro scales occur in practice but also captures a phenomena of learning more purposive than the unintentional enculturation proposed by situated learning, firmly instantiating the role of deictic (directive) and diegetic (projective) agency that is integral as learners orient themselves with respect to the actual contingencies and vicissitudes of actual learning settings, where groups must assemble sense from potentially incommensurate interpretive schema and incongruent sources of insight in material situations.

Pata's image schema aptly goes some way describes how individual and group units of analysis interact, providing a perspective of learning that leverages ecological logic to account for distributed online collaboration. However the representation does remain in the socially abstract dimension of

different units of analysis (self, group) and does little to attend to field type transformation resultant from moments of practice within communities and how over time these promulgate to changes within looser entities such as industries or CoP, the titular *design fielding.* These are issues of influence and stimulus of changes usually associated with planning, but reliant on naturalistic consequence of collective action where particularly ecologically successful approaches can be seen to 'catch-on' causing transformation to learning, working and leading practices.

The assumption of this kind of scalar effect harkens the work of scholars like Uzzi & Spiro (2005) who sought to retrospectively analyse factors influencing success in collaboration and creativity in communities situated in competitive fields, but instead of analytic, retroactive this approach is suggestive of prospective even anticipatory value in understanding how small sites of focused activity can have outsized influence on fields of action. In situated observation, as learning proceeds, physical setting increasingly reflected intellectual change amongst groups, certainly cultural conduct and behaviors stemming from shared experiences were enacted into the space, evidencing a dynamic history of interactions inscribed into the space. Following Tuan (Tuan 1979) the process of imbuing meaning is tantamount to place-making, this enactive activity is simultaneously an account of orienting and wayfinding in environments where contingency reigns but also a functional explanation of how collaborative learning occurs. Correspondingly, how this is projected out into communities through practices, propagating influence into their future state. This capacity for orienting and reframing influences explains how learning occurs in practice; orienting with respect to task field and renegotiating meanings in context is a foundational stage in the formation of professional membership, relevant to Strauss's social world imaginary.

Might place-learning, or the process of becoming inured and orienting with respect to social worlds provide a distinctive image of learning that aligns with legitimization processes that enable membership to communities of practice? Following Wenger's ideas (2007) but leveraging the part improvisational, part agential action of learning. Learners are certainly motivated to learn in andragogical settings to manufacture social capital and transform their fortunes in rapidly shifting industrial employment markets, whilst often also seeking meaning in membership of values-led, or simply relatively successful cultures for the license it grants to advance as professionals. People in pursuit of expressing their personhood are highly goal oriented, seeking to achieve blends of intrinsic and extrinsic motivators. Situated learning views learning as unintentional, arguably there is intentional expertise involved in this process that employs mutual interpersonal and environment co-structuring, finding oneself within a community is partly conscious, partly an improvisational response to circumstance. Certainly, organizing group-oriented learning requires expertise to engineer

imageable settings where learning can occur, but also the ability for outsiders to image the internal potentials of joining a community of practice.

In situated learning (Brown 1989), (Lave:1991) practices, meaning and identity become interlinked, learning is locative conceptually, socially and bodily within community relations, learning is conceived as journey through a part conceptual, part spatial territory, the group environment. Communities of practice curate spatial situations as venue for this, social worlds and fields are often diffuse and highly distributed, not coterminous with defined spaces. In mediated communication, for example remote work or exchange in virtual communities, dynamics of place-making are transformed, direct analogizing from spatial thinking becomes problematic (Harrison 1996). Evaluating Ley's (2016) model of digital enhanced spaces again provides useful perspective to interpret observation, here the relational practices within groups act to stabilise and formalise relational patterns between individual and collective levels, learning is viewed as a scalar realtionship reciprocally connecting every greater units of analysis.
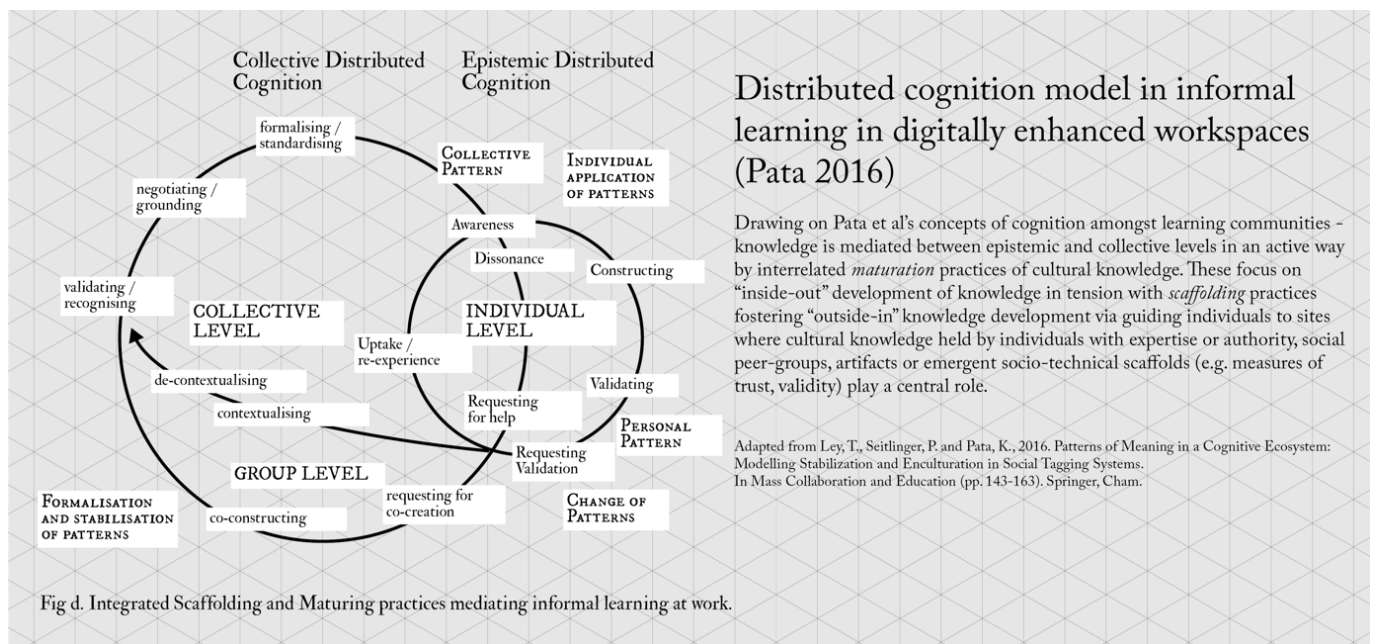
Figure 27 – Model of Distributed Cognition (adapted from Ley 2016).

This relates to the observed context, where a form of expertise akin to orientation was diagnosed, its occurrence integrates identity (self), meaning (group) with place (site). This form of integrative expertise involves an ill-defined locative capacity, an active and recursive monitoring to direct attention and steer inquiry towards common patterns so that shared schema can be established, or at least where attempts to support in situ schematic negotiation and alignment can be cultivated.

Scalar accounts of learning are important because they anticipate the impact over time of collaborative learning networks on interactions between communities of practice and ultimately on fields. This is

the domain of Fourth order design activity which attends to the creation of environments and consequently their shaping action on fields of activity, which are generally scalar, distributed phenomena.

Relevant to this type of design expertise, many existing models of design and learning, which are shown to be related and offer a systematic image of activity, often assume the role of background dependence on context and the role of collective sociality in social construction of knowledge. Topological logic is used to represent decision-action loops, most relevant to the context are Bruner's learning spiral and Kolb's (Kolb 1984 & Kolb 2008) learning cycle, which in turn formalize Lewin's and in turn, Dewey's model of experiential learning.
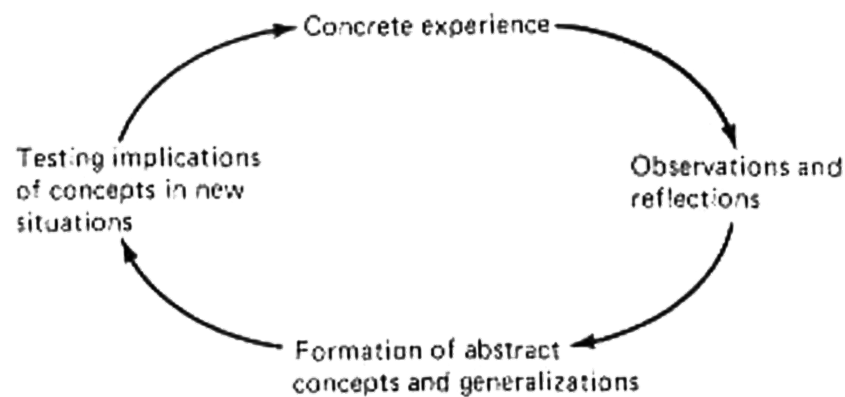
Figure 28 – Foundational Learning Loops - The Lewinian Experiential Learning Model (source: Kolb 1984).

The objective of this research has been to derive from situated observation of actual learning a more situated view of collaborative learning to support generational advancement within design methods that acknowledges recent developments in research scholarship not native to design. The argument follows that in design fields, as design activity expands the role of setting and collective action become more significant. Furthermore, explanatory models that reflect scalar relationships and integrate collective phenomena are important contributions to theory of practice in design, which other fields, notably systems practice, HCI particularly, sociology and organisational science are suitably well furnished.

Whether representations of interrelation amongst groups (*micro*), culminative influence of single entities such as learning organisations (*meso*) or those that seeks to explain the impact of large, distributed learning networks (*macro*) there is need for design models that anticipate and integrate the scalar impacts boundary interactions of different types. Recall that Star's objective was to understand infrastructures through interactions at ground level. Lewin commensurately, underlined the value of attending to conduct to support concord, attending to whether change in group or organisation could

occur rather that overt concern for only their internal objectives. Current research does allude to collective action in design but are often underprivileged in favour of individual meta-cognitive schema or overarching meta-schema which tend toward accounts of *what-to-do* in design activity rather than *how-to-do* it. A missing middle ground that reconciles individual perceptual perspective with high-level abstractions would ideally represent the situated, systemic and scalar aspects of design-led learning activities common to design schools, but increasingly in important to non-orthodox or extra-mural settings such as within organisations or amongst online communities. Unifying these aspects equips design methods to build dialogical social theory of design, models of social representation which assume flux over stability and in so doing, properly diverge from social theory stemming from scientific or technical rational accounts of activity. Conceivably, Design Methods provide the grounding for a novel and epistemically legitimised account of generative or synthetic account of social action that privileges social and collective agency whilst building out from assumptions of dialogical flux providing dynamic stability in practice rather than rely on assumptions of stasis which appear increasingly untenable. Physical phenomena and raw embeddedness in the body provide stability enough to support the unbounded expansions of human ingenuity without assuming functional limits to what can be thought or made, which experience should tell us are inevitably succeeded. This would support a more cogent strategic conversation about the objectives of training people to enact synthetic generative responses to their circumstance and consequently, what this means for the searching, rationalising action of organisations.

Shown throughout the study are examples of how orienting capacity, social representation and attention guiding activity in momentary task fields are fundamental skills to integrative expertise, which over time become relevant to explain how influence and thus transformation to practices are enacted at larger scales. Fields, ultimately, are complex overlapping sets of practices.

Lynch's model repurposed is so important to future models of design learning, in that it attends to becoming inured to environment through intervening with features of territory and perceptual structure in parallel, but what is suggested here is only tentative steps to expanded accounts of synthetic learning. Lynch's work is a systemic engagement with urban form that support evaluation and planning of sites which assumes living sites and their inhabitants are mutually constitutive entities. The difference is that Lynch's participants regard themselves with respect to relatively static or slow changing built structures, harnessing relations between specific and general urban form to abstract perceptual patterns to act as the basis to anchor organization. Lynch proliferated the perceptual, systemic view later expanding this view to temporality, together Lynch represents an influential oeuvre. A deep account of how sense is made from experiencing the world, redirected as a prime resource for planning designed worlds, creating feedback between perception and agency.

However, in the rapidly shifting settings present design learning environments which echo the functioning of agile, cross-functional teams in lived work situations. Adapting Lynch's to dynamic group settings provides an explanatory account of how integrative expertise formation occurs. Future research is required building on observation that accounts for co-structuring and environment's role in scaffolding learning, but also take consider how scalar phenomena consequent of learning networks influence action at field scale.

Practices are persistent temporal structures that afford relatively stability and means to convey experience amongst communities of practice. Yet learning practices are dynamic and involve becoming, design activity confounds this situation, its objectives are often yet to be. The suggestion is that learning is inevitably about locating oneself simultaneously socially, spatial and temporally, to make human action both relevant and contemporaneous in a meaningful way.
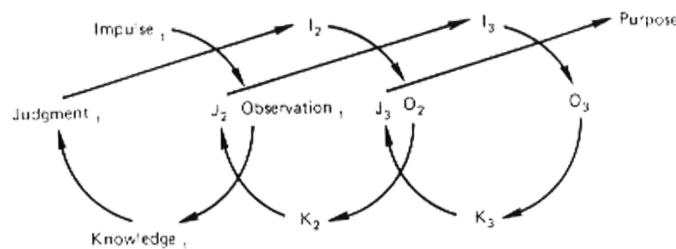
Figure 29 - Dewey's Model of Experiential Learning (from Kolb 1984)

As such modifying Lynch's appreciation of way-finding and place-learning to account for the dynamic parallel restructure of perception and environment offers an explanatory account of group-oriented learning activity;

The proposition is that as design activity employs robust abductive inference it lends learners an acute adeptness at responding to changing setting. As learners enculturate within entities of different scales; embedded in design teams, organizations, communities of practice and disciplinary fields, this places distortive influence on self-concept as they engage in framing activity or more precisely schematic negotiation that restructures their assumptions and awareness of self-amongst-others. Reciprocally, to achieve group-oriented design activity individuals orient towards changing their social setting and to establish mutual intelligibility they engage in a process of construction of social knowledge and social representations. In practice, this can take multiple forms, often appearing as mundane organizing. As trust and alignment develops, more sophisticated forms of narrative-making and world-building are instantiated. Often tension and contestation are integral to this process, so having suitable strategies to resolve conflict and foster alignment are profoundly important. In so doing, the actor restructures the perceptual environment of their collaborators (their co-operators respond dialogically in parallel). This activity provokes adaptive responses, often involving intensifying dialogue and ideally, attempts

to represent their perceptual image, not of the design, but an emerging perception of the problem situation. This characterized by a high degree of affective commitment, this co-structuring is experienced by each team members as learning about others, whilst reflecting on the *self-amongst-others*. Attention, if drawn to features of conduct, results in gradual modification to schematic assumptions and disposition towards a problem situation, the consequence of this engagement with dispositional reconfiguration, is learning.

Adapting Lynch concepts to explain collaborative learning is apt as it integrates a systemic middle ground integrating phenomenal experience with overarching description. The progressive maneuvers experienced in appreciation for place from *disjointed* to *positional* to *relational* and finally *fluid* reflect the structuring activity of building a flexible internal model of a territory. By analogy, when encountering the abstract conventions and concepts of a culture, when experiencing enculturation, the proposition is that comparable processes occur. As peripheral participation becomes moves toward more central positioning, people are reshaped through these encounters with the causal texture of environment, but additionally that a progressive enactivity occurs. As learners inure to the casual texture of a socio-material territory the achieve this through a gamut of design-like acts, most are mundane, some highly specific, fewer but critically important acts resolve on schematic reconfigurations that emplace meaning into or intervene with the symbolic relationships extant in the environment. Refinement of these naturalistic embodied tendencies, results in capability to reconfigure the relative import of each enaction and how its influence propagates outwardly or results in internal schematic updating, experienced by the individual as insight and reframing.

As learners develop feel for their social milieu, so that they can progressively orient themselves fluently with respect to it. Design-like acts that restructure the evidence trace in the materials of an environment, even mundane ones are viewed to be of critical importance, closing the experiential loop but acting upon needful mutual intelligibility – design acts are enactive tactics. The differences here are crucial as actions that mediate degrees of relative variance, stability and intelligibility of their quasi-perceptual-physical structures. This social-situational-schematic updating, is not just reflexive monitoring but reflexive enaction, occurs with vast rapidity but is subject to expertise formation. Evaluating adeptness with this process is another crucial indicator of expertise. Consequently, dialogical social theories and differing accounts of rationality (those that assume flux rather than stability) are needful as the basis for novel foundations for a design rationality. Social settings are by their very nature dynamic, so perceptual appreciation of dynamic coordination results in robust integrative expertise, each stage of perception in place-learning, represents a stage of expertise moving toward more fluent reconfiguration and organizing behaviour. Continual engagement in the process

of learning to meaningfully engage with social territory supports the modification of the assumptive ground each person carries into social transaction.

As Bourdieu would have it, *habitus* is comprised of *hexis* (analogous to disposition, the tendency to hold or use the body in certain ways) and other mental abstractions (such as schemes of perception, classification, appreciation, feeling, and action). For Bourdieu these aren't merely habits, but products of experience – and suggested these allow individuals to find new solutions to new situations without calculated deliberation, founded on their own gut feelings and intuitions, whilst recognizing these were collectively held and socially shaped. Habitus corresponds to assumptive world as dispositions inherited from life experience. However, in the midst of intense learning interaction, habitus can experience quickening - discontinuous, expansive change as new forms of perception are experienced, schema are exchanged, as such habitus is responsive to the structuring of habitat. Anecdotally, these kinds of encounter are experienced as transformative. This describes a cognitive process of akin to familiarizing and orienting within new territories; *wayfinding*. So, like Lynch, we might regard this form of learning as a poorly understood but fundamental phenomena, but one crucial to viability, efficiency and survival of mobile life, defined as *'a consistent use and organization of definite sensory cues from the external environment'* (Lynch 1960). Wayfinding first requires expansive modification to offer explanatory efficacy as a learning theory, but it offers aspects of context dependency, appreciation of collective experience and generalizability at scale that appears missing from the other descriptive accounts of collaborations examined in this thesis. A wayfinding, suitably reconfigured, present significant insight into learning phenomena, but also insight into what it means to do design, especially amongst others – beyond retrospective or reactive appreciation of situation, this mode of experience is also prospective – where the way is made by walking.

5.15 **Response to research questions.**

Synthesizing Alvesson's typology of problematization with theories of action and design, intervening with framings of activity (interpretive or perceptual schema) via situated action creates venue for individuals to problematize assumptions. Organizing cooperative activity towards intervening with assumptions is useful to surface schematic difference, opening these to negotiation, which is judged to be indispensable to meaningful collaboration. However, Alvesson's typology also reflects expansive progressions seen to occur in prevailing models of expertise formation – the concern of each level is necessarily scalar, beginning by challenges to 'inhouse' cultural assumptions (reflecting the internal dynamics of groups, organizations or communities), creating potential for transformation of increasingly diffuse assumptions shared across different and expanded units of analysis, stepping through *in-house, root metaphor, paradigm, ideology,* and ultimately shaping *field* assumptions. Necessarily, this process is non-linear and reciprocal, collaborative expertise formation is aided by design cognition through its capacity to intervene with framings. Consider Schön's second order appreciation of "metaphor" which refers both to a certain kind of product – a perspective or frame, a way of looking at things – and to a certain kind of process – a process by which new perspectives on the world come into existence (1979). Design expertise involves learning to analyze (Goffman 1974), reflect (Schön 1995) then generate (Dorst 2015) framings which influence perception of the meanings of activity in situations. What is glimpsed here is a process by which these framings are enacted, likely through sophisticated collaborative design activity.

Framings can have impact at any scale as it changes how situations are perceived, fielding a learning environment means giving venue for intercommunal negotiation and schematic enaction, the collective outcome of this can fundamentally reshape domains of activity. In this form of organizing each subset field can influence the intentional action of the whole, this dynamic coordination is a highly provisional but effective form of self-organization, which is reliant on individual's ability to sense changes in internal dynamics of their task domain. A thematic direction directly alluded to by facilitators, directors of executive functions, global learning strategists and the founders themselves.

Observation of this organization provided purview of alignment and divergence of shared schema, as common patterns of values and dispositions encoded in practice. By moving across the organizational network, examining these scalar actions with parity to one another, interaction patterns emerged that have explanatory relevance at *micro*, *meso* and *macro* scales by revealing their relational schema. Learning activity moves across boundaries by tacking back and forth between internal and external environment but also through via shared environment reciprocally restructuring collaborating individuals and groups. This suggests alignment between schematic and socio-cultural theories, the case study leant granular understanding to how learning theories-in-use are enacted, with special

relevance to design activity. This research, through examining incidents of design activity experienced from the perspective of learners, to examining how facilitators conceptualize learning itself applying this to curate highly-structured environments which are venue for learning experiences which allow exploration of ill-structured problem situations, to how groups a global learning organization expertly coordinate activity across weakly coupled sites using shared value schema provides a rich repository of insight into collaborative practices relevant to the production of expertise apt for the digital economy. Regarding each of these scales as activity fields is useful to cohere an image of design cognition as enaction upon actual environments, acting with respect to shifting circumstances rather than allow free floating theory and activity models peculiarly independent of contextual background. Category formation involves orienting with respect to social territory, this activity shapes social worlds and necessarily their boundaries. Assumptions reciprocally condition perception, thus activities of signification, mediation and representation are actually grounded in the non-representational domain of practices. Observational evidence points to interlinking between different scales of organizing. Interpreting this, design activity, generates representations and inscriptions which are mobilized via practice. Crucially, social construction of knowledge hinges on materiality, processes of making objects and artefacts often mundane, witty, circumstantial are vital to organizations as they are how matter is made to matter (Carlile 2013). This differs from how prototyping activity is thought to reflect a plan for an emerging design. Instead, frame-setting, narrative and world-building are often in service of a dynamic co-structuring of perceptions. As situativity would have it; there is a gulf between plans and situated actions, but one that can be recohered. As such, conventional learning theories and design approaches are meaningfully expanded by social theories such boundary object theory, in acknowledging different categories of object that inhere interpretive flexibility enough to enable meaningful brokerage between communities. Other critical treatments native to sociology, psychology and organizational learning theory (blending key learnings from situativity, enactivism and field theories) attend to the implications of sociality sensitizing them to how shared framings are mobilized exchanged and become object of negotiation and restructure. Design learning, reconfigured has generalizable relevance to a range of practice contexts, but is also show to lend an explanatory sharpness and immediacy to situations where learning and design actually take-place.

In this sense, design activity is a phenomenon of scalar organizing and making sense not only reflecting on but intervening with a context, these kind of involvements are active and concurrent with activity rather than meta-cognitive and retrospective. Actors used sophisticated diectic guiding of each other's attention, pointed at different scales of activity, they also apply mimetic and diegetic techniques naturalistically to manage flows of meaning and create needed verisimilitude to foster the willingness of collaborators to suspend disbelief as they participate in the becoming of the yet-to-be.

Design's broad application of analogous thinking expedites this guiding activity leveraging intuitive ability to distinguish fluently between immediate action and wider conduct intentionally, whilst enhancing the capability to transfer between the two. Analogy offers interpretive flexibility to understand the relevance of one setting in another, to reconcile potentially conflicting schema and incommensurability between source matter. As experienced design educators would attest, learning to deal with contingency in the here-and-now is effective for its value to engender robust flexibility to apply general understanding in domain-specific ways and vice versa. Learning in situ provides proxy environments that mirror general types of decision-making context; navigating in-task contingency inures learners to rapidly orient and respond flexibly the next time comparable uncertainty is encountered.

The developing insight derived by learning from context then integrating relevant theory to provoke interpretation; sophisticated mastery of aspect and telicity is fundamental to acts of prospective design cognition and organizing. This points toward accounts of design activity as scalar phenomena adept at identifying, selecting, integrating and then propagating contextual influence, this is of high relevance to understanding the research context. Prevailing understanding points toward design inquiry's inherent knack at integrating reflection with intervention, design cognition is situated by nature. Learning loops inherent in existing design models instill *that* we dig into context but not *how* and *why* that occurs. In shaping action with respect to setting, designers necessarily steer emergent socio-material outcomes toward intended outcomes, anticipating configurations in their field of application. Yet, existing design models (and toolkits) allude to context, but are largely free-floating and background-independent (emphasizing *know-what* over *know-how* potentially at the expense of *know-why* (Garud 1997)). The insights from the study of design, learning and leadership instills the impetus to reintroduce contextual grounding into design methods and also to integrate understanding of how organizing activity creates flows of influence across scales. Practically, this occurs via mastery of deictic enaction using aspectual and telic blends in directing, guiding or shaping attention. In this way, an impetus for design methods to advance by integrating how framing influences action, but also how the field impacts enaction, this is what is meant by *fielding design*.

This attempts to make sense of observations about flows of scalar influences as a learning organization continually reorients with respect to its grounding context (in the developing terms of a grounded theory, the environments within an organization are continually fielded and re-fielded, influenced by both interaction within and from external factors.

This is where Lynch's blending of different relational schema important to the processes of becoming inured to place are of increasing relevance, by providing a different functional disposition towards how learning occurs. Lynch's wayfinding model, expanded to understand habituation not just to a

multivariant territorial structures , such as cities, but to the social dynamics of practice worlds; whether disciplinary field, culture within an organization or schema of conduct internal to collaborating groups. The core thematic learning is relevant to each scale; becoming a fluent navigator of sociality and contextuality in parallel.[72]

Lynch's perceptual images glimpse the process of becoming inured to place, developing flexibility then eventual creative mastery of fluent navigating. This thesis borrows from this, interpolating learning about place with learning about dynamics of social milieu, finding reciprocation between habitus and habitat. In practice, place provides anchoring, a notional environmental scaffold for this form of learning to occur. In group learning, learners use one another and agreed patterns of conduct as orienting features of said social world to provide dynamic stability whilst they engage in making sense of highly provisional activity, which in the case of system or service design, which the design field is increasingly occupied with, involves bringing about new instances of social world, place or new forms of activity.

In Hyper's case, the founders set out to create feedback loops between domains, allowing contextual industrial experience to adapt learning conduct, instilling an important feedback loop that has shaped the organization's value schema; to allow different scales of activity to interact and cast influence alongside guiding attention toward relevant external contexts, in this case, emergent dynamics of early network culture **(1).**

The decentering of the therapeutic relationship evident in these approaches has meant it inheres schemata analogous to diagnosis and healing. These approaches to learning influenced by Rogerian psychology and the Human Potential movement which were in turn influenced by the developments of social psychology associated with Lewin were brought in by a second layer of co-workers joining the organization after their experiences as early students of the organization. The second layer of people responsible for shaping the organization as it grew built on the core founder group were facilitators and strategists, who often shifted roles. Many, entering the organization as learners, later

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[72] In principle, Lynch's research was a framing of reciprocal consciousness > environment relation, as was common to cultural patterns of scholarship at MIT who claim their form of educational innovation: results from a merger of intellectual study with hands-on experimentation, an institute who set out a doctrine aimed to blend empiric pedagogical pragmatism with deep introspection encapsulated by the ethos - *mens et manus* (mind and hand) (MIT 2017). MIT scholars commonly are urged to first isolate phenomena, find its relevance in both scholarship and professional practice and how these concepts can be learned and shared across domains. This is also strongly, reflected in the work of Kurt Lewin and Donald Schön, both MIT scholars. Importantly, MIT is simultaneously a bastion of American pragmatism, a harbor for intellectuals escaping war-torn Europe whilst also standing as an intellectual redoubt supporting the United States technical military advantage, the basis of its geo-strategic preeminence in the later half of the 20th Century. Notably, as an institute, MIT blends civilian concerns with military-industrial expenditure, as an exemplar of their $14.8bn research & development endowment, the principle source remains the Department of Defense (MIT 2017).

went onto shape first the learning methodology and then the organization itself. Over time various generations of collaborators within the organization have left traces of their own schematic approaches, furnishing a distinctive methodological core, often emplacing schema in tension with the original approaches. An example of this is seen in the theoretical lineages of applied framings – a critical example; the influence of military research and therapeutic practices – however these tensions appear to have conferred advantages by encouraging decentering of power relationships, the cultivation of resilience and through perspective-taking.

In practice, by moving attention away from inducting groups via delivering specific curricula to group learning and self-leadership foregrounded the influence of therapeutic models, stemming from Carl Roger's client-centered therapy, which deemphasized doctor-patient and consequently teacher-learner relationships and foreshadowed facilitation approaches, those that dealt well with intervening with self, through guided schema change.[73]

These concepts aligned through Kurt Lewin's focus on the centrality of contextual encounter and group dynamics. Rogers acknowledges how Lewin's shift from pre-existing trend of individualist psychology, expanded to incorporate a macro view where they focused on the *'social psychology of small group communication'* was instrumental in the development of Rogerian therapeutic theory, which has come to influence user-centered design approaches. J.L Moreno's influence on encounter psychology and the practice of sociometry focused on dynamics of group structure, which widened psychological unit of analysis from person to group. The Human Potential movement in general associated with social psychology is evidently intrinsic to Hyper's learning approaches **(2)**.

The organization's incidental setting, in a demobilizing town in southern Sweden which happened to be a frontier of a de-escalating conflict, which displaced the attention of another community of practice, the National Naval Defense School which pivoted from external defense to internal social recapitulation. Through incidental meetings, 'the military piece' became instrumental in forming Hyper's methodological approach, through the influence of UGL's leadership training. This was highly co-incidental, literally stemming from blends of proximal and synchronous contextual factors **(3)**.

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[73] Lewin at MIT in 1946; Lewin received a phone call from directors of Connecticut State Inter-Racial Commission, requesting support in deriving effective ways to combat religious and racial prejudices. Lewin's workshops, as narrated by (Bennis & Biederman 2010) led to T-Group approaches and 'sensitivity training' which Rogers held was *"perhaps the most significant social invention of this century"*. Lewin conducted 'change' experiments, laying foundations for sensitivity training. and group dynamics. In 1947, this led to the establishment of the National Training Laboratories, at Bethel, Maine. Not without controversy, intergroup methods derived from ; sensitivity training have become all pervasive in a way that early proponents could not have anticipated (Lasch-Quinn 2001).

The relevance of organizing schema borrowed analogous practices is fundamentally important to the development of new forms of activity, inherent to organizational cultures which enact it. These influences arise once intentions are put into an action context, influences are;

1. *'Baked in' from founding decision-making and distinct intent (value oriented)*
2. *Stem from core contributor's experiences (group oriented)*
3. *Stem from highly contextual factors, stemming from place (place oriented)*

4. *Once these factors co-mingle and begin interacting, this is formative of a distinct cultural and historical narrative, which in turn begins to distinguish a field of activity apart from the contextual field. Ideally, these interacting influences remain in cahoots. As the organization enters new contexts, for example expanding into Asian markets, members can use this to 'recruit' their context to direct and shape further action. Opening up to further influences from new contributors or environmental setting as the organization scales (organization oriented)*

5. *There is a fifth dimension of influence that the organization seemed to be contending with, at a relatively mature stage of its development after 20 years of operation, the network having played an instrumental role directly shaping organizational dynamics through executive consultancy work and indirectly through the production of individuals who have gone on to influence organizational culture. The network influences of the organization have (to some degree) influenced the field the organization operates in, forcing the network to restructure to respond to the interaction of influences at least part resulting from their own impact, inducing the network to engage in re-fielding its activity (field oriented).*

Although compressing 20 years of interacting with the design field, by educating active participators and learning from new contexts, developing organizations co-opt schema from analogous contexts, inhering relevant values and learning into their own activity context. Here, first learning from networks to establishing networks to learn from, the organization integrates interaction and context into a novel form of activity, an integral field that begins to interact with the wider contextual field.

The organisation's narrative represents a singular architype of value generation and innovation driven by circumstantial factors. The research views observational critique of the organization as metonym for other networks and learning organizations and transformational activity in the digital economy. The supporting research supports a reframing of educational epistemology with pragmatic consequences and actionable insights, it points towards to reorientation of rationality in light of the design paradigm as counterpoise to scientism.

Rather than examine what or whether Hyper Island innovates, which is irrelevant, the focus is on how this occurs and why the network might be considered to contribute to perspectives on collaborative learning or organizational innovation. Certainly, it exemplifies how organizational development, innovation and change processes are often consequent of part intentional, part circumstantial activity - decisions are often consequent of such concrescences. It also stops short of claiming causal hypothesis about their activity, instead pointing to context where thematic areas might translate in testable causal constructs. Admittedly, the difficulty of retrospectively making sense of tangled contexts from the shop floor is thorny, what can be assembled is a situated framework to conceptualize from a design methods perspective how factors coalesce to engender learning, bring about organizations and enact changes to field configurations. At this stage testing causal hypothesis are beyond the scope of the research.

Where advanced design inquiry engages with situations at the level of assumptions and takes perceptual schema (framings) as material for design activity. Assumptive framings often take the forms of organizing concepts and metaphors, by examining how interactions between interpretive schema take place and how they can be transferred by analogy from a donor situation to the task of adapting schema into an organizational context. Rather than simple knowledge transfer this appears to enact at an assumptive / perceptual level, schema transfer implies transformation. In other words, creating time and venue for individuals to experiment with different schema amongst others and for schema embedded in place to have influence on action. For example, the influence post-cold war reorientations and Realpolitik of Sweden formative on their military leadership doctrine fostering the formation and influence of UGL. UGL in moves to decenter command structures brought ideas born from observation of resilient teams of operators learning to orient in highly contingent situations has stimulated reorientations in civilian organizing. In Hyper's case, adopting schema from situations derived from situations where social coordination faces severe challenges such as in conflict or within the therapeutic relationship has been transformed through co-optation and reframed into experimental educational contexts where cooperation is the desideratum, producing the distinctive stance witnessed at Hyper. The organizations history is characterized by it's own admission as a semi-deliberate, semi-coincidental borrowing of interpretive schemas from successive donor contexts, shaping distinctive approaches to learning and leadership. Narrative-making and sharing appears to be the primary apparatus through which these assumptive schema are stabilized. Opening organizations to the influence of their evolving ambit and sensitizing to the causal texture of social milieu and factors consequent of being emplaced in environment can confer advantage, cultivating ecologically rational perception allows networks to operate inside decisions cycles, this seems to coincide with opportunities to make assumptive and perceptual schema mutually intelligible.

This allows us to explore how a landscape of diverse rationalities underpin professional structures, how they form meaning, via orientation with respect to an axiomatic core, analogously to other situations or with respect to direct environmental configurations or combinatorial influences.

Awareness of dynamics of a domain of practice, a field, steadily becomes emblematic of membership of that field. Underlying the emergent grounded theory is simply to supposition that design inquiry functions well to provide orientation in circumstances where contingency reigns. As participation proceeds, membership unpacks into leadership as participants increasingly develop acumen in orienting to the dynamics of said world and the types of task field encountered. Increasing involvement in membership of a community of practice leads to increasingly core participation and leadership whilst also increased awareness of organizational boundaries and the influence of corollary communities, but it also risks a hermetic self-sealing logic where the internal dynamics of a network become a totalized environment blocking wider feedback relations with environmental signaling. As such having active strategies to anticipate and respond to issues of incommensurability are critical, this occurs at the level of assumptive, perceptual and environmental schema. Attending to conflicts or tensions in meaning arising here from tasks common to an intellectual field can generate the emergence of new fields of inquiry.[74]

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[74] This process is exemplified by Russell Ackoff's growing awareness of inadequacies of methods pioneered in Operational Research when applied to social systems, finding his suggestions increasingly unheard with the field he had co-founded led him to depart from it's membership entirely, instead starting a new field Social Systems Sciences, which in turn had wider impacts on the broader field of systems thinking and the emergence of soft systems thinking. A key example of innovation driven by incommensurability and environmental perception.

6 Conclusion

To conclude this thesis, a discussion of insights taken from this study with relevance for education and practice, this section gives a high level of discussion based on findings arising from the study. This is followed by a discussion of future research. As reflective practice has been integral to the approach and topic of this study, a detailed reflection on these research contributions is apt.

6.1 Practice

This thesis stems from a desire produce a definitive statement on collaborative practice, the aim; to form robust theoretical foundations for collaboration. Human activity broadly diverges into conflictual and cooperative modes, in practice though, these are neither discreet nor easily differentiated. Ultimately, humans act to restructure their environment to meet first their needs then their desires then finally to remake the world to be commensurate with their image of it.

The forms of rationality applied by the professions often conflate the logics of human and non-human systems, the fields applied to studying human affairs misapprehend differences between the nature of natural and social phenomena, the research struggled to find epistemologies that successfully differentiate then re-integrate these perspectives. This foregrounds ways in which scientific methods are somehow at odds with design methods which emerged out of need for accounts of decision-making that consider practice-based situations. However, as scientific practices rely on comparably mundane acts comparable to design-like activity, different paradigms of practices under close enough scrutiny reconnect at the level of pragmatic activity.

The notion of ecological rationality assumes human rationality is the consequence of the adaptive fit between the human mind and it's environment. Ecological rationality focuses study of decision-

making on two important issues: *What are the environmental regularities to which people's decision strategies are matched and how frequently do these regularities occur in natural environments?* Then *How well can people adapt their use of specific strategies to particular environmental regularities?* Conversely, discussions in research ask whether the assumptions underpinning social inquiry should be regularity, invariance and stability or whether we need theories built on the assumptions of constant flux. Generalising, the research study examines an environment with an remarkable lack of conventional stabilities, but those stabilities are re-emplaced onto different kinds of dynamic stabilities, these are standing waves in the flow of human action rather than the assumption of some enduring stantion ensuring a baseline of stability against which change can be evaluated. The language framing inhered in discussion of change hold connotations deeply suggestive of defence or defensive structures. Harking Schön's treatise on belief in the stable state, which he intimates, is belief in *'the unchangeability, the constancy of central aspects of our lives, or belief that we can attain such a constancy'* (Schön 1973). Such a belief is strong and deep, and provides a bulwark against uncertainty. Institutions are often characterized by '*dynamic conservatism'* – as *'a tendency to fight to remain the same'*. However, as technical change proceeds at an exponential rate, its pervasiveness and frequency was *'uniquely threatening to the stable state'*. In response, Schön proceeds to build the case for a renewed concern with learning, especially of the organisational kind. Learning is the prime means for people inhabiting social structures to adapt to their surroundings, design provides societal structures means to enact their own environments, these are enacted by individuals arranged into an array of configurations and situations. There is no more pressing task for society to confront than tracing out the collisions and implications of these reciprocal relations – the more we learn, the more we design the greater change will be. If to paraphrase Shelley; nothing is so painful to the human mind as a great and sudden change then learning to anticipate and weather its vicissitudes is pivotal to societal resilience and ultimately precursor to potential flourishing.

Revisiting dialogical perspectives with relevance to perception; *'Theories of social perception are based on the idea that humans, in their desire to control and predict the world in which they live, tend to explain social and natural phenomena in terms of relatively stable attributes (eg. Heider 1958, Schutz 1972)'* (Markova 2003). In this statement, Markova challenges the Heider - Gibson ecological perceptual paradigm, which in turn challenged the Lockean perceptual paradigm. Gibson's view owes much to the radical empiricism of William James (1976) – which asserts that experience includes both particulars and relations between those particulars, and that therefore both warrant place in explanation. In other words; any philosophical worldview is flawed if it stops at the physical level and fails to explain how meaning, values and intentionality can arise from that. Notably, Dewey referred to his attempts to resolve the dichotomies haunting philosophy and psychology; by taking the perspective of immediate empiricism – that 'things' are what they are experienced as, a deceptively subtle idea not

incommensurate with radical empiricism, it includes similar and differing perceptions of all of those which experience a thing, in all its differences and agreements. The later turn towards speculative realism explores the possibility of differences in the entities that experience as, it decentres away from normalised stable perceptions into exploring the potentials of experiencing as and the hidden aspects of things as they are.

Recall the main principles of ecological psychology lie in the continuity of perception and action, where the organism-environment system is seen as primary unit of analysis, the study of affordances as the objects of perception, combined with an emphasis on perceptual learning and development. Surprisingly, ecological psychology emerges out of a radical empiricist treatment of behaviourism, tempered with elements of pragmatism, gestalt psychology and phenomenology. Before ecological perspectives emerged, Dewey argued against prevailing *stimulus – motor* response accounts of perception, instead setting in place an active process, where exploration, action and perception were considered parts of the same activity (Lobo 2018). As discussed, design theories owe much to perception-action loop image stemming from Dewey and subsequently developed by Heider and Gibson. Gibson's concept of perception forms the foundational account underpinning User Experience Design, particularly the implementation of affordances popularised by Don Norman after discussion with Gibson.

Markova's assumes a comparable mantle although where ecological psychology takes active perception of environmental invariances or affordances as its centre, Markova explores the continuous struggle to understand interdependence between Self & Other – taking the non-continuousness and variance of human experience as an alternate basis for social perception. James asked the probing question; *'how can two minds know one thing'* to unpack the role of common objects of experience. Markova claims dialogicality as an epistemology of daily life and the professional practices, based on triangular relational interdependence between *ego, alter* and *object*, seeing perceptions of changing social relations as prior to active perception of static features in the environment. This harks Tuan's inversion of space and place that frames relational meaning as prior to bare facts of physical space.

Markova's modification, comes not from an empiric, but sociological position. Reflecting on this leads to a synthesis with observational exploration that suggests an alternate account of learning; a synthesis that highlights cooperative model of perception that recruits physical space and collaborators into a co-structuring activity. Immediate collaborating participants and their social milieu form a significant dynamic structure that individuals act with respect to and alter through their action. Individual action responds to these encounters with this dynamic structure by enacting their experience onto their environment, forming personal and shared evidence traces. Learning activity involves close, continuous collaborative interaction, which becomes evident in formation of a meaningful shared

environment, this constitutes a distinctive form of place-making, which is also fundamentally commensurate with situated learning, but potentially reinstituting the possibility of conscious design of learning, via heightened attention to the group and its environment. The emergence of schematic alignment is concurrent with intense negotiative exchanges, affinity building and restructuring of the shared physical environment, as such the environment acts a scaffold for learning transactions.

Scholarship of practice has strong parallels with the dialogical view. Heeding Schön's schema of '*designing as reflective conversation with the materials of a design situation*' (1992), Markova assumes *'an integrated agent is engaged in a dialogue with her social environment'*. The former assumes sophisticated cognitive engagement with physical or material features present in given environments, the former however assumes sophisticated dialogue with the social milieu, as the material present in situations. The findings of this observational research reveal that practice can learn much from observing collaborative interaction, especially where that activity attends to group learning in complex, ill-structured problem situations. The research aimed to deconstruct incidents of interaction, whilst diagnosing assumptions at work in practice which form the basis for action and theories-in-use. By examining these alongside diverse perspectives on collaboration evident in research literature, this research attempts to reassemble novel approaches from these traces, based not only on knowledge but on relational understanding.

Design expertise is notoriously inscrutable, but its relevance to expanding domains of application (and interactions between them) is undeniable. Simon voiced that design processes can no longer hide behind the cloak of *judgement* or *experience*, that professional problem-solvers can simply play the role of a controller or a manipulator. Simon's analysis articulates a vision of teaching design as a unifying language that enables communication across fields, which this research shares. Furthermore, recent scholarship holds Simon considered problem solving within a bounded rationality perspective, that expansion beyond individual concerns, must engage with expandable rationality and principles of collective action (You & Hands 2019). Importantly, these authors articulate that Simon's conclusions, especially about design shifted throughout his work and the nature of his work is often misinterpreted as being confined to narrow information processing perspectives. Research considering the social contexts in which design takes place tend to see design as situated processes, especially responsive to contingencies. Extending bounded rationality to reflect advances in design cognition, means rather than searching sets of alternates, we need to consider how bounded minds cultivate the *ability to manipulate (individually and collectively) infinitely expandable concepts* (Hatchuel 2001).

Not only do our accounts of rationality need to expand, expansion provides a recurrent assumption that unifies the nature of sociality in learning but also change in application of the design field. Designer's role is to expand, moving the boundary of the task to encompass wider issues of *'why are*

we doing this task?' and *'what does this indicate about identity and value?'* and consequently, task scope expands to consider nested systems and activities so that outcomes are woven viably into the world, integrated rather than fragmentary, sustaining rather than ephemeral. Constructivist theorists conceptualise learning as occurring through expanding (Engeström 2014). Observation evidences that integrative learning might occurs through expanding the open self. From this perspective, expanding the social arena where communication of what is known to the self and to others by disclosing and requesting feedback is integral to enhancing self-awareness and group communication (Ingham 1955). Commensurately rationality must open itself to the vicissitudes of actual practices exchanging highly structured objectivity for a reflexive agility.

Conceptualisations of transactions across boundaries between domains endure as recurrent shared imaginaries common multiple perspectives, not just literature relevant to a single field, but ultimately the field relations themselves. Were there a unified ration high ground, the likelihood that interacting fields will share it is low, they will have, properly equipped their own internal rationales for action which require reconciliation. As such this awareness forms the crux of this research, unpacking the different dimensions of assumptions present in practice then to synthesise these perspectives and seeking evidence of their interaction and reconfiguration in actual situations. Then to inquire into their immediate relevance to practice, learning, leading and organising. Returning to James' proposition; how *do two* minds know *one* thing?

Tacking back & forth between two environments; the cognisors memory and the task environment, such that practices in experiential and design models imagines reciprocity between concrete and abstract, information gained from one environment is used to guide next steps in the other. Tacking across boundaries is central Star's boundary object theory, but not between inner and outer environments but between minds. Design methods are peculiar in that design goals are generative, functioning to motivate activity to generate new situations and new goals. Simon's *rational problem-solving* interpretation of design is often juxtaposed with Schön's *reflection-in-action* (1983), a paradigm of design knowledge integrating professional expertise with intuition. Schön's practice perspectives appears to be a synthesis of pragmatism and systems practices. Pragmatism's maxims emphasises a 'primacy of practice' principle; foundational proposition that meanings of our conceptualizations of the world—ideas, theories or assumptions, should be evaluated on the basis of their consequences, implications and relations in practice (Dalsgaard 2014).

Reassembling implications for practice based on findings differentiates from these accounts in crucial ways. It finds that collaborative learners engage in restructuring their external environment in order to enact learning, they do this through the construction of social representations in that environment, but their objective is to restructure their collaborators to achieve mutual intelligibility or at least

enhanced interoperability. A consequence of this interrelation over time is the restructure of their own disposition, an expertise founded in their ability to recruit their environment, which other people are fundamentally integral, into enacting change. Importantly, the material environment provides a contingent but relatively stable substrate within which to enact a different kind of change within collaborators in a design team, their shared propositions and continually refurbished understanding that arise from this process become propositional logic that go onto underpin the designed systems and environments. Both material and milieu are integral features of this expanded view of design as learning process. However, importantly matter and consciousness retain different nature and epistemic status, but take on a renewed relational disposition.

To understand expertise formation uncloaked of some the mystique that surrounds design expertise, Brian Eno discusses the idea of *scenius*, as genius embedded in scene rather than meme or gene. Eno defines this *'stands for the intelligence and the intuition of a whole cultural scene… the communal form of the concept of the genius'*. The geography of scenes is fostered by factors; by mutual appreciation of risk-taking and subtlety; a form of positive peer pressure, by rapid exchange of tools and techniques; sharing flows when it sits within common a sensibility and lingua franca. Network effects that amplify success, breakthroughs erupt and are claimed by the whole network, empowering licence, standing and further success. Interpreting, this suggests situated network carry learning potential which is supra-individual. Finally, local tolerance of novelty, scenes embrace radicalism and subversion of practices, the outside buffers renegades to explore the boundaries of the field (Kelly 2008).

In socio-cultural theories mediation, mediating objects embedded in context are foundational to social cognition, Activity Theory (Vygotsky 1979), Symbolic Interactionism (Blumer 1986) and Enactivism (Stewart et al. 2010) each addresses this continuum. Foregrounding interplay of *thought*, *thing* and *place* - experience (to trial or undergo) involves performing brokerage across plural boundaries. Two domains hence take on relational significance; the design site and its eventual use domain. Bringing these domains progressively closer together is notable as pivotal to the success of contemporary design methods.[75]

However, the functional dichotomy between *internal, mental, knowing* and *external, physical, acting* are dually problematic, difficult to defend but risky to elide. Importantly, relational schemae are seldom simply dichotomous, they are in fact polychotomic (many classes). The realities of decision-making in ill-structured problem-situations common to design is that they involve polytely, complex problem-

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[75] Reid Hoffman, founder of LinkedIn (representing a significant networkisation of professional structure and formation) argues we should regard ourselves and what we design as in a state of *permanent beta* (Casnocha:2012).

solving situations that are characterised by multiple parallel goals, which may be contradictory or conflict with one another. The nature of complex problem-solving is captured by Funke's (2001) evaluation of the literature as having *complexity, connectivity, dynamics, intransparency (opaqueness),* and *polytely,* this supplements the definition of *open, complex, dynamic* and *networked* problems faced by contemporary learners contributed by Dorst who attests cannot be attacked by single-discipline perspectives so that trans-disciplinary innovation is becoming an increasingly ineluctable necessity.

The so-called *social messes* that design practice increasingly takes as it subject matter, fourth order-type design activity inevitably brings design practice into domains of concern addressed by systems practice.

6.2 Linking practice with education

Important for this research, conceptualising these insights into models of design learning that allow collaborators to recursively improve their capacity and resilience in highly heterogenous, cross-functional teams should be a priority for design methods as they conceive how contemporary learning environments are organised and fielded. Learning from observation of naturalistic settings becomes source matter for conceptual models that can be tested through collaborative practice in experiential learning environments. The outcome of making these models intelligible to collaborators and to modify the basic of accounts of epistemology in education is that first specialist then more general accounts of integrative practice derived from observation of collaborative design activity can be used to support learning, leading and organising in more general settings and application in non-designer or non-expert settings. Equipping collaborators with suitable schematic assumptions about the nature of interrelation supports efforts toward sustaining mutual intelligibility and increasingly transformative collaborations between disparate social and technical disciplines extant in communities of practice.

In most academic settings, group-oriented learning is the weak link in institutionalised pedagogy. Furthermore, effective collaboration is vital to organisational learning, success in business, which nowadays equates to survival, this supports expansions of the concept of digital transformation, as restructure of organising practices. Notably, restructuring industry with respect to changing technological infrastructures is only the latest instance of industrial organisation, as digital economic activity becomes defacto in industrial economies, new threats and opportunities to operation will appear. Transformation is continuous, renewal is an engine of economic growth and an industry in itself. Perversely, learning how to participate effectively in collaboration can present more of challenge than expert practice, hence learning to orient oneself within shifting professional structures and communities of practice is a crucial skill. Societal resilience relies on how we anticipate and robustly

respond to change, certainly the perennial rejoinder and redoubt to societal transition is how we work together and by extension, how we learn to work together.

6.3 Education

6.3.1 *Reflecting on contributions for education.*

The learning that occurs amidst collaborative situations is quite distinct. Experiential learning or learning-by-doing approaches are well researched and their principles known, what's more poorly understood is how to approach self-led and group learning. Many learning theories revolve around change to internal mental state, taking individuals as irreducible unit of analysis, there are phenomena not reducible to individuals. There are situations resistant to analysis, these tend to be those that involve people. In fact, to understand systems that involve people synthetic thinking is required.

Paraphrasing Ackoff (2005); a natural mode of inquiry is to *'cut things down to size'*, to analyse, what systems practice learned by doing is that when you're dealing with systems that contain people you have to increase their size or expand scope of concern to make them tractable. Analysis yields information about structure, *know-how*, whereas explanations lie outside in the domain of synthetic thinking. Broadly, scientific research is analytic, whereas design thinking employs synthetic thinking. At a finer grain, the mode of inference supposed to occur in cognition associated with design is abduction. Abductive reasoning arrives at best guesses based on incomplete observations, as such it creates tentative beachheads, rapidly and iteratively to create space to generate further potentials for action. This cognitive mode is observed in diagnostic clinicians and criminal detectives, who are forced to accept the ill-structure and dynamism of lived situations where complete knowledge about situations is elusive, even actively evading understanding. Simon held, abductive reason employs a decision-making heuristic of satisficing; searching through available alternatives until a threshold of acceptability is found, knowledge useful to models of cognition, but whether this analysis yields understanding remains unclear. Abductive reasoning is also referred to as explanatory thinking, a capacity evident in expert designers.

By enabling meaningful collaboration by design, we unlock learning potential otherwise latent in communities, in ways that traditional pedagogy cannot. Learning should not be regarded as something only taking place within institutional arrangements, whether public or private. Recent events have only accelerated the rise of incipient models of learning, especially those mediated by technology, however professional vocational education relies on interactions that are embodied and situated in place. A perennial human phenomenon underlies this; people are subject to constant change and are strongly driven to gather together. Crucially though, both learning and design-like

activity is integral to the tactical practices of everyday human life. However, we should not discount the irruptive potential of self-learning, remote learning or distributed collaboration. As Sugata Mitra (2005, 2010) has shown, the potential of self-organising learning is astonishing. Regardless of age, learning level or access to social capital, basic technology and connectivity alone can make all the difference. Counterintuitively, learning is often seen as a solo activity, the opportunities of learning together are remain thinly explored, despite prevailing research emphasising intrinsic sociality. This should not be surprising; the founding assumption that innate expertise present is present in people; personhood, grounded in the ordinary machinery of interaction, the everyday ingenuity with which people approach simple tasks. A simple account of learning and design precludes the radical potential for people to find new ways to encounter and generate knowledge to adapt to change together.

This is clearly reflected in UNESCO and OECD setting forth the global learning paradigm of life-long learning (LLL). UNESCO's initial position viewed lifelong education, the precursor of LLL as holistic strategy directed towards the *'fulfilment of adaptive and creative functions of the **individuals** leading to the continuous improvement of the quality of personal and collective life'* (UIE Medel-Anonuevo, Ohsako et al. 2001). Covering not only formalized learning but also non-formal and informal patterns throughout the lifecycle for conscious development and enhancement of quality of life, both personal and of societies (Dave & Cropley 1976). Lifelong education, the precursor of lifelong learning meant to unify all stages and forms of education. The Faure Report sought to institutionalize the concept of life-long education as a general principle which anticipates local adaptation (Faure et al. 1996).

Core to each learning situation is the learning relationship, the development of this reflects the generational continuum of educational paradigms; from *pedagogy*, *andragogy* and *heutagogy* (Hase & Kenyon 2001). The research looks at the expanding design field, examining situated application, the resultant contributions extend this continuum to become commensurate with and grounded in experience.

Undoubtedly, the learning industry is experiencing untold expansions; the basic economics imply only the tip of an iceberg (one that may tilt at any time). Cursory estimates hold that actual global education expenditure in 2015 was $5.2 trillion (£3.86 trillion) and estimated to double to $10tn by 2030, driven by the addition of 350m secondary and 150m post-secondary students by 2025. Yet the global education market cap is limited to just $150bn. According to this research, education is grossly under digitised with 3% of education spend is directed toward technology, digital spend on ed-tech is forecast to double by 2025. Advanced technology expenditure into emergent technologies, notably AR/VR, AI, Robotics and Blockchain technology are seeing an order of magnitude growth between 2018 and 2025, with venture capital investment in education expanding by four times between 2014-2018 (Brothers 2019). There are already signs of fundamental shifts away from NY-LON dominant

financial poles towards a multipole economic landscape, the future is inexorably polycentric. Yet China already represents 50% of global venture capital investment in education. Likely this situation will be further impacted by 2020's global pandemic and the subsequent economic fallout and conflict.

The trends underpinning these changes are supported fundamentally by networked information systems, not only has access to information exploded, but informal learning has become integral to the use of spare time in inestimable ways. Elite university institutes are expanding to service mass markets, whilst new delivery models emerge; the presence of MOOCs, proprietary online education, networked platforms, software or app-based learning and edu-tainment is ubiquitous. The inexorable expansion of learning throughout life-stage and life-space continues, however quality not just quantity is vital.

Giving context about the speed of demographic change is of extreme relevance, humanity crossed a boundary threshold in 2004 when for the first time it became predominantly urban. This was synchronous with the occurrence of a more rapid change; global internet users increased from 413 million in 2000, 1 billion in 2005, 3.4 billion in 2016, 4 billion or 51% had access in 2019. By today, 4.66 billion have access, predominantly on mobile devices (ITU 2020). The significance of this threshold, where humanity is now predominantly online is yet to be fully appreciated, the progression of digitisation, digitalisation and digital transformation represents shifts in forms of organising emblematic of shifts from the third to the fourth industrial revolution. Imagery of successive waves of industrialisation, building on the third's application of electronic and information technology to automate production, the fourth '*wave is characterized by fusions of technologies that blur the lines between the physical, digital, and biological spheres*' (Schwaub, WEF 2016). Yet, the future is very definitely already here, but is remains unevenly distributed.

Access to learning, especially of management and leadership often remains the preserve of specialised communities. In so called mature economies with slowing population and economic growth, socieities increasingly leverage their advantageous standing in social capital towards applications of soft power. As Nye (1990) notes, Henry Kissinger foresaw the crumbling of old international patterns reflected in interdependence in economics, communications and human aspirations. Noting how co-optive power, defined as *getting-others-to-want-what-you-want* and soft power resources such as *cultural attraction, ideology,* and *international institutions* is of increasingly importance. Noting how European states traditionally exhibit co-optive power from their democratic institutions which are facing an unprecedented onslaught from internal and external actors. The utopian promise of digital transformation has somewhat soured, change is historically and culturally rooted. The provision of education remains an important generator of soft-power, learning systems and approaches are how

industries are organised and supplied with capable workforces, this is especially important to knowledge economies.

The research approach was to inquire into the assumptions underpinning theories of collaboration. Reflecting on the interpretive scheme; *boundary* has been immensely generative means of grasping the nature of collaboration. The subtext is concern for the nature of work, what is meant by progress and to explore the horizons of human potential, which present industrial economic infrastructure only partially harnesses, education systems are strongly coupled with the requirements of industrial economy. Directing total human endeavour towards some totalising image is neither warranted nor desirable, however economic systems do entrain how societies are organised and therefore the forms of rationality they apply. Labour, so often interpreted from an individual perspective as meaningless toil necessary to maintain the means for life erects a simultaneously jubilant and sorrowful midden that societies stand upon, work is all too often deleterious for health and wellbeing. Causative of stress and illness, work is all too often tied to economic growth and the myths of progress rather than human flourishing. However, for every commodification of action and act of exploitation, work is actually how societies generate structure from their own experience, create and maintain their habitat, sustain systems for their affective or aesthetic value alone. Work is how people cooperate to offer protection and support for one another, to display the altruism, wit and care needed to enact meaningful change onto the world, it is pivotal to how people make meaning from the material circumstances of their lives. Learning is integral to work, providing the adaptive capacity organisations require to survive the vicissitudes of global events, markets and fluctuations of economic cycles.

The reality is neither this polemic nor simple, each act of exploitation and hollow instrumentality represents a threat to meaning which is inevitably met with a countervailing force of ingenuity, subversion and emancipation. Ideological doctrines are far too slow-moving and adherent to theoretical principles set in motion in the 19th century. Sociology itself as a field was organised as response to the emergence factory-based economy, explosive growth in urbanisation and novel ideas about democracy and political rights. These professional structures and domains reflect strongly the organisation of expertise and professional education inherited from this era, exchanging time for the production of goods and services is still the primary underpinning logic of work.[76] The situations

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[76] Manchester was venue for early social research into industrial transformation, industrialisation of Ancoats and the Northern Quarter transformed the space, with arterial canals and attracting immigrant diaspora. Engels' critique of living and working conditions, especially the impact of infectious disease in the industrial system was vociferous; *'The only difference as compared with the old, outspoken slavery is this, that the worker of today seems to be free because he is not sold once for all, but piecemeal by the day, the week, the year, and because no one owner sells him to another, but he is forced to sell himself in this way instead, being the slave of no particular person, but of the whole property-holding class'* (Engels 2004). Conditions have changed, mortality has been replaced by unpredictable economic fluctuation and the condition of precariousness.

encountered in 21ˢᵗ century Manchester echo convulsive transformations that wracked industrialising civil society then, yet time has not aged many of these master-narratives well. Work reconceived as the active reconfiguration of personhood and placehood reconnects it to the enaction of power – work is integral to realpolitik.

At *macro*-scale, how vocational learning is organised paradigmatically has enormous import for *meso* and *micro* situations of learning, furthermore these domains of scale have reciprocal and recursive relations and influences on one another. Vast disruptive influence all too often emerges from unseen quarters, the consequence of small committed collaborative teams, it's important that scholarship of learning, design and practice anticipate and conceptualise these scalar influences. Sociologists of science have explored how singular sites, socio-spatial typologies like laboratories can have concussive impact on global affairs. As we have argued, as the application of design methods expands, these sites also result in products, services and systems of global consequence, so how design is learned now is tantamount to how future change will be enacted. Just as successive approaches to problem-solving have emerged from the design methods movement and design activity has expanded its purview from niches of artisanship to organising activity at greater scales, so has its centrality in organisational life and thus its responsibility. How design activity acts as transformative agent continues to have far reaching consequences.

The generational paradigmatic progression of design methods, mapped by Buchanan and Gasson are testament to the expansion of design methods into non-traditional settings, changes paralleled in generational progression of educational paradigms. In the context of organisations, Gasson saw design methods progress from concern for functional analysis, to problem-solving, to problem-setting and more recently to processes of evolutionary learning; a convergence between problem understanding and solution-definitions. A process which involves '*reflective action on the part of the individual: learning-by-doing, where individuals' courses of action are created and modified by the organizational structures they are acting upon and individuals' actions create and modify organizational structures in turn*' (Gasson 2006).

	Traditional paradigm	*The ecological paradigm*
The Practice		
Object of learning	Transmission of existing knowledge; abstraction of generic concepts	Perception of invariants; discovery of serial concepts; discovery of universal in particular
Control of learning	Asymmetrical dependence: teacher-pupil; competition of pupils	Symmetrical dependence: co-learners; cooperation of learners
Coordination of learning (a) Behavior settings (b) Timing	School/classrooms; age-grading/school calendar, class time-table	Community settings synchronized to and negotiated with community
Learning materials	Text books; standardized lab. experiments	Reality-centered projects
Learning activity	Paying attention; rote practice; memorizing	Discrimination; differentiation; searching; creating
Teaching activity	Lecturing; demonstrating	Creating and re-creating learning settings
System principle (after Abrahams, 1953)	Pedagogy: "the mirror"	Discovery: "the lamp"
The Experience		
Cultural mode	Work/religion: "serious drudgery"	Active leisure: "exciting," "frustrating"
Dominant group emotions (after Bion, 1961)	Dependency: fight-flight	Pairing
Personal development	Conformity; bullying; divorce of means and ends; cheating; self-centeredness; hatred of learning; toadyism	Tolerance of individuality; depth and integration; homonomy; learning as living

Figure 30 - Emery's (1980) comparison of traditional and ecological paradigms of education.

We can see mirrored in Emery's image of an ecological paradigm many features evident in application in the observed collaborative learning environments. These factors; symmetrical dependence, negotiation within communities, reality centric projects, creating and recreating learning settings, pairing or peer relationships and tolerance of individuality accompanied with homonomy (lack of distinction of parts), were strongly evident in observation and are mirrored in the coding structure that emerged from the observational data.

Generational changes in learning models revolve around the learning relationship, core to every learning experience; *how, from who* and *where* learning takes place remains imperative. Practically, Garud calls attention to practical forms and representations of knowledge, establishing relations between *know-what, know-how* and *know-why* as components of the intellectual capital involved in the design, manufacture and use of technological systems.[77]

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[77] *Know-why* represents an understanding of the principles underlying phenomena. *Know-what* represents an appreciation of the kinds of phenomena worth pursuing. *Know-how* represents an understanding of the generative processes that constitute phenomena (Garud 1997).

Garud warns each component is acquired through different means; k*now-how* emerges through *learning-by-doing* where experience builds up over time. However, *know-what* arises through *learning-by-using* where learning occurs from interactions between vendors and customers. *Know-why* develops through *learning-by-studying* (presumably akin to research), where knowledge is accumulated within the confines of a community, field or overall paradigm. Garud's argument foregrounds relations between each form of knowledge, insisting the limitations lie in relative path dependence, difficulty of replication and assumptions that expertise relies on 'storage' in various forms, either within individuals or as organisational routines or structures. The agility afforded by experiential methods often comes at the expense of transferability, organisations that move quickly in dynamic coordination will consequently struggle to conceptualise, document or replicate how they are able to, perceptions of informants showed strong alignment with this perspective.

In philosophical discussion, Emery's (1981) epistemological imperative argues for transformation from the traditional educational paradigm to an ecological paradigm. Reflecting on these features (above) this hinges on changes to epistemology, how we come to acquire knowledge about the world. How we come to know is reliant on perception. The principles of ecological perception form the foundation for the ecological educational stance. Fritz Haider laid the foundation of ecological perception with a deceptively simple realisation; that the environment had an informational structure at the level of objects and their causal interactions, and that the human perceptual systems were evolved to detect and extract that information. Emery argues the key to unlock paradigmic change in learning lies in epistemology, yet epistemology is reliant on perception. Issues of epistemology and rationality are important to research communities and to practice communities for different reasons, creating flow through of relevance from research into pragmatic application remains a priority. As the implications of this area subtle to grasp, problematisation of the assumptions underpinning education is nothing new, yet calls emerging from philosophy and social theory have struggled to create clamour enough for material change in educational institutes at the paradigm level, thus practical application of this remains elusive. However, clear and direct activities, social technologies that allow learners to engage in the experience of schematic negotiation are a powerful means to enacting transformative learning. There was a litany of such incidents contained in the observational engagement, this thesis has undertaken the task to manage, interpret and harness these.

As Bruner surmised, education is not to impart knowledge but to facilitate thinking and problem-solving skills transferable to a range of situations. Bruner subverted education-level and readiness for training, instead any subject can be taught in some form regardless of stage of development, as such a distinct field of collaborative integrative practices has relevance not just to design, but design in its expanded form, which is as we have argued is an enhancement and reconfiguration of a fundamental

innate expertise, akin to active or enactive inference and a function of being an embodied, situated cognisor. Counterintuitively, as perception is shaped by assumptions about how the world works, this is inherited from the totality of experiences, referred to as the assumptive world, unique to each person. Strong influences from culture and membership of social worlds are evident in the formation of personal disposition toward situations, social capital hinges on sociality, but also ambit. As discussed, the role of perceptual and interpretive schema are fundamentally important precepts in collaborative situations in general.

Organizing contributions in simple terms, surveying the assumptions that various theories of collaboration, learning and design finds, they are often founded on common topological relations, basic forms and concepts that are reconfigured and reassembled to generate many theories. The dimensional relations between basic primitives; *points*, *paths, frames* and *worlds* are apparent in different forms throughout the theoretical landscape. Topological sensitivity, a consequence of embodiment forms an undergirding syntax, but the impact of the affective domain on decision-making potentiates these simpler relations. Furthermore, people although situated, engage in constant reflexive monitoring, their perception is shaped by their assumptive world – perhaps the most interesting aspect is how future oriented thought and action actually – a collision between assumptive, situated and anticipatory modes, enacted with feel, into the now. These are commensurate with the basic dimensional progression from non, one, two and three dimensions, peculiarly this mirrors generational change in design methods from functional analysis, to problem-solving, to problem-setting and world-building.

| 1 | 2 | 3 | 4 |

Point   Path   Frame   World
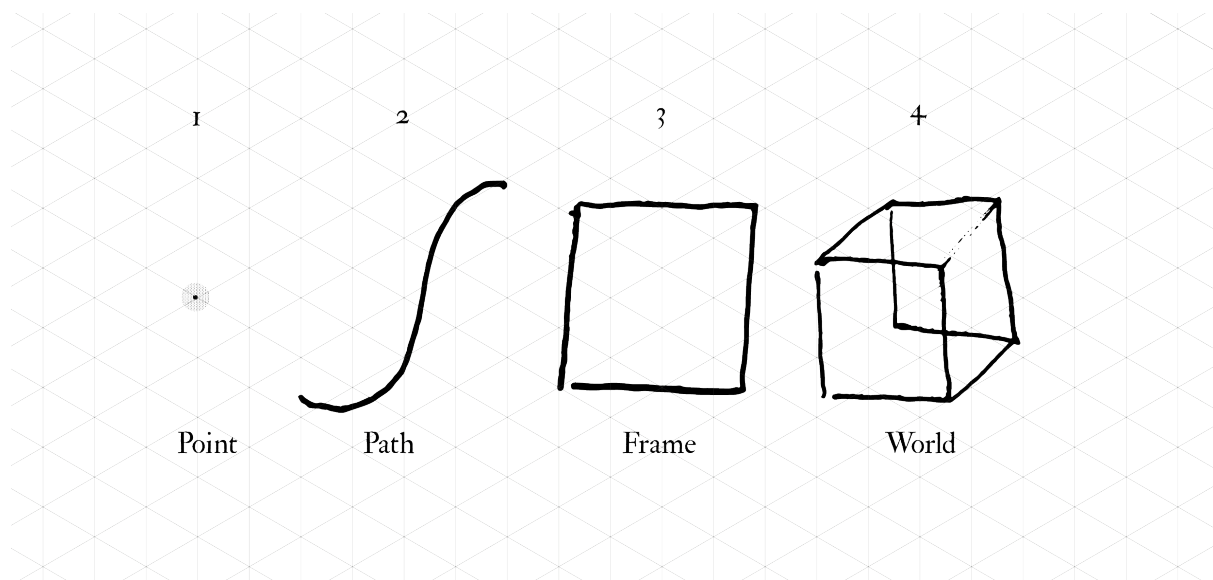
Figure 31 – Topological schema underpinning social and design theory.

This is to argue that topological relationships representations form a common assumptive ground underpinning social theory, seen in theories of framing, boundaries, social worlds. However, there is a grave risk of back-applying the same logic of technological systems to human society, resulting in far reaching threats to meaning. It is important, learning from systems thinkers like Ackoff who found that analysis cannot produce understanding of systems, analysis produces knowledge about the structure of things, but function is the product of interaction, this is reliant on synthetic thinking. The distinction between discreet knowledge and relational understanding is the basis of systems thinking. Feedback in a hard systems context has very different connotations and consequences to the feedback seen in soft or appreciative systems. Encountering interpersonal feedback between collaborators follows a similar principle to systematic feedback, idea generation can be thought to converge or diverge but ultimately these are perceptual schema representing a subtler phenomenon, when representations are misapprehended, trouble follows.

We encounter networks of topological relations throughout contemporary theoretical landscape, perspectives which assembles topological primitives into mathematical / conceptual structures throughout contemporary theory, networked relationships are applied generally. Lynch's spatial syntax of; *Paths, Edges, Districts, Nodes*, and *Landmarks* is an exemplar of this. However, for the inter-domain utility this provides, the relational logic of systems inheres assumptions which should be surfaced and questioned. Design activity as a route to reframing, allows for discussion and search for new assumptions to underpin theory-in-practice and knowing-in-action.

As Scott (2017) shows, direct antecedence can be traced through the progression Gestalt Theory, Field Theory and Sociometry, Group Dynamics to Graph Theory, forming a continuum. Sociometry, developed by Moreno (1951) was devised as experimental method and 'a science of society', still plays a fundamental role in social network analysis, which underpins the systems of algorithmic prediction and behavioral intelligence of mass digital platforms. Systems which have revealed themselves to be potentially isolating, opinion amplifying and politically polarizing when applied to human systems. The behavioral loops employed from social exchange theory and theories of behavioral change have been hugely consequential and quantitatively successful but have had questionable impacts on qualitative experience, social interaction structures and wellbeing.

Questioning whether design of synthetic systems disrupts the ecological fit between environment and inborne perceptual systems, becomes a pivotal question for design. As Djulbegovic (2017) explores from a clinical perspective, the territory of candidate rationalities that support decision-making in practice is vast and the consequential outcome of mis-framing can mean the difference between life and death. Furthermore, as design expands it affords the ability of researchers to find analogies and novel patterns of practice in other professional structures, design so equipped is useful to understand

fundamental relationship between forms of organizing and organizations, whilst retaining the ability to generate new forms and representations.

This has general relevance to education, but also special relevance to the study of how different practice fields interrelate and are organized. Studying brokerage activity, applying design methods as the basis for a foundational stance on education of integrative expertise is a compelling prospect. There are key differences between the relational systems used to formally describe systems and systemic appreciation of human situations. Human systems, invariably are open to their environment, in simple terms, transactions with the environment are integral to cognitive / enactive activity.

In situations where more than one person is in interaction, the significance of this is elevated, the relational properties of the system and transaction at these boundaries take on primacy. Watching design activity take place, reveals that cooperative learning hinges on active restructure of the material and perceptual environments of others. This is a continuous, mutual process of interrelating at variform boundaries that transcends language, applying multimodal literacies and subtler non-representational embodied activity. This form of interrelating is subject to expertise formation; collaborators act to mutually intervene with the causal texture of one another's perceptual environment and we can begin to conceptualize how this takes place to the betterment of future education.

Open & Closed Systems
Boundary between system domain & environment

ENVIRONMENT · CLOSED SYSTEM · boundary

ENVIRONMENT · input · OPEN SYSTEM · output · boundary

"A systems environment consists of all variables which can affect its state. External elements which affect irrelevant properties of a system are not part of its environment.

A closed system is one that has no environment. An open system is one that does"

(Ackoff, 1971, p. 663)

Figure 32 - Open & Closed System Boundaries.

However, descriptions of networks are only formal first order representations of fleshier ecological infrastructures that are arguably not reducible to analysis. This is where the near infinite utility of technical rationality fails, creating a vacuum for alternate candidate rationalities that are able to reconcile situated, embodied and interrelational factors. This implies recognizing the limits of modes

of rationality as themselves bounded systems subject to expansion, identifying domains and incidents of application where fit is found, or crucially, not.

Tracing of consilience between branches of 20th century thought, however imperfectly, elements of Gestalt, Structuralism and Constructivism have converged into systems thinking and ecological theory. There are profound relationships between technically rational systems underpinning the digital era and the interpretive imaginaries and constructs generated by social theory to respond to the affective and collective aspects of mobile, industrializing life which traces the cyclical patchwork expansions and retreats from conditions of need to those of desire. However, misperception of how these concepts apply in practices leads to radical divergences, thus the assumptions underpinning models of the world, how we articulate these and make them mutually intelligible in the moments of the design situation are perennially imperative.

6.4 **Fielding Design**

As communities within the design field continue to exploit the robustness that abductive inquiry provides in equipping individuals to orient themselves within complex settings, design practices are rehabilitated as they enter new settings, but their core processes display extraordinary interpretive flexibility as they expand.

We can define that such an Expanded Design fundamentally equips people intervene with and generate responses to situations, but also to consider interconnectedness with wider circumstances and interplay between social milieus. Design activity so configured affords collaborators the ability to interoperate and collaborate; if the object of design becomes the acts of brokerage inherent to design, it allows members of different disciplinary communities the ability to leverage their specialist expertise by applying a general relational lingua franca for enaction. It poses the question, is the design field so altered still recognizably design or becoming something else entirely? Design activity retains its specialized nature within local settings, but also provides the fabric of knowing-in-practice that underpins professional structure. Interpolating, akin to boundary object theory; design practices have need to be *'both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. It is weakly structured in common use, and becomes strongly structured in individual-site use'*. Generating an organized means to grasp how design activity disposition shifts in relation to its site of application is critical, whether the forerunner mode of localized and specialized design associated with artisanship through generational orders to the more domain-crossing and generalized species of design acting as systemic organizing and dynamic coordination. Hence, rather than tune taxonomies of expertise formation to individuals this means considering the co-competencies of design for supporting coordination at group and site level. Design's robust adeptness not only for brokerage but for organize responses to incommensurability. If boundary objects are second order classes of object. Boundary objects in this view are enacted framings that afford interpretive flexibility to sustain co-operative action on ill-structured problem situations. Relational knowledge about how problem situations are perceived from different perspectives allows for a systemic view that permits reconfiguration of perception as the basis of co-action.

Checklund's Soft Systems Methodology is instructive in this regard; by recognizing that the world is not inherently comprised of systems with problems, instead, that processes of inquiry are systemic. As such, acts of perceiving give form to systems in the world as encountered. In so doing systemic perspectives permit exploration of complexity through organizing learning – in this way the objective of higher order design practice becomes to recognize, generate and exchange learning systems appropriate to perceiving and reframing complexity. Expanded design is reoriented as a learning and organizing process, which accomplishes intercommunal co-operation by making perceptual schemata

(assumptions and framings) an objective of design. Design processes already play a pivotal in organizing societal perception, design in the expanding field enables a conscious practice of reframing as means to support intercommunal organizing between participants with different disciplinary perspectives, acting across boundaries. Collaboration is recast as means to intervene with and reorient perceptual schema affords means to respond to the thorny reality of polytely that haunts contemporary problems situations, a robust response to encounters with vicissitude and ill-structure. A refurbished epistemology of design methods thus forms a counterpoise to scientific methods and redoubt against scientism.

This research took as its frame the idea of boundaries, exploring boundary objects as somehow as relevant to acts of mundane acts of design as to sophisticated polytelic collaboration across domain boundaries. A quick checking maneuver: what happens if we exchange the classic definition of boundary object for those of design? Does this proposition still make sense?

***Design activity generates objects and practices** which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use. They may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of **design methods and practices** is key in developing and maintaining coherence across intersecting social worlds.*

(Adapted from Star's (1989) original definition of boundary objects)

There are aspects here not dealt with in go-to definitions of design even within its own community. Design has need to reconfigure to engage with the domain of affect and meaning, design activity is recognized as integral to the process of co-operative meaning-making. In observation, design-like activity, especially applied by non-designers, focused not only acts of satisficing design outcomes, but towards purposeful efforts to cultivate mutual intelligibility via continuous social representations and reconfiguration of environ. Before sense can be presented to a stakeholder, client, investor, user or audience it must pass basic checks of sense and verisimilitude within a design team. Each domain benefits form closer orbit with relevant others, but this can be delicate to organize and sustain.

Design problems often are characterized by polytely (exhibiting presence of multiple simultaneous, possibly conflicting goals) and indicate polylogy (belief that different groups of people reason in fundamentally different ways). However, search for common denominator cannot only rely on reduction down to units of analysis, rejoinder must be sought through synthetic thinking. Properties of relational systems imply that there are properties within groups that are irreducible to individuals. This puts the assumption to the test; that groups, however different their internal components, can

arrive at co-operation. It then frames the task of organizing fields of inquiry to meaningfully equip inquiry into this subject, importantly, much brilliant work already exists on the higher order activity of design.

Just as Francis Bacon sought to do with organizing the system of sciences, there have been multiple attempts to organize design, Bacon rejected the idea of the anticipation of nature in favour of the interpretation of nature, insisting that *'making is knowing and knowing is making'* rendering the maxim *'command nature, by obeying her'*. The system of sciences arose by making every attempt to banish error, superstition and confusion through formalizing a system of checks. Bacon argued anticipation leads to theories that recapitulate the data, moreover, resulting in final theories that aren't replaced. Scientific methods implore the natural philosopher inquire into *'appetites and inclination of things by which all that variety of effects and changes which we see in the works of nature and art is brought about'*. Yet, science practices have and continue to transform thought and remake the world.

Decoupled from its roots, what's the core relevance for design? Certainly, the rationale for learning, leading and organizing it affords, but this means the objectives of design must shift. Consequently, so must specialist design education and the general diffusion of relevant design methods into wider education. Design methods deal effectively with design's capacity for planning and realizing, as engagement with existing research proceeds, this became ever more certain. The core cognitive practices within design practices are not unique to it, but are refined by it. The recognition that the core of design cognition as something more fundamental to activity not bounded within design specialisms but refined by it. As design methods mature their application decouples from their source in artisanship, this is characteristic of field maturity, this is seen similarly the field of computer science which has undergone a similar diffusion into application progressively embedded into other fields.

Lawson & Dorst's taxonomy of design expertise stems from three categorizations; which distinguish between kinds of design activity (*formulating, representing, moving, evaluating* and *managing*), levels of design expertise level (*naïve, novice, advanced beginner, competent, expert, master and visionary*) which roughly correspond with layers of design practice or modus operandi for design (*choice, convention, situation, strategy* or *experience-based* then crucially concern for *schemata creation* and finally *field redefinition*).

This research expands on the final two, the interplay between *framing* and *field*. Another layer considers three layers of design practice: *project*, *process* and *field* (which responds to Bourdieu et al. (1999)). As Dorst claims *'the rationale behind this categorisation is that design is not just an activity within projects, but that experienced designers develop up their own processes that work across projects within a firm or professional practice. This third layer, 'field' then is the organizational, intellectual and physical*

environment in which a type of design practice can take shape' (hence the term, as Bourdieu sets out the 'playing field' of a social group) (Dorst 2011). The field oriented perspective in this research stems ultimately from taking a systemic, enactive perspective on situations of collaborative design inquiry, but also quite literally investigating higher order meanings of field, as an area used to derive value.

It's both a source of mild exasperation but also external validation to identify research in design methods that has arrived at comparable conclusions and that supports those arrived at independently through observation. The nature of this expansion to Dorst's conceptualization of frame innovation was discussed in vivo with Professor Dorst, which formed a positive foundation for further research. Especially, concerning design expertise's field orientation, such that this research aligns with disparate perspectives derived by other means but arriving at a field orientated perspective of design. Dorst's discussion of the core of design thinking presents comparable judgement about the field shaping nature of design, although distinctively this thesis expands design method's direction to consider the nature of intercommunal negotiation and collaborative organizing, sensitizing the scholarship to awareness developed in corollary fields of organizational and management theory but also perspectives from the sociology of science and social psychology.

Figure 33 - The Four Orders of Design (Buchanan 1992)

That this thesis arrives in a grounded, original way at the apprehension that design activity lies in interplay between frame and field concepts. Arrival at comparable conclusions from more than one independent perspective is a decent indicator of if not veracity, then validity and relevance. Although critically, this forces this research to consider the originality of its contributions. Without a doubt, these remain in the form of learning and to reframe design learning in terms of the potential for value-creation at boundaries.

Taken as aid to decision-making via schematic negotiation and finally for the aggregate effects of strongly coupled communities equipped to enact change within organizations, collaboration between communities of practice and over time on their own field of operation. Field could be of equal relevance to site, market or discipline, but it's taken here to mean a particular branch of study or general sphere of activity or interest, any large and diffuse macro-entity of organizing activity.

The observed setting points towards a reconciliation in practice of schematic and sociocultural theories of learning; built on synthetic, abductive thinking, which has implications for expansions of rationality. The above delineates features common to individuals and their domain of concern, but remarkably has a somewhat abstracted character necessary to discuss such general features, but perhaps doesn't give practical recourse to understand how these individual and supra-individual reconfigurations co-occur as an enactive learning phenomena.

Returning to the origins of schema theory - Bartlett discussed schema as an "organized setting" and not as some uniform feature of the mind (Bartlett, 1932/1961, p. 200). Schemata from Bartlett's perspective aren't knowledge structures stored within individuals for the purpose of interpreting experience but **functional properties of adaptations between persons and their physical and social environments** (McVee et al, 2005) (emphasis added).

The place-like features of schema as organized setting, points to design activity as an organizing activity that restructures perception and place in parallel, reconciling individual schema with need to establish mutual intelligibility. This approaches an explanatory account of learning relevant to enactivism. The mantle of design methods has long been in generating a continuum of responses to inadequacies in thought and incommensurability between situation and problem-solving approaches to deal with problem situations in society with open, complex, dynamic and networked characteristics.

Development of the practice
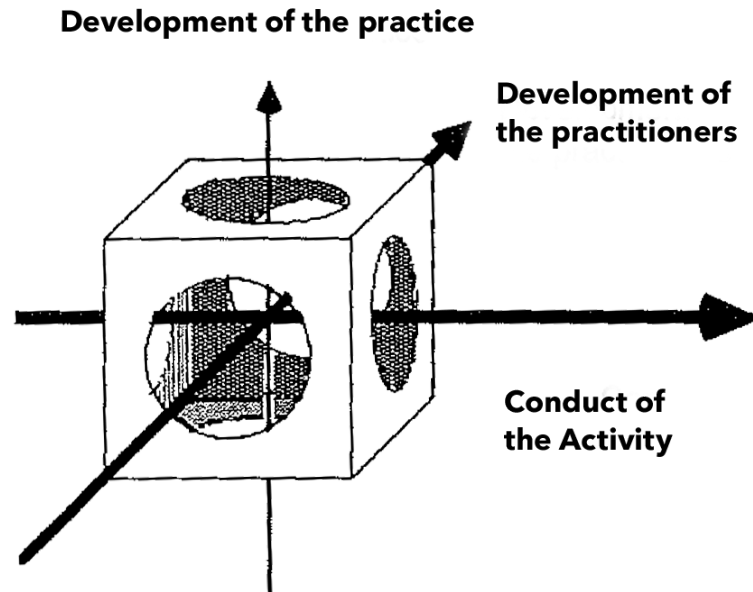
Figure 34 - A moment of human practice (Hutchins 1996).

6.5 Design Fielding

Asking how fields learn and reshape eventually emerged as primary theme. The concept; *field* helps to make sense of domains with intersecting boundaries. Engaging with actual field research, what became apparent is how communities and spaces are mutually coordinated to generate value or values, which often blending instrumental and affective concerns. As meanings are negotiated, place-making occurs, this is consequent of micro-interactions between individuals, but examining the scalar features of collaborative organizing has intriguing potential for research, especially as the domain of learning and learning organizations become ever vaster, exerting influence equivalent to states.

Hutchins (Hutchins 1996) provides a neat way to interlace these concerns in the above diagram, neatly summarizing the principles of *enactivsim*, this is an important means of acknowledging how fields of action (and consequently communities of practice) are progressively oriented – through the conduct of activity, practitioners as agent of practices are continually materialized and in so doing a practice field is progressively shaped by its members. Bringing situated awareness of this into each moment of collaborative transaction highlights the learner's role in the expanded concerns that sit beyond the boundaries of their immediate environment and that they are active contributors to the formation of practitioners and the development of the practice.

This is a view of organizing in a highly distributed, yet highly situated way, fields are not organizations, they are symptomatic of localized organizing. Yet, as organizing practices influence conduct and no practice nor organization is somehow hermetically sealed from another, via influence

whether subtle or direct, practice fields form and are continually reshaped, the common mediating logic – the boundary. Although clusters of particular practice approaches will form in highly situated ways, their diffusion across domains is an inevitable consequence of increasingly blurring boundaries, a primary accelerant are network effects propagated by networked technologies and interdomain collaboration.

Organizations are stabilities of shared practices, practitioners themselves participate in plural membership of worlds, this organizing imagery is common to modern occupations (see discussion of Strauss's Social World image and the persistent logic of sociality). The need to transfer knowledge, transform practices from site to site and circumvent the path dependency and stickiness of expert knowledge are desiderata for organizations, but also for organizational research in general. Design research holds exceptional potential to support innovation in organizations but also in learning environments. As Neiderhelman so rightly asks; *'beyond all the digital demands, what is the place of learning and knowledge in design education? What sort of models will design education need in the future to address these and other issues?'* In the 20 years since writing this, design-led activity has become the defacto route to value creation in organization and increasingly digital organization are switching to an organizing logic and organizational structure derived from blends of software engineering and design methods. Design research as such is in a prime moment to enact meaningful change, or at minimum to understand the influence of mass application of design management strategies on global affairs, whether or not their core propositions are well understood. Buchanan is joined by Neiderhelman and others in asserting we need to spend more time equipping non-designers with design knowledge, but as a caveat to this pertinent questions arise; *do we need more designers? What must they be capable of doing in the future?* and *what must the educational system be that this can be achieved?* (Dilnot in Leiderhelman 2001). Tracking the answers to these questions has transformative implications of special relevance to research. In basic terms though the findings of this study are reasonably clear - designers must be equipped for brokerage, to readily engage with schematic assumptions and to generate and apply new ways of thinking responsive to setting. They must also, like all burgeoning contributors to the fourth industrial revolution, be able to rapidly orient themselves with respect to shifting knowledge and implicate one another in arriving at robust decisions, ideally through cooperative, values-led mutual co-structuring activity.

What is perhaps most significant about the learning organization in question, and by extension learning organization in general is how they actively engage in the generation of individuals who themselves engage in the formation of practices who then propagate these practices elsewhere, a significant and recurrent insight in the research data was how these strongly formed approaches persisted when relocated elsewhere. Vocational training can be viewed as a formative moment in the

practices of individuals and that the flow or transaction of practices around and across communities of practice is a fundamentally important (yet potentially poorly conceptualized) phenomena in contemporary organizational life.

This is why, as Alvesson et al note (2011) schema of *assumptions – in-house, root metaphor, paradigm, ideology,* and *field* assumptions are so powerful to understand the dynamic formation and interaction of practice-knowledge fields themselves (management field, design field etc.) whose boundaries are far from closed. Recognising that assumptions about how the world acts are deeply held but also subject to change over time, these fundamental beliefs are the bedrock of our conceptual system and are the assumptions we are least aware of and least likely to challenge. As Parkes notes, these schema 'constitute our assumptive world' defined as *a 'strongly held set of assumptions about the world and the self which is confidently maintained and used as a means of recognizing, planning, and acting'* (Parkes 1988).

Learning organisations that curate situations, whose specific goal is intervene with these assumptive structures, whether directly or as consequence of being part of communities of practice with both high heterogeneity of backgrounds, but also their own strongly held methodology, are through their activity an agent of frame change activity and consequently are integral to influencing change in the domains of practice they associates with through their membership. Notably, the concepts of *assumptive loss* and *assumptive world* derived from the psychology of grief have been co-opted by management theory to explain organisation change. Notably the Kubler-Ross curve (Kübler-Ross 2011), used to conceptualize traumatic loss often appears as a key conceptual model in theories of organizational change (Rashford & Coghlan 1989). These are an example of the mobility of concepts from one domain to another.

Thus re-habituating concepts that are sensitized to this field-oriented view of practice is a means to highlight how change to assumptive concepts is integral to design methods in general whilst bridging concerns relevant to how learning practices are enacted. Specifically, where expanded sociality and collaboration play a role in practice environments at different scales, design situations are notable examples of this transaction and transformation of practices. As a general concern for how social percepts and spatial factors are blended through design activity in practice. Design cognition in particular involves tacking back and forth across internal / external boundaries to enact change in agency itself but also in sites where formation of agency is enacted in general. A consequent outcome is a supporting framework to understand how highly situated communities influence change in fields of practice at scale. These phenomena of field change are germane to conceptualizing contemporary learning in the *open, complex, dynamic* and *networked* territories that characterise contemporary organisational life.

6.6 Further Research Opportunities

A substantive review of research perspectives on collaboration, reveals much about how group-oriented learning activity differs from traditional accounts of pedagogy. Substantive inquiry also unpacks assumptions underlying social theory, and provides novel perspectives on how learning theory-in-use is enacted. This research presents one such direction is to support expansions to the design methods field, yet observation of collaborative activity points to expansion of the overarching paradigms of learning that are used to organize education.

6.6.1 *Expanding the Continuum of Learning Paradigms*

Observation foregrounds shifts in the learning relationship that do not seem to be accounted for in prevailing theories. Interestingly, this makes a clear link between learning and leadership. The progression of learning relationship from their beginnings in *pedagogy* (child-leader relation) have developed to *andragogy* (adult-leader relation) to then *heutagogy* (self-leader relation) and more recently *life-long learning* (lifeworld to social world relation). Observation suggests possible expansions of paradigmatic considerations used to organize education and research. To expand the epistemological continuum of learning, harking Emery; epistemic relations with sources of learning determine practices. Troubling epistemic assumptions about the stability of learning-relationships, highlighted in the study, continual reconfigurations of spatial and group formation processes were actively implicated to enact learning. This builds on a continuum of design methods and experiential, situated learning theory, which fundamentally are shown to be deeply interconnected.

Synthesis of primary and secondary research implies tentative expansions of the extant paradigmatic taxonomy that are able to anticipate collaborative learning phenomena that leverage collective action and involvement of environment in behavior. By identifying the opportunity to reframe educational epistemology to anticipate group phenomena, the potential to reframe learning relationship generates new prefixes to (-*agogic*) which inhere different relational assumptions that better reflect shifts in how learning occurs amongst groups (observed in primary research) and insights from contemporary design, learning and sociocultural theory (derived from secondary and tertiary research). These tentative steps to identify paradigmatic inadequacies in explanatory understanding and to engage with the simple semantic task of reframing learning relationships is worthy of critical discussion.

6.6.2 *An Expanded Pedagogical Framework*

Coetagogy *(group-leading)*
(from *coetus* – meaning group, assembly or meeting)

or equally;

Synagogy *(amongst-leading)*
(from *syna* – meaning together)

&

Ambitagogy *(environment-leading)*
(from *ambitus* – meaning extent, encircling field, circumstance, context or surrounding)

Or equally

Habitagogy *(habitat-leading)*
(from *habitus* – synthesising the dual meanings habit and habitat)

Deriving approaches meant to destabilise assumptions about the source of learning emerge from sensitivity to the core learning relationship, this is supported by innovations social and spatial theory. In practice, just as different versions of rationality become practicable in different settings, so a polytelic appreciation of learning relationships is appropriate to describe the variety of different ways that people engage in legitimate and authentic learning.

Fundamentally, *Heutagogy* (self-led) remains the primary way that people organise themselves with respect to knowledge and their social contexts. Knowledge decoupled from acquisition becomes a question of orientation, to be equipped to locate the appropriate kinds of knowledge and organise with respect to these remains vital, there is equivalence between the need for this inside and outside formal institutions. Being able to readily evaluate and discriminate the value of knowledge and establish relational understanding between disparate and partial sources represents a fundamental learning literacy of the 21st century, which acts as redoubt against the shaping influences of social networks, dominant and alternate media framings. Research into providing learners with these kinds of literacy early on and with intellectual honesty about the practicalities of actual lived collaboration is vital and should not remain only in the domain of research.

As social mobility, generativity and huge disruptive influences can come from properly motivated and resourced individuals or small groups, barriers of access to learning are lower than at any time, whilst the bar for entry to specialist communities of practice and the rate at which their internal knowledge is

expanded and reconfigured has never been higher. This places profound duress of individuals to access the right kind of learning continually and throughout all life-stages. As such, cognitive apprenticeship, coaching and mentorship remains profoundly important, this becomes a matter of organising routes of access. There are singular value propositions to vocational learning situations no attainable through self-organised individual learning made possible through vastly expanded access to learning materials on-line, these are centred around the facts of collaborative exchanged enabled by working together. Bourdieu's sceptical view of social capital and habitus is as likely to guarantee exclusion as inclusion, who gets to know and whose point of view counts represent major thresholds of social power in the 21st century. As such research into inclusive strategies for education and issues of representational ethics and epistemological justice are of high significance. The inclusion of diverse assumptive viewpoints is a primary strategy to support adaptive innovation and bringing the domains of design and use closer together, ensuring different types of minds are able to influence decision-making is absolutely pivotal. The value of this, especially in technological innovation was shown starkly in investigations of stories of disenfranchisement and emancipatory power of participation. Equivocality, a flattening of voice, generating design experts who are able to facilitate meaning brokerage across boundaries and champion different ways of thinking are tantamount to organisational advantage but also support wellbeing and societal flourishing.

The generative frame; *boundary activity* was stimulated by interrogating psychological and sociological treatments of boundaries. Evaluating observation of Hyper Island's distinctive learning relationships and methodology with respect to theories of collaborative activity has generated much new understanding. As situations that exemplify approaches to societal co-structuring, co-organising and co-evolving with respect to shifting social and economic conditions but that also reconcile how material-conceptual relations are encountered in design situations, through the generation of joint fields.

Marková's dialogicality (2003) insists variance rather than stability should form foundations for social theory, anticipating continual reframing of social representations and relation, this aligns with Schön's prognostication on the loss of the stable state. Apt response means reattending to how experiences of group relations generate learning, interpreting ongoing negotiation of social capital within a dynamic field, a distinct form of integrative expertise formation; *fluent orientation*. Increasingly, professional expertise relies on capacity to rapidly reorientate and to anchor to dynamic entities rather than imagine static ones.

As learners experience progressive deracination, gradually becoming inured, engaging in continual perspective-taking and place-making activity, the gain mastery over situations in flux. Formation of collaborative expertise amongst groups via group formation equips learners to fluently orient to rapidly

shifting circumstances. Tentatively, such *fluent orientors* are able to enact dynamic anchoring to counter situational flux. Arguably, this process of expertise formation is under characterised, but of increasing value to organisations undergoing rapid transformation. To question the fitness of existing learning epistemologies to reflect the insights stemming from observation provides impetus to generate new assumptive grounds for fields of design and learning, but also the support their diffusion as general approaches.

As future research directions characterising the features and implications of changes to learning relationships and how access to learning impacts success in acclimatising to different professional structures, evaluating which learning settings and formats actually provide pertinent learning experiences becomes the imperative to reorganise strategic provision. Certainly, threats to formal organisation of university systems by challenger models and especially recent rapid transformations over to online, mediated and distributed forms of learning and collaboration present tangible challenges and stimulus to develop new models of education.

This corresponds with directives set out by in the research questions, responding to Alvesson's call to problematise assumptions which suggests a taxonomy of relational assumption scaling from framings shaping individual perspectives to framings negotiated amongst groups through to assumptions underpinning fields.[78]

Yet if collaboration at boundaries is as profoundly generative as we assume, it's potentially fundamental to innovation precisely because of the tensions inherent in achieving mutual intelligibility, a fundamental sociological concept. Research in this area, that examines how blends between practices, methods and field becomes a profoundly fecund territory, means to evaluate potential quality and efficacy of collaborations. It also focuses research on ameliorating the likely difficulties arising from the realities of schematic distance between disparate worldviews, to achieve this would have general utility in learning generally. It also suggests unexploited theoretical territories; duplication of work and comparable concepts are masked under competing attempts within specialist communities to attend to general issues shared by fields, creating unified interpretations is problematic, and often unwarranted, given the realities of situativity - these must instead be exchanged and built on site then exchanged via cross-domain collaboration. This can be achieved practically by creating opportunities for schematic negotiation amongst collaborating individuals and across communities they participate in.

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[78] Alvesson highlights Simon's challenging of the assumption of economic rationality to arrive at bounded rationality as one such example of how challenging field assumptions can be profoundly generative.

However, certain practices and forms of cognition are of general value for particular reasons, namely design cognition, design activity often is resistant to generalizability by virtue of its situativity. As such proper basis for future design is to reveal foundational strategies that allow for situated knowledge to be generalized and mobilized across boundaries and between domains, most likely by conscious enactive activity. The most efficient strategy presently is widespread and continuous interdomain collaboration, so organizations that learn through this process and that facilitates this kind of engagement, and research that investigates this remains highly desirable. As potential for technical specialism grows, so does need to better characterize integrative forms of expertise.

Chapter 6: Conclusion

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8 Appendix A

8.1 **Prior Research & Pilot Studies**

Research assets from precursor case studies formed a foundational of understanding that was taken forward into primary study. There were two parallel streams to the early exploratory phase of this doctorate;

1. *The first explored design methods, namely film / interaction design applied to collaborative social research.*
2. *The second explored blending design methods, specifically design fiction with social research methods, specifically ethnography and design ethnography, to derive novel practices and methodological directions.*

Each resulted in research contributions, either research publications or design outcomes, blending film and interactive design.

8.2 **Research & Film - Narrative Worlds**

1. Investigating Collaborative Research Practices via Film & Ethnographic Documentary.
These studies blended ethnographic and documentary processes to investigate and develop narrative accounts of collaborative research projects [79].

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[79] These individual case studies were formative of the main study of the research, exploring how narrative-making outcomes exploring the overlaps between design research methods such as film and boundary objects as a means to drive collaborative strategy. These were approached by combining ethnographic observation with design research approaches to derive methodological innovation.

8.3 **Primary Activities**

8.3.1 *CATALYST Research Project*

Citizens Transforming Society: Tools for Change

EPSRC Reference: EP/I033017/1

Selection of films created as part of sprints internal to the overarching Catalyst research funding;

8.3.1.1 *Patchworks*

Catalyst Sprint Project 1 - [Patchworks]{.link}

#Patchworks is a citizen-led co-design project to design innovative technologies for and with homeless people in the North West of England. The project involved 3 quite distinct communities: Signposts, a community resource centre that works with homeless people in Morecambe; Madlab, a community of DIY hackers and creative technologists in Manchester; and an interdisciplinary community of academics from bio-medicine, computing, art-design, anthropology and management science from Lancaster University, as part of the Catalyst project (www.catalystproject.org.uk).

This video was made to communicate the Patchworks research to a wider public audience. It shows how through a series of practical electronics workshops and discussions the co-design team developed a prototype to help homeless people, whose lives are often characterised as 'chaotic', to access important appointments.

[(Film Link)]{.link} (Co-Authored Paper)

8.3.1.2 OnSupply

Catalyst Sprint Project 2: [On Supply]{.link}

Stimulating a dialogue on renewable energy through making.

'This project will work with local communities to co-design interactive technologies aimed at reinforcing the connection between citizens and the energy from their turbine."

Renewable energy sources challenge us to think differently about the expectation that energy is always available whenever we demand it. 'On Supply' will work with the citizens of Tiree, a small island off the west coast of Scotland, to explore how new energy awareness devices might help communities reflect on when energy is available and promote use at 'greener' times'.

(Short Film link) (Interim Film Link) (Full Film Link)

8.3.1.3 ACCESS ASD

Catalyst Sprint Project 3: [ACCESS ASD]{.link}:

Access ASD is a new research sprint in the Catalyst project that will devise digital tools to help adults in the community with autism.

The principal research question is : *To what extent can digital technology be effective in reducing barriers to societal and civic engagement amongst people on the Autism Spectrum?*
(Film Link)

8.3.2 *ESPRC Telling Tales Grant*

The Telling Tales of Engagement (TTE) Awards are funded by the EPSRC Digital Economy (DE) Theme. It is designed to help capture and promote the impact arising from Digital Economy research supported by UKRI. This grant provided follow on funding to produce an interactive narrative system to explore the project.

[Outcome: Catalyst Interactive](#)

An innovative system was created to allow project participants, stakeholders and public to explore a suite of 14 films through an interactive system. The research objectives was to contribute to advanced interactive narrative systems and interaction design. This allowed development of practices applying embedded narrative ethnography and design research methods to develop dissemination strategies for research narratives about citizen driven technological innovation.

Application supported by Prof. Jon Whittle at Lancaster University. **Project record** [Link](#)
Project Title: *Yes We Can! Interactive Stories of Digital Technology and Social Change*

8.3.3 **CLASP Project**

Clasp Digital Tactile Anxiety Management for the Health Internet of Things
UKRI Grant Ref: EP/L023644/1

Follow on funded development of wearable prototype for Autism associated anxiety, citizen driven innovation. Embedded ethnography to develop narrative about alternative narrative of technology development and wearable technology that acts as narrative artefact.

Project Record: http://www.research.lancs.ac.uk/portal/en/publications/clasp(a74f3fd2-769d-48d2-af0e-736c6e7be3f9).html

(Film Link)

8.4 Secondary Activities

8.4.1 *DARK MATTERS Project*

AHRC funded research project

Interdisciplinary Research Group exploring perspectives on imperceptibility & innovation.

Collaboration between Arts, Anthropology of Science & Mathematical Cosmology.

Embedded in research team, team dynamics, knowledge transfer resulting in a Shared Narrative Artefact.

Finalist for Best Research Film of the Year for AHRC Research in Film Awards 2017

Outcome: Film link / UKRI Announcement

Permalink; https://vimeo.com/223987276

Project Details:

Project Website: here

Permalink: https://darkmattersproject.wixsite.com/thresholds - !about/mainPage

AHRC Project Site: here

Full permalink: https://www.sciculture.ac.uk/project/dark-matters-an-interrogation-of-thresholds-of-imperceptibility-through-theoretical-cosmology-fine-art-and-anthropology-of-science/

8.4.2 *REFORM Project*

Collaboration with GHOST Shape Changing Displays Team, part of School of Computing & Comm. Design & User Narrative process to develop working demonstration as research output accompanying paper for 28th ACM User Interface Software and Technology Symposium.

Outcome Film Link

Project record link

8.4.3 *AGEING PLAYFULLY*

AGEING PLAYFULLY with DEMENTIA FUTURES TEAM Project

Short Narrative Film developed with E. Tsekleves to produce outcomes Dementia Co-Design Workshops and outcome from interdisciplinary Dementia Futures Event in Lancaster.

Film - https://www.youtube.com/watch?v=jYCAABnnpRU&feature=emb_logo

Project Website: https://imagination.lancaster.ac.uk/update/ageing-playfully-video-journey/

Several other engagements in interdisciplinary research projects both in industry and academic research settings charged with the role of developing interpretive strategies for the project, producing narrative.

8.5 Design Research Futures – Narrative Worlding

2. Investigating collaborative research through design (RtD) strategies. This research brought together three collaborators (the Author, Joseph Lindley & Dhruv Sharma) in a highly generative exploration of the overlaps and boundaries between design and research methods – RtD, specifically design fiction and social research methods, specifically ethnography.

8.5.1 *Methodological Innovation*

The precursors studies represent examples of experiments to blend social research and design methods in collaborative research contexts. An iterative design approach was useful for investigating how novel research methodologies can be adapted for technological innovation, specifically by exploring the practice boundaries between research through design and ethnographic research. These early research studies provided strong foundations to understand the dynamics of interdisciplinary research and issues pertaining to advanced collaborative strategy. The research explored how design methods can be applied in different collaborative settings, drawing together several strong themes; notably boundaries & interfaces in collaborative practices, issues of space & place in research and learning and design methods concerning futures. Together, these prior explorations strongly influenced the researcher's initial disposition to the primary doctoral research, providing experience and a testbed for emerging concepts and approaches. This resulted in the generation of a number of original approaches adapted to frontier sites of collaborative research characterised by sharp epistemic boundaries within collaborative teams whether between diverse disciplinary specialists, industry professionals and public stakeholders. Pertinent experience of collaborative dynamics was germane to investigate general issues of collaboration wherever highly heterogenous communities interact towards purposeful outcomes.

8.6 **Supporting Research Publications**

Research contribution as individual or as part of research with collaborative partners with links.

Papers were presented at several international conferences and journal publications. These papers each investigated instances of interfaces, boundary-crossing or boundaries in research (in chronological order)

Design Education at the Boundary
Potts, R. (6/09/2017) The Design Journal. 20, Suppl. 1, p. S4263-S4280 18 p.
Contribution to journal › [Journal article](#)

Special Edition on Ethnography Matters: Post Disciplinary Ethnography
Lindley, J., Sharma, D., Potts, R. & Wang, D. (26/01/2016) Ethnography Matters
Contribution to specialist publication › [Article](#)

Operationalizing Design Fiction with Anticipatory Ethnography
Lindley, J., Sharma, D. & Potts, R. 10/2015
Ethnographic Praxis in Industry Conference Proceedings. Wiley, p. 58-71 14 p.
Contribution in Book/Report/Proceedings › [Paper](#)

Shared Ethnography of Shared Cities
Potts, R., Sharma, D. & Lindley, J.
10/2015 EPIC 2015 Proceedings: Building Bridges. Wiley, p. 88-104 17 p.
Contribution in Book/Report/Proceedings › [Paper](#)

Anticipatory Ethnography: Design Fiction as an input to Design Ethnography
Lindley, J., Sharma, D. & Potts, R. 7/09/2014 2014 Ethnographic Praxis in Industry Conference Proceedings. American Anthropological Association, p. 237-253 17 p.
Contribution in Book/Report/Proceedings › Conference contribution / [Paper](#)

A Machine Learning: an example of HCI prototyping with Design Fiction
Lindley, J. & Potts, R. 2014
NordiCHI '14 Proceedings of the 8th Nordic Conference on Human-Computer Interaction:
Fun, Fast, Foundational. New York: Association for Computing Machinery (ACM), p. 1081-1084 4 p.
Contribution in Book/Report/Proceedings › [Paper](#) – [Film Outcome](#)

9 Appendix B

9.1 Methods & Methodological Approach

9.1.1 *Adapting Grounded Theory*

In this appendix, I show how I contextualise this research method and methodology to the research context, adapting intuitively to the specific conditions driven by guiding insight and practice-based experience emerging from the pilot studies. The objective is to show how data was interpreted.

Grounded Theory is an inductive methodology. The Grounded Theory Institute insists all research is "grounded" in data, but few studies produce a 'grounded theory'. Literature indicates that Grounded Theory is a general method, not a qualitative method. It attempts to engage in the systematic generation of theory from systematic research. It inheres rigorous research procedures leading to the emergence of conceptual categories. These concepts/categories are related to each other as a theoretical explanation of the action(s) that aims to continually resolve the primary concern of the participants in a substantive area. Grounded Theory can be used for either qualitative or quantitative data.

Christiansen (Grounded Theory Institute et al. 2014), explains key differences between "classic" or "Glaserian" GT, and other grounded methods. Noting three "hallmarks" that are unique to Glaserian GT and indicate how Glaser's approach differs from the other approaches. There are indications that Glaser's approach is meant as a reflexive and recursive process, the goal appears to be to derive consilience upon a central thematic concern within the total contextual field by creating looping internal relations that amplify thematic relationships in the data. In this appendix, I show how I contextualise this research method and methodology to the research context, adapting intuitively to the specific conditions and my own guiding experiences which emerged from the pilot studies. The goal here is to show how data was interpreted;

Glaser indicates;

(1) **Q** - *If there are many equally justifiable interpretations of the same data?*

A - Identify the core variable, as the first step of the study, then delimit to the core variable *(what is the main concern and its recurrent solution?)*. This means gather a global heuristic frame to understand the contextual field as a whole.

Contextual Response -

Entering the study, my assumptions and preconception informed the decision to examine this research context. GT forces reflection on assumptions and attempts to delimit the impact of initial framings, in other words it's useful as research methodology. The focus on the dynamics of collaboration and the role of artefacts in this process, initially led me towards applying narrative methods and film-making procedures as a bespoke investigative research methodology, to engage in the development of better boundary objects and to use the study as a design space to develop better shared artefacts. Embedding in the context quickly led the research away from this assumption, shifting from the *know what* to the *know how* that was occurring in the context. The complexity of the setting and plurality of activity presented key challenges to the application of the initial research agenda, also engaging in research through design was too closely allied to the forms of activity the participants were engaged in.

(2)   Q - How can we make intelligible the main concern; the goal is to *'get through to exactly what is going on in the participant's recurrent solution of their main concern'.*

A - To accomplish this, the researcher acts to suspend their preconceptions and assumptions, the goal to remain open to trust in *'emergence of concepts from the data'.*

Contextual Response -

The surprising apprehension entering in the context was the emotional impact and confusion participants seemed to be experiencing as they entered into the initial interactions, parallel discussions with the organisational coordinators and strategists foregrounded the sanctity of the early onboarding experiences – the Way Week, a strongly structured learning design used across different sites within to the organisation to induct participants into the profoundly strong culture of the organisation and inured a heterogenous group into a common situation entraining several strong behavioural attitudes which aim to guide conduct stemming from the organisation's core methodology. Participants anecdotally report experienced a profound loss and remaking of meaning by simultaneously being bombarded with an overload of interaction and interpersonal affinity building. Most were also decoupled from their social anchors – place and social structure. Moving to a new city or new country the sense of dislocation was palpable. It quickly became clear that learning was being forced by an imperative to quickly re-anchor or reorient to a new social group. The specific setting was both deeply embedded in the industrial arrangements of the local and national economy but the groups that formed were distinctly outside of the normal social space of the city. Participants quickly anchored to one another, not without conflict, emotional duress and confusion, they also, for the most part,

seemed to find solace in amplified attention to cultural conduct and a reverence for their newly adopted internal processes. As such, their principle concern seemingly had much to do with reconciling their assumptive world, inherited from their previous experience with the formation of a strongly structured group culture facilitated quite deliberately by the organisation.

Although initial research had explored literature pertaining to the loss of sense-making and the role of heedful interrelating and their relevance to organisation learning, the sharpness of how this process was occurring within the studio was inescapably present. In the initial stages of building trust and license to breach this culture, access to many of the initial learning experiences were blocked, only through retrospective dialogue and observation of and discussion with people leaving these incidents did it became clear how profoundly disruptive and emotionally charged these incidents were for many. As the researcher attempted to slough away assumptions and gain an unbiased perspective, it was clear that the participant learners where being encouraged to do the same, their assumptive grounding was being brought into discussion and progressively destabilised through the co-examination of their interpretive schema of along with others in the environment. The qualities of the dialogue with participants at this stage attests to this. There was no sense of coercion and generally this group formation was experienced as intense but positive.

(3)   Q - How might we avoid descriptive interpretations in favour of abstract conceptualizations by the method?

> **A** - *Focus attention on constant comparison, which facilitates the discovery of stable patterns in the data (i.e., "emergence of concepts").*

Contextual Response –

In the early stages, in professional practice overlapping with the pilot studies, I found applying a documentarian's mindset to the context was useful. I had built expertise in the practices of interviewing, eliciting insight at an assumptive level by very carefully listening to responses to direct, simple, open questions – *What does this mean? Where is the knowledge? What is going on here?* I had found these were frustratingly imprecise for interviewees, particularly those from academic settings with a high demand for specificity, but decoupling questioning from conduct stimulated accessing metacognitive reflections that circumvented defensive discipline specific detail which obfuscatesAsking imprecise totally open questions and claiming total ignorance was an important strategy because it provokes an interviewee to engage in the process of making their own sense, often their accounts were descriptive and lacked conceptualisation of meanings. Often interviewees indicated frustration with their inability to explain their actions, progressively finding inconsistences and assumptions underpinning their action. This highlighted key differences between impressions and

actions, mismatched between saying and doing and failure to articulate was common. By listening very carefully for cues like indecision, confusion and uncertainty the line of questioning emerged progressively, simple question Feedback from research participants was overwhelmingly positive after a period of intense discussion, the interviewer assumes the role of external holding place for a developing explanation, by repeatedly playing back a summary of their answers accompanied by a stock question, *do you mean this?*

Through this, an original line of questioning was allowed to emerge – this came from the participant. In this way I was able to avoid leading and encourage absolute candour and trust. Not minding being frustrating in service of collectively realising a better sense of a situation was exceptionally useful in producing shared narratives that captured the disjuncture, failure to arrive at consensus and rich fabric of interaction in a complex collaborative setting where the outcomes were far from set or known despite extensive planning and rigorous organising strategies. This was a profoundly useful strategy that I carried forward into the learning environment research context. Dropping assumptions and emptying preconceptions became obsessive. An important general question became *'What are you thinking about?'* or *'How are you thinking about this?'* very quickly it became apparent that the focus wasn't on individuals but what being part of a group meant and what individuals had to do to be part of a group. Individuals were quickly reframed as agents within a group entity acting as informant to illicit intergroup flows of meaning. Questions became more group focused; *'How are the group doing this?', 'How does the group see this?'* or *'How is the group deciding this?'*

Alongside this, steadily as trust was built, strong relationships and personal concern was developing, I progressively developed a collective impression that I was open for discussion at any time, participants started to approach me to speak, by maintaining ambivalence to what they were designing or learning emphasising how they learned something or how this changed their understanding, I was able to establish rapport and friendships. I had learned to sit on the edge, suspend judgment and refrain from comment on anything but their experience of how the learning was affecting them, and how it was affecting me. This was a potent mean to build trust and gain credibility because I was the only person in the environment who had no responsibility to engage in task or their organising. Alongside this, two influences were exceptionally relevant – tracing back through the organisation to understand its origins, by speaking to founders and strategists I developed a growing sense of the intended meanings of the experiences and tensions between this and what learners were experiencing. I was profoundly aware of poly-voicedness – every person had an impression of Hyper's origin narrative, which was either a remote imaginary or something they had directly experienced. I started to notice patterns and relationships and also divergences between narratives – this became the singular focus – *'Why is this environment like it is and how did this come to be?'* Speaking with founders and strategists, they

collectively pointed to group dynamics and the Human Potential Movement – in terms of pulling in theoretical accounts – the search was induced through ongoing dialogue.

Vitally, an account of the moment of inception of Kurt Lewin's research program on Group Dynamics became a proxy research context – this highlighted Lewin's emphasis away from content onto conduct (Bennis & Biederman 2010). Finding simply that working sessions tended to descend into overfocus on details, personal concerns and identity. Lewin's 'innovation' that spurred the development of group dynamics was to have reflection session between researchers at the end of a day and surreptitiously position the sessions and leave the door open to where participants were putting their coats in preparation to leave – Lewin found that participants would eavesdrop and then sensing there was no barriers to their participation would drift into the room where researchers discussed how they had acted (not what they had said). Eventually, these sessions became the research study itself. Replicating this strategy of collective reflections fully allowing participants to vent attending to their conduct rather than content was instrumental in eliciting insights beyond descriptive accounts of the days designing and learning. This allowed the nature of the data to move beyond descriptive accounts into conceptualization. Having both of these in the data was a powerful way to create joint impressions, creating relationships between observation and their interpretations. As embedding in the culture proceeded, this reflexive questioning approach intensified, as sense emerged, an active sensemaking strategy felt natural, the researcher actively involved in inquiry at the level of perception. I deliberately engaged in playing back partial sense about a situation or an aggregate of activity into interpersonal discussions with key stakeholders. The goal of this was to close (or open) loops, to create feedback between emerging interpretations and then eliciting queries about the perceptual schema of participants. Imparting partial accounts of what I thought was occurring elsewhere in the context and asking *'I think I am seeing this, how does this fit with your impressions?'* or provoking reinterpretation of existing interpretations *'I think this, how does this resonate with you?'*. This seemed to sit well with the experiential learning process that purportedly (and evidentially) underpinned internal activity.

The cyclical activity of *concrete experience, reflective observation, abstract conceptualisation* and *active experimentation* (drawn from Kolb 2014) was tacitly appreciable to participants and an acceptable way to engage with individuals in the organisational network. This kind of iterative looping common to experiential learning theories would be sensible in design research methodologies such as RtD. Questioning at the level of perceptual schema attempting to elicit organising concepts, or attempting to, was both intelligible and useful strategy to engage with denizens of a tight knit organisational network. As Gidden's observed, reflexive monitoring is a 'chronic activity of everyday action' involving conduct of the individual but also others. 'actors not only monitor continuously the flow of their activities and expect other to do the same; they also monitor aspects, social and physical, of the

contexts in which they move. Incisively, the rationale of an active research method is to sensitively acknowledge following Giddens; that actors routinely and without fuss – maintain a continuing 'theoretical understanding' of the grounds of their activity (Giddens 1986) and to naturalistically integrate with this – this approach to dialogue was germane to the goals of the research, in that it sought to engage with the process of reflexive monitoring, motivation and then rationalisation of action ongoing in participants. Notably, often seamlessly, people are able to reconcile their own values and schema with those of the organisation 'field' around them, this flow of conduct amongst a community, tacking back and forth between concrete and abstract via reflective and experimental activity.

9.2 **Methods Appendix 2:**

9.2.1 *Applying the Grounded Theory Process*

A classic (*Glaserian*) Grounded Theory (Glaser 2014) study proceeds sequentially. Stages are generally sequential, but once research process begins they are often conducted simultaneously, as the particular research requires (Grounded Theory Institute et al. 2014). The methodological approach used in this doctorate followed (with some contextual adaption) the stages prescribed by Grounded Theory, a process which incidentally aligns with the iterative or appreciative modes of inquiry common to design and system theory processes.

Simmons (2010) notes that both learning, doing then teaching Grounded Theory is an incremental, recursive process. Outlining this sequence, to make the inquiry process clearer, at each stage I show how the research approach was applied (and adapted) to this research context.

1. Preparing   To minimizing preconception, no preliminary literature review.

Contextual Response - I had already conducted an extensive lit-review of on the theory of collaboration and focus on shared artefacts, this is what I was searching for, attempting to elide this intent is disingenuous, the goal was to examine collaborative interaction through deliberate design. Identify a general research topic, but no predetermined research "problem.". Experiences from design inquiry made me intuitively understand the problematic nature of problem solving, given the fact I wanted to explore design experts learning and doing design activity, it was meaningless to pretend this overarching shape wasn't important. However, I quickly abandoned solutionism in favour of attention to problem-setting. The study began to move towards an examination of integrating framing through collaboration, this set out the path to resultant extensions to design inquiry by learning from design inquiry process not in individuals per se but amongst individuals in highly dynamic contexts.

2. Data Collection: Commonly; intensive interviews, often combined with

participant observation. But, any type of data can be included, including quantitative.

Contextual Response – I made extensive use of participant observation and used staged clusters of interviews to unpack and sense-check contingent insights and bolster the conceptualisation process.

2.1 Theoretical Sampling – Initial analysis determines *where to go* and *what to look for*.

Analysis and data collection reciprocally and continually inform one another.

Contextual Response – **During the ethnographic study,** the inquiry process moved intuitively towards this, each stage of reflecting on data was conterminous with engagement with informants in context – this afforded the researcher the opportunity to constantly playback, reintroducing provisional interpretations back into the research context to see how they work amongst the participants and help the mutual context orient itself and point towards next steps. The grounded theory that emerged actually was guided by the dynamics how these looping iterations of sense-making, or more closely narrative-making were experienced throughout the research enquiry.

3. Form of Analysis: Constant Comparative Analysis

Relating data to ideas, then ideas to other ideas.

Contextual Response – As above, this integration of provisional sense back into the operating field proceeded intuitively, the more ideas were emptied out and assumptions sacrificed to the context, the strong the conceptualisation became. There are obvious threats to validity in this process, refraining from establishing causal constructs and allowing relational schema to emerge, to bolster a better understanding of the participant's practices in collective conceptual/expertise formation and my own concept formation about this process was amplified. The product of this formed the shape of the thesis, this was research occurring *in vivo* (within the livin*g*), reflecting on the nature of field research itself and how activity systems form and interact *in the field* gave shape to the emergent theory. The ethnographic data, using first software packages for qualitative memoing, coding and thematising - **f4 Analyse** (for its barrier free interface and simplicity) and then **MaxQDA** were used to thoroughly parse the data through several stages of coding, which involved the application of an emergent code system (see here).

3.1 Substantive Coding - Substantive codes summarize empirical substance.
The goal is for these to have grab, relevance, and fit.

Contextual Response - No code system was applied a priori to the analysis, instead as clusters of thematic interest appeared through exploring, codes were applied progressively to group incidents. For example, what emerged as the theoretical cluster **Affect** arose through noticing the prevalence of interactions that attended to emotional state; discussions of emotional duress arose regularly with respect to issues of organising, this seemed to arrive through different meanings ascribed to conduct – for example timekeeping, in several incidents prolonged discussion focused on respect for other sense of timing, with both views represented, this seemed to overlap with spatial concerns for how the studio and shared spaces were maintained as some of the group arrived early to find late leavers had not reset the studio space or cleaned dishes. This evidenced overlaps between temporal, spatial and emotional discussions, a highly prevalent code; **Stress, Conflict, Crisis** was seen to overlap with **time organisation** and **situation** codes.

3.2 Sensitizing concepts – This implies that concepts are "accessible" through imagery.

Contextual Response – In arriving at the supposition that interpretive schema were intrinsic to the formation of boundaries. These schema lead to organising activity which result in closed worlds that conform to certain world views, the cultural directives. An important strategy was to try to codify

insights into analogous thinking, by using metaphor and asking for analogies to describe meaning behind activity, I was able interact at the level of interpretive schema underpinning theories of action.

3.3 In vivo concepts - Concepts inherent to the scene of action. As the thematic codes arose and were organised, higher order codes also emerged.

3.4 Open Coding - Coding for anything and everything.

This meant asking three general questions of the data:

A. *"What is this data a study of?"* thus leading to discovery of the *'core variable'*.
This core variable becomes the focus of the research and theory.
The core variable is the variable which accounts for the most variation.

B. *'What category does this incident indicate?'*

In the coding process, paying attention conduct rather than content, the decision to assign a code stemmed from the activity participants were engaged in terms of primary forms of activity (e.g. #Guiding) interacting tensions indicative of relevant boundaries (eg. object/process), organising structures (business or network structure) or dimensions of interaction.

C. *'What is actually happening in the data?'*

This directive prompts re-evaluation of the data set to understand relationships further removing biases and increasing validity. As sense emerged from the data set, I engaged in a process of reflection and reflexive monitoring in parallel, this was how tentative insight was made explicit and sense checked, by replaying my emergent sensemaking to participants in the study, particularly key informants, particular care was taken to transfer this knowledge across boundaries, moving observation from out of context to another relevant site in the organisational network.

3.5 Selective Coding – This occurred reflecting on the core variable and major dimensions and properties had been discovered.

3.6 Closed Coding A process of proceeded which limited coding to incidents related to the core variable.

3.7 Theoretical Coding – In truth, the major theoretical codes emerged through reflection, it is unclear how influenced by the initial experiences of the researcher. Theoretical codes conceptualize how the substantive codes may relate to each other as hypotheses to be integrated into the theory.

Contextual Response – As the analysis proceeded, indications that incidents pertaining to the realm of affect were highly prevalent in the code scheme, the codes **Emotion / Empathy, License, Value / Values, Stress / Crisis / Conflict, Body / Physicality / Sensory** were eventually grouped into a single cluster called Affect. The early suspicion that the learning environment was one where the emergence and negotiation of boundaries would be visible, it was increasingly pressing to account for dynamic negotiation between individuals as group interaction is prioritised aspect of the learning process. In parallel, a number of codes that indicated the process of articulation arose, partially led by this original focus on boundary interaction between heterogenous groups, this was later grouped as the thematic group **Structural** to denote how articulation was applied to apply structure to emergent design processes, for participants to guide and shape one another's attention, but also crucial to shape the physical environment of the studio, which was in constant flux, as articulation proceeded so did the emergence of various modes of evidence building, mainly pointed at representing the status of emerging design processes, but also to strongly indicate expectations of cultural conduct, humour and shared experience. These subcodes **Structuring / Restructuring, Awareness / Perspective / Guiding, Narrative, Boundary / Barrier, Boundary Object, Model / Prototype / Tools, Modality of Communication, Brokerage** slowly to reflect concerns for mutual coordination and articulation, these were different in nature to concerns for the actual processes of designing and learning, but highly interlinked. It was important to discriminate between issues of learning about design and demands to coordinate. As thematic groupings were produced, three primary meta codes emerged; **Activity (1565), Affect (1535) & Structure (1176)** (in order of prevalence).

The ethnographic data generally points towards organising with respect to shifting ground. The learning environment, which is an adaptive reaction to contextual shifts in its operating field (digital transformation) acts to disrupt the assumptive grounding of participants via ongoing group interaction pointed towards design and innovation, their reaction is to learn how to adapt to this disruption, as a consequence become *fluid orientors*. This is highly valued in industry and research settings where restructuring of relational systems is causing them to feel demand for constant restructure. Readymade tool-kits are found wanting, thus individuals with these capacities are desirable leaders, especially those that can broker restructure on behalf of organisations and within cross functional teams. The embedding of these attributes into working culture exerts internal restructuring tension upon existing structures, which interface with external restructuring tensions via ongoing interaction.

The guiding assumption; that actively attending to tension across boundaries between activity systems creates opportunities for learning.

4. Memoing

Memos as the theorizing write-up of ideas about codes and their relationships.
The method advises that data collection, analysis and memoing are ongoing, and overlap.

After the initial analysis, memoing took precedence, the formed the precursor to the actual write-up of what is emerging from the data analysis. The data was returned continually throughout for further analysis and to look for evidence of emerging directions. While writing memos, I engaged in thinking and writing theoretically in a "stream of consciousness". As I discovered more about the subject matter, the memos were progressively modified as the features of the topic became intelligible. As grounded theory emerged, it was clear that ideas were fragile and needed to be represented. The process of diagramming was an extremely useful strategy.

5. Sorting & Theoretical Outline: In GT, sorting refers conceptual sorting not to data sorting, by sorting memos an outline of the emergent theory arose, showing relationships between concepts. This process generated more memos, and these were used in a summative tranche of interviews (mainly conducted visiting Hyper Island Stockholm headquarters after the principle ethnography, this was used as means of sense check the code schema.

6. Writing: The sorting process led to the initial write-up, which was a conceptual exploration of concepts indicated in the data. The process has then been an iterative process of amplifying sense.

The analysis and open coding phases resulted in a complex code system detailed here, this was organised progressively as themes emerged from the data, beginning with open analysis of each day chronologically, themes emerged from incidents which were then established into first individual codes then relationship codes, these were then coded into thematic clusters – the general concept boundary was used to demarcate interesting interfaces and functional boundaries. The general idea of examining tensions between key ideas and looking for boundaries gave the code scheme shape.

After the initial thematic coding, it was important to understand semantic relationships in the text, to understand how and where attention was being focused in the memoing process, a heuristic visualization tool was applied, a pleasing outcome meant the data set could be treated as a kind of relational landscape. Following the general conceptualization of the organization as an interaction territory, a method to create an overarching pass of interpretation, based on frequency, to understand relationships in the text was particularly useful.

9.2.2 *Integrating the Literature*

The GT institute advises as confidence builds in an emergent theory, you should begin to analyse and integrate relevant existing literature into it. The process of integrating theoretical material into the study was progressive, the initial suspicion guiding the study was to examine the context in terms of boundaries. GT implores researchers to make theory earn its place in the study, I approached this comparatively. Examining existing theoretical constructs – specifically theories of activity, I found these built on other construct entities, which required unpacked, this defined the shape of the study – finding parallels, overlaps and examples where constructs and processes used in one theory had become the basis of other theories. An example of this was the used of social worlds in boundary object theory and the application of boundary objects into communities of practice theory of learning. In other case, for example the principal proponents of boundary object theory and activity theory had collaborated to explore mutual ground. Finding Leigh Star had worked with Bruno Latour in the early development of Actor Network Theory was another example of theoretical alignments between the two meta-theories which provide the basis of many other theories of socio-material interaction.

Examples of this came later on in the study in conversation with founder member Jonathan Briggs;

Researcher: *'I began the research by looking at Hyper. Obviously, I wanted to do a grounded study and basically just park all of my theoretical understandings, leave them at the door and go in there with a fresh mindset to try and understand the underpinnings of the culture, how it's formed, how it operates. One of the concepts that I became really interested in before the theoretical build-up got the PhD, essentially, was this idea of brokerage... The way that people use tools to articulate difficult collaborative situations to sync up between themselves.*

I've used that as a sort of framework to understand what was occurring. I think a lot of this theory about social psychology, constructivist education, experiential learning, all these kind of things, I think it's very well expressed and there's just tons of stuff that explores this area, but I wanted to look at it from perhaps a different angle and see if there was anything new to say in that ground. One of the things that I wanted to look at was this role, learning about brokerage, as that being a key skill instead of the hard skills … but also making a design, being part of this process of making boundary objects to facilitate collaboration. It's like the extragroup artefact or something like that, that seems to be a really interesting area to explain'.

Jonathan Briggs: *'I really like that, I've never heard it articulated quite as well as that before. I think that's a very, very interesting insight. It certainly wasn't deliberate in the sense of, I don't think we articulated it. I think that you could absolutely see that that idea of, in a sense, taking things from the group and parking them slightly outside the group and giving people tools with which they can interact with that thing outside the group, what you decide is the boundary object. I think that's absolutely central to some of the things that Hyper Island is doing'*

Researcher: *Fantastic. That's pleasing to hear, I've got my pet theories but I don't want to force them. In terms of articulating, how do I better articulate that and use that if that's a decent insight for Hyper? How do I go forward from now to expand that into something?*

Jonathan Briggs; *I think the help you could give Hyper Island is to create, if you like, that simple mirror where we can see a better version of our selves. One that, in a sense, has its feet in the past but is also looking at what's going to happen next and maybe it's relatively simple, in some senses.*

(Interview with Briggs 1 August 2016, 103-108)

And again, with key learning strategist Åsa Silfverberg;

Researcher: *'It makes me think that the process of designing, as in the creation of novel blends and connections based on precepts is what drives learning. Rather than learning to innovate, the foundation is learning through innovating. Making new, exploring associative space in an embodied way.*

> *Also, I think that Hyper is externalising and making social and embodied that innate network coherence that underpins individual learning, makes it something that occurs across the group thus organisational learning'.*

Åsa Silfverberg: *'Exactly! Love your reflection!'*

(Correspondence with Silfverberg 14ᵗʰ March 2017)

9.3 Primary Analysis of Data

9.3.1 *Patterns from data; deriving insights by applying open coding process.*

A primary stage of analysis dealt with incidents captured in the qualitative data (ethnographic notes and interviews), the process moved from memoing, open coding, thematising then axial coding as a process of comparative analysis within the data to understand relational inisghts and patterns. Detailing the stages of data analysis, first F4Analyse was used for qualitative of first the ethnographic notes then the interviews. Interesting passages and incidents were highlighted in the texts, using which was later 'cleaned' and used as corpus data set for comparative analysis and synthesis.
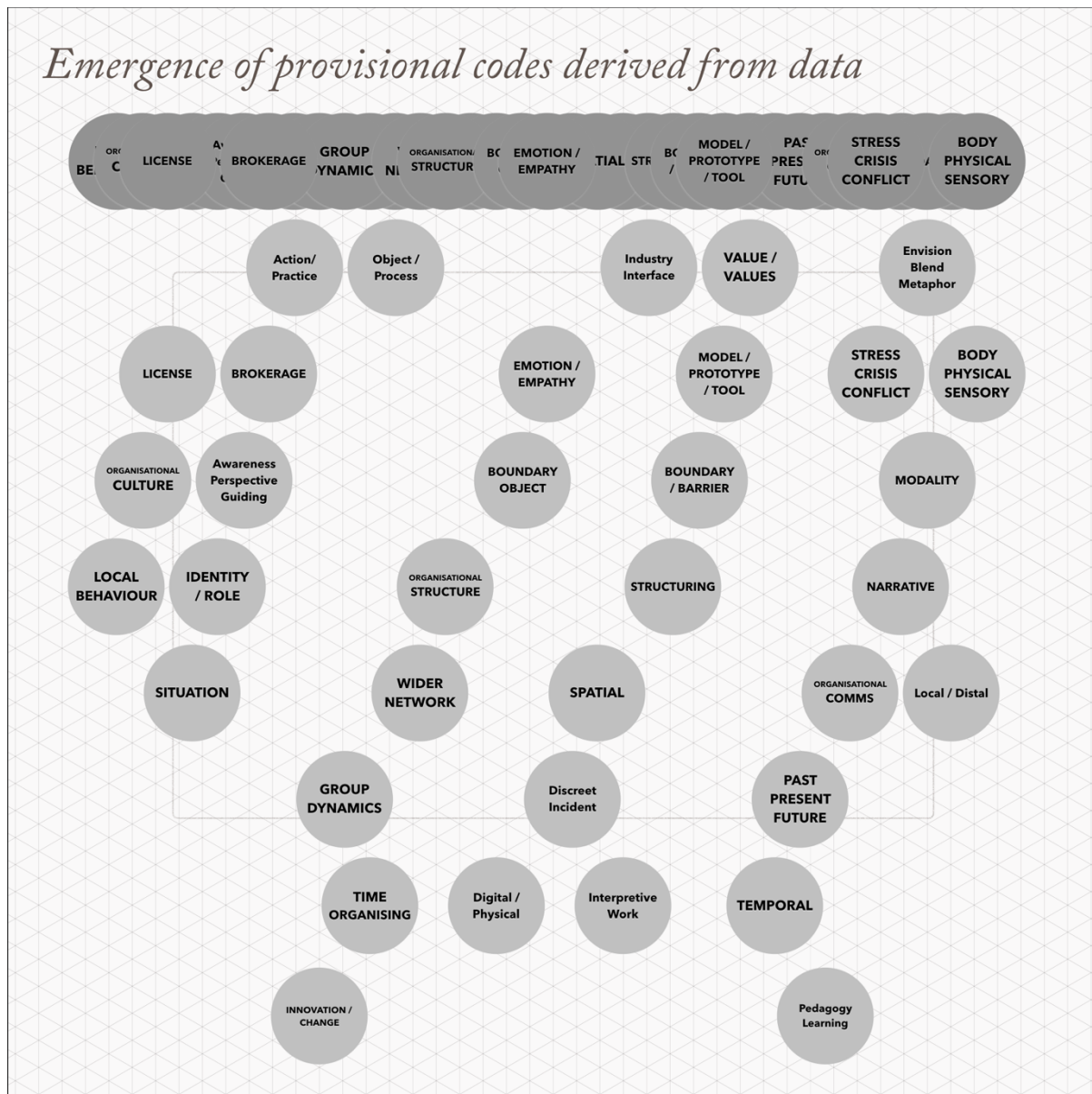
Figure 35 – Emergence of provisional codes from memoing of ethnographic data.
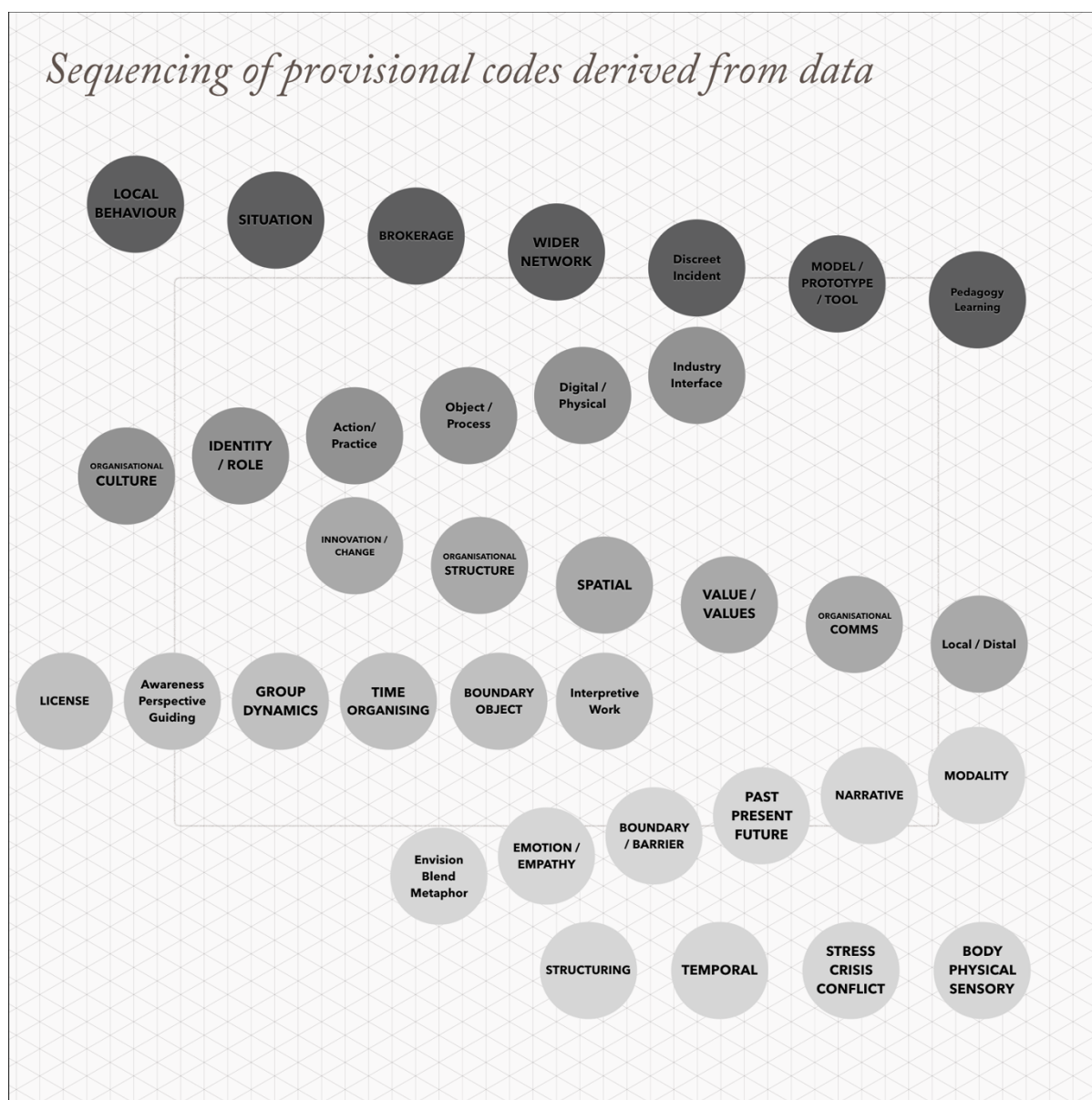
Figure 36 – Sequencing process of provisional coding schema from memoing process.
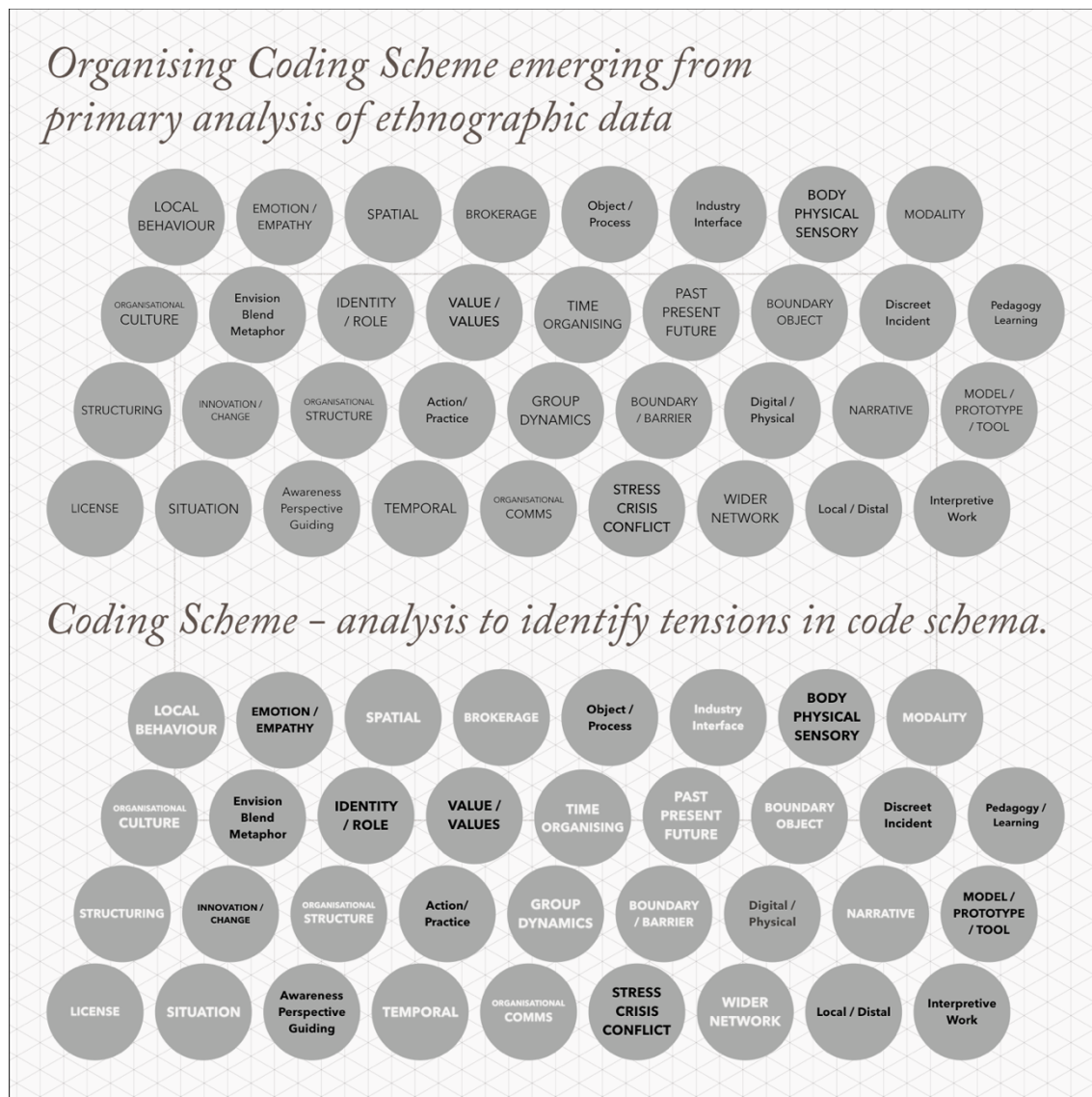
Figure 37 – Open & Axial Coding - Thematising ethnographic codes into groups

Codes emerged quite naturalistically from the memoing processs as codes were needed to account for certain reoccurring processes, these were generated as successive passes of close reading and reflection occurred. Each code arose to account for goings that were more that singular events and seemed to fit within an embryonic pattern. This focus drew on Lewin's accounts of early group dynamics research, which advise focus on *conduct* rather than *content* – paying attention to this dimensions of dialogue was useful as it leant the notes a feel which was more amenable to become generalisable, this process usefully could account for detailed specifics without labouring on over technical or mundane specifics of projects or domain-specific knowledge that may be sensitive or simply irrelevant for this research, not *what* was said and done, but *where*, *when*, to *whom*, *how* and *why*.

Figure 38 – Applying thematic groupings via colour coding.

As rough categories emerged, they were actively sorted, the delimiting factor was; where an issue didn't naturally fit into any of the existing code schemes, a new one would be created, but only if felt novel enough and of sufficient weight in terms of frequency to merit one. This necessitated several iterative loops of data analysis to ensure the data in the first stages was fit into codes that were created later in the data analysis process. The following thematic groups emerged, the interpretative rubric applied here was to make each code fit either with a level – denoting unit of analysis or a dimension spotted within the data for example '*incidents pertaining to…*' – the organisational structure, culture, communications or particular practices therein or different kinds of domain relevant to observed activity. Examples that emerged from the analysis were incidents pertaining to particular action and activity, those related to the space and spatial factors, time organising and temporal issues, incidents of designing making or generally enacting. Significant incidents relating to the affective domain, including interrelating, interpersonal or emotive issues such as significant positive heightened moments, stress, conflict or even crisis were grouped and coded appropriately. Largely, each of the codes were differentiated with respect to others to give space to emergent patterns in the data and not to forcibly corral issues into thematic groups. This led to open coding and loose thematic clusters emerging which were provisionally assigned arbitrary colour coding. Given the overarching directive to explore collaboration boundaries or interfaces between discreet domains for example interpersonal, intergroup or intercommunal these emerged as distinct coded domains in the analysis. As such the overarching analytic step was to to regard patterns as internal or external to clear ostensibly defined domains or interface between these domains, this lent the data analysis its distinctive shape, naturally,

given the interpretive methodology this was filtered through the researchers interpretive schema, which is why participatory sense checking and returning to informants with provisional proposition for further reflection.

At all times confidence and confidentiality was observed in line with the strictest respect for the covenant of the learning environment and to take extreme care to protect participants from harm and diligently observe the highest of ethical standards with respect to research ethics.

Figure 39 - Sorting into thematic groups

Figure 40 - Thematic Relations between codes

As memoing progressed, thematic codes and then clusters emerged, the next phase of analysis set about organising open codes into axial groups unpacking linkages, shown above. The visual spatial approach was particularly useful to make sense of complex relational schema. A sensible code grouping emerged, grounded in the data, dealing with memoed data at the exclusion of detail deemed extraneous. Each memo group was reviewed and a secondary layer of analysis of each group further made each thematic cluster distinct, incidences of overlap where two or more codes were co-located further ramified the selection process of grouping into clusters.

Figure 41 – Establishing thematic prioritisation weighting based on code frequency.

A simple frequency weighting was applied to memos throughout the data analysis to ascertain focus on certain issues and their relative weighting in the data set, these were provisional and a consequence of both attention in the observed data but also attention given in the successive analytic steps. Certain dyads and triad patterns, some were judged to be distinct, the interlinks between were organised into axial relationships following a logic of relevance and distinguishing tension across domain boundaries for example objects or processes, digital or physical and conceptual or concrete factors. Following structuration many of these grouping were considered to be mutually constitutive aspects of a common phenomena the master axioms applied followed from the basic action-structure distinction common to Giddens' basic sociological schema.
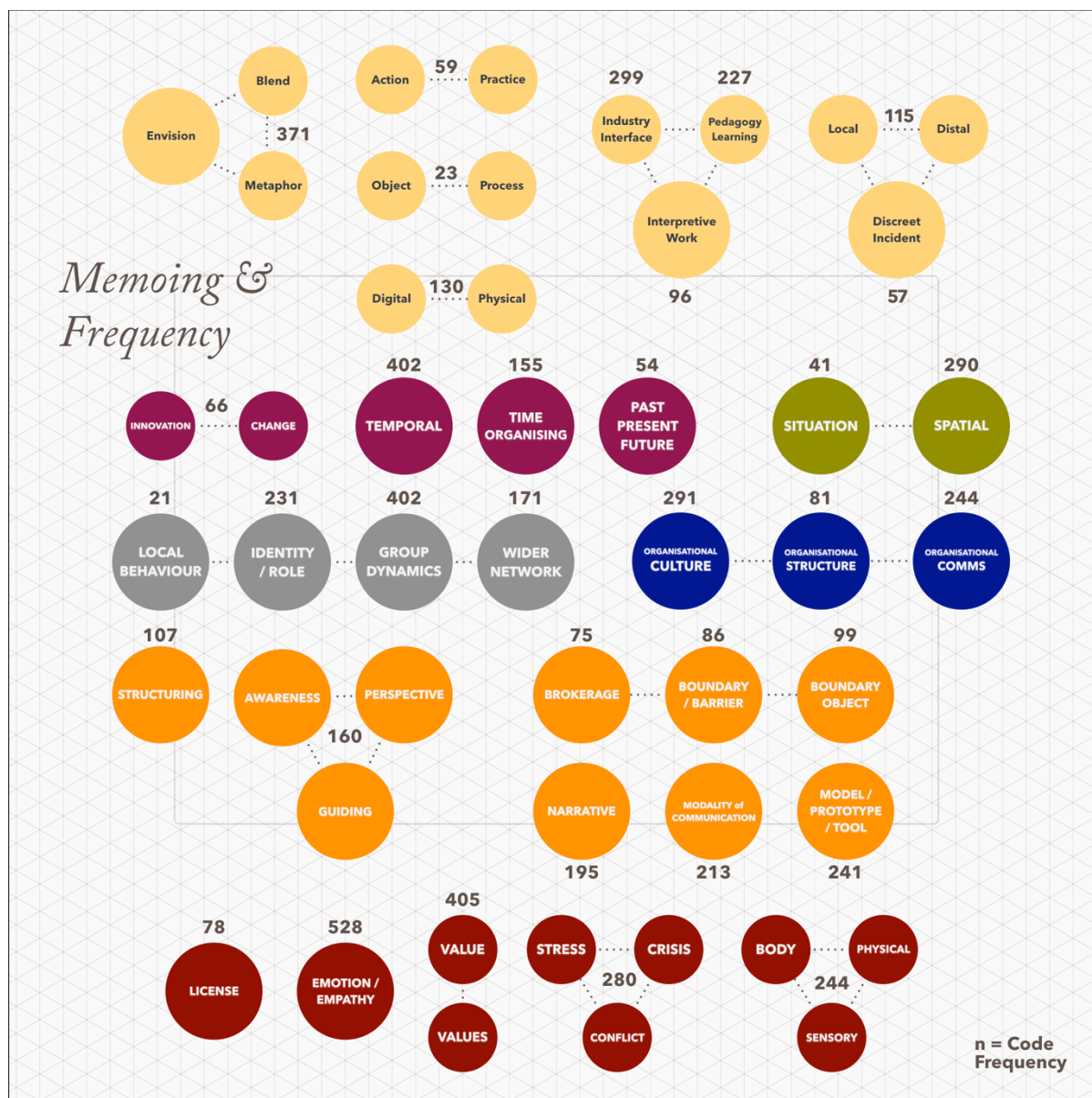
Figure 42 - Refining code scheme via memoing

9.4 Memoing & Coding Scheme

Heuristic Analysis of Coding for Ethnographic Data Set

Figure 43 – Code Map

Figure 44 – Second-order analysis of thematic code grouping in ethnographic data.

The weighting of thematic clusters was then organised into frequency relationship and then prioritised into thematic prevalence in the data. For example its clear that issues relating to the affective domain were foregrounded along with issues of interrelating and collaboration.

#structuring / restructuring 107

#awareness / perspective / guiding 160

Figure 45 -Frequency distribution reveals thematic focus derived from ethnographic coding process.

Figure 46 - Sorting codes into thematic clusters

Code groups, sorted by frequency;

Activity = 1565, Affect = 1565, Structural 1176, Group 825, Organisation = 616, Temporal = 378, Spatial = 339

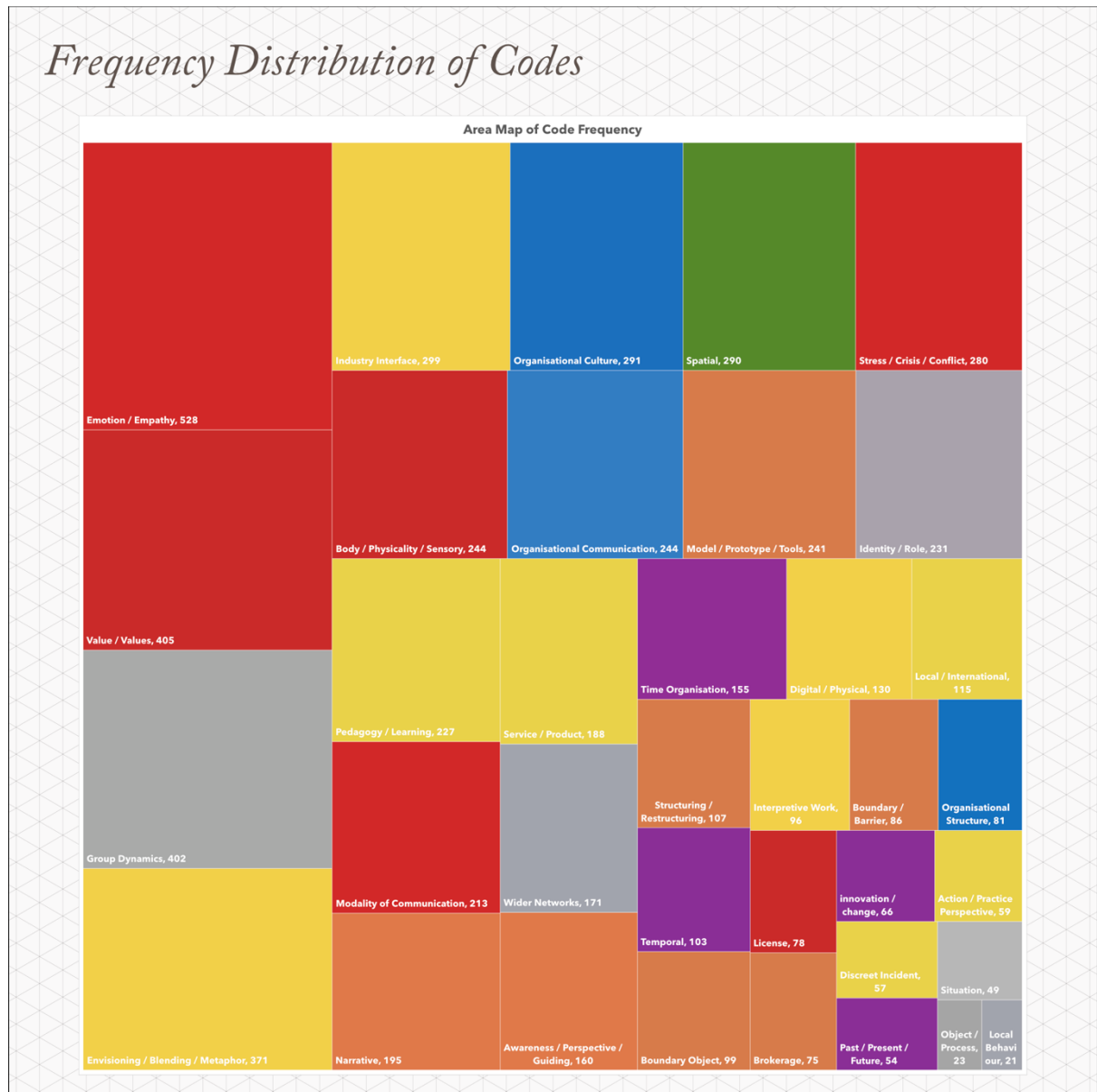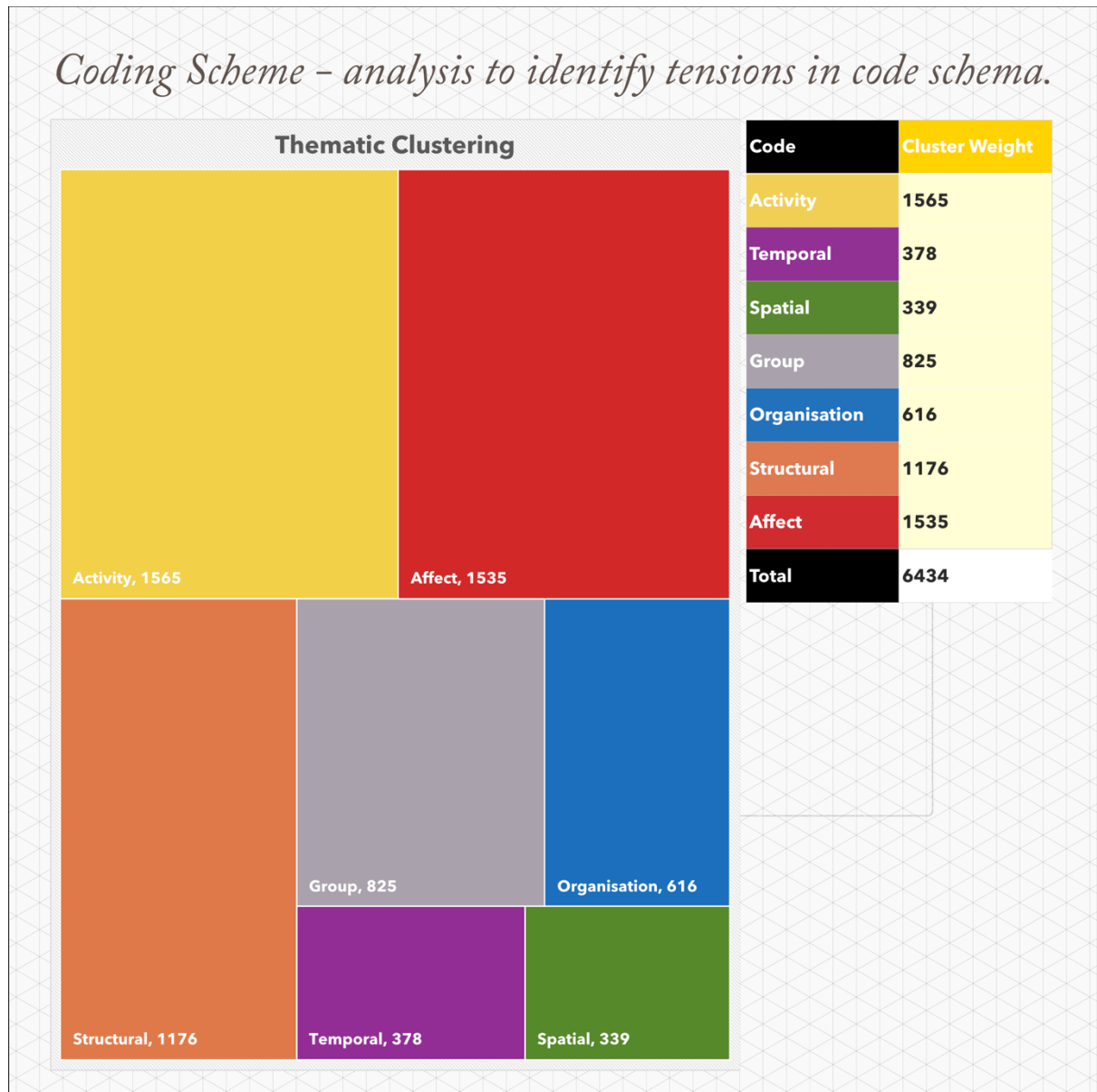| Original Order	Code System	Envisioning / Blending / Metaphor	Service / Product	Object / Process	Digital / Physical	Action / Practice Perspective	Industry Interface	Pedagogy / Learning	Interpretive Work	Local / International	Discreet Incident	innovation / change	Temporal	Time Organisation	Past / Present / Future	Situation	Spatial	Identity / Role	Local Behaviour	Group Dynamics	Wider Networks	Organisational Culture	Organisational Structure	Organisational Communication	Structuring / Restructuring	Awareness / Perspective / Guiding	Narrative	Boundary / Barrier	Boundary Object	Model / Prototype / Tools	Modality of Communication	Brokerage	Emotion / Empathy	License	Value / Values	Stress / Crisis / Conflict	Body / Physicality / Sensory	SUM
1	Envisioning / Blending / Metaphor	0	13	4	6	4	14	9	10	4	12	4	5	4	4	6	18	10	1	16	3	10	5	14	5	9	11	6	9	15	16	7	16	5	14	4	9	302
2	Service / Product	13	0	7	9	3	12	6	4	5	8	3	2	1	0	4	8	1	0	1	5	2	1	5	3	4	5	2	2	7	4	2	9	1	8	4	3	154
3	Object / Process	4	7	0	6	0	2	2	1	0	5	0	2	0	0	0	1	0	0	0	1	0	0	1	0	1	4	0	1	3	2	0	3	0	3	0	2	51
4	Digital / Physical	6	9	6	0	1	7	2	0	2	7	4	2	3	2	3	6	3	0	2	6	2	1	3	1	3	3	4	2	4	4	4	4	0	8	1	5	120
5	Action / Practice Perspective	4	3	0	1	0	4	4	1	0	6	0	0	0	0	1	2	2	0	2	1	2	0	4	2	3	0	1	0	3	3	3	6	4	5	2	3	72
6	Industry Interface	14	12	2	7	4	0	13	9	4	12	4	2	4	4	1	11	10	1	9	5	14	5	10	8	7	8	6	2	9	7	7	8	6	13	9	5	252
7	Pedagogy / Learning	9	6	2	2	4	13	0	8	7	14	1	3	5	0	1	8	10	3	17	4	13	3	10	3	8	6	4	1	10	7	2	11	2	9	7	3	216
8	Interpretive Work	10	4	1	0	1	9	8	0	3	6	3	3	2	2	1	4	2	0	5	3	5	1	3	2	4	4	1	3	6	2	1	4	0	8	1	7	119
9	Local / International	4	5	0	2	0	4	7	3	0	8	0	2	3	1	1	5	7	0	4	6	8	1	3	0	1	2	4	1	1	4	2	4	2	6	4	1	106
10	Discreet Incident	12	8	5	7	6	12	14	6	8	0	3	8	8	5	4	7	10	2	14	6	15	6	11	7	10	7	10	8	10	9	9	16	7	11	13	11	305
11	innovation / change	4	3	0	4	0	4	1	3	0	3	0	3	2	4	1	4	3	1	4	3	4	1	0	4	3	2	1	0	2	2	1	3	1	6	3	4	84
12	Temporal	5	2	2	2	0	2	3	3	2	8	3	0	18	4	2	10	3	0	6	1	5	2	5	3	2	6	1	1	4	5	1	6	0	5	4	7	133
13	Time Organisation	4	1	0	3	0	4	5	2	3	8	2	18	0	2	0	5	3	1	8	1	4	1	6	3	4	3	2	0	3	3	1	7	2	7	9	2	131
14	Past / Present / Future	4	0	0	2	0	4	0	2	1	5	4	4	2	0	1	4	1	0	4	3	6	0	1	2	3	2	2	0	3	3	1	4	1	2	2	4	77
15	Situation	6	4	0	3	1	1	1	1	1	4	1	2	0	1	0	7	2	0	4	2	2	0	0	1	2	1	1	2	1	3	1	7	0	3	0	4	69
16	Spatial	18	8	1	6	2	11	8	4	5	7	4	10	5	4	7	0	9	1	9	5	6	4	5	9	9	15	3	1	7	7	3	17	6	14	9	14	253
17	Identity / Role	10	1	0	3	2	10	10	2	7	10	3	3	3	1	0	9	0	0	19	4	13	3	12	4	7	3	4	1	3	5	1	12	5	7	10	7	196
18	Local Behaviour	1	0	0	0	0	1	3	0	0	2	1	0	1	0	0	1	0	0	7	0	5	2	0	0	0	1	1	0	0	1	0	0	0	0	2	1	30
19	Group Dynamics	16	1	0	2	2	9	17	5	4	14	4	6	8	4	4	9	19	7	0	6	21	10	20	11	12	9	3	6	12	12	6	20	5	13	15	10	322
20	Wider Networks	3	5	1	6	1	5	4	3	6	6	3	1	1	3	2	5	4	0	6	0	7	1	6	2	3	2	2	1	2	3	2	6	3	5	3	3	116
21	Organisational Culture	10	2	0	2	2	14	13	5	8	15	4	5	4	6	2	6	13	5	21	7	0	10	15	6	5	4	2	3	7	1	4	23	3	14	13	14	268
22	Organisational Structure	5	1	0	1	0	5	3	1	1	6	1	2	1	0	0	4	3	2	10	1	10	0	5	4	0	1	1	1	3	1	4	6	0	3	1	1	88
23	Organisational Communication	14	5	1	3	4	10	10	3	3	11	0	5	6	1	0	5	12	0	20	6	15	5	0	4	8	5	6	0	5	14	2	15	3	8	9	5	235
24	Structuring / Restructuring	5	3	0	1	2	8	3	2	0	7	4	3	3	2	1	9	4	0	11	2	6	4	4	0	10	4	0	0	5	2	2	11	3	5	2	3	131
25	Awareness / Perspective / Guiding	9	4	1	3	3	7	8	4	1	10	3	2	4	3	2	9	7	0	12	3	5	0	8	10	0	2	3	1	3	2	4	12	4	7	6	7	169
26	Narrative	11	5	4	3	0	8	6	4	2	7	2	6	3	2	1	15	3	1	9	2	4	1	5	4	2	0	5	8	11	8	7	11	1	7	2	5	175
27	Boundary / Barrier	6	2	0	4	1	6	4	1	4	10	1	1	0	2	1	3	4	1	3	2	2	1	6	0	3	5	0	15	6	1	4	5	9	1	3	5	108
28	Boundary Object	9	2	1	2	0	2	1	3	1	8	0	1	2	0	2	1	1	0	6	1	3	1	0	0	8	8	15	0	7	9	7	7	0	3	1	3	103
29	Model / Prototype / Tools	15	7	3	4	3	9	10	6	1	10	2	4	4	3	1	7	3	0	12	2	7	3	5	5	3	5	3	11	0	11	1	8	1	11	4	5	190
30	Modality of Communication	16	4	2	4	3	7	7	2	4	9	2	5	3	3	7	5	1	1	12	3	1	1	14	2	2	8	4	9	10	0	11	14	4	10	5	8	208
31	Brokerage	7	2	0	4	3	7	2	1	2	9	1	1	1	1	1	3	1	0	6	2	4	4	2	2	4	7	4	7	1	11	0	15	3	3	7	5	140
32	Emotion / Empathy	16	9	3	4	6	8	11	4	4	16	3	6	7	4	7	17	12	0	20	6	23	6	15	11	12	11	9	7	8	14	15	0	6	22	24	19	365
33	License	5	1	0	0	4	6	2	0	2	7	1	0	2	1	0	5	5	0	5	3	3	0	3	3	0	1	9	0	1	4	3	6	0	11	5	3	98
34	Value / Values	14	4	0	3	8	5	13	9	8	6	11	6	5	7	2	14	14	0	13	5	14	3	8	5	7	7	3	3	10	3	3	22	11	0	18	12	284
35	Stress / Crisis / Conflict	4	4	0	1	2	9	7	1	4	13	3	4	9	2	0	9	10	2	15	3	13	1	9	2	6	2	5	1	4	5	7	24	11	18	0	17	221
36	Body / Physicality / Sensory	9	3	2	5	3	5	3	7	1	11	4	7	2	4	4	14	7	1	10	3	14	1	5	3	7	5	1	3	5	8	5	19	3	12	17	0	213
	SUM	302	154	51	120	72	252	216	119	106	305	84	133	131	77	69	253	196	30	322	116	268	88	235	131	169	175	108	103	190	208	140	365	98	284	221	213	6104

Figure 47 - Map of Code Relations

9.5 **Methods Appendix 3:**

9.5.1 *Heuristic Textual Analysis*

After the initial grounded coding process, it was important to look at the texts, using rudimentary statistics to get a sense of core issues and relationships in the text. This process allowed a rapid heuristic analysis of the ethnographic observation and the interview data. This was a simple but illuminating process in line with the interpretivist grounded approach. Gleaning a rapid sense of the concepts that float to the top. This basic statistical analysis has a basis in theory, which we will explore briefly here.

9.5.2 *TextTexture*

A tool developed by Nodus Labs allowed the Identification of pathways for meaning circulation using text network analysis. A paper by the same name gives reasonable justification approach is valid. TextTexture and open source software as service is at least grounded in research, the principle is as follows. This method provides a useful inroad, and as such is of value to researchers applying comparable ethnographic methods. This holds at least a passing relationship to the perceptual imaging and spatial vocabulary stemming from Kevin Lynch (Lynch 1960). This language of network patterns is significant, in as far as it applies a spatial analysis technique to abstract and non-spatial data. As detailed in the paper *'any text can be represented as a network. At a basic level, the words, or the concepts are the nodes, and their relations are the edges of the network'* (Paranyushkin 2012).

Paranyushkin's paper proposes and algorithmic method to derive meaning circulation in a given normalised text, deriving key metrics for the concept and for the whole of the text using network analysis. The key concepts function as junctions for meaning circulation within a text, contextual clusters comprised of word communities (themes) as well as most frequent pathways for meaning circulation. This is accomplished by visualising the text as a network then a wide range of tools from network and graph analysis can be used to perform quantitative analysis and categorisation, detecting communities of closely related concepts, identifying the most influential concepts that produce meaning. By identifying the most influential pathways for the production of meaning, which they refer to as pathways of meaning circulation. This provides an overview of the general narrative structure in a relational manner.

As a heuristic technique, or heuristic which can be defined as; any approach to problem solving, learning, or discovery that employs a practical method not guaranteed to be optimal or perfect, but sufficient for the immediate goals.

9.6 Diagramming First Order Relationships

9.6.1 *Overall Structure: First Order Terms*
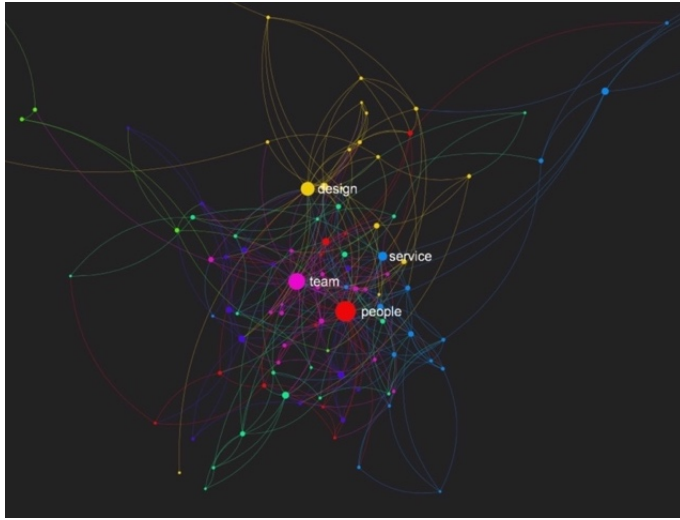
Figure 48 – Overall Textual Structure; Relationships between most frequent terms.

9.6.2 *Improved Overall Structure: First Order Terms*
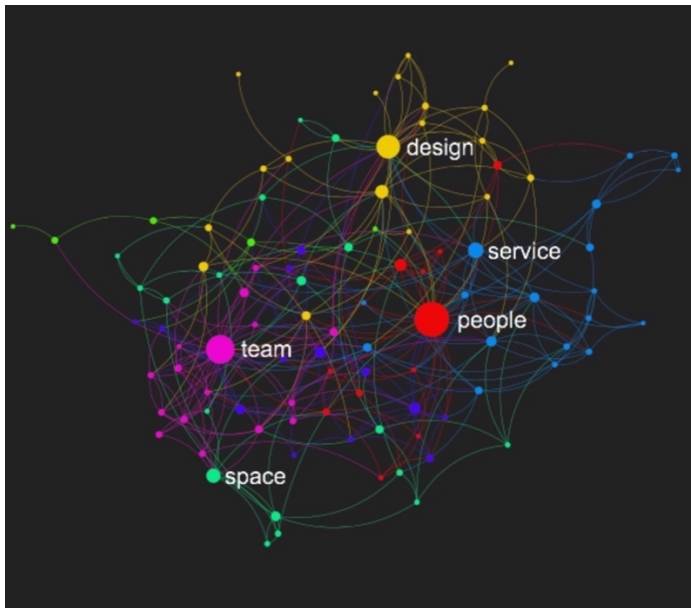
Figure 49 - Overall Textual Structure; Relationships between most frequent terms

Examining the ethnographic data set as a landscape was useful as it highlighted key relationships, shown here, the principle terms *design, service, team* and *people* were prevalent in the data.

The tools allow the nodes in the network to algorithmically improve their arrangement, compressing outliers and compressing the semantic network. Through this method a fifth term emerged; **space.** This created a closer network of key terms and showed their relationships in the text.

9.7 Diagramming Second Order Relationships

After the first order terms were established, **design, service, people** and **team** the tool allowed each term to be searched individually for relationships. This allowed the revealing of second order terms linked to the most prominent terms. Each top term was selected to reveal related semantic relationships, this revealed the most prominent secondary terms within the data set. The key themes; emerging purely from their frequency in the corpus, we illustrative through its close parallels to the grounded coding procedure applied to the data. As a rapid sense checking procedure to indicates the thematic core of discussions, or at least the collective focus of attention of the research with participants. This in no way was taken as an indicator of causal constructs, only as a heuristic mapping of semantic relationships in the text.

9.7.1 *Design: Second Order relationships with First Order Term*

Figure 50 - Term – Design: thinking, team, service.

Figure 51 - Term – People: thinking, story, service, focus, make, process

Figure 52 - Term - Service - thinking, story, service, focus, make, process

Figure 53 - Term – Team: project, culture, feel, story, design, ways
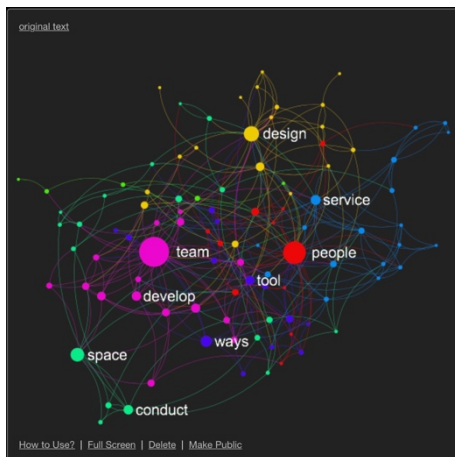
Figure 54 - Term – Space; design, service, people, tool, ways, develop, space, conduct.

Evidenced here, high degree of relatedness between the general term *space,* using TextTexture's analysis, the algorithmic operations are fairly opaque from a user's perspective, however terms are organised in terms of proximity and relatedness, similar to MaxQDA's co-occurrence models and

word clouds. A basic frequency analysis of the whole ethnographic corpus reveals interesting semantic connections, these are solely heuristic indication of the focus of attention in the ethnographic note taking set, what's interesting is their parallels to the emergent code schema and the eventual code clustering that emerged after the grounded theory procedure had been applied.

team (0.98%, 185), *time* (0.91%, 173), *work* (0.64%, 121), *design* (0.60%, 114), *experience* (0.56%, 106), *feel* (0.53%, 101), *culture* (0.48%, 91), *change* (0.43%, 82), *feedback* (0.41%, 77), *value* (0.41%, 77).

Shown here 10 most frequent terms, their frequency percentage of occurrence in the corpus. Although rudimentary analysis by statistical standards, the goal here was to understand meaning circulation and focus heuristically by regarding the data set as territory with discernible features. This technique is commonly used by IDEO as a means to foreground key concepts amongst teams and in user research.

9.8 **Limitations**

This analysis lacks intercoder agreement, give the size of the data set and the time demand of analysis (in weeks), only the researcher's analysis is present cross-thematization was seen as having limited feasibility and desirability at this stage in the research. Further steps to generate additional interpretive validity would follow card-sorting approach (Nielsen 1995). Moore & Bensbesat's approach would have been particularly useful to validate constructs through a distributed judging system, where categories could have been sorted through rounds of judging to ascertain degrees of convergent and discriminant validity (Moore & Benbasat 1991). This would have rendered a quantifiable matrix of perceptions to understand the observability of constructs and whether these differed from the researcher's interpretation.

 Although limited in terms of validity, in terms of shaping attention and creating a semblance of internal validity between the corpus and the code schema. The statistical analysis proceeded only as deeply as to highlight thematic directions in line with the development of the grounded theory. This was judged sufficient for the scope of the study, to understand circulation and relation of meaning within the two primary corpora (ethnographic notes and interview texts).

9.8.1 *Term Frequency Data*

Word	%	Frequency
team	0.98	185
time	0.91	173
work	0.64	121
design	0.60	114
experience	0.56	106
feel	0.53	101
culture	0.48	91
change	0.43	82
feedback	0.41	77
value	0.41	77
business	0.40	75
process	0.38	72
idea	0.37	71
between	0.36	68
start	0.36	68
service	0.33	63
space	0.33	63
story	0.32	61
day	0.30	56
ideas	0.30	56
talk	0.29	55
thinking	0.28	54
learning	0.28	53
creative	0.26	49
digital	0.25	48
research	0.25	48
focus	0.25	47
world	0.24	45
sense	0.23	44
social	0.22	42
key	0.22	41
structure	0.22	41
tools	0.22	41
create	0.21	40

Figure 55 – Frequency Distribution of Key Terms in ethnographic notations

9.9 Significant Contextual Associations

9.9.1 *User:*
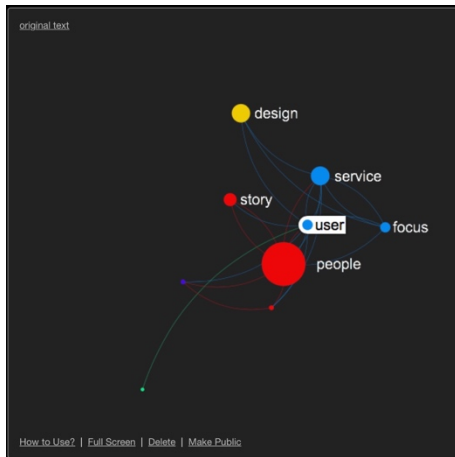
Figure 56 - Term – User: people, design, service, focus, story.

9.9.2 *Hyper:*
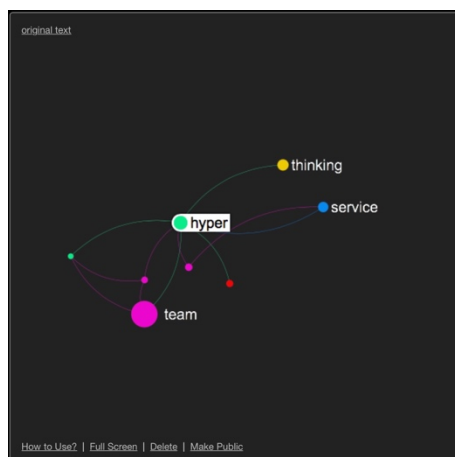
Figure 57 - Term – Hyper: thinking, service, team.

Ethnographic Data (with terrier stop list)
(source: http://text-analytics101.rxnlp.com/2014/10/all-about-stop-words-for-text-mining.html)

back being build business change creative culture day design digital down experience feedback feel focus doing group here hyper idea ideas just know learning like need new people problem process research see service space start story take talk team think thinking time value want way who will work working world

Ethnographic Data Spellchecked (after regressive analysis)

brief build business change client create creative culture day design digital experience feedback feel focus gonna idea ideas industry insights key language learn learning look opportunity process project research service share sharing social space start story structure talk team teams thinking time tools trust using value world

Ethnographic Data (with basic high frequency taken out)
Applying minimal stop list (plus erratics)

all am are as back be can culture design different do experience feel get go group have how i if is it make me more need not one other people team them there they things think time use want was way we what when why will work would you your

Ethnographic Data (with Stop List 1 and removal of numbers)
http://www.lextek.com/manuals/onix/stopwords1.html

am build building business change client create creative culture day design digital doing don't experience feedback feel focus future getting hyper idea ideas industry information island journey learning look moment people person process project research sense service social space start story structure talk team teams thinking time tools value world

Ethnographic Data (with basic high frequency taken out)
http://www.lextek.com/manuals/onix/stopwords1.html

around back being business change culture design different each experience feedback feel get go good group if just know like make me more my need one or other our out people something team their them there things think time up use value want way when why will work would your

Ethnographic Data (with Stop List 1)
http://www.lextek.com/manuals/onix/stopwords1.html

am build building business change client create creative culture day design digital doing don't experience feedback feel focus future getting hyper idea ideas industry information island journey language learning look moment people person process project research sense service social space start story structure talk team teams thinking time tools value world

INTERVIEWS

Interview; Alex Neuman (names removvded)

actually approach background bit boundaries called change companies company course create day design designer digital engaged executive guess help instance internal island learn hyper learning listening little moving network online organisation people process program role sense sort spider strategy students talk terms time training try trying understand web world yeah

Interview; David McCall (names removed)

actually behave bit bring business can't change clients company content create creative culture day development digital attention emotions feedback hyper idea industry island it's learning meeting model models moment network online people process project school self sense sort students stuff talk team time tools training try understand values world yeah

Ethnographic Data Spellchecked punctuation removed and removal of irrelevant terms (after regressive analysis).

between brief build business change client create creative culture day design digital experience feedback feel focus idea ideas industry insights key language learn learning look own person process project research sense service share social space start story structure talk team teams thats thinking time tools trust using value work world

Interview; Charlotte Sundaker (names removed)

actually amazing bit business ceo change companies company create exactly fantastic feel hyper idea image island i'm journey learning little love manchester maybe natural network nice organisation people process purpose question research sense shift society space started stuff super support talk talked terms that's time trying understand value weird yeah

Ethnographic Data Spellchecked punctuation removed (after regressive analysis)

brief build business change client create creative culture day design digital experience feedback feel focus gonna idea ideas industry insights key language learn learning look person process project research sense service share sharing social space start story structure talk team teams thats thinking time tools trust using value world

Interview; Asa Silfverberg (names removed)

able absolutely bit business collaboration coming concept conversation course crazy culture day design hyper idea island it's leadership learning little look looking maybe military people process program purpose question research sense sort space start started stuff sweden swedish talk team that's thinking time trying understand values week world yeah yes

Sveinung Skaalnes (2 of 2) (names removed)

absolutely actually change client clients collaborator collaborators coming digital director driven experience feel help **hyper** island little look managing **maybe** mean network object **people** process project projects purpose question relationship saying sense sort space speaking spoken start started strategy stuff sweden talk time value **yeah** yep

Interview; Miranda Bachelder (names removed)

able actually bit boundaries boundary **coming** create crisis definitely **feel** happens **hyper** idea individual island job little looking **maybe** mean model network okay organization person **process** program programs question relationship research sales school seen sense **sort** space student **students** stuff super talking team tell **time** trying type understand yes

Interview; Sveinung Skaalnes (1 of 2) (names removed)

actually based believe biggest bit build **business casting** client clients collaboration coming confidence course data **design** digital document exactly example executive humility **hyper** intuition island little mean **network** online organisation **people** photography **process** product **program** programs **project** projects running students talk team terms thinking **time** try trying value yeah yes

Interview; Bella Funck (names removed)

actually bit building business **challenge change** company core creative customer data design **digital** experience **future** hear **hyper** industry island learn **learning** look looking manchester mean meeting **network** okay organization **people process** purpose question research saying sense society start started students stuff support talking technology time transformation trying understand value world

Interview; Jonathan Briggs (names removed)

absolutely actually ago avatar bit change context definitely digital driven happening hard hear **hyper** idea inaudible involved **island** lars learning look looking maybe mean military **model models** moment obviously **people** sense simple singapore **sort** started stuff suppose sweden talk tension thinking **time** try trying understand value view weird **world yeah**

Group Interview; Sveinung Skaalnes with Peter & Anna (names removed)

actions **actually** availability bit brazil brief **casting** check class classes client couple course current days day definitely deliveries delivery doc **document** exactly feels guys heard hyper little local location look maybe **mean** meeting network normally **okay people** person process **project** reach sense **sort** speak speakers stuff **time travel** world yesterday

All Data (cleaned using stop lists, removed the word am)

build building business change client create creative culture day design digital emotional experience feedback feel focus future hyper idea ideas industry island journey key language learning look moment people person presentation process project research sense service sharing social space start story structure talk team teams thinking time tools value world

All Data (cleaned using stop lists)

am build building business change client create creative culture day design digital emotional experience feedback feel focus future hyper idea ideas industry island journey key language learning look moment people person presentation process project research sense service social space start story structure talk team teams thinking time tools value world

Collected Data Set

All Documents (interviews plus raw ethnographic data, names removed)

actually bit business change client coming create creative culture day design digital experience feedback feel focus future hyper idea ideas island learning little look looking maybe mean model network people person process project research sense service sort space start story stuff talk talking team thinking time trying understand value world

Summative Assay; All Documents
(interviews plus raw ethnographic data, names removed) –
(removed Hyper, Island, People)

actually bit build building business change client coming create creative culture day design digital experience feedback feel focus future idea ideas learning little look looking maybe mean model network person process project research sense service sort space start story stuff talk talking team thinking time tools trying understand value world

Figure 58 – Thematic prominence – iterations of data cleaning using stop lists and examining different corpus within ethnographic data set.

9.10 Chronology of Interviews (redacted in Public version)

David McCall -   Managing Director Hyper Island UK

Interview: Hyper Island, Manchester

Date: Wednesday, 1 July 2015 at 13:20

Alex Neuman -   Learning Designer & Facilitator Hyper Island

Interview: Hyper Island, Stockholm, Sweden.

Date: Monday, 16 May 2016 at 11:12

Charlotte Sundåker -   Hyper Interim Global CEO

Interview: Hyper Island, Stockholm, Sweden.

Date: Friday, 20 May 2016 at 13:32

Åsa Silfverberg -   Head of Design & Development and Part Owner

Interview: Conducted over Skype.

Date: Friday, 15 July 2016

Jonathan Briggs -   Founder, Hyper Island

Interview: Conducted over Skype.

Date: 1 August 2016 at 20:05

Bella Funck -   Director of Customer and Network Experience

Interview: Hyper Island, Stockholm, Sweden

Date: Monday, 16 May 2016 at 15:26

Maria Distner -   Swedish CEO Hyper Island

Interview: Hyper Island, Stockholm, Sweden

Date: Monday, 16 May 2016 at 10:04

Sveinung Skaalnes -   Global Network Casting Director, Hyper Island

Interview: Hyper Island, Stockholm, Sweden (1 of 3)

Date: Tuesday, 17 May 2016 at 10:40

Miranda Bachelder -   Admissions & Relationships (now Team Lead Student Recruitment Sweden)

Interview: Hyper Island, Stockholm, Sweden

Date: Tuesday, 17 May 2016 at 14:15

Sveinung Skaalnes -	Global Network Casting Director
Interview:	Hyper Island, Stockholm, Sweden (2 of 3)
Date:	Wednesday, 18 May 2016 at 08:00

Sveinung Skaalnes -	Global Network Casting Director
Interview:	Hyper Island, Stockholm, Sweden (3 of 3)
Date:	Wednesday, 18 May 2016 at 08:00

Sveinung Skaalnes -	Global Network Casting Director
Anna (Obscured) -	Casting & Travel
Peter Hagander -	Head of Casting & Travel
	(Alumni of Business Management Program 2009)
Group Interview:	Hyper Island, Stockholm, Sweden
Date	Wednesday, 18 May 2016 at 08:59

The organizational structure and roles reflecting the period of observation study April 2015 – October 2016. Subsequent shifts in organizational structure, organizational churn, departures and onboarding have subsequently restructured operations, the study was contextual and temporal, but discussions were attentive towards general persistent organizational approaches rather than specific incidences. Naturally, in a highly dynamic organization particulars may be transient however, the intent was to tune into recurrent persistent patterns of organizing that have generalizable value.

10 Appendix C

10.1 Key Concepts in Anthropology & Ethnography

10.1.1 *Etic & Emic Interdependence*

It is worth making a broad distinction between the concepts of etic and emic and their relationship to anthropological theory but also to trace their lineage. To draw out the utility of the parallel of the critical positions in the study of boundary research sites. As Hymes notes, there has been a history in American anthropology of argument for an integral intellectual significance of linguistics to general anthropology (Hymes 1964). Language matters because it conditions how interpretation is conceptualised and the significance that anthropologist ascribe to situations. Harris argues however that often, social scientists often literally don't know that they are talking about, *'because they cannot ground any significant portion of their discourse in a coherent set of describable observational practices'* (Harris 2017).

Current distinction between *etic* and *emic* is as follows;

An emic account is one in terms of features relevant to the particular.

The behaviour in question, a situated view, an emic perspective investigates how local people think, as a description of action meaningful, consciously or unconsciously, to the actor.

Whereas an etic account is one in terms of patterns relevant to the general.

A description of action meaningful to the observer that can be applied in more general across cultures (Kottak 2011).

10.1.2 *Discussion*

As Goodenough points out, the fundamental distinction between *etics* and *emics*, the interdependence of the general and the particular, relating these two viewpoints is how significance is generated via practice.

Cultural materialist positions share their stance with other scientific strategies an epistemology which seeks to 'restrict fields of inquiry to events, entities, and relationships that are knowable by means of explicit, logico-empirical, inductive-deductive, quantifiable public procedures or "operations" subject to replication by independent observers'. This is never perfect and remains an ideal in practice. As the operationalisation of a broad class of phenomena - the field of enquiry it is concerned with is reliant on the postulate that there are two fundamentally distinct kinds of sociocultural entities - events and relationships. On one hand, there are phenomena that comprise the human behaviour stream, the total motion and environmental effects produced by all humans that have ever lived. On the other hand, there are all the thoughts and feelings which humans experience. This duality is conditioned by the distinctive operations required to make statements about each realm, to describe their 'universe of mental experience', observers must elicit insight. The operations to discover what goes on inside the mind have come to be known as emic operations. While those for discovering patterns in the behaviour stream have come to be known as etic operations (Harris 2017).

Emics is *'the method of finding where something makes a difference for one's informants'*. Goodenough, an idealist, sees anthropology as means to transcending material particulars to access underlying forms. 'Goodenough "sees" *emics* and *etics* from an idealist perspective in which the entire field of study – culture, is off limits to materialist strategies' (Harris 2017). He establishes through this, the importance of etic concepts to science in general, but acknowledges the futility of constructing typologies as ends in themselves (Goodenough 1970).

This foregrounds the importance of relationships between insider and outsider accounts over and above each in isolation. This tension sets out a means of brokerage across supposed domains of subjective and objective positions, again evoking the value of interfacing at margins. Managing the relationship between the general and particular is an essential epistemological consideration to understand any culture. This means the active formation of usable knowledge which is implicitly the object of research. Harris argues, whether this is approached from the ground up *'real people situated as they really are'* or whether it is possible to identify material sociocultural entities independent of the ideational constructs that emanate from the people being studied.

Regardless, this categorically rejects that there is any superiority between *etic* and *emic* positions, instead establishes boundary conditions between inside and outside perspectives. This pair of core

anthropological concepts aim to intervene with subjective - objective relationships, suggesting that only the careful synthesis of these positions will reflect reality. As Harris observes; *'Everything that we human beings experience or do is real. But everything we experience or do is not equally effective for explaining why we experience what we experience and do what we do'* (Harris 2017).

Importantly, this thesis focuses on these interfaces, consequently is reliant on interpretive expertise. This boundary is crucial for generating insight into situations because it's where synthesis is enacted. The inside / outside dichotomy resonates with Lewin's concepts in topological psychology, although somewhat obscure, are valid in the utility they provide in making sense how the interdependence between etic and emic perspectives is enacted (experientially at least) as a form of boundary.[80]

Forms of talk were taken as a systematic approach to understanding human behaviour, especially in Pike whose attempts to use language in relation to a unified theory of human behaviour. As such, speech is taken as an integral mode of engagement, principle means to understand culture and implicit stances of members of that culture.[81]

However, design and learning activity, although applying speech in highly sophisticated way to creativity and exploration, only so much of the significance of an incident is contained in the verbal or vocal dimension. Significantly, to deal with observed contexts, dialogue was a primary mode of building rapport and insight about complex activity.

However non-linguistic modes of interacting, activity, movement, artefacts were at least as important within highly dynamic learning cultures embedded in complex organisational settings. As Hymes notes, *'mere observation, however systematic and repeated, can obviously never suffice to meet the high ideal standards of objectivity and validity'* (Hymes 1964).

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[80] This highlight the importance of relationships here between linguistic and material stances. The significance of the etic-emic dyad in anthropology can be traced through the work of (Sapir 1929), (Mead et al. 1938), (Lévi-Strauss 1945), (Pike 1967)ences and (Goodenough 1970). However, the *etic-emic* concepts stem from linguistics. This reflects the impact of French classical anthropological, semiotic and linguistic traditions on later pragmatic approaches (principally anglophone) to anthropology and later design ethnography. However, the origins of these concepts stem from linguistics, further emphasising a significant divide between linguistic and material modes of inquiry. This makes a more spatial definition of what is actually occurring in anthropological study palatable, transcending the linguistic origin of the anthropology as a social science remains a challenge.

[81] The concept of the *etic* and *emic* stems from Kenneth Pike. As Pike notes, social scientists have long debated whether knowledge is objective or subjective. Pike's innovation was to turn away from an epistemological debate to a methodological solution. Stemming from the linguistic terms phonemic and phonetic. Pike sets out an *emic/etic* dichotomy in anthropology as a means to deal with issues in philosophy surrounding the nature of objectivity. Hymes work characterises important distinctions that this lineage provides ethnography, highlighting its lasting reliance on linguistics as a science, its emphasis on communication patterns and its use as a mode of brokerage and building understanding in cross cultural situations.

Drawing on Sapir, purely objective or subjective accounts taken on their own would reveal insights way off the mark of accounting for the actual social reality. Thus synthetic understanding of circumstances is required to reveal relevancy, this implies a need to account for native sentiment as well as to record behaviour (Sapir 1929). This focuses attention on synthesis across different forms of objective and subjective knowledge.

For Hymes *'ethnographic objectivity then is intersubjective objectivity, but in the first instance, the intersubjective objectivity is that of the participants in the culture'* (Hymes 1964). This prevents an observer from standing apart from investigation, imploring inevitable participation. The advantages of these approaches is in providing criterion to appraise participants own explanations and conceptualisations of their own behavioural activity, their *'home-made models'* as well as supposedly objective systematisations.

10.2 Origins of Hyper Island's Learning Methodology

10.2.1 *UGL*

The Understanding Group and Leader *Utveckling av grupp och ledare* (UGL) is a training course important methodologically to Hyper Island. Originally developed and delivered by the Swedish National Defense College (SNDC) who own the copyright and ability to certify trainers. UGL's approaches were introduced in Sweden in 1981 and were initially offered as a type of leadership training only for officers and cadets in the Swedish Armed Forces, but it soon gained popularity in civilian leadership contexts as well.

UGL's approaches were long integral to Hyper Island's internal training and delivery, inspiring principles fundamental to their methodology - although their influence is still evident within the organization, the connection is no longer naturalized into the organization's methodological development.

UGL is described as; A residential course, requiring groups of *'8 but not more than 12 participants during a 5-day long course. All of the participants are expected to be complete strangers to one another at the start of the course, since exploration of interpersonal relationships is a major aspect of the learning climate during the course (i.e., experienced-based learning; Kolb, 1984). The participants are exposed to different exercises that aim to develop skills related to decision-making, perception, cognitive flexibility, and emotional control. These exercises are designed to generate cognitive and emotional conflicts of diverse nature. Participants are encouraged to express, communicate and provide feed-back about their observations and feelings when testing novel and more adequate approaches and behaviors that aim to improve the quality of their collaboration skills. The fundamental notion of the program is to provide a positive experience of a "muddling-through" process; which might end in mistrust and conflict but yet allows for the possibility to evolve into a process of mutual trust and cooperation by improvement in communication skills'*

The basic theoretical structure employed by UGL and Hyper Island evolves from William Schutz's FIRO model (1958) which describe a person's *fundamental needs in certain phases of the life cycle of any group (i.e., inclusion, control, and affection)'* In 2008, the SNDC introduced the integrated model of group development into the UGL training, which is an evidence-based model with both research and a theoretical framework (Wheelan, 2010) stemming from group dynamics (Schutz, 1958; Bion, 1961; Tuckman and Jensen, 1977). In short, Wheelan's integrated model of group development (Wheelan, 2003, 2004; Wheelan et al., 2003) presents the notion of "stage-wise" group development: from the stage of *'inclusion and dependence'* to the stage of *'counterdependence and conflict'* and then to the stage of *'trust and structure'* and finally the last stage of *'work and productivity'* (Ricciardi & Åkerman 2014).

Anecdotal awareness of the course came from a discussion of leadership in teams under stress, necessitated in military situations, intriguingly this was explained to the researcher as being a means to envision a practice of leaderless leadership in high performing cross-functional teams – the suggestion; that leadership was increasingly viewed as a quality or activity distributed across a group rather than assigned by role identity or position, although clearly leader figures emerge and are nominated in the organization, the language of self-leadership was quite unusual. This somewhat encapsulates an emerging stance on leadership distinct to the organization, but traceable in contemporary accounts of leadership in contemporary organizations. Key approaches derived from social psychology (relations to Lewin's topological psychology are evident).

10.3 Group Development

10.3.1 *Group Learning*

Sources and mode of learning are undergoing radical transformation, this reframes shifting in the learning relationship from individual to group relations. Exploring group-oriented, learning relationships in Hyper Island, exemplify the displacement of learner-teacher relationship towards facilitation of individual–group relations, this troubles paradigmatic assumptions underpinning traditional education.

In settings where group conduct is privileged over individual concerns, how interpretive schemas interact and are negotiated amongst groups forms both the conditions of and drivers for learning. Specific attention to group dynamics were enacted via various experiences designed to encouraging reflections on framings. Specifically, iterating through group formation, development and termination processes afford continual opportunity to reflect on how thought-worlds influence activity with respect to social-worlds. Principally, the learning experience prioritizes methodological application of Susan Wheelan's integrated model of group development (IMGD) (Wheelan 2005) which builds upon Tuckman's group development perspective (Tuckman 1964, 1965 and 1977) evaluated by (Bonebright 2010) through longitudinal observation of groups.

Learners in Hyper Island are enculturated (Kottak 2011) into membership of a primary social world that co-presences strong conceptual and environmental aspects (via coalescing organizational, cultural and spatial factors) providing opportunities to derive novel configurations of disposition toward learning through experience. Within this, learners are exposed to different perspectives on expertise formation through industry experts and clients introducing their own perspectives on organizing and operative assumptions within their respective practices, organizations or fields. Each module attends different approaches to expert cognition. Interaction with these collaborator networks comprised of corollary organizations brings outsider perspectives that inhere their own in-house values and assumptions which introduce disorienting and deracinating influences into the group, this fosters adaptive responses of sense-making and perspective-taking. This ramifies how the organization leverages its status as *polycontext*, learning experiences inculcate boundary crossing as instrumental to expertise formation (Engeström 1995). Each individual, grounded in their in own assumptive world, represents membership of plural social worlds, in this context, learning relationships are thus *polyrelational,*

Learning sources are thus displaced into novel arrangements; learnings arise from amongst the group via collaborative interaction. Rather than repositories of content, the studio environment acts as both venue and vessel to mediate relational learning. Commensurately, learners, grounded in their prior

membership of groups conduct learning through group formation, rather than content transfer. Negotiating conduct within collectives necessitates purposeful reframing of assumptions intrinsic to *thoughtworlds*. Group experiences attending to sophisticated interpersonal negotiation and dynamic coordination displace prevailing content-led approaches. Learning content, strategically distributes experiences encourage reflection on group formation and experiences of continual deracination, anchoring and decoupling from group. Group activity, seemingly react to loss of sense through voluminous production of evidence, inscribed within spatio-temporal environment. Assiduously, learners continuously restructured their environment via design activity, interpreting sense-making and place-making occur in parallel in place is taken the process of inscribing meaning into spaces. Following experiential models, conceptual spirals of enaction led to renegotiation of shared meaning and identity in parallel.

Situated design learners through abductive and synthetic design activity, actively restructure their conceptual, material and social circumstances. The changing social milieu forms an environmental field that restructures the experience of others, this process involves intervening with how frames are embedded within worlds. Learning stands as mutually constitutive outcome of interacting groups, situated in context, where factors reciprocally influence one another enabling formation of collaborative expertise. Re-orientation of learning sources continually restructures learning relationships.

Underneath we can see three self-explanatory illustrations that convey the original research behind group development and its contemporary updates, these give context to activity observed with the research.
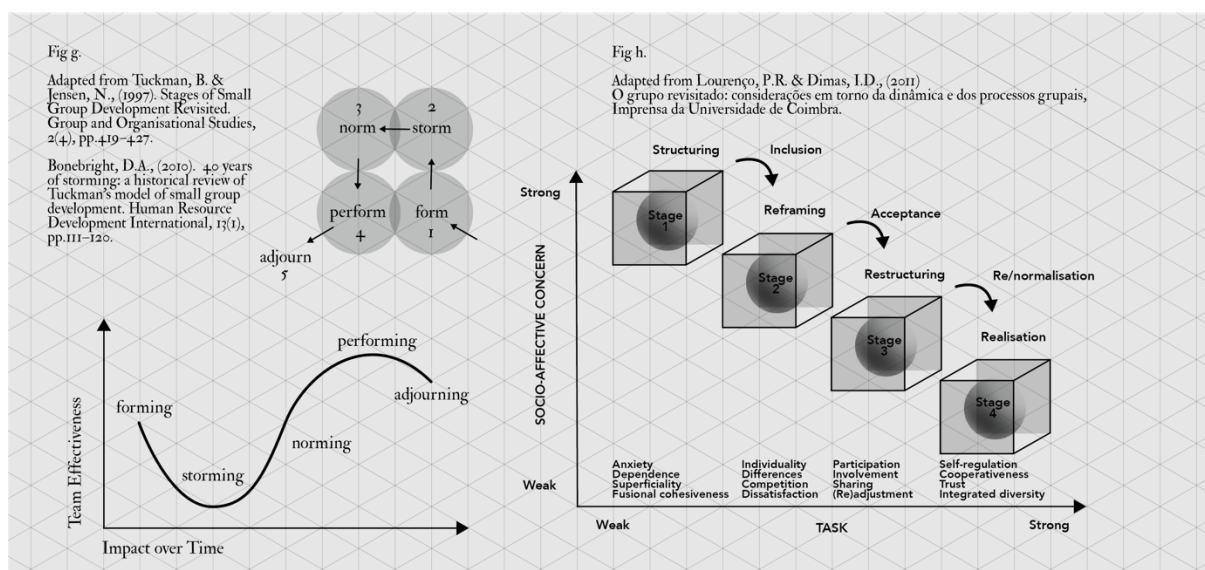

Figure 59 - Tuckman's Stages of Small Group development and contemporary update.

Summary Evaluation of observational data from Hyper Island's learning environment with respect to an Integrated Model of Group Development

Wheelan's model is an important strategic tool applied by Hyper Island to curate learning experiences focused around group dynamics. As it is applied by the studied organisation to structure the activity of cohorts, it's relevant to evaluate how the model is manifest in the behaviour or participants undergoing successive 'life-cycles' of group development and developing a unique form of expertise through the process.

Stage I
Dependency & Inclusion

The opening stage of group development is characterized by significant dependency of members on a designated leader, or as witnessed in my research context, the search for one. As Wheelan indicates, concerns about safety, and inclusion issues arise, these indicate lacks of surety and the struggle to orient with respect to the social matrix, to build confidence and struggles to identify positioning with respect to others. Wheelan notes members may look to leadership or powerful group members to provide direction, participants were observed orienting with respect to their social milieu by calling upon the assumptive experience they bring with them whilst using the physical space of the studio to enact tentative contributions, making inscriptions of their experience, often physically rearranging or 'tagging' their space. As Wheelan indicates, group members commonly engage in 'pseudo-work' this was strongly witnessed, and a component of what later became the robust social fabric each participant called upon to orient themselves within the culture. As such, this exchange of stories, which I came to think of as *narrative making* was crucial is stabilising cultural patterns, certain individual experiences and stories became prominent means to encapsulate and represent the group's collective experience.

Participants, arriving with rich experience and their own out-milieu, brought across narrative about past experience which acted as 'containers' for their experiences or how they had approached certain situations in the past, in this way outside activities or other topics that are not relevant to group goals, were made relevant as codifications of what how each group members felt with respect to the present situation, using past experience to anchor and give weight to their assertions and contributions. This fits strongly with Pata's model of enculturation.

Stage II
Counterdependency & Fight

Secondary stage group development members is characterised by disagreement among members over shared goals or group procedure. In general, I observed jostling, which was indicative of clashes of interpretive schema toward design approach, time organisation or project focus. As the teams witnessed were engaged in concept formation, this was especially prominent as task objectives and meanings shifted rapidly.

As schematic differences became more apparent amongst the group, a prominent activity witnessed was times spent fielding approaches amongst the group which were either adopted or began to cause friction, evidence of schema clash and irreconcilability of interpretations. This is where as Star notes artefacts that promoted interpretive flexibility acted to stabilise activity without the need for consensus. A vast amount of tentative representation making occurs here to illuminate particular framings, As Dorst notes, reframings have need to emerge organically to reorient group approaches here. Wheelan insists conflict is inevitably part of this process, in more detail here this is where framing, reframing and restructuring occurs most strongly, the sophistication of this process causes frustration, which could be mitigated by sensitive facilitation - to anticipate and circumvent hindrance or as learners became more adept and socially sensitive, members could use their expertise to manage these conflictual moments within the group process. Group at stage 2 work collectively to establish a unified set of goals, values, and operational procedures. These were often oriented towards subtasks making use of existing expertise to create opportunities for restructure of overarching ideation and concepting. This stage is where perspective taking either begins in earnest or scuppers progress. This task inevitably generates some conflict as is involves a high degree of identity negotiation (and often formation of new identity modes, conferred onto individuals upon the group noticing a particular useful trait or remembering a reaction to a comparable situation in another group cycle) Learning is often taken forward from one cycle to the next through this process, resulting in individuals identifying new capabilities or dispostions that match them to particular roles. Wheelan opines that conflict is necessary for the establishment of trust and a climate in which members feel free to disagree with each other. Giving enough space for this dynamic group restructuring and fluid identity negotiation with respect to peers is essential to provide learning opportunity. The suspicion is this orienting with respect to social and physical milieu is an important, underexplored aspect of design expertise, a learning disposition acquired through this kind of highly socialised, weakly stuctured exploratory activity dealing with so called ill-structured problems common to creative design briefs - it is therefore fundamentally important to a wide range of learning contexts where social, material and environmental restructure is common, necessary or desired - diving deeper into this learning phenomena is highly relevent to the field as a whole.

Stage III
Trust / Structure

As, when or if a group manages to emerge from the inevitable conflicts endemic to Stage 2, Wheelan indicates that factors such as member trust, group commitment and will to cooperate increase. As social bonds solidified throughout the observed academic cycle, more challenging exchanges seemed to act as venue for cohering support networks and social bonds. Narrative-making in later stages often referred to tough experiences and moments that a team has *'come through together'*. Often pairs of individuals were seen to discuss the degree to which their perception of the other had shifted by working together or in rarer incidents, their self-perception had altered with respect to the capabilities, activity or

interaction with another group member. As such, pair bonding and interpersonal affinity seemed stronger at one level of organising than others but this shifted regularly between individuals, groups and the overarching organisational culture with affinities shifting between different levels of analysis. This seems resonant with Hackman's (2003) concept of bracketing at micro, meso and macro level of analysis and level crossing. As communication became more open and task-oriented, affinity to various levels of organising; individual, group and organisation undergoes restrcuturing. This tacking between levels was strongly observed as social orienting occured. Macro level or organisation-level was seen to expand beyond the institutional walls as individuals attended to different concerns of a particular user group, academic field, community or even societal considerations. Wheelan notes, third stage group development, the so-called trust and structure stage, is characterized by more mature negotiations about roles, organization, and procedures. This involves negotiating and integrating cross level considerations that rarely pertain to only one unit of analysis - individual, group or organisational but was seen to integrate cross level blends - this type of integration is seen as quite a sophisticated organising behaviour worthy of further scrutiny. In this stage, members work to solidify positive working relationships with each other, but also are seen to explore relationships between immediate, co-present activity and wider, more generalisable concerns, participants seemed to use this negotiation to both orient their own activity but also to shape the activity of the group - the source of decision making stems from imagined or research situations that sit outside the group itself but pertain to the groups activity - for example changing social arrangements and their impact on a designed service. Higher and lower level concerns are always vitally important to the restructuring work at a given level - thus the negotiation carried out concerns integrating cross level issues.

Stage IV
Work / Productivity

Fourth stage group development is characterised by intensity. This was witnessed amongst the observed cohort and was of particular note in the ethnographic data. The social atmoshpere in the studio space was marked by reciprocating period of intense silence, with individuals retreating to their devices or pouring over documents or notebooks, at other times social interaction would erupt into intense discussion particularly when collaborative interaction was required to move projects forward. Intense team productivity and effectiveness was evidenced by these reciprocating cycles. This is well described by Gersick's model of punctuated equilibrium (1988). Teams progress in a pattern of *punctuated equilibrium* through alternating inertial change and revolution in the behaviors and themes through which they approach their work'. As Gersick notes, these cycles belie a deeper order 'relatively long periods of stability (equilibrium), punctuated by compact periods of qualitative, metamorphic change (revolution)' social systems follow a basic gestalt, a step like paradigm of periodic stability and intensity - in the observed, as the team stabilised, growing trust allows for groups to engage in intense discursive activity without damaging the integrity of the group, so that stabilisation that occurs as group development progresses arising

through shared experience and enculturation, provided an integral platform for intense exchanges, which allow for change in individual schemas, the process of reframing and thus the impact of a project. As Gersick notes; 'in every model, the interrelationship of these two modes is explained through the construct of a highly durable underlying order or deep structure'. The suspicion is that this deep structure is in part stabilised by the cultural environment of the organisation and the tools it uses such as IMGD which foster the idea that intensity is to be expected and embraced. The facilitation staff play the role of moderating this intensity and avoiding overspill into social conflict. With guidance, a group issues resolve based on experience of the previous stages, groups feel able to focus their energy on accomplishing goals through tasks.

Stage V
Ends & Closure

As witnessed, deliberate closing of group interaction approached sensitively was a primary learning strategy used by Hyper, this is where a highly private and emotionally intense collective reflection was engaged in to gather points of reflection and actionable insight from group cycles - this ending stage generates 'learnings' As Wheelan indiates - impending termination may cause disruption and conflict in some groups, activities that anticipated this became vital, furthermore the final termination of the course before learners moved into final stages was particualrly intense.

A great deal of posistive and negative disruption arose in the wake of the course ending. If separation issues are addressed and members' appreciation of each other as a group experience is expressed this goes some way to ameliorate this process. However, the degree of intensity experienced through the overall group development cycle caused lasting impacts upon participants. Many reporting feelings of isolation or feeling 'lost' after the intesity of the studio learning phase.

Certainly, taken together groups are subject to social, material and environmental factors which mean it is functionally difficult to traces causes only within a given unit of analysis, what was witnessed was a tacking between micro, meso and macro entities as individuals oriented themselves to groups and learned through this process. At each level of analysis, each level engaged in interaction with levels above and below, inevitably designers are required to make radical jumps up to consider wider organisational or societal issues, but also down into deeply micro personal, psychological concerns but also to consider finely technical detail of system patterning. Whether sampling these through direct exploration, reflective thought or concept formation individuals contribute to group development by effectively managing these jumps to enact purposive activity whilst managing interpersonal integrity. Discontinuities here can be intensely emotionally affective, thus concern for wellbeing during these intense learning experience is paramount.

Gersick, C.J.G., (1991). Revolutionary Change Theories: A Multilevel Exploration of the Punctuated Equilibrium Paradigm. The Academy of Management Review, 16(1), p.10.

Hackman, J.R., (2003). Learning more by crossing levels: evidence from airplanes, hospitals, and orchestras. Journal of Organizational Behavior, 24(8), pp.905–922.

Wheelan, S.A., Integrated Model of Group Development (2005)

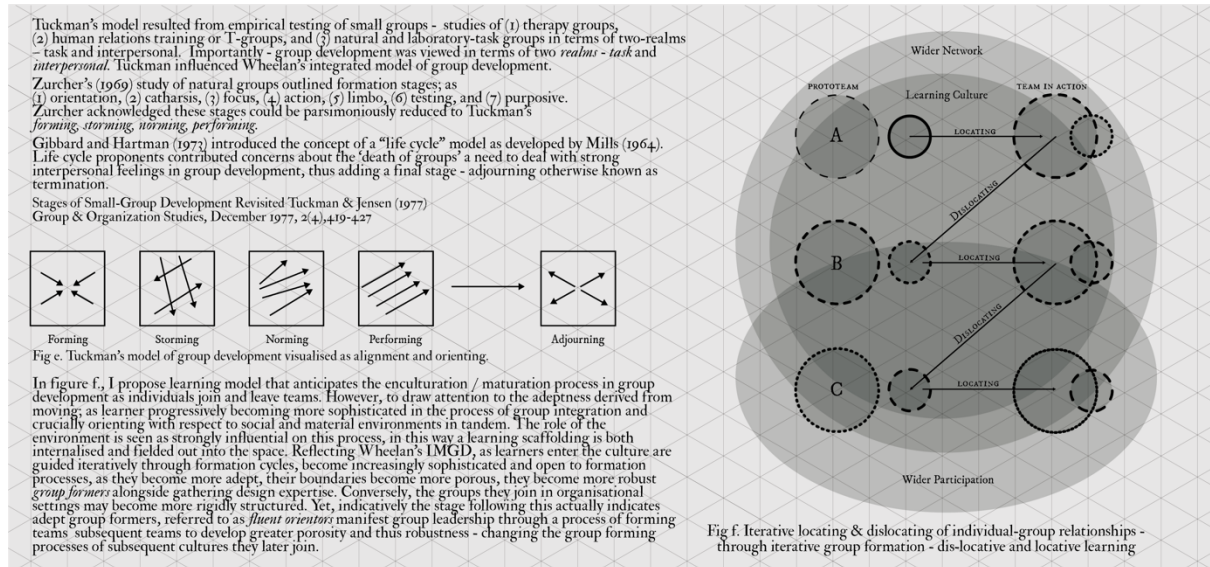Figure 60 – Analysis and evaluation of Integrated Model of Group Development as applied in context.

Tuckman's model resulted from empirical testing of small groups - studies of (1) therapy groups, (2) human relations training or T-groups, and (3) natural and laboratory-task groups in terms of two-realms – task and interpersonal. Importantly - group development was viewed in terms of two *realms* - *task* and *interpersonal*. Tuckman influenced Wheelan's integrated model of group development.

Zurcher's (1969) study of natural groups outlined formation stages; as (1) orientation, (2) catharsis, (3) focus, (4) action, (5) limbo, (6) testing, and (7) purposive. Zurcher acknowledged these stages could be parsimoniously reduced to Tuckman's *forming, storming, norming, performing*.

Gibbard and Hartman (1973) introduced the concept of a "life cycle" model as developed by Mills (1964). Life cycle proponents contributed concerns about the 'death of groups' a need to deal with strong interpersonal feelings in group development, thus adding a final stage - adjourning otherwise known as termination.

Stages of Small-Group Development Revisited Tuckman & Jensen (1977)
Group & Organization Studies, December 1977, 2(4),419-427

Fig e. Tuckman's model of group development visualised as alignment and orienting.

In figure f., I propose learning model that anticipates the enculturation / maturation process in group development as individuals join and leave teams. However, to draw attention to the adeptness derived from moving; as learner progressively becoming more sophisticated in the process of group integration and crucially orienting with respect to social and material environments in tandem. The role of the environment is seen as strongly influential on this process, in this way a learning scaffolding is both internalised and fielded out into the space. Reflecting Wheelan's IMGD, as learners enter the culture are guided iteratively through formation cycles, become increasingly sophisticated and open to formation processes, as they become more adept, their boundaries become more porous, they become more robust *group formers* alongside gathering design expertise. Conversely, the groups they join in organisational settings may become more rigidly structured. Yet, indicatively the stage following this actually indicates adept group formers, referred to as *fluent orientors* manifest group leadership through a process of forming teams subsequent teams to develop greater porosity and thus robustness - changing the group forming processes of subsequent cultures they later join.

Fig f. Iterative locating & dislocating of individual-group relationships - through iterative group formation - dis-locative and locative learning

Figure 61 – Proposal for a model to account group development cycles observed within Hyper Island

10.3.2 *The Johari Window*

The Johari window is a technique developed by psychologists Joseph Luft (1916–2014) and Harrington Ingham (1916–1995), it was designed to be used in therapeutic circumstances, such as self-help groups, it is also applied to a range of organisational settings and communities of practice. This framework which Luft indicates *'seems to lend itself as a heuristic device to speculating about human relations'*. It stands as an important part of the group development activity in Hyper Island, providing a means for individuals to reflect on their assumptive world and their relations with the group in collaboration. The model is a basic quadrant, each of the four sections broken into a notional domain, the model neatly visualises a boundary between the internal psyche and the external psycho-social arrangements each person in group is subject to. This model effectively considers the person but held in reference to others, the delimiting boundary is arranged along lines which contain knowledge about self and what others 'know'. This division in epistemic domains is implemented as a fundamentally important tool to cultivate noticing behaviours within the organisation - The importance of reflecting on the simple and powerful dimension of 'known to self' / 'known to others' a tactic co-opted from social psychology is inestimably important. The axes are divided into (X) Self and (Y) Others. Leaving the following matrix; (X) known to self, not known to self and (Y) known to others, not known to others.
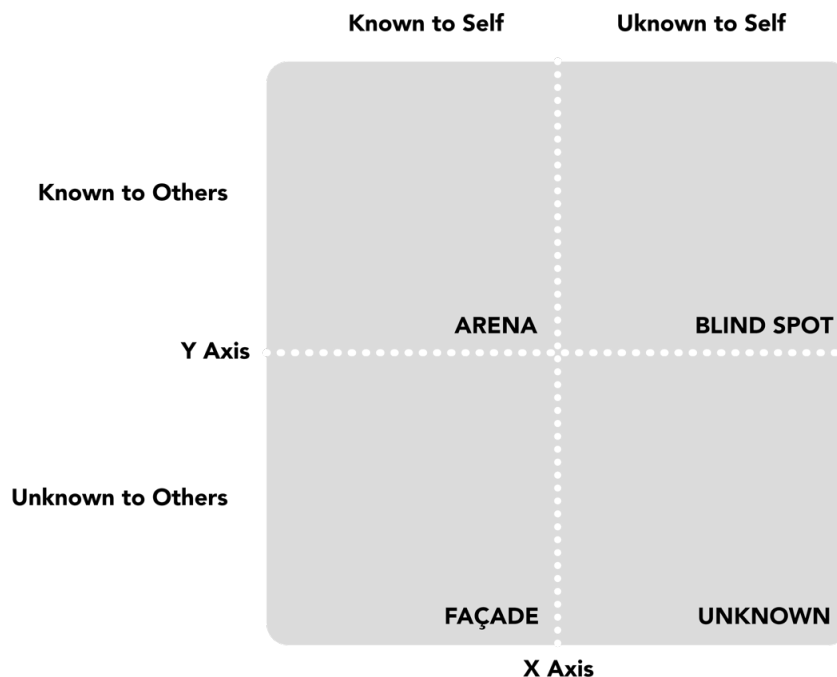

The Johari Window
Adapted from Ingham, H. & Luft, J., 1955.

Figure 62 – Johari Window Model (Ingham 1955).

Four bounded zones (KTS, UTS) and (KTO, UTO) emerge. The combinations of the four possible areas, the areas of the quadrant, result in four 'spaces' that provide a thinking tool. The arena (KTS + KTO), the Façade (KTS + UTO), the blind spot (UTS + KTO) and the Unknown (UTS + UTO).

This heuristic tool, originating with Joseph Luft and Harrington Ingham (a portmanteau of their names) has long been used as an analytic tool by intelligence communities. It's an example of a heuristic tool that spatialises personal > interpersonal boundaries. It is interesting because it highlights the relative legibility of the self in relation to others. Note how activity operates to reconfigure the boundaries of the model, the model is in permanent flux via interaction. The movement in this diagram is mediated by the act of learning, in this case the most important characteristic is therefore implied but not represented by the model.
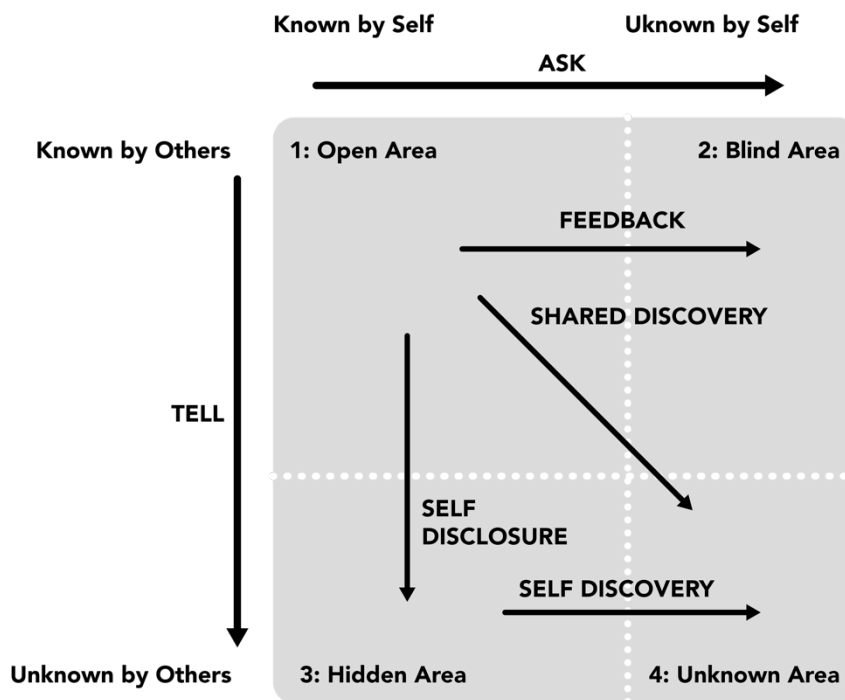

Adapted from "Of Human Interaction" by Joseph Luft. © 1969

Figure 63 - Interpersonal feedback enabling learning development by expanding awareness.

This heuristic was made infamous by Donald Rumsfeld in an address to the US Department of Defence in 2002 concerning the evidence base for the subsequent conflict that has deeply marked the early 21st century geopolitical landscape. Furthermore, this contends that Rumsfeld's *'little poem'* conceals an important category; *'what we don't want to know'*. Sociological literature contends that the

relationships between what *we know, what we do not know, what we cannot know* and *what we do not like to know* that determines the cognitive frame for political practice (Daase & Kessler 2007).

Daase argues that this omission allows for the manufacture of threat based on non-knowledge, that there are things we could know but decide not to know by forgetting, suppressing or repressing them. This suggests two aspects, from the sociology of knowledge that link ontology and epistemology. *'There is knowledge (or non-knowledge) about things, and knowledge (or non-knowledge) about ways to identify things'.* From this we arrive at flexible taxonomy of knowledge; first relating to the knowability of the phenomena of reality itself, the second to epistemological status of such knowledge. Whether we might know methods of gaining knowledge. As Daase argues, if we have ways of escaping non-knowledge, we possess methodological knowledge. This certainly reveals linkages to contemporary theorists Harman (Harman 2010) and (Meillassoux 2008) who apply this duality to develop their discussion of ontology and epistemology. For Daase, this illustrates the relations between empiric and methodological knowledge and the perception of threat.

Empirical Knowledge

	KNOWN	UNKNOWN
KNOWN		
Methodological Knowledge	THREAT	RISK
UNKNOWN	IGNORANCE	DISASTER
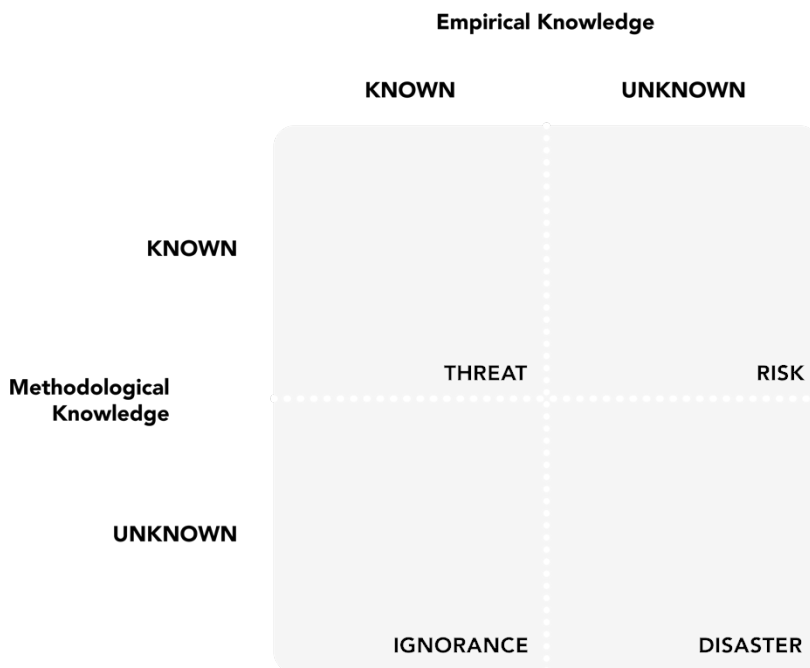
Four kinds of Dangers
Adapted Christopher Daase and Oliver Kessler (2007)

Four Kinds of Dangers (Daase & Kessler 2007)

The relational typology of *Known Knowns, Known Unknowns, Unknown Unknowns, Unknown Knowns* maps well to the framework as it draws on the Johari model. Importantly, Daase highlights

the relevance of this system in terms of building a rational basis for action, insisting that *'not all uncertainties are of a quantitative nature, and thus understandable within the common definition of rationality'* and that in this context deterministic causality has lost validity, that political research can strive for is probabilistic knowledge, reasons and causes point to trends and tendencies through the identification of conditions under which their realisation is likely. The prospective nature of the framework is a means to deal with stochastic interaction between human systems and environments. This interrelates two aspects of uncertainty subject to a different kind of rationality; probability and risk; *'Probability theories provide different conceptualisations of how the future and the present are connected via characterising the unknown. Risk names the boundary of what an individual can and does (not) know, what lies in his responsibility or what is subject to, for example, a 'higher force'* (Daase & Kessler 2007).

The application of this tool to group development observed in context reveals an important means that the relationship between self and other is negotiated and a principal function of learning within the culture. Drawing parallels between intelligence gathering community, this model is interesting because it is agnostic to scale or domain, witnessing its application to justify the War on Terror but also to arbitrate group relationships as a learning tool begs the question, are there innate organising concepts underpinning this kind of model that have implication for the kind of activity they permit, this tool facilitates gathering, state changes or modification of these abstract categories which thereby, implies learning.

The application of this to a learning organisation, reveals the cognisance of change as presenting threat, the tools as diagnostic implement and learning the remedy. This is especially relevant in our discussion of Carl Roger's person centred therapy which forms the basis of the learner centred approach, herein, threats to self-concept hinder or occlude learning, the reverence and curation of atmosphere in the feedback sessions seemed focused on creating a place where contesting self-concept was seriously attended to as fundamental to personal learning development, the trust required to do this, and to allow the researcher to observe this, signified the thick boundaries of the social world the Hyper cohort represent. A thickening of intergroup relations was a formative part of the learning process, the dynamics of the group overlapped with the enablement of learning, drawing flexibly on Ryle, as each of the cohort develop thickened relations and thick descriptions about one another this formed the social world but also facilitated the learning that occurred within it.

Resistance to modification presents to challenges organising activity in many forms; to cause learning activity but also to enact change. The pattern here is that material conditions (and psycho-social relations) present inherent resistances to conventional learning activity. The sessions were a form of intercommunal negotiations which was fundamental to learning and to collaboration. As such collaborative learning emerges as an important signal in the observation, crucial to understanding the

organisation. Learners and organisational members used this tool as a means to reflect, first *intra-mentally* but also *inter-mentally*, crucially the learning in these sessions occurred amongst the group. Shifts in this model, on the ground, take the form of aligning movement towards preferred states, these models thus reveal the nature of organising activity as means of making. Viewed as Situation making, this has two directions: conditions informing stance and stance informing conditions. The reciprocal tension between these two is inherent to organising, but this also firmly falls into special capacity of design thinking approaches with their ability to frame purposeful activity within a given field of action.