

Designing contextually relevant digital interpretation for a public garden

Elizabeth Edwards

MA, MRes



HighWire Centre for Doctoral Training
School of Computing and Communications
Lancaster University

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Abstract

This thesis is concerned with the design of digital technologies, particularly digital interpretation, to reveal the natural world and support human connection to natural places. The natural world is under an accelerating threat as a result of human behaviour and increased technology use is perceived to be part of the problem. Some philosophers have made a connection between the design of technology and the behavioural and attitudinal tendencies elicited through the use of technology. Whether or not this is true it is an interesting area of research. The research project described explores the use of criticism of technology, taken from a selection of critical theory writings, as a design lens to inform design process and the design of digital artefacts for use in nature.

The research draws heavily on the work of Heidegger, Borgmann and Feenberg to inform the design lens. The first phase of the research involved drawing out design criteria from the critiques of technology. The next phase of the research which drew on Reflective Practice and Research through Design, applied the design lens to a prototype design which was intended to be used to build connection with a woodland area.

The subsequent research involved a longterm collaboration with gardeners and volunteers at the Walled Kitchen Garden in Clumber Park, a National Trust property in Nottinghamshire. The research explored the use of the design principles drawn from critical theory to create and evaluate digital interpretation for the garden. The open and reflective research approach allowed for the evolution of new research

questions through the process. This led to additional questions about sustaining digital interpretation and designing for active engagement. The findings suggest that the designs produced using the lens drawn from critical theory are distinct and contextually relevant designs that have a 'family resemblance'. The research shows that the design principles drawn from critical theory resulted in an embedded, design process that was highly responsive to context. One of the contributions of the research is a set of recommendations to be considered when designing digital interpretation for organisations with an interest in environmental issues. The research also results in tentative contributions towards a digital nature strand for the primary school curriculum involving cross-curricular, multi-sensory and multi-dimensional activities to build connection to natural environments.

For my parents, Elizabeth and Alan.

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Declaration

This thesis is my own work and no portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification at this or any other institute of learning.

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Chapter 1

Introduction

The natural world is under an accelerating threat as a result of human behaviour. People are increasingly disconnected from the natural world and a link has been made between human disconnection and the degradation of ecosystems. Conversely it has been shown that connection to nature can support pro-environmental behaviour. This is the starting point for my thesis. I am motivated to research ways that design can contribute to building environmental knowledge and pro-environmental attitudes and behaviours, so investigating design to support connection to nature was the starting premise for the research. One of my areas of interest within the field of design is digital technology and its potential for impact on pro-environmental action. There isn't a consensus on the impact of digital technology in this area. There is wide acknowledgement of instances where digital technologies have supported pro-environmental behaviour but there's also agreement that use of digital technologies may encourage behaviour that is a threat to pro-environmental action.

Some of the concerns about technology in general, and digital technologies in particular are rooted in a political and philosophical tradition that argues that technologies associated with industry and modernity have a tendency to change human values and behaviours in ways that are damaging to society and the natural world.

I have sympathy with the idea that digital technologies can be used for positive environmental outcomes, but often are not used in this way. I wondered what

would happen if we accepted, and even embraced the criticism of technology and used it to create a lens to inform the design of digital technologies. Would the new designs have a different character to prior technologies? Would a set of artefacts designed in this way have a “familial resemblance” [3]? How would the influence of theory that was critical of technology affect the design process? Would a design project that used this lens produce knowledge that could be transferred to other ‘digital technology for the environment’ research programmes? Would digital technologies created in this way support connection to nature or pro-environmental attitude or activity?

The following sections will guide the reader through the prior research and thinking that forms the premise for the research.

1.1 Natural World under Threat

There is strong evidence that the natural world is under threat. The 2013 State of Nature report [4], which audited populations, trends and habitats in UK and Overseas Territories found that 557 species were listed as priorities for conservation in the late 1990s. A decade later this number had doubled and there are currently 2,890 species defined as priority species. In the early part of the 21st century global rates for biome and population loss was estimated to be between 0.5 - 1% per year [5] and it is predicted that there will be thousands of extinctions within the century [6]. Habitat loss accompanies these population losses. For example, 97% of lowland meadows were lost between 1930 and 1984, and the areas covered by coppiced woodland fell by 90% between 1900 and 1970 [4]. Human activities are driving the environmental changes that cause these threats to non-human nature. The next section shows how connection to nature contributes to the environmental attitudes and decision-making.

1.2 Nature Connection

Various terms (e.g. connection to nature, connection with nature, nature connectedness) are used to describe the concept of nature connection which can

imply subtle distinctions in political or theoretical stance. Discussion of these is beyond the scope of this work because the research is concerned with the broad concept rather than differentiation, so I will use the terms interchangeably. Other researchers, like Latour [7], dispute the use of the term, arguing that it is a false construct that reinforces the idea of division between human and non-human nature. Discussion of this is also outwith the parameters of this research.

Connection to nature is defined in different ways. I will be using it generally to refer to “an individual’s subjective sense of their relationship with the natural world” [8]. Connection to nature is not analogous with knowledge of the natural world, or time spent in the natural world, though both can feed a connection and may be indicative of a connection. It isn’t definitively linked to particular categories of activities as much as intentionality [8] and the influence of the people who play a role in formative environmental experiences [9]. The feeling of connection to nature usually builds over time as the result of mundane, habitual activities, in one’s local area [6, 9, 10, 11, 12] but it can also happen as the result of singular transformative wilderness experiences that take humans out of their usual ways of thinking and behaving and enable them to perceive interconnectedness with non-humans [13].

Childhood is a formative time for seeding connections with nature [9, 14], fuelled by opportunities to “explore, dig, prowl, play, catch and ultimately discover, among indigenous local plants and animals...” [10] Building connections by the age of twelve is believed to be important by people trying to encourage positive environmental behaviour [15].

I was interested in all the approaches to building connection and wondered if digital technology could be used to catalyse connections by increasing awareness of local nature or creating moments of wonder and transformation. Given the evidence that experiences in the natural world are crucial to building connection, I speculated about how digital technologies might be used to drive those encounters. I was struck by parallels between the literature from critical theory and nature connection. For example, Heidegger wrote about the need for people to see things ‘for themselves’ in order to escape the instrumental thinking about nature as a resource, that dominates modern urban life. This echoed ideas of revelation as a part of nature connection, as exemplified in Aaltola:

“instead of existing in an auto-pilot mode, one is suddenly awakened to the world and sees it anew” [13]

This is expanded upon in detail in Chapter 4, (Philosophical Interlude). The following section explains why connection to nature is important for environmental protection and the subsequent section describes the decline in connection, which sets the scene for the research.

1.3 Connection and disconnection with nature

Strong connection to nature is associated with positive concern for the natural environment and research shows this may extend to pro-environmental behaviour [8, 16, 17, 18, 19, 20, 21]. Outdoor recreation can help to establish “place attachment” through “place markers.” The association of positive feelings with natural places develops into an eco-centric attitude [21]. Chalwa’s work on the life paths of adult environmentalists demonstrated a connection between access to nature in gardens and elsewhere during childhood and later involvement in environmental work [9]. The research suggests that building connection to nature may be a way of increasing the number of people who take an interest in environmental issues and potentially the number who engage in pro-environmental behaviour. To invert David Attenborough’s famous quote (cited in [15]), people protect what they care about and care about the things/places they have experienced.

However people in the West are increasingly disconnected from nature, in part because of urbanisation which means people’s daily lives are less closely interwoven with the non-human world. Children play outside less frequently and for shorter periods across smaller territories [22] than previous generations of children, to the point where they have been labelled “containerised kids” (Clarke, cited in [22]). “Fewer than a quarter of children regularly use their ‘local patch of nature’, compared to half of adults when they were children.” Ecological knowledge is decreasing [23] and there are fewer amateur naturalists with each successive generation [15]. This is a problem, not only because people are losing an emotional connection to nature but they no longer notice losses occurring in the natural world and they lose awareness of interdependencies between humans

and non-humans [8, 24]. This results in increasingly anthropocentric or environmentally damaging choices. One example at a local level was placing spikes in trees to deter birds from landing and excreting on cars below [25, 26]. Through the democratic process we can contribute to decisions that have the potential to affect environments locally and globally for example in decisions about land use, transport and energy use. Our connection to nature may influence our decision-making.

When I began my thesis research, one of the drivers was a desire to show people the natural world around them in a new light in the hope that the revelation would play a part in reconnection. So, when people made choices, even seemingly mundane choices about how to use their backyard space, the natural world was at the forefront of their minds. Pyle describes a cycle he calls “Extension of Experience”, whereby people become habituated to species loss from an area and with each loss the habitat care is diminished to the point where people care even less about the species that remain and act less to prevent further losses [10]. I wanted to challenge this by promoting care for places and awareness of non-human nature through design. I wanted to use understanding about connection to nature to inform the design research, but I did not want to reproduce ‘connection to nature’ studies from psychology, because I felt the time that it would take me to become equipped to research in that domain would have taken me away from my own research interests in design. The literature about connection to nature informed choices about the research site, discussed in the Methodology, (Chapter 3), and underscored the things that might be needed in a design to support connection to the natural world or design to increase awareness of place.

The following section introduces my interest in the relationship between connection to nature and the influence of technology.

1.4 Technology and separation

The concept of human separation from the natural world is closely linked to Cartesian separation of mind and body [27], though Ingold [28] says that it can be linked to the introduction of pavement, when people no longer had to pay

attention to the undulations in the ground they walked upon. This image struck a chord with me because I know that I attend to the land when I am walking in the countryside to avoid ending up boot-high in waterlogged ground, or on my back after slipping on loose scree. In Western cities, I rarely think about my footing, and sometimes I can barely see my feet as I plan my route through crowds. Industrialisation has reduced the need to pay attention to the non-human world in daily life. The link between industrialisation and disconnection to nature and the self has been widely discussed in literature [29, 30, 31]. Several factors were posited for the separation including changes to labour brought about by machines. The production process was modularised and workers lost a sense of the whole process of production. Thus workers were less invested in the fragmented process, especially as they became deskilled through the use of machines. The “movement away from the continuity and immediacy of experience” [30] caused a change in people’s emotional state, which was compounded by the intensity of living in new urban environments. Separation which began with physical separation from rural environments was repeated at every level until the individual was fragmented and disconnected even from themselves. Once the separation from self and natural environment had occurred, the ‘othering’ of nature could proceed. The principles in this account on the impact of Industrial Revolution (detachment from context, deskilling and compartmentalisation) persist into more recent concerns about technologies in general, and digital technologies in particular.

For example, with respect to physical separation from natural environments, the proliferation of digital technologies means outdoors competes for time against television and various computing activities [24]. A recent Ofcom report [32] found 3-7 year olds spent on average between 13.5 to 15 hours a week watching television while 12-15 year olds spend an average of nearly 21 hours a week online, 18 hours a week using a mobile phone, 14 hours watching television and 12 hours gaming. Life and play have become more sedentary [5, 33]. With less time spent in actual nature there are increasing occasions where technological versions of nature are used as a substitute and some researchers [34] are concerned that the digital alternatives alienate us from ‘real nature’. Kahn [34] cites an example of experiencing a VR rendering of a wild area in Iceland.

“I put on the VR goggles, and there I was in Iceland in wide-open plains. It was the afternoon, and the wind was starting to blow. I heard it blowing strong but it was unnerving because I did not feel it. Even more unnerving, I didn’t need to do anything, I didn’t need to take care of myself: When I’ve been in wild places with the sound of wind like that, I immediately go for my hat to keep my head warm, and I put on a layer. But I’m experiencing this VR in the safety of a research lab inside a warm building in Seattle.”

The digital substitute doesn’t enable the human to develop the experiential knowledge one gains from being outside. It didn’t enable the participant to build any connection with the surrounding environment. Not only does the technology prevent authentic engagements with the non-human world it can fill space and time that would previously have been opportunities for nature encounters [35].

I was inspired to research the place of digital technologies in human relationships to natural environments, the theory of this is discussed in Chapter 4, (Philosophical Interlude). I hoped to address the concerns about the characteristics of technologies that were perceived to be problematic. My interest in philosophy of technology began during my time at HighWire Centre for Doctoral Training (HighWire) but my interest in design and the natural environment is not new. The next section outlines my journey to the research space.

1.5 Personal journey to the research space

The researcher is core to the research - not separate from it. So it is relevant to acknowledge formative influences that have brought me to the research space and have made it meaningful for me. I will briefly highlight six factors that in hindsight appear to have brought me to this place, and though I am aware that memory “is reconstructive”, I agree with Chalwa [36] that “people’s own construction of their past point to forms of experience we should take seriously.” These factors have contributed to my ontology and epistemology and the shadow cast by these factors is evident in the decisions taken through the development

of the thesis.

i) Childhood connection to nature: My relationship to the natural world was established in childhood. We lived in a village with a house bordering a brook with fields beyond, though moved to town when I was eight. I have strong memories of collecting wood for the stove from a nearby copse and digging for tiny star shaped fossils as my parents tended the garden. We often went camping on holiday and as my dad was a Welshman, we had many holidays in Wales. I have vivid memories of playing barefoot in a Welsh stream; the feel of the freezing water and the care needed to make a single step on slippery stream-bed against the force of the water. In childhood I learnt by trial and error how to cross a scree slope and which colours of grass I could cross safely and which were most likely to leave me up to my knees in mud or water. My dad could read the landscape and would tell us about the volcanoes, glaciers and seas that had covered the land millions of years before. As I write this more and more memories come flashing to mind. Through childhood I became ‘fluent’ with nature and I felt at home, and at my happiest spending time outdoors in countryside. Getting wet and cold with sharp grazes and chilblains on fingers was part of building the relationship and familiarity. My memories are sensory loaded. I also became aware that my experience wasn’t shared by all of my contemporaries, some of whom experienced nature as dirty, uncomfortable and frightening. Several insights come out from this, first that I perceive my connection with nature to be drawn from early encounters in formative years, many of which happened close to home. My parents modelled behaviours that have influenced my attitudes and connection to the natural world, and in both of these factors resonate with research linking childhood experience in nature with connection to nature [6, 9, 10, 11, 12, 22]. The second insight is the power of placemaking and importance of experience in formation of place.

ii) My family was not the only influence. I went through Brownies, Guides and Rangers and was lucky to be a member of active groups with knowledgeable leaders and that played a major part in the development of my environmental values. In addition to learning about the material properties of leaves, moss and

wood, I learnt never to cut living wood, to walk tracks in ways to avoid erosion and to leave almost no evidence of a campsite because nature wasn't just for me but was important in its own right. Again, I learnt through experience and observation. Tacit and experiential learning is something I continued to value into adulthood, and I believe this has contributed to my epistemological understanding about ways of knowing. Doing and reflecting was part of childhood and so the relevance of Reflective Practice and learning through doing in later life seems connected.

iii) This study crosses between design, environmental studies, philosophy of technology, Human Computer Interaction (HCI) and media theory and touches on areas such as sociology. That it is interdisciplinary research seems inevitable because my career has taken me between disciplines from training to be a Secondary School teacher to becoming a designer, then lecturer and researcher. I moved between disciplines from a student training to be a Physical Education and Environmental Geography teacher to actually teaching Humanities, Geography, ICT, Business Studies and English as a Second Language. As a design lecturer I worked in an art and design department that exposed me to different literature and practices, where interdisciplinary collaboration was valued. Over the years my work setting also changed between schools in different countries, universities, summer schools and a women's centre and in each setting people had different motivations and approaches to communication, recognizing differing needs. In my research I collaborated with a jeweller and we shared research papers and books from our respective disciplines. Along the journey I read different literature and encountered different philosophies and I found that looking at a problem from another perspective could shed new light or open up new opportunities and directions for investigating a problem. I saw the value of interdisciplinarity for asking new questions, reflecting and combining methodologies. It seemed natural to pursue a Ph.D. at the HighWire C.D.T., a programme that built interdisciplinarity into the structure. During the HighWire M.Res. I encountered the tensions and difficulties of colliding philosophies, methods and perspectives, but also saw the value in the provocative, disruptive, enlivening influence. Interdisciplinarity feeds and challenges me and has become an important aspect of my

work practice, though the degree of interdisciplinarity varies.

iv) My worldview has also been shaped by my lesbian identity. I came out at a time of Section 28 when prejudice was common and equality seemed far away. Lesbian and gay venues were safe spaces, to be oneself, meet others and absorb gay culture. Over time things changed, for better and worse. Changes to funding and rent increases meant the closure of some venues but as different sexualities became more accepted some places closed because people didn't feel the need to go to them. With them a culture and history that were part of my identity vanished. As I walked streets and passed sites that were once beacons of protest and music and literature and sex, I keenly felt the loss of 'my' culture and the history of an important moment in time. The history was invisible and lost to the following generations. The idea of making visible the invisible, revealing lost stories and multiple histories of places became a concern and place-making and the process by which place-making happens became important to me. These interests continue into the thesis. The matter that is lost or hidden differs but there are parallels in my ongoing desire to reveal and show aspects of life that may be unnoticed or even 'othered.' My political awakening happened in parallel with my 'coming out' and integration within the lesbian community. I began to become aware of the interconnectedness of prejudice, societal 'othering' and the power and responsibility of personal political decision-making in all aspects of life. I witnessed a political transition in the UK from a time where it was legal to sack people because of their sexuality and exclude same-sex partners from life and death decisions because of a lack of legal protection to a time where equality is enshrined in law and societal attitudes have become accommodating of different sexualities. This radical transformation came about through action on a variety of fronts, from direct action and political action, to individual personal actions, but a significant part was about showing people who thought they didn't know any lesbians that they were everywhere. It was about revealing what had been hidden and building familiarity and emotional connections so that people who might otherwise oppose equality legislation would instead support equality. The relevance for the development of my thesis is the idea of changing attitudes

through revelation and emotional connection.

v) The importance of unseen histories and hidden narratives that had become important because of my personal experiences, influenced a collaborative partnership with jeweller, Cerys Alonso [37]. Through design practice we explored invisible stories and the lives of objects and people through digital narratives and memories connected to jewellery and other artefacts. This connected with other design research of the time such as Jayne Wallace's use of digital jewellery to research memory and memory loss [38, 39]; Wallace's work with Hazel White and Sarah Kettley to create interactive objects and wearable pieces created around narratives of life in the Shetlands [40]; and Chris Speed's TOTeM (Tales of Things and Electronic Memory) [41] project with Oxfam that explored how the value of objects brought to particular Oxfam shops changed when stories about the objects and their lives were connected to the objects. Other work influenced my research interests in relation to narratives of place and the use of combined media in artworks that stimulate connection to place. These included Jen Southern's '(area)code' [42, 43], which enabled participants to text digital memories about a particular GPS location to a digital store, from where they could be retrieved by others; Steve Symon's 'Aura' installation [44], which overlaid audio onto physical space, through use of GPS and headphones, though this was an investigation of interaction with space, rather than with specifics of a particular place; and the 'Half Life' project, which intervened in an area of Argyll, Scotland to reveal narratives related to the prehistoric landscape and its Neolithic inhabitants [45, 46]. This multifaceted work involved a collaboration between design group NVA, the National Theatre of Scotland, the Forestry Commission and a group of fine artists and sound artists. Crucially the activities took place in the natural environment. The first activity involved walking to Neolithic archaeological sites where artists had created digital and physical installations. The second activity involved an evening theatre performance that took place in a woodland area on an illuminated wooden henge. The performance drew on themes from the archaeology and installations. I was struck by the power of the layered multimedia approach to show new perspectives and provoke reflection and the impact of this work stayed with me as I began to think about the focus of my thesis. Themes

of physical and digital materiality became more prominent and the importance of place recurred.

1.6 Narrowing the research space

A consistent theme, present from the earliest stages of this research was a desire to investigate the possibilities and limitations of digital technologies in turning ‘spaces’ into ‘places,’ by building an intimate relationship with the natural environments through direct experiences to boost familiarity and counter to the ‘othering’ influence of increased urbanization. This is a theme I will return to in the literature review. At the earliest stages I considered researching digital mapping strategies to bring together community knowledge, historical layers and inputs derived from non-human sensing. This was connected to my previous interests in invisible stories and layered narratives. I was inspired by paper maps created by Mish Crouan to show pre-Clearance tracks and ruins on a small Scottish island. The maps led to more people using the routes and becoming aware of the historical Clearances in that area. Crouan talked about the dilemma of sharing the maps; the value of sharing the history weighed against the potential for physical damage as old paths came into use again and more people visited fragile historic sites. I found these tensions and ethical decisions interesting, and started to think about digital maps as a possible area of research. Ultimately I did not focus on mapping but the ideas of layering information, and making visible obscured aspects of a place remained a focus, as did interest in tensions associated with using digital technologies in outdoor environments. The idea of ‘getting to know a place’ in order to grow an emotional connection came from the ‘nature connection’ literature and the theme persisted.

I decided to see how criticism of technology could be used to shape the design of technology to support connection to place and awareness of nature. I began by exploring the use of digital technology to extend my personal connection to nature in a local area. Later I came to focus on the design of National Trust interpretation. Gardens are amongst the most accessible environments for making a nature connection and they are places where people often have the ability to

take action to support nature. Interpretation has potential to act as a meeting place between digital technology, outdoor spaces and living things. Also it has a wider reach than more bespoke technological devices.

1.6.1 The influence of Critical Theory

Critical Theory is differentiated from Traditional Theory or scientism by showing how the researcher's perception is shaped by history and experience, which means researchers are always wittingly or unwittingly partial. This sets the foundations for the aims of Critical Theory, which are to "emancipate" and "liberate" humans from power structures that "enslave" [47]. Its origins lie in Marx's writings on society and power.

Critical Theory "must be explanatory, practical, and normative, all at the same time" [47]. Philosophy and social science are combined to achieve these aims. "In so doing, it can link empirical and interpretive social science to normative claims of truth, morality and justice, traditionally the purview of philosophy." [47]

The integrative, comprehensive approach that is core to Critical Theory has spawned many forms that address inequality and power structures in all domains. Although there is a specific use of the term that is associated with the work produced by the Frankfurt School, (a school of social theory linked to Goethe University), the ideas have been applied more generally by researchers in varied domains, and to differentiate this more general usage, these critical theories are often written with lower case, rather than proper nouns.

My use of the term is general, rather than specific to the Frankfurt School despite the strong influence of Marcuse, who was a member of the Frankfurt School and his student, Feenberg. General critical theory informs my world view and hence my research decisions. In Chapter 4, "Philosophical Interlude", I introduce the three main influences that guided my research, Martin Heidegger, Albert Borgmann and Andrew Feenberg. None are direct members of the Frankfurt School, in fact Heidegger is directly criticised by philosophers within the group. However, Feenberg was taught by Marcuse and I perceived parallels and

complementary ideas, (as well as divergence), in the work of Heidegger, Borgman, Feenberg and Marcuse.

Critical theory is applied to all aspects of society, to detect and understand the way structures bind people and reinforce inequality. It is used to practically challenge these constraints. Within HCI the use of critical theory has been advocated by researchers including Jeffrey Bardzell, Shaowen Bardzell, Mark Blythe and Simon Bowen [48, 49, 50] as a way to forment change and prompt new ways of seeing the world. I am attracted to the practical application of theory to situations in the world and critical theory is often linked to action. Critical theory reveals indirect or hidden links that explain oppression and unequal power relations. This approach is very relevant for understanding and addressing potential connections between technology, people and an “oppressed” natural environment. I reflect on my understanding of my ontological commitments in detail in Chapter 3, the Methodology.

1.7 Initial aims and research questions

I decided to research the design of digital artefacts in the light of criticism about the impact of using technology on individuals and society. I wanted to see if a different approach to designing digital interfaces could prompt different awareness, understanding and sense of connection to non-human nature. My initial questions are listed below.

- How does a lens taken from criticism of technology affect the design of digital interpretation artefacts?
- How does a lens taken from criticism of technology affect the design of digital artefacts to support connection to natural places?
- How does a lens that is critical of technology affect the design process?

It is important to understand that the questions were not fully formed at the start. My area of interest was technology (particularly digital technology), and human relationships to the non-human world.

The questions emerged through my research process, which is discussed in Chapter 3, the Methodology. These were the initial research questions and others arose as a result of interactions and observations during the process.

Research through Design became my dominant way of working and new questions came to light through the design activities and the reflections on the findings from the initial research phases. These additional questions are introduced in Chapter 3 to recognise the unfolding process.

1.8 Interpretation

Interpretation, which is also known as mediation, is commonly used within museums, heritage sites and cultural organisations. It is a type of communication for visitors that happens in tandem with direct, first-hand experience. Interpretation takes many forms, from text and illustrated signs placed beside displays, to encounters with performers playing historic roles and interacting with visitors, in character.

Much of the writing about interpretation has its roots in Tilden's six principles of interpretation described in "Interpreting Our Heritage", written in 1957 [51]. These principles include the need for interpretation to be connected to experience and the idea that interpretation is an art, which combines many arts. Interpretation should provoke, rather than instruct and interpretation is about "revelation based upon information". Tilden describes it as follows,

"Thousands of naturalists, historians, archaeologists, and other specialists are engaged in the work of revealing, to such visitors as desire the service, something of the beauty and wonder, the inspiration and spiritual meaning that lie behind what the visitor can with his senses perceive. This function of the custodians of our treasures is called interpretation." [51]

Interpretation is often associated with non-formal learning and it often linked to storytelling. Mark Woolmer explains,

“Interpretation is, essentially, storytelling. It’s my job to tell a story about a person, thing or place: bringing it to life in such a way that people can relate to it, appreciate and understand it and take something of the experience away with them.” [52]

Tilden spent many years writing about National Parks and his principles of interpretation are especially relevant for outdoor sites. However interpretation has also been adopted by other organisations that involve experiential encounters, where the collection or focus of interest is inside. Hence interpretation is an aspect of museum studies. In this context, it has been defined by the American Association of Museums as “the media/activities through which a museum carries out its mission and educational role”[53]. The organisation expands to explain interpretation as,

“a dynamic process of communication between the museum and the audience. Interpretation is the means by which the museum delivers its content. Interpretation media/activities include, but are not limited to: exhibits, tours, Web sites, classes, school programs, publications, and outreach.” [53]

Meanwhile, heritage interpretation has been described as,

“the constellation of communicative techniques that attempt to convey the public values, significance, and meanings of a heritage site, object, or tradition is central to understanding the wider characteristics of heritage itself.” [54]

In recent years there has been a shift in heritage interpretation because of the realisation that histories are contested and that interpretation can impose authorised versions that exclude marginalised histories. As a result there are attempts to make heritage interpretation more participatory, and hence richer through the inclusion of multiple narrative layers.

“public interpretation can be an activity where all these distinct modes of cognition are encouraged to be openly expressed and reveal themselves to each other, each enriching all the others with unexpected understandings and insights about the significance and value of heritage.” [54]

Silberman [54] shows how the public space can be used for the inclusion of many or to reinforce power structures that shut down multiple voices. He goes on to discuss the aims of the International Council on Monument’s and Sites (ICOMOS) Interpretation Charter [55] which aims to move from the single, definitive voice of the interpreter to a more collaborative approach to include more voices alongside that of the trained, experienced interpreter.

As will become clear, the evolution of what is meant by interpretation is relevant because it aligns with the theoretical contributions that critique technology, particularly the work of Andrew Feenberg introduced in Chapter 4.

The Review of Literature, which follows, and the Philosophical Interlude (Chapter 4) show how literature further shaped the research. The research site also influenced the direction of my research, as did my practice. This is discussed in the Methodology (Chapter 3).

1.9 Summary: Grounding the research and setting initial questions

This chapter used literature to establish the impact of technology on human relationships to the natural world, in order to establish the initial research questions about the potential influence of criticism of technology on the design of artefacts, the potential to influence interpretation, and the design process.

- How does a lens taken from criticism of technology affect the design of digital interpretation artefacts?
- How does a lens taken from criticism of technology affect the design of digital artefacts to support connection to natural places?

- How does a lens that is critical of technology affect the design process?

I began by identifying the problem that is the concern of this research, the threats to non-human nature posed by humanity, including mass extinctions, widespread habitat loss and increasing numbers of threatened ‘priority species’.

This led to a discussion of nature connection and disconnection. Connection with nature is associated with experience and care, which can be achieved incrementally through habitual experiences in mundane local areas, or through one-off transformative encounters in extremely wild places. It is understood that people who make these connections are more disposed to pro-environmental behaviour, so encouraging nature connection is important for changing the current trajectory towards environmental decline. Connections made in childhood are likely to be retained into adulthood.

Disconnection is associated with life in urban, industrialised areas, where technology dominates time, and shapes interactions with the non-human world. For example the car creates a compressed, removed experience of the natural world when compared to walking the same route. Writers over many decades, from Simmel to Kahn have expressed concerns about the way technology shapes experiences directly or shapes the psyche and perception, which in turn influences the way the natural world is valued and experienced. Sections 1.3 and 1.4 presented an overview which is expanded upon in Chapter 2, the Literature Review and Chapter 4, the Philosophical Interlude.

Having set out the general issues of concern I described my journey to the research space, which included my own childhood experiences and how they affected my nature connection. The personal journey also took account of political, academic and artistic influences that catalysed my interest in the space as a research domain.

Towards the end of the chapter there was a shift from general to specific. Section 1.6, “Narrowing the research space” to Section 1.8, “Interpretation” focused on specifics of the research and definitions that were pertinent to the research. Here digital interpretation was identified as the focus of the research, and a critical approach was selected as the means of research. I noted in the definitions the move from a single voice of authority to a participatory approach that is

underway within historical interpretation. This is relevant in respect of the use of a critical approach, because both are complementary means of undermining entrenched power. The synergy between theory and practice is also important because of the intent to conduct applied research that draws on the general principles of Critical Theory, established by researchers of the Frankfurt School, of practice driven by theory to disrupt established power.

This chapter also planted the seeds of my personal philosophy and worldview that are developed in the Methodology chapter. It is the grounding for subsequent literature.

Chapter 2

Literature Review

2.1 Overview

The research project that forms the basis of this thesis was conducted using a Research through Design process in which reading, making and reflecting informed each other concurrently, through the process. (This is discussed more fully in the Methodology Chapter.) This means that literature was encountered throughout, informing different stages of the research project. Literature is interspersed throughout the thesis, where it seems most appropriate to help illustrate a non-linear process within a linear narrative. Several chapters concentrate on literature and its relevance to the research. This chapter develops arguments set out in the Introduction in order to establish a context for the research and to identify a research space.

Later in the thesis a chapter called Philosophical Interlude addresses theories that have influenced the research project in more detail. It introduces specific writings from the canon of three writers who have shaped the ideas that underpin this work, Martin Heidegger, Albert Borgmann and Andrew Feenberg.

The following diagram, Figure 2.1, gives an overview of the main blocks of literature in the thesis. It provides a summary of the three main chapters and the sections that comprise the Review of Literature. It is intended to give the reader a sense of what follows, given that the literature is not contained within a

single chapter.

Figure 2.1: Literature overview.

Literature is interspersed throughout the thesis, but is most concentrated in two chapters

REVIEW OF LITERATURE

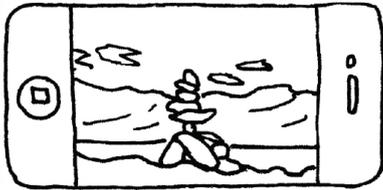
This chapter sets out the research context and identifies a research space.

PHILOSOPHICAL INTERLUDE 1

This chapter identifies criticism of technology in selected writings and uses it to create design principles that address the criticism.

THE IMPACT OF TECHNOLOGICAL CHANGE

This section exposes the need to pay attention to technological change because the impact of change can extend far beyond what was initially anticipated, influencing behaviour and perception.



TECHNOLOGY, HUMANS AND NATURE

This section acknowledges the complexity of technology, human, nature relations. It shows the precedent for subverting expected technology-nature relationships.



TECHNOLOGY AS NATURE AND TECHNOLOGY TO REVEAL NATURE

This section identifies examples of designs that use technology to reveal aspects of the natural world, and shows how these examples influenced my practice.



TIME, SPACE AND PLACEMAKING

This section introduces influential work on placemaking and embodiment which underpins my thinking about design and connection to nature



TANGIBLE EXHIBITS, INTERPRETATION, PLACE-BASED INTERVENTIONS AND DISCURSIVE OBJECTS

This identifies related work in design and HCI, particularly projects involving gardens, growing and technology, but also areas including sustainable HCI, reflective design and critical design. This identifies research influences but also space between other related research.



THE INFLUENCE OF VALUES LITERATURE

- Values and Frames
- Value sensitive design
- Values in Software engineering and Human Computer Interactions

This section introduces Values and frames Theory. It shows the role of frames in shaping attitudes, values and behaviour. This sets the seed for potential reframing using digital technologies.

2.2 Setting the Context in Literature

This section establishes the setting in literature that led to the emergence of the research project.

2.2.1 The impact of technological change

My thesis focuses on digital technologies but some of the literature that influences the work pre-dates the widespread use of digital media. In my reading it has often appeared there is a continuum between pre-digital and digital technologies and concerns expressed about the former are also relevant to the latter.

Neil Postman's critique of technological change is a useful starting place for considering the impact of technology, especially media technologies on people and society [56]. Although some of his ideas appear dated, others remain relevant and useful for establishing the context for this study. Postman listed five things he thought people should know about technological change. These included the idea that although technology brings both advantages and disadvantages the disadvantages are given little attention. He argued that technology benefits some and harms others so the question of who wins and loses should be given more prominence, and from my perspective the scrutiny of winners and losers should not be limited to humans. The stories told by 'technology winners' dominate and gradually become part of the established order. The main thrust of these arguments is that technology is not sufficiently questioned or critiqued, either at the time of its inception or later in its life. What makes this more serious is that technology is "additive", irreversibly changing any culture to which it is introduced.

One of Postman's most significant claims in respect of my thesis is his third point:

“every technology has a philosophy which is given expression in how the technology makes people use their minds, in what it makes us do with our bodies in how it codifies the world in which of our senses it amplifies, in which of our emotional and intellectual tendencies it disregards.” [56]

Postman illustrated this as follows,

“To every person with a camera everything looks like an image.
To a person with a computer, everything looks like data.” [56]

This idea is illustrated by a recent news story, “Stone-stacking:cool for Instagram, cruel for the environment” [57] in which Instagram culture has been blamed for a trend where people ‘use’ the environment as a canvas for creating images, oblivious to the potential impact their actions may have on fragile environments.

My interest was sparked by the idea that technologies, wittingly and unwittingly, inevitably encompass a philosophy, which is often overlooked. The philosophy is carried through the hardware of the technologies, as described by Kittler [58] and Gane [59]. It is also carried through the output medium of those technologies, an idea expanded upon in McLuhan’s [60, 61] writing about the way media channels, like radio or books amputate and extend different senses. Hayles’ deconstruction of the difference between type on the page and type on screen reinforces this idea, that “all texts are instantiated and the nature of the medium in which they are instantiated matters” [62]. These writings suggested a research space at the intersections between philosophy, technology, design and values.

Like Postman, Peter Kahn argues that something is gained and something is lost with each technological change but Kahn also challenges the idea of the ‘technological fix’ [63, 64].

Technological fixes may alleviate some of the losses that occur as new technologies take effect but some less tangible things may be irretrievably lost. Kahn illustrates this with an account of the transition from handmade cigars to machine-rolled cigars in Cuba. In early days the workers collectively paid a ‘lector’ to read politics and classical texts to them as they worked. As industrialisation took hold the lectors could no longer continue because they couldn’t be heard over the machines. A technological fix came in the form of radio, which broadcast music, not just inside a single factory, but across all factories. Although the introduction of radio might appear to ‘fix’ the loss of the lector Kahn identifies a list of additional losses brought about by the technological change. These include:

Stone-stacking: cool for Instagram, cruel for the environment

Patrick Barkham



From Orkney to Australia, adventure tourism and social media are turning a benign impulse into a plague on the natural world



▲ A stone stack in Dunbar, Scotland. Photograph: Andy Buchanan/AFP/Getty Images

Figure 2.2: Section from article in the Guardian newspaper reporting a perceived connection between Instagram culture and the practices of stone-stacking in wild environments

- loss of political education and discourse
- loss of worker agency (in commissioning the lector)
- loss of the experience of live performance
- loss of locally relevant content
- consolidation of corporate power (because of the relationship between radio stations and factories)

Many of the losses slip away and are forgotten over time till the current status quo is all people remember. So Kahn's writing, like Postman's also points to the need to attend conscientiously to technological change. One of his most salient arguments in respect of my thesis is that technological change can "diminish the depth and richness of human life, and more specifically our relationship with nature" [64].

One of the positives that comes from Kahn's writing is that technologies are not a *fait accompli*. People can intervene to influence what technologies become. This is addressed further in the section on Values and Design.

2.2.2 Technology, humans and nature

The relationship between humans, technology and nature isn't straightforward. Writers like Shultis [65] have shown how National Parks were supported by the technologies of the Industrial Revolution, Ingold [66], shows how "enskilment" involving technologies can help bridge the divide between human and non-human worlds, and Levi and Kocher [67] makes the point that virtual experiences of nature may result in less pressure on actual nature. However Levi & Kocher [67] also argue that virtual nature distracts the public from real environmental problems, and presents a hyper-real perfection, that causes people to "downgrade" the value of their own, local environments.

Technology becomes the focus for some recreationists (Hill and MacLean (1999) cited Shultis [65]), sometimes at the expense of the natural environment. Payne expresses worries about the "effect of technologies on 'inner' nature" [68]

in environmental education. He fears “‘raw’ human experience” are being sacrificed to “vicarious, ‘second-hand’, and virtual/abstracted learning experiences” [68]. He believes that experiences of nature mediated through technology produce different “time/space/place relations” and ultimately “devalue the experience of the environment” [68]. Kahn has investigated the effect of ‘real nature’ and ‘technological nature’ on humans [34, 63, 64] through a range of substitutes including digital ‘virtual windows’ [64] and he concludes that “technological nature” is better than “no nature” but ultimately “real nature is best.”

Many of the of art, design and research projects in this space try to subvert the expected technology-nature relationship, particularly by challenging technology’s part in the separation of humans from nature.

For example, Bohlen & Tan’s [69] work ‘UNSEEN’, starts from the premise that digital technologies inform us, but remove us from nature. Working in a garden, they aim to disrupt traditional ways of using technologies to “think differently” by “seeing differently” [69]. Embedded cameras within the garden were used to track the growth of plants, and non-human movement in the garden in order to generate information for visitors. They tried to encourage behaviours, like patience, that are sometimes seen as the opposite of efficient, instantaneous computer processing, and they made ambiguity a feature of the design. They resisted an online component (requested by some visitors), saying, “The last thing we want is to replace the actual visit with a virtual one” [69].

Bidwell and Browning [70] used Egocentric Point of View video and Nature Probes to investigate meanings made through experiences in nature. Using McCarthy & Wright’s “dialogical approach”, they explored temporalities and dialogue with a place over time. Others [71, 72, 73] combine walking with the technology of photography or video-recording as a research method to learn about relationships to place and nature. Bidwell also showed how digital technologies as ubiquitous and everyday as databases can embed Western values and assumptions and exclude Aboriginal cultural values that emphasise embodied “living knowledge of place”. She worked with Aboriginal elders and youth to develop video techniques to re-establish Traditional Knowledge that had been erased by Western digital technology practices. Bidwell’s work [74, 75, 76, 77] had a profound influence on me because it not only made visible inequalities and privilege

enacted through digital technologies but also tackled these directly using digital technologies in alternative ways shaped through collaboration with the people disenfranchised by the established digital technologies.

Bidwell & Browning's, "Pursuing genius loci: interaction design and natural places" [78] was also influential because it sought to "provoke integration of the natural and computational worlds" by identifying a series of themes that challenge entrenched values and perspectives.

Bidwell's work is cautionary but encouraging because it shows the potential for outcomes that challenge the status quo.

2.2.3 Technology as nature and technology to reveal nature

Some creatives and researchers have used digital technologies to reveal nature and human-nature relationships. Others have created novel digital configurations to share information, reveal aspects of nature or initiate engagement with natural places. For example, Chavez's & Saccoia's '(x)trees' [79] created a virtual forest from tweets about trees, to explore perceptions and understanding of nature. In Mark Malmberg's robot birds ('Albireo') [80] rose and slept to the rhythm of the sun, communicating with each other with chirps and squeaks that drew attention to different rhythms and human and non-human communications. Chris Woebken has created a series of artworks that draw attention to the natural world. For example 'Animal Superpowers' [81], enabled children to experience animal "superpowers" by wearing devices that change the way the world is sensed. 'Amphibious Architecture' [82], used environmental sensors, lights and SMS to build a "two way interface" between river, fish and human inhabitants of New York. 'Transition Habitats' [83] encouraged humans to listen to non-humans indicator species and attempted to translate their communications. 'Holibien Urbanism' [84] processed debris collected by bees to visualise the microbial life of cities and Jeremijenko & Woebken's, 'Bat Billboard' [85] re-appropriated billboards as combined roosting place and interactive display for translating and displaying bats calls to humans.

Since 2011 Rachel Stevens and Meredith Drum have been collaborating on projects to “engage people, playfully, with the ever evolving NY Harbour and surrounding estuaries” and to this end they have developed an Augmented Reality, mobile walking tour, Oyster Bay [86], to show social and environmental history of lower Manhattan and the Hudson River, focusing on the relationship between humans and oysters.

These works of art and design were helpful for reflecting on the direction of this thesis. My research into art and design practice occurred during the time when I was reading about critical theory, media theory and philosophy of technology so my appreciation was shaped by theory as well as experience.

I was most excited by pieces that involved exploration and interactions in outdoor environments because they spoke to the theories that state nature connection is primed by experiences in the natural world. I was less enthused by app-based, screen-focused designs because they seemed to act as a barrier and did not break people out of traditional patterns of technology use.

2.2.4 Time, space and placemaking

Space is defined as “a set of relations between things” [87] or “a bounded area given in our ability to move” [88]. Places, however are “centres of value” [88] built over time, as one gets to know the character of a place and associate it with prior experiences and feelings. Tuan [88] and Lewis [27] present contrasting views of placemaking, which I have found complementary rather than incompatible. Tuan’s theory sheds light on the importance of pauses, when one absorbs a place and gives it full attention, even if that pause is only a moment in time as one stops to gaze on a landscape. In fact, Tuan calls places, pauses. Lewis and Ingold’s [28] contraposition emphasises the role of the body’s movement in making places. They argue that one learns a landscape as a result of movement through it, as we feel undulations with our feet and adjust our bodies to negotiate obstacles. As a climber, like Lewis, I recognise his descriptions of mutual inscription, of body on land, and land on body, as a part of building an intimate knowledge of place. Both positions form part of discussion about nature connections in later chapters.

Farman’s [89] work on embodiment, space and place and locative media technologies was a key resource. Thrift [90], Pile [91], Harvey [92], Dourish and Bell [93], Virillio [94], McCulough [95], Bilandzic [96] and Davis [97] also contributed to discussion of impact of geography and temporality and its influence on themes including embodiment and locative ‘ghosts’. Speed and Southern’s paper on ‘Walking Through Time’ [98] was influential in my thinking about the potential for technologies to re-engage people with places, and their work led me to Tim Ingold’s paper, “Culture on the Ground: The World Perceived Through the Feet” [28] mentioned above, which was influential in considering research methods. Cheverst [99] provided an example of methods used when working with people and digital technologies on location.

2.2.5 Tangible exhibits, interpretation, Place-based interventions and discursive objects

This research has conceptual, theoretical or methodological connections to specific research projects and to fields of research.

2.2.5.1 Gardens, city farms and technology

For example, there are parallels between Sara Heitlinger’s work [100, 101, 102, 103, 104], because of similar underlying concerns and intent, although there is a different framing and approach. Her projects at Spitalfields City Farm, used HCI, including Internet of Things to support sustainable urban food growing and to encourage a shift from human centred design processes to More than Human concerns. Heitlinger used participatory processes to work with community values and to involve citizens in smart cities that offer a more inclusive vision than those created by “modernist, top-down, efficiency-based techno-solutions” [100]. Although our outputs share similar traits; delivering experiences that reveal non-human life in a growing space and enabling knowledge-sharing, the means by which we reach these outputs differ. My research focuses on the use of values to create design parameters that shape the evolution of designs.

Other related work includes The Rooftop Garden [105, 106] a project located in the Northern Quarter of Manchester. Although this research also uses Research through Design and combines values and participatory methods in a garden setting to address environmental concerns, it differs in several respects. The research adopts an activist approach to bring people together for the co-creation of green, social spaces in urban areas where green spaces are under threat of development. There is a major emphasis on the social; community building and community cohesion between city workers and residents. By contrast my research is more concerned with attention to non-human nature in gardens and how values and philosophy may be used to shape relationships to places.

2.2.5.2 Digital Interpretation

Although the specific subject matter differs, there are overlaps in other areas of research, particularly cultural heritage and digital memories. The meSch project [107] which ran for four years from 2013 was concerned with empowering stakeholders to author and create their own “smart objects” and “intelligent spaces”, “without the need for specialised technical knowledge”, to give control to those with first hand knowledge of artefacts and stories that surround them. Petrelli’s [108] paper “Integrating Material and Digital: A New Way for Cultural Heritage” identified some of the problems that the meSch project tried to address; the ‘things that are lost’ (as Postman and Kahn might express it) when digital technologies are introduced in a museum and cultural heritage setting. The “materiality, authenticity, or ‘aura’, cannot be transferred to the digital” and the “emotion, affect and sensation” associated with material characteristics are displaced by information-heavy interpretation. The authors see an opportunity to “work to integrate technology...instead of creating a parallel and detached digital experience”. Some of the problems this project aims to target also occur in the context of my research about the use of technology to support nature connection. For example:

- “Digital media can enrich the experience, but can easily divert attention thus preventing contemplation and reflection.”

- “Digital models can recreate and contextualize exhibits, but this may contribute to diminishing the perceived value of the original (e.g. its ‘aura’ and ‘authenticity’).”
- “Digital media often targets visitors’ cognitive abilities via quizzes, games or detailed information thus neglecting to engage in what is essentially an affective experience: the visit.”
- “Digital media determine the pace of the visit and induce visitors to follow their digital guide thus potentially missing exhibits they may enjoy more.”
- “Interactive technologies can offer a great user experience, but screens and apps create new barriers that distract and disengage visitors from the actual content on display.”
- “Interactive technologies often interfere with social interaction within visitor groups (e.g. audio guides tend to isolate visitors in their individual ‘audio bubbles’, and small screen devices are hard to share in larger groups).” [108]

The authors also recognise the tendency for digital software and hardware for cultural heritage to be generic and not differentiated for place, a matter anticipated by the philosophers on whose work this thesis rests. Hence the intent is to create digital interpretation that responds to particular places and historic collections.

The ‘meSch’ researchers [109] reported the adoption of some similar strategies to those I used, such as walking and talking with volunteers to build a thematic understanding of place from which to collaboratively design digital artefacts. Learning from the volunteers, the researchers learned about the place in which they worked and developed themes, such as “Knowing the invisible” and “Peacefulness and reflections”, to inform the design of digital prototypes. The designs were created through a workshop process that differed from the methods used in my Masters in Research.

Research from the meSch team aligns with other interpretation research, for example Silberman’s work, (introduced in Chapter 1) on using narrative layers

to challenge hierarchies and single definitive voices. The need for a change in the nature of communication in museums, (from didactic to conversational), and the role of social media technology in facilitating dialogue is a related theme in interpretation research [110]. These themes are also part of the academic discussion about digital interpretation. Rahaman states “the present trend of digital heritage is predominantly descriptive, technology-driven and imposing; rather than user-centric” [111], although he notes there is a move towards use of social software in interpretation. He also makes the point that the developers of digital interpretation are involved because of their digital skills and they may not be aware of the “intrinsic cultural values of a particular artefact or environment”. Consequently their “methods may well reflect their personal ‘inappropriate’ assumptions” and their representations “partial” [111]. This reminds me of Bidwell’s [74] writing on the way technological design decisions can be presumed neutral when they are actually excluding of particular groups. Rahaman uses his critique of digital heritage interpretation to propose a conceptual framework for digital interpretation. He makes the point that other principles for interpretation do not attend digital factors and are still rooted in Tilden’s original interpretation principles, developed for the physical realm. Many of the theoretical building blocks Rahaman draws on, to create his dialogical interaction model for digital heritage interpretation resonate with my interests, though our applications differ. Rahaman talks extensively about embodiment and referencing McCullough [112] and Forlizzi and Battarbee [113] discussed the importance of “co-presence” and “social meaning-making” that “enhance contextualization.” This is interesting because the Natural History writing draws attention to the importance of individual encounters in nature. Interpretation is often designed to be accessed by groups, so the place of the social and individual experience in nature interpretation is of interest for my research.

2.2.5.3 Narrative, discursive and critical objects

Research about Digital Memories and tangible objects [38, 41, 114, 115] discussed in the introduction, continued to exert an influence on my thinking about the way sensory connection can affect emotional connection.

One of the things that unites this research is attention to what is valued and the opportunities for “...enabling people to collectively participate in the social significance of objects, places, and events” [116] through digital design.

Critical design, such as Dunne and Raby’s *Foragers* [117] was an initial focus, especially where it overlaps with participatory processes, as in Simon Bowen’s, ‘Critical Artefact Methodology and Critical Probes’ [3, 50, 118, 119]. This is discussed more fully in the Methodology (Chapter 4) where the connections between the evolution of my research process and its connection to ontology is unpicked.

2.2.5.4 Sustainability and HCI

More generally this thesis is related to a seam of HCI and design writing that pushes designer researchers to question their own design decisions, and the drivers of those decisions. ‘Pay attention and take nothing for granted’ is a key take away from some of the papers on ‘reflective design’, ‘ambiguous design’, ‘design for participation’, ‘HCI & sustainability’ and ‘values in design’.

For example, Dourish [120] dissected patterns of discourse in HCI and Sustainability to show how dominant neoliberal frames are reinforced in design decisions. He showed that framing sustainability in terms of individual choice perpetuated the idea that markets are “natural objects rather than social constructions” that can be challenged. The result of treating sustainability and design as discrete things, separate from the political world is that it makes design complicit in the hegemony which can shift responsibility “away from the government and corporations onto individuals and their lifestyle ‘choices’”. It therefore narrows design possibilities to those that treat sustainability in isolation and ignore the wider impact of politics on environmental sustainability.

Other work in this area includes Di Salvo et al.’s [121] map of sustainable HCI research which identified and discussed key genres, notably contrasting the nudging of “persuasive technologies” to the disruption invoked by “sustainability interaction design” which comes from the position that there is a “need to fundamentally rethink the methods of HCI in order to address sustainability”.

Although my research discusses sustainability, the influence from Dourish and Di Salvo is not primarily to do with sustainability, but is instead to do with

approach and intent - the need to do digital design differently, in a way that recognises the influence of politics and philosophy.

In order to recognise how politics intervenes in design it is necessary to pay attention to the design process. Hence the significance of Reflective Design [122] and Reflective Practice [123, 124] that will help to encourage reflection on the processes at work in the design of artefacts and systems. This is discussed further in the Methodology (Chapter 4).

Openness is also advocated by Sengers and Gaver [125] as is ambiguity [126] which opens multiple possibilities and alternate interpretations to challenge the imposition of a single dogma.

Participatory design literature such as Ehn [127] and Iverson [128] fed into both the philosophy and methodology of my research.

Many of the papers described in this section discuss values in the design process, and the values literature has informed this thesis. This is expanded upon in the following section.

2.2.6 The influence of values literature

2.2.6.1 Values and Frames

In the introduction I cited work, including Schultz [129] and Dunlap [130] that show how connection to nature was shaped by values. I described Crompton's [131] account of the way that the dominant values of Western industrial society caused nature to be valued for economic, health and social benefits to humans, rather than for its intrinsic value. The body of literature that surrounds this research was influential at the start of my thesis.

Building on the work of Tom Crompton, Darnton & Kirk [132] drew together research on values and frames to illustrate how they might be used to stimulate lasting pro-social and pro-environmental engagement. Their case wove together Shalom Schwartz's [133] research into values and George Lakoff's work on frames [134]. Values are "at the root of our motivational system" [132] and influence human behaviour. Values have a more lasting effect than attitudes, which are linked to individual incidents. Although values are more stable than attitudes

they can be changed over time. This was a driver for my research. I was interested in how digital technologies might be designed to shift values away from those that prioritised human benefits of nature, perhaps eventually to a point where nature's "interests", however expressed, override human benefits.. This led me to work on frames.

Frames are cognitive structures that we use to make sense of everything we encounter [131, 132, 134]. Frames are established through "neural binding" [132] of associative links from prior experience and knowledge. Words activate associations. Lakoff cites the Bush administration's introduction of the term 'climate change', as a substitute for 'global warming', as an example of frames in action. "... "climate" had a nice connotation - more swaying palm trees and less flooded out coastal cities. "Change" left out any human cause of the change. Climate just changed. No one to blame." [134] Frames are continually informed by new information and experiences so the meanings we ascribe to words, for example 'environment' and 'natural' can change over time.

Lakoff distinguishes between shallow (cognitive) frames and deep frames. Shallow frames are instances of words that trigger associations, like the example, 'climate change' above. While shallow frames refer to particular associations, deep frames are the complex amalgamation of groups of cognitive frames, stored in long-term memory that influence one's worldview [131]. Examples of deep frames described by Crompton include "self-interest" and "common-interest", which persist in communication across multiple situations. Crompton [131] cites their use in climate change documents; "If we [the US] clean up our environmental act and the Chinese don't we all die anyway and their economy will outperform ours while we live. If we don't clean up our act, we still all die, but at least we have a stronger economy until then." Example of (national) "self-interest" frame illustrated in a document by Clemons and Schimmelbusche (2007)

Deep frames activate and reinforce values [132], therefore, activating particular frames can help to boost particular values.

'Common Cause for Nature' [135] showed how these principles applied to nature communication, through the analysis of the communications of thirteen nature and conservation organisations. They found that even these organisations, which had express purpose of nature protection, communicated in ways

that emphasised the usefulness of nature to people, rather than intrinsic values, illustrating how entrenched deep frames can be within society and the individual psyche. However this research also showed the potential to challenge and disrupt frames that perpetuated values that reinforce disconnection and human supremacy over the natural world.

Although my thesis does not use methods associated with values and frames research it is influenced by the literature because the theories, like others from media studies, show the potential for all communication, including interpretation to influence frames, attitudes, values and ultimately behaviour. The literature suggested that it would be unlikely to change values with a single encounter with a single artefact. However a body of interpretation, reinforcing a consistent set of values might affect attitudes and over time, shape values.

2.2.6.2 Value sensitive design

Technologies can support and suppress values [136, 137, 138] because of the overt and subconsciously held beliefs of the team and the way their beliefs act on design choices.

Value Sensitive Design (VSD) is an approach which draws attention to universal values through a three-part process that identifies direct and indirect stakeholders, documents the effect of a design, and analyses the properties of technologies in relation to the values and value conflicts. [137, 138, 139].

Values in conflict, can create difficult choices for designers. For example, user autonomy appears desirable, because it puts users in control, but greater autonomy may be dependent on skills, and this in turn can limit who has control. Friedman [136] showed this means balancing “higher order desires”, like the ability to work easily and efficiently, against “lower order desires” for total control over every aspect of functionality.

VSD has been criticised, [139, 140], particularly for focusing on ethical, universal values, when it could apply to “any set of values” [141]. I was interested in how values might be drawn from a philosophy in conjunction with research context and the ethical values addressed by Friedman were of less relevance. I

didn't use the VSD methodological framework directly in my work but Friedman's writing was in mind as I weighed decisions in the design process. This is discussed in reflections in Chapter 5.

2.2.6.3 Values in Software Engineering and Human Computer Interactions (HCI)

Other researchers in Software Engineering and HCI have referenced Schwartz's values circumplex (a circular structure used to categorise values) to create a taxonomy of Software Engineer 'types' [142], and show how persuasive technologies often fail because they co-opt values that are in opposition to the pro-social and pro-environmental values they wish to trigger [143]. Ferrario [144] drew on Schwartz's circumplex to reveal the influence of values on Software Engineering choices and created a "reference framework for decision making..." within the software development process.

Ferrario also combined Action Research and Participatory Design with Software Engineering methodologies, like iterative design and agile development to create 'Speedplay'[145]; a project management framework that aims to be more responsive to the social context and the needs of all stakeholders in order to design for "social good". In part this method seeks to incorporate a greater range of values in the development of software and hardware.

I have drawn on some of the literature that is the basis for this work and there are similar motivations driving the research, but there are differences in our approaches. It is as though we are using similar ingredients in slightly different ways to create different dishes.

Although I am aware of Schwartz's value circumplex, I haven't referred to it directly and have instead focused more on the use of frames to stimulate connections and reinforce values. Values "represent our guiding principles influencing our decision-making..." [144] and rather than use the value groups identified in the circumplex, and its subsequent iterations, I have used criticism of technologies to draw out guiding principles that frame the work and my relationships. (This is explained in subsequent chapters.)

Instead of referring back to a chart of values when making decisions, I am referring back to design guidelines that are drawn from a philosophy that is the accumulation of connected values. It would most likely be possible to extrapolate the values on the circumplex that connect to my design lens, but I don't think it is necessary.

2.3 Summary: Locating my research in relation to literature

The literature shows that many researchers are interested in values, especially in relation to the design of software and hardware. I am interested in values but my approach differs from those described in the sections above.

I begin by analysing the criticism of technologies that arise in selected texts from critical theory and the philosophy of technology. (The detail of this analysis is described fully in Chapter 4.) My criticism draws from media theorists like Postman, as well as critical theorists, as described in Section 2.2.1 'The impact of technological change'. The criticisms show that technologies tend to support and suppress certain values which have consequences for society that can go far beyond the immediate use of technology. The criticism of technologies found the selected writings, particularly from Feenberg, Heidegger and Borgmann go beyond stating the values that are activated or repressed but unpick the reasons why technologies have this impact. This is the part that has relevance to my research. I use these accounts that deconstruct the connection between technology, values and behaviour and translate them into a set of design criteria; a design lens. This differs from other research because it targets specific facets of technology that theorists identify as problematic, and I orientate the work towards connection with nature. I apply the literature the design of digital interpretation, considering both design process and design outputs.

Technology is too broad to be the focus of the thesis as everything from clothing to heavy machinery could be defined as technology. Researching digital technologies would narrow the focus but would still be too broad for a thesis

as it could encompass digital tools used by environmental organisations, digital equipment used in recreation, websites and a host of other categories of disparate but loosely connected things. Digital interpretation is the focus because of its potential to act as a conduit for communication and its relevance for my partner organisation, National Trust.

The literature shows that there are others working with technology and nature, technology and gardens and technology for interpretation of environments and nature, and some of the research shares a similar intent, but the route I have carved out within the research space differs. For me, ontological stance is the driver for methodology and application and choice of literature and this is discussed in more detail in the following chapters.

Chapter 3

Methodology

“Methodology is inevitably intertwined with and emerges from the nature of particular disciplines (such as sociology and psychology) and particular perspectives (such as Marxism, feminist theory, and queer theory).” [146]

This chapter is an account of the emergence of my methodology and the disciplinary and paradigmatic entanglements encountered along the way. Guba and Lincoln state “questions of method are secondary to questions of paradigm” [147] because the researcher’s worldview informs every aspect of a research project, from understandings of reality, which in turn influence beliefs about what counts as knowledge, to ways that knowledge can be apprehended and validated. I took this preeminence to heart. Some researchers are instantly sure of their paradigm and others are more comfortable with an unconscious approach to paradigm, prioritizing methods and making sense of decisions later. At the start of the thesis I wanted to know who I was as a researcher so that there would be congruence through ontology, epistemology and methodology [148]. It turned out the process of understanding my paradigmatic position and its influence on different parts of the research process continued throughout the duration of the thesis and though I have come to a holding place in respect of this work I anticipate that my position may shift and blur in the future, in the same way that paradigm boundaries

have shifted in response to new readings and the recognition of new paradigms [146, 149].

3.1 What is my paradigmatic stance?

A paradigm is a “set of basic beliefs (or metaphysics) that deals with ultimates of first principles. It represents a worldview that defines, for its holder, the nature of that “world”, the individual’s place in it, and the range of possible relationships to that world and its parts...” [147]

I will declare my paradigmatic stance and in subsequent sections try to unpick the journey that has led to this worldview. Disclosure is itself a positioning act, identifying me as a researcher associated with the ‘new-paradigms’ [146] that sit in opposition to positivism and post-positivism, where the researcher’s presence is removed from discourse, as far as possible, to maintain the objectivity of a “disinterested scientist” [146, 147].

The thesis is broadly constructivist in activity but it is heavily informed by critical theory and to a lesser extent, the participatory paradigm. I have resisted writing “I am a constructivist” because it doesn’t feel right, for though constructivism may be the dominant driver for my work, critical theory is in my heart and my personal politics. There is also messiness in my outlook related to the relationship between paradigm and discipline. I feel there is a natural affinity between Design Research and a constructivist position, (though my belief is not shared by all designers), but the issue of environmental action seems to speak to a critical theory paradigm. I have held both these paradigms in tension through the thesis and as time has progressed have come to describe the relationship as follows. The research is framed in a constructivist way, because it does not assert the “truth” of a particular position, from which the research follows. Instead it recognizes that the starting point for the thesis is a construction, one of many possible readings of history and current events. It starts from the place that ‘if’ we accept a particular position, in this case taken from critical theory of technology, what are the consequences and implications for design and the people

involved in the design process. The ‘if’ is important because it is an acknowledgement that this is not a definitive position, but a recognition that it is one construction among many possible constructions. I imagine it as a constructivist body wearing critical theory glasses. If we approach the research looking at the world through the lens of critical theory, how does this affect the research and outcomes? I should add that I have sympathy with the critical theory position and it has a place in my heart, but it doesn’t reflect me as a researcher. I also feel allegiance to some aspects of the participatory paradigm, particularly the emphasis on “practical knowing” and “living knowledge” [146, 149] but this is not the dominant research paradigm.

Constructivism has a relativist ontology [146, 147] that is fluid and co-constructed from multiple realities. Critical theory and constructivism are commensurable [147] and over time there has been an increased acceptance of blurred boundaries and overlaps in the “new-paradigms”. (Richardson in [146])

Having summarized my paradigmatic stance at the outset I will describe the journey and thinking that has brought me here. One of the tenets of interpretive research is that the researcher is present within the research. Gray and Malins [150] encourage use of the researcher’s “true voice” in telling the research story and Moses & Knutsen [151] emphasize researcher honesty and transparency. The reflexivity means that one comes “to know the self within the process of research itself” [146]. The researcher “brings the self” and “creates the self in the field” [152], and the openness of the methodology and the “inquirer’s evolving understanding” [153, 154] through the process, is a contributing factor to the validity of this form of research. This is not to bracket researcher prejudices and biases in pursuit of more objective research, but instead a commitment to value the researcher’s own contribution [146], to follow as the “researcher’s original sense of the topic changes over the course of the research” (Bergen), and to open up all aspects of the methodology so that other researchers may be able to gain a deeper, richer understanding of the work and engage in dialogue about the work. [153, 154] Bruce Archer explained it thus:

“The author’s ideology and framework of values will have coloured his or her view of events, and will be embodied in his or her expression

of them. Unless the witness shares the author's position, or at least recognises what that position is, he or she will not be able fully to understand the work or to judge it...Witnesses may or may not share a particular author's ideology in their hearts when confronted by an Arts work, but if they know what the author's position is, they can at least appreciate what the author was expressing." [155]

Hence my account will describe the personal influences that shaped the research journey.

3.2 The seed: critical theory

My research proposal was transformed through the M.Res. year. Although some aspects endured, as outlined in the introduction, the focus of the work changed. The realization that I had an opportunity to do research that mattered personally to me and could have an impact beyond academia prompted my turn towards the intersecting space between the natural environment and digital technologies. This desire for action to make a difference gives the first hint of the influence of critical theory, which is marked by a drive for social action and change [147].

At the time I was angry about political decisions that were being made in respect of the natural environment, and issues of power and powerlessness in other areas of society, for example the increase in zero hours contracts in parallel with diminishing union strength, and this was what I brought to initial supervision meetings. I believed in an interconnection between different forms of oppression and othering, so I made connections between the erosion of workers rights and the devaluation of the natural world. My worldview about the interconnections resonated with a tongue in cheek section written in the introduction to a cartoon book by Alison Bechdel (Figure 4.1).

Despite recognizing the value of Actor Network Theory in recognizing previously unattended-to parts of networks, I felt frustrated at the flattened networks because I felt they didn't reflect my experience of hierarchical power structures that created an 'othered' nature. I found the idea of 'fluid identities' in ANT

AT FIRST, I ADMIT, WHAT ATTRACTED ME ABOUT LESBIANISM WAS THE SEX. BUT I HAPPENED TO FALL IN WITH A ROUGH CROWD -- WOMEN WHO WERE ALWAYS THROWING BLOOD ON THE PENTAGON, OR BLOCKADING WALL STREET, OR GOING OFF TO NICARAGUA TO HELP THE SANDINISTAS WITH THE COFFEE HARVEST. WHILE I STOOD ON THE SIDELINES GAPING WITH AWE, IT BECAME CLEAR TO ME THAT SEX WAS MERELY THE TIP OF THE LESBIAN ICEBERG.

WHAT LURKED BENEATH WAS A WORLDVIEW, AN ENTIRE LOGICAL SYSTEM IN WHICH HOMOPHOBIA WAS INEXTRICABLY LINKED TO SEXISM AND RACISM AND MILITARISM AND CLASSISM AND IMPERIALISM. AND A FEW OTHER THINGS. AND THE BEAUTY OF IT WAS THIS: THAT IN ORDER TO ADDRESS ANY ONE OF THESE PROBLEMS, WE NEEDED TO ADDRESS THEM ALL. IT WAS A COMPELLING SCHEMA, AND IF IN MY EXCITEMENT I CONFUSED THE PERSONAL WITH THE POLITICAL, WELL, THAT WAS PART OF THE IDEA.

Figure 3.1: Alison Bechdel's personal and political connections. [1]

troubling because I believed that without a consistent identity it would be difficult to find solidarity that would provide the strength and stability needed for change. The importance of a strong identity to challenge a dominant hegemony was a grounding principle.

I felt nature was being co-opted into the traditional economic system through the use of ecosystems service models. Although these models can go beyond converting natural features (or 'resources') into monetary value, I believed that they often displayed anthropocentric characteristics that were blind to the values of natural environments for non-humans, and missed less tangible values to humans; the kind of values described in people's accounts of nature connection.

From my perspective there was a two fold problem. First, capitalist structures reinforced the domination of humans over the non-human world and presented alternative views as marginal and trivial. Human and particularly economic needs were always weighed against environmental needs and in the matchup the environment almost always lost. Second, humans were increasingly disconnected from the natural world and were unable to see other values in nature that might present an opposing view.

These factors contributed to my sense that I was most comfortably aligned with critical theory. Critical theory aims to "create change to the benefit of those oppressed by power" [146]. Power and politics are central features of the paradigm. Critical theorists believe knowledge is constructed socially and can be used to perpetuate structures that produce and reinforce inequality in the guise that this knowledge is common sense [156]. Researchers with a critical theory worldview seek to challenge hegemony by uncovering opaque power structures and revealing how they work in order to empower and emancipate people

[146, 156, 157]. This is achieved through dialogical/dialectical process that raises consciousness in order to achieve transformation of the status quo [146, 156].

Reading reinforced the idea that my worldview conformed to a Critical Theory perspective and several texts resonated with my thinking. Some will be discussed within the review of literature and the chapter on guiding theory (Chapter 4), but it is helpful to give an indication here of how the literature helped shape my methodology and understand my location within the research paradigms.

One of the books that strongly resonated was “One Dimensional Man” [158], in which Herbert Marcuse expresses concern about the “machine process”, linked to consumption and “false needs”. Marcuse unpacks the relationship of needs to power and social control. He showed how people osmose “false” needs from a surrounding culture. The individual’s drive to satisfy these needs hinders consciousness causing people to lose their individual identity and to become “incorporated” into the “established order” from where they are unable to see that they are living in a state of “democratic unfreedom”. Marcuse looks to the voice of the outsider, activism and “artistic alienation” to disrupt and upend the status quo stressing need for inward reflection as a catalyst for change.

In relation to the ecology movement Marcuse asserted the importance of political and psychological liberation because of the interconnectedness between nature and humanity,

“...the pacification of external nature, the protection of the life-environment, will also pacify nature within men and women. A successful environmentalism will, within individuals, subordinate destructive energy to erotic energy.” [158]

Marcuse’s philosophy is echoed in Michel Bosquet words;

“the ecological logic is purely and simply the negation of capitalist logic; the earth can’t be saved within the framework of capitalism.”
(Bosquet in [159])

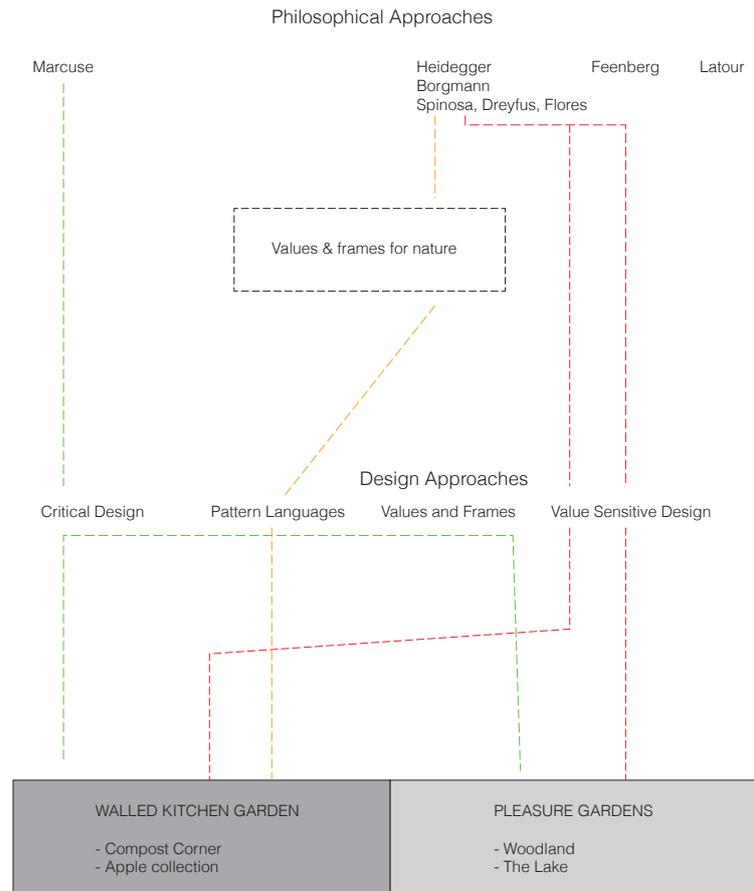
As well as being part of labour, nature is also “beyond labour” and the values it contains negate market society. Nature offers an escape from the norms imposed by industrial society and is therefore a threat. Hence the need to bring land under

control as a resource or site for “organized leisure” [158]. Marcuse described the dual tendencies of capitalism to subdue man’s nature and tame external nature. The subjugation of external nature is essential to sedate humanity to acceptance of the “reality principle”. This is because “nature is the source and locus of the life-instincts” which would threaten the dominance of Thanatos, the destructive force. Marcuse’s philosophy applied to the environment is strongly reminiscent of the circular arguments about nature connection outlined in the introduction. Nature connection is threatened by human activity and humans are diminished with the loss of nature from their lives, but nature can awaken people’s consciousness towards the environment and can provoke human action towards its interests. The intervention creates the disruption and change.

The power of creative pursuits to awaken society has contemporary parallels in critical design. Bardzell’s [49] definition of critical design as “an approach that rather than serving needs as they are presently understood, instead seeks to disrupt or transgress such constructions of need”, seems to speak directly to Marcuse’s discourse of needs and the tensions that can be articulated in the world with more than one dimension. They demonstrate commonalities between critical theory and critical design, including the shared ability to reveal “ideological structures” [49] that were previously concealed and explain critical design as an approach using processes or producing “products that generate dilemmas or confusions among users” thereby encouraging users to “expand their interpretative horizons or rethink cultural norms.” The intent to spark dilemmas and confusion echoes Dunne and Raby’s proposition that critical design is “an alternative to mainstream “affirmative design”” (cited in [119]). Designs are used to open debate and challenge preconceived ideas and taken-for-granted-assumptions.

At this point in the research process the natural path for methodology that followed from my theoretical stance was to use critical design practice to challenge attitudes and behaviour. Simon Bowen’s use of “critical artefacts” [118, 119] as probes to explore problem spaces with stakeholders, and his work bringing together critical theory and participatory design [50] presented a possible way forward.

However, I was skeptical about the appropriateness of using critical design within the National Trust context. Critics accuse critical design of being elitist or



The aim is to explore design for different environments in Clumber Park. The design process will emerge with participants. Dotted lines are suggested routes. The aim is to explore what different theoretical approaches offer toward design for connection to nature.

Figure 3.2: Initial research plan: It became clear that this was inappropriate for the site and the timeframe and was revised.

detached [49, 160]. Poyner says “If critical design is more than an aloof intellectual pose, it should spend less time hanging out with artists, turn its intelligence outward, and communicate with the public about issues and ideas that matter now.” [160] Additional criticisms arise, for example the difficulty in putting it into practice in the world [49, 119]. Bowen talks about the need to work with the “right kind” of stakeholders. Bardzell identifies the need to establish the right level of provocation and the need to build an extended relationship with participants for effective application of critical design. I was concerned that critical design would be alienating to the National Trust team and might impede collaboration.

Further, I perceived internal conflict in the application of critical theory, because despite attempts to break hegemonic power it appears to displace one power structure by imposing another ideology. Although critical theory purports to create change from the ground-up, the researcher’s dominant position can inhibit the power from the grassroots. Consequently, I reassessed the place of critical theory within the research. I planned a strand of work to include critical design as well as design strands grounded in other approaches or using other methods but ultimately I did not carry these through. The plan, which involved a semi-scientific comparison of strategies, (see Fig. 4.2) had an experimental character that was not in keeping with the ethos and philosophy, so after reflection the plan was revised. Instead critical theory became the lens that informed a set of design principles that guided practice and aims for the design of artefacts.

3.3 Constructivism and practice-led research

I will repeat the structure used above to describe and explain my position in relation to constructivism and then unpick some of the associated issues and debates and my position within them.

I wanted to construct understandings of the inter-relationship between context (including garden and organisation), people (including visitors, volunteers and employees) and interpretation (such as designed artefacts) to see how a particular lens (critical theory) might influence designs and people’s connection to place. Consequently I was intuitively inclined towards the constructivist research,

which asserts “we construct meaning based on our interactions with surroundings” [146]. Constructivism acknowledges human construction of the world. It is not seeking the truth of the ‘Real World’ because the ‘Real World’ cannot be separated from perception of the world [151]. Constructivists aim to unpack the interrelationships and perceptions that contribute to different constructions, for example “temporal, geographical, gendered, ideological, cultural” [151] and other factors. The constructivist paradigm allows for the constructions that come from gardeners, volunteers, visitors, designers, and place, through a cyclical ‘to and fro’. The process underscores the sense that our understandings are in flux. “The social discourses we are engaged in, through our past and present interactions with the world around us, constantly inform and reformulate our understandings, our interpretations, and our claims to knowing.” [153]

I value design, amongst other approaches, as a means of interacting with places and people to build understandings, and constructivism recognizes the contribution of qualitative research of which practice-based research including design is a form. Although it is possible to use quantitative and qualitative research across paradigms there are some ideological traits that mean there is a greater affinity between some methodologies and paradigms than others. Angen [153] notes that researchers from a constructivist paradigm “rely heavily on naturalistic methods” such as interviews, observation and text analysis. Proponents of the paradigm assert that knowledge is derived from a hermeneutic, dialectical, [146], discursive process [161], in a movement towards ‘consensual language’ [146]. Qualitative methods are able to capture the richness and subtlety of people’s voices and positions that are vital within constructivist research. I have always valued the kind of research that reveals nuance and detail and enables participants to have a less mediated presence in the research. Active involvement of “passionate participant(s)” [146, 162], in the co-creation with the researcher, is another characteristic of constructivist research. In this form of research, participants are not regarded as people that research is ‘done to’ but are collaborators with influence and sometimes dominance over the shape of the research. I had the ultimate say in the research questions and I introduced the initial theoretical framework but the designs and process were open to influence from collaborators. Andrew Feenberg has criticised self-perpetuating design processes that increase

dominance of a technological cultural horizon and reinforce particular values. He believes that this can be challenged by opening up the design process to include a wider range of voices and values, so that alternative designs representing a broader set of values can be considered. (This is discussed in Chapter 4.) Therefore one of the principles of the research, drawn from critical theory, was that participants should have a voice and should be active in the process. Connected to this is the idea that the design context should participate. Feenberg, following Heidegger, shows how technologies have become divorced from context with negative outcomes. Hence the aim within the research was to bring context to the fore to entice the “voice” of the site. This was achieved in two main ways. First through the voices of the participants who are passionate about the place and are advocates on its behalf, and secondly from conducting research in situ, to give space and time to ‘let the place speak’. Some methods that pay attention to place can draw focus onto the non-human residents even though they don’t have the same type of agency of human participants.

The participatory paradigm is also associated with active participants, co-creation and social action, and some aspects of this paradigm are compatible with my intent, however there are significant differences. Participatory inquiry works towards control by “local context members” [146]. It stresses “democratization and co-creation of both content and method” and “democratic dialogue as co-researchers and as co-subjects.” This is a point of difference with my research approach. Although one aim of my research was to enable research participants to control designs and future design processes, it was not for participants to control the overall research, (though they could influence its direction). Certain criteria were set in place through the PhD process, for example the aim to investigate use of the critical theory lens. These were fundamental to the research agenda and could not be overturned by participants, though the participants might critique the principles and suggest alternative parameters. The research agenda was not co-created, and though co-design was an aspiration it took time to establish a participatory design practice. The collaborative relationship increased through the research project but the starting point and overall intent didn’t fully or accurately reflect the characteristics of the participatory paradigm.

The constructivist paradigm is substantially different from earlier paradigms like positivism, and this has led to debate about validity and measurements of research quality. Many constructivist researchers believe the criteria for assessing research derived from positivism and post-positivism isn't appropriate for constructivist research, because the differences in worldview immediately invalidate interpretivist perspectives of constructed worlds, rather than one 'Real World'. "With failure built in from the start, they are systematically denied legitimacy, and the dominance of the experimental model is assured." [154] Qualitative research is the dominant methodology in the constructivist paradigm and it suffers challenges of legitimacy. Constructivists select strategies to address this problem. Some, for example Creswell [163], attempt to find criteria comparable with that used within foundational research paradigms in order to bring the constructivist research into the fold. Others believe this reshaping is harmful because it negates the principles of non-foundational research. They argue the paradigms are not commensurable so the criteria on which the research is assessed must be re-framed or re-designed. They seek to escape from "the strangle hold of validity as truth" [153]. Though I appreciate the desire to ensure research across paradigms is comparable in quality, I am in the second camp of constructivists who assert that this research should be defended in a manner that is consistent with worldview. I'm sympathetic to the aim of refocusing on trustworthiness through openness and visibility within the research process, and to validation given by ongoing use of the research, because that is a measure of confidence in the work [153, 154]. I think that "thick description", "prolonged engagement" and "alternative perspectives" [153] are useful ways to gain deep insights into a research context that may be trusted. Like Angen, [153] I see potential problems when methods adopted from quantitative research are appropriated in qualitative research. For example, triangulation can be problematic because inconsistent findings are as likely as convergent ones, but divergent findings are not necessarily invalid.

This might seem like an unnecessary detour into intricacies and subtleties of paradigms, but it is relevant because parallel arguments and tensions also exist within design research in general, and Research through Design (RtD) in particular. I will try to show that my stance in these design debates has antecedence in my paradigmatic commitments.

3.4 Design research

Design research is comparatively new so there are ongoing debates about how it fits within the broader research landscape and the relationship of design practice to design research. The debate centres on researcher's understandings about what counts as knowledge and research and this is partly related to ontological stance. Design is a very broad discipline encompassing specialisms across the spectrum of science and arts, so there are engineering designers, computing designers, graphic designers and multimedia designers, amongst others who also call themselves designers. The culture and traditions surrounding each specialism create a dominant paradigm, which influences research approach and acceptance of alternative approaches. Hence some designers may be more aligned to a scientific and post-positivist outlook than others, who may be more committed to a participatory or interpretivist paradigm. The respective paradigm will influence understandings about all areas of design research. Design is a discipline that is almost inherently interdisciplinary and is cross-pollinated by exposure to different specialisms. In addition, it is highly responsive to prevailing culture, so that understanding about what counts as knowledge in design, and how design research should be carried out, are not consistent. There are shifts that reflect the cultural horizon. At times when the collective mood is positive about the economy and the potential for science to solve societal problems, the influence of science permeates more widely and is evident in design processes and expectations of design research. For example, Nigel Cross [164] recounted repeated attempts over the last century to "scientise" design. These included Modernism in 1920s and Buckminster Fuller's "design science decade" of the 1960s. This philosophy has waxed and waned through the decades. Even during times when there is no active push towards design as a science there are tensions between researcher and practitioners from different traditions and paradigms.

The argument proceeds as follows. Some argue that for design to be recognized by the wider academic community it must conform to accepted research methods and measures. Some commentators offer triangulation with other research methods from outside design as a way to assure findings of design research. Others

argue that design introduces the possibility to discover things that cannot easily be found by other means and would otherwise be lost through ‘the gaps’ in traditional research methods. If design research tries to conform to traditional measures of quality and validity it will fail or it will lose the unique quality it brings to research. For this reason design research should not be measured against traditional parameters but should be measured against other criteria that are better suited to the character of design. For example, Cross argues that “we must concentrate on the ‘designerly’ ways of knowing, thinking and acting” so that design research builds its “own intellectual culture, acceptable and defensible in the world on its own terms” [164]. This does not mean rejecting imports from science or other art cultures, but it means adopting when appropriate, not as a wholesale, default and singular research strategy.

I adhere to this idea that design as a means of research has value in its own right. It can elicit knowledge about the world in ways that may be difficult through other means. I appreciate there are circumstances when a scientific approach in design may be useful, but I don’t believe that knowledge gained without it is necessarily less valid and I don’t believe design has to become ‘scientized’ to be counted as a valid discipline.

3.4.1 Research through Design

For a long time I thought of Research through Design (RtD) as a methodology or an overarching approach for my research. Methodology has been described as a “theoretical bridge that connects the research problem with the research method” [148] and method has been described as an empty glove which is given shape by methodology [165]. I thought of RtD as the bridge between my questions about the design of technology and the design techniques and other related practices I might use to collect and make sense of data. I thought of it as the animating force that controlled the movement of the glove because I believed RtD encompassed philosophy and values that took it beyond a ‘mere’ tool for gathering data.

There were two reasons for this belief. First RtD emerged through dialogue between Frayling [166] and Archer [167] who showed the value of design itself as a means of research. I thought the ideas of knowing in action and the epistemology

of practice drawn from Schön [123, 168] were implicit in their arguments and the concept of RtD sat alongside the arguments for the anti-scientism of design [164]. For me, RtD encompassed a set of values tied to an ontological position about what counts as knowledge and how we can pursue that knowledge so it was shorthand for a way of doing and presenting design research.

In addition, I believed the Research Through Design (RTD) conference series, which I participated in, had a particular ethos and values, articulated through every aspect of the conference, particularly the exhibition and “Rooms of Interest.” [169] The centrality of the exhibition gives prominence to making and designing artefacts in the research process. In addition the discursive “roundtable” format in the “Rooms of Interest” gives space to novel, “experience-centred” [170] means of presenting research, that may be more compatible with presenting the findings of design research, than the traditional paper presentations in “darkened auditoriums” [170]. Other conferences incorporate some of these elements, such as the pictorials at the Designing Interactive Systems (DISS) conferences, but the RTD approach is all encompassing and holistic, so that every aspect of the conference reflects its values, from paper template structure, to venue selection, use of scribes and its choice of keeping the event to a small scale. From my perspective the conference was a manifestation of a philosophical position in relation to knowledge generation and transmission.

Additionally, I interpreted Gaver’s writing as an assertion that RtD was a manifestation of a particular research stance, “After all, most of us working in research through design seem to share a set of common values.” [171] The commonalities he describes include a concern for user-centred design, including a degree of audience involvement; delving into a breadth of design possibilities using various techniques; valuing craft; and most importantly recognising “that the practice of making is a route to discovery and that the synthetic nature of design allows for richer and more situated understandings” [171]. Gaver goes further, “The notion of making falsifiable statements, or of arranging tests to refute such statements, runs against the grain of the methodological approach of research through design. Design, and research through design, is generative.” [171] This clearly makes a connection between philosophical commitments and RtD and I read Gaver’s statement as an assertion of RtD as a methodological

approach. These factors contributed to my understanding of RtD as a methodological approach to design rather than a method.

However, I came to realise that mine was not the position held by most researchers.

“Arguably, research through design is not a formal methodological approach with a particular epistemological basis. Instead, it is a foundational concept for approaching inquiry through the practice of design; as a concept it has been subjected to multiple articulations and interpretations...” [170]

As outlined in Section 4.4 design is a broad field and designer-researchers span the breadth of paradigms, and I have come to see that RtD is practised in a variety of different ways that represent different beliefs about the acquisition of knowledge and validity in academic research. For example Friedman states, “tacit knowledge and reflective practice are not the basis of research and theorizing” [172] yet Niedderer argues that practice “makes tacit knowledge available to research because it includes the experiential part of knowledge which evades conventional communication” [173, 174, 175]. As Green explains there is often an alliance between methodologies and particular methods [176] but methods can be used differently within different methodological frameworks, so the examples above would add weight to the idea that RtD is not in itself a methodological approach.

I use RtD as an approach encompassing values that link to my research paradigm. RtD is compatible with the philosophical commitments from critical theory and it works well with my understanding of what it means to design, which is holistic, incorporating participation and reflection within the making process. The links between RtD and Reflective Practice are particularly pertinent for my thesis because Reflection-in-Action is Schön’s response to the dominance of Technological Rationality as an epistemology of practice. The impact of technological Rationality on society is addressed in more detail in Chapter 4 (Philosophical Interlude).

My research began with an interest in the use of digital technology to support connection to place and nature, and to build awareness of the natural world. The literature (discussed in Chapters 2 and 4) led me to question whether the use

of criticism of technology, within the design process, might lead to new forms of technology that would be more conducive to building emotional connections and promoting exploration of these environments.

At the outset I didn't plan to use RtD, mainly because I didn't know much about it. I intended to frame the research as Participatory and Ethnographic Action Research using a series of research cycles [177, 178, 179].

However, early in the process I came to realise I was instinctively using RtD, albeit with other research practices, like "walking and talking." Design is familiar to me and practice-based enquiry feels natural. I have found that design practice can be used as a focus for my own reflection and for conversation with others. There are some similarities with the way that boundary objects [180, 181] or cultural probes [182] use something tangible to elicit information or facilitate interaction conversation. Coulton [183] describes design fiction artefacts as "entry points' into the Design Fiction world." I think other designed artefacts can also act as "entry points" that illuminate the world around them. This ties in with Gaver's assertion of artefact's as "points in the design space" [184]. The idea being that a research space can be more fully understood as additional designs are introduced in the space, thus accreting information about the space. I began thinking of the prototypes I made as propositions through which to reflect on theory, and later as prompts for conversation. I thought of them as objects to design with and design against. The objects themselves were the embodiment of a research process, representing theoretical concepts, but from my perspective that isn't necessarily enough for them to become accessible academic research, unless the underlying ideas and knowledge are shared with the research community [166]. In theory it is possible to communicate research through a designed artefact, but often something else is needed to make the knowledge transferrable to other researchers. Nevertheless I found artefacts useful for knowledge generation.

The process of making was another route to knowledge generation because of the opportunities to think through making. Propositional knowledge is privileged by dominant academic systems, but making opens up opportunities for procedural, experiential (non-propositional) knowledge that "cannot be specified" using traditional dissemination to produce knowledge [174]. Making enables the designer-researcher to gain material insights. Rust says "the designer will also

generate ideas from dwelling in the situation” [185]. He refers to Polanyi’s “in-dwelling” to explain how social engagement with stakeholders, facilitated through the creative process, can result in “ideas driven by tacit insights” [185]. From my perspective the design process enabled me to think about different kinds of materials, their properties and their implications in respect of critical theory and place. This was especially important in the early stages.

Iterative, embedded making provided a “way in” to understand the site, the people and the organisation. This is discussed in more detail in the Digital Nature Hybrids (Chapter 5). Making opened up a space for people to collaborate, either through discussion of iterations, suggestions or co-creation, which began to happen in the latter stages of the project. This was important in respect of Feenberg’s guiding design philosophy, which emphasised the need for different voices within the design process. This is explained in more detail in Section 4.2, Feenberg. There is a degree of messiness when trying to pull apart Fraylings’ “research for” (investigation towards the creation of an artefact that is not new knowledge for academia) and “research through” design (which produces contributions to academia). Research for and through design are intertwined within an artefact, and “research for” can lead to “research through” design if patterns emerge that reveal new understanding of materials or design forms in relation to research questions.

The RTD2015 conference was an important external influence on my research process. This is documented in more detail in ‘The influence of the 2015 Research Through Design Conference’ (Subsection 9.1.5).

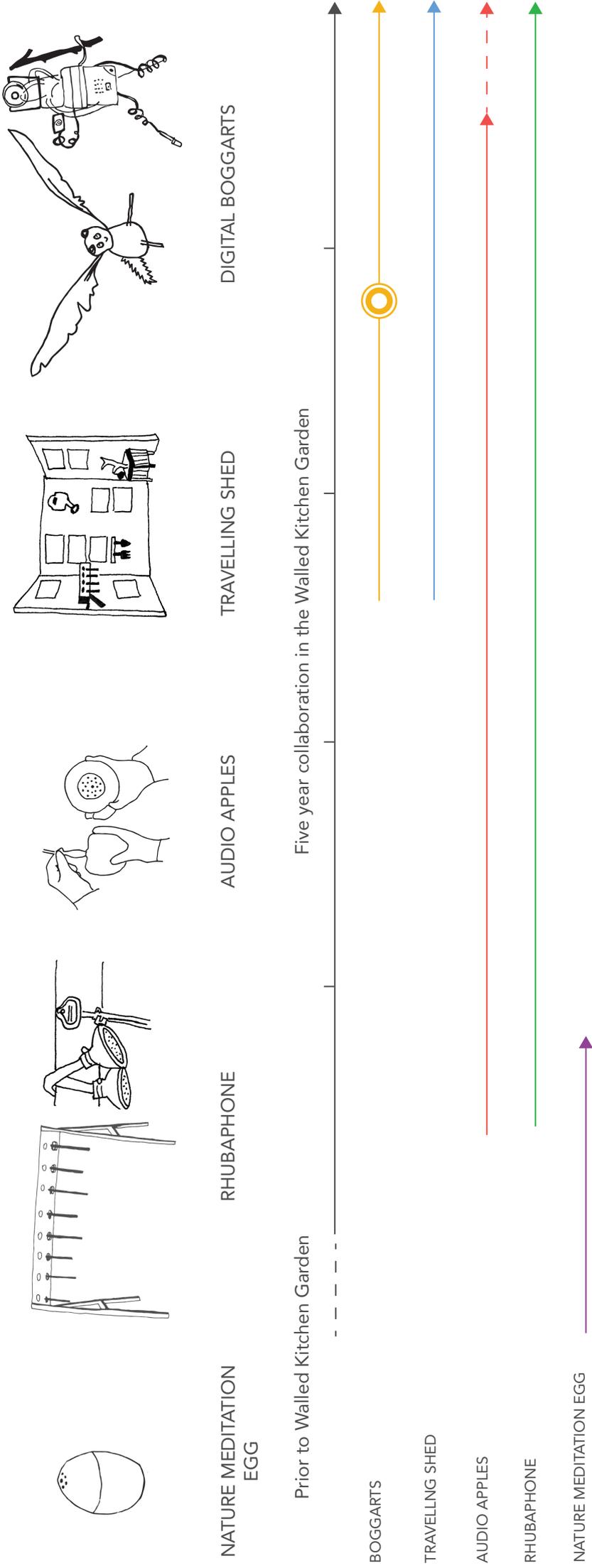
RtD was the guiding principle for my research but I used ethnographic and anthropological methods in conjunction with design, particularly in the early phases in the Walled Kitchen Garden.

Ingold criticizes attempts to conflate the role of ethnographic and anthropological research because he believes that depreciates both activities [186]. I engaged in both ethnographic and anthropological research but though there may have been some overlap, the change in activities marked a subtle shift in my approach over time. At the start I had more distance and approached research ethnographically, documenting the life of the garden to understand it and to inform design. As I spent more time in the garden my mode changed to become

more anthropological. As well as learning ‘about’, I began to learn ‘with’ and ‘from’ [186] the garden and its non-human and human assemblages. Ingold explains “we learn from those with whom (or which) we study”, [186] and I was taught by the seasons, the aspect, the weather, the birds, as well as gardeners, volunteers and visitors. Ingold describes this mode of study with reference to Gibson’s “education of attention” [186], which is apt for me, because ‘attending to’ or ‘being present to the world’, (in my case the world of the research site), is a core principle of the guiding philosophy drawn from Heidegger (Section 4.1). The resonance between the research philosophy and the description of this research approach added weight to its relevance.

The previous sections have given an account of how my research process connects back to ontological and paradigmatic commitments. The next section gives an overview of the research process. It shows different stages in the research, from initial personal exploration of theory and practice, to the research partnership with a National Trust team. The overview is followed by a more detailed account of the collaboration, from the process of finding a research partner to ways of working with the partner.

Overview: the diagram shows the main artefacts designed as part of the research process on a timeline in relation to the emergence of research questions .



Timeline to show lifespan of designs. Digital Boggarts was focused on a single event. The lines indicate preparation before the event and development towards next event.

RQ

How does lens taken from selected philosophy affect the design of digital interpretation artefacts?

RQ

How does lens taken from selected philosophy affect the design process?

RQ

What is the impact of the digital interpretation on visitor's experience of the garden?

RQ

How can digital technologies be used to promote active engagement and exploration in the garden?

RQ

How can the guiding philosophy be used to reach new audiences?

RQ

How can digital interpretation be sustained beyond the length of a funded project?

Figure 3.3: Overview of the research process: the diagram shows the development of key artefacts and emergence of research questions.

3.5 The research process

The digram (Figure 4.3) gives an overview of the research. It should not be read as a plan created to guide the research, but rather a representation created retrospectively to give a sense of the whole and to aid the reader's understanding of how the different parts of the research fit together. The diagram starts towards the end of first year of PhD research (which mainly focussed on reading to gain an understanding of the research area and finding a research space). It comprises two stages, a short phase of personal design exploration, followed by a five-year collaboration in the Walled Kitchen Garden at Clumber Park.

The diagram shows the development of artefacts in relation to the emergence of research questions. RtD was compatible with the guiding design philosophy (documented in Chapter 4, Philosophical Interlude) because RtD's openness gave space for new research questions to emerge, and the research was not tied to artificial cycles, (though it was closely linked to seasonal cycles).

In the first year of the PhD research I read and through the literature narrowed my research to the influence of critical theory on design to support connection to natural places. During this time I focused my reading on selected writing by Andrew Feenberg, Martin Heidegger and Albert Borgmann and used their writing to develop a set of design guidelines. I aimed to investigate how those guidelines might manifest in designs and in design process. I wanted to see if the guidelines elicited from these writers might result in the design of new forms of digital technology, that would be more likely to support connection to nature.

- How does lens taken from critical theory affect the design of digital interpretation artefacts?
- How does lens taken from critical theory affect the design of digital artefacts to support connection to natural places?



Figure 3.4: Exploring the local woodland

- How does lens taken from critical theory affect the design process?

I began by experimenting with materials and prototypes. I used technologies I already owned, including my mobile phone, to explore local woodland in new ways. For example I used an app on my phone to generate directions and distances for walking and locations from which to take photographs. This took me off my regular paths and gave me new perspectives on place. I mapped the phone network, internet signals and other technologies across the woodland to see how it made me feel to be more or less connected to the human and non-human world.

I began prototyping to see if I could design an artefact that particularly responded to the design criteria drawn from Borgmann's writing. This resulted in the development of the Nature Meditation Egg, discussed in section 5.1. This prototyping and exploration overlapped with the start of my time in the Walled Kitchen Garden.

I first visited the garden in the summer towards the end of my first year of thesis. When I had settled on the Walled Kitchen Garden as a research site I applied for ethics to enable me to work with the Gardens Team and others working at the site, through organisational consent, and with individual visitors to the property through individual consent.



Figure 3.5: Exploring the woodland with digital technologies

I worked with a combination of ethnographic, anthropological and design practice to learn about the site and design digital interpretation artefacts using the design guidelines drawn from critical theory.

- What is the impact of the digital interpretation on a visitor's experience of the garden?

The processes are described in more detail in the following section. The designs included the Rhubaphone and Audio Apples, documented in Chapter 5, Digital Nature Hybrids. Reflective practice was a significant part of my process within and without the design work. I used interviews and other data gathered on-site to build my understanding of the impact of the artefacts. I used themes from the design criteria to evaluate the impact of theory on designs and process.

After I had gathered data through semi-structured interviews and conversations with visitors I reflected on Digital Nature Hybrids in the garden. These reflections resulted in the emergence of new research questions about active engagement and audiences (documented on diagram 4.3).

- How can digital technologies be used to promote active engagement and exploration in the garden?
- How can the guiding philosophy be used to reach new audiences?

This led to work with a local primary school. I applied for ethical approval to work with a group of year five children and their teachers and assistants and ran a workshop with other researchers, in collaboration with the Gardens Team. I gathered data from the workshop, including images of artefacts, feedback drawings, photographs and interviews with classroom staff. I analysed this with respect to the overarching philosophy and specific aims of the project.

During the time at Clumber, I continued to gather information about artefacts and their ‘life’ in the garden. This led to a research question about sustaining digital interpretation.

- How can digital interpretation be sustained beyond the length of a funded project?

In addition to ongoing notes, photographs and reflections, I conducted reflective interviews with a small group from the Gardens Team towards the end of the five year collaboration. These conversations focused on design philosophy, impacts of designs and process, problems and lessons learned, and future plans. I concluded the research by reflecting on these in relation to the research questions and philosophy.

The following section provides more detail about the collaboration with National Trust. It begins by explaining how the partnership came about and how it was informed by epistemology. It also provides some information about the research context.

3.6 Finding a partner for collaboration

My research process involved overlapping activities. My first visit to the Walled Kitchen Garden in Clumber Park, a National Trust property, was in August 2013. By this point I had been reading for several months, and had ideas about the direction of research. I had talked to people from environmental science and nature organisations to make connections and find potential research sites. Visits to different sites helped me understand the potential benefits, challenges and constraints of different research sites, (e.g. access/remoteness). I began to think

about potential work styles for collaborations with these organisations, and their compatibility with my research paradigm. I felt one of the potential partners might push me into a consultancy-style relationship, because the manager was technologically savvy, very driven, and had grown the project as ‘his baby’. I didn’t think there was sufficient scope for other visions. I could envisage myself being pushed into a support or service provider role, which would prevent me from investigating my research questions, so I decided not to work with the organisation.

Another potential organisational partner had a work style informed by a scientific positivist ontology and my work style wasn’t compatible with the way they presented their worldview. This isn’t to say it is impossible to collaborate across differing ontological and epistemological boundaries, but for my thesis I felt it would be risky to work with people I couldn’t be sure would be open to my approach.

At National Trust I had an instant rapport with some of the Gardens Team and they were open to trying things out. Even those who were sceptical about the use of digital interpretation in the gardens were willing to approach the work in an open manner. Some declared their scepticism, but did so in a way that was not confrontational or obstructing. Of the groups I visited, the Gardens Team had the least digital technology for interpretation. Although the organisation at a National and Regional level has a great deal of digital expertise this does not necessarily extend down to the individual teams, so I brought the potential for something new and maybe that was one reason for receptiveness to collaboration. I should state that I knew one of the Gardens Team personally before the collaboration. She was a student member of the team and we’d talked about shared interests in relation to interpretation and we had wanted to work together. My initial plan was to work with her on a project that would contribute to her coursework but in the end we didn’t work on that project because other aspects of the garden took priority, in that they ‘called for attention’ and were more immediately fitting to the philosophical exploration. So, I settled down working with the Gardens Team at Clumber Park, with a view to working with other teams later in the research.

3.6.1 The Walled Kitchen Garden at Clumber Park



Figure 3.6: The Walled Kitchen Garden, Clumber Park

The Walled Kitchen Garden was created in Georgian times and at its peak employed over thirty gardeners and garden boys within the four acres of walled garden and more in the agricultural fields and orchards beyond. On my first visit there were three full time gardeners, two student gardeners, a seasonal gardener and 40 part-time volunteer gardeners. There isn't the resource to replicate the intensive gardening of Georgian times, but the team aims to manage a delicate balance of new and old, demonstrating new practices whilst preserving the garden's heritage and cultural relevance. When I first visited, the Walled Kitchen Garden opened between Easter and October and was closed over winter. This has subsequently changed, and the property is open all year, except Christmas Day.

The Walled Kitchen Garden includes orchards, a fruit garden, herbaceous borders, a rose garden, hot and cold walls, vegetable beds, compost corner, an apiary, a 450ft long glasshouse, and it is home to the National Rhubarb Collection and a Regional Apple Collection with apples from the surrounding five counties. Adjoining the glasshouse, former fruit stores and mess rooms have been converted

3.6 Finding a partner for collaboration



Figure 3.7: Views within the Walled Kitchen Garden, Clumber Park

into a garden museum holding heritage equipment, tools and paraphernalia. Beyond the Walled Kitchen Garden are other formal gardens around the chapel, lake and in the grounds where the main house stood, before it burned down in the last century.

Having described the research site, the next section will discuss the approach taken while working with the Gardens Team at Clumber Park.

3.7 Working at Clumber Park

On my first visit to Clumber, I was taken on a tour of the Walled Kitchen Garden by two gardeners who showed me different parts of the garden and talked about the interpretation used, some of which is shown in Figures 3.8 and 3.9.

3.7.1 Interpretation in the Walled Kitchen Garden

At the time of my first visit to Clumber three kinds of physical interpretation dominated. These were:

- Laminated printed sheets, including images and text (in National Trust typeface), in A3 and A4 sizes. These were low cost, and quick and easy to produce by anyone in the Gardens Team. They were resilient to the weather and could be reused. For these reasons they were popular, but there was a sense from some that the interpretation was limited because it just encouraged people to ‘read their way around the garden’ and there was a desire to move away from this form of interpretation.
- Brightly coloured chalk boards, often used to promote events and activities.
- Themed trails that changed through the seasons and involved a quiz. Visitors could find answers from signs placed around the garden or from interactions with props in the garden. These were popular with children and were introduced to coincide with half terms and holidays.

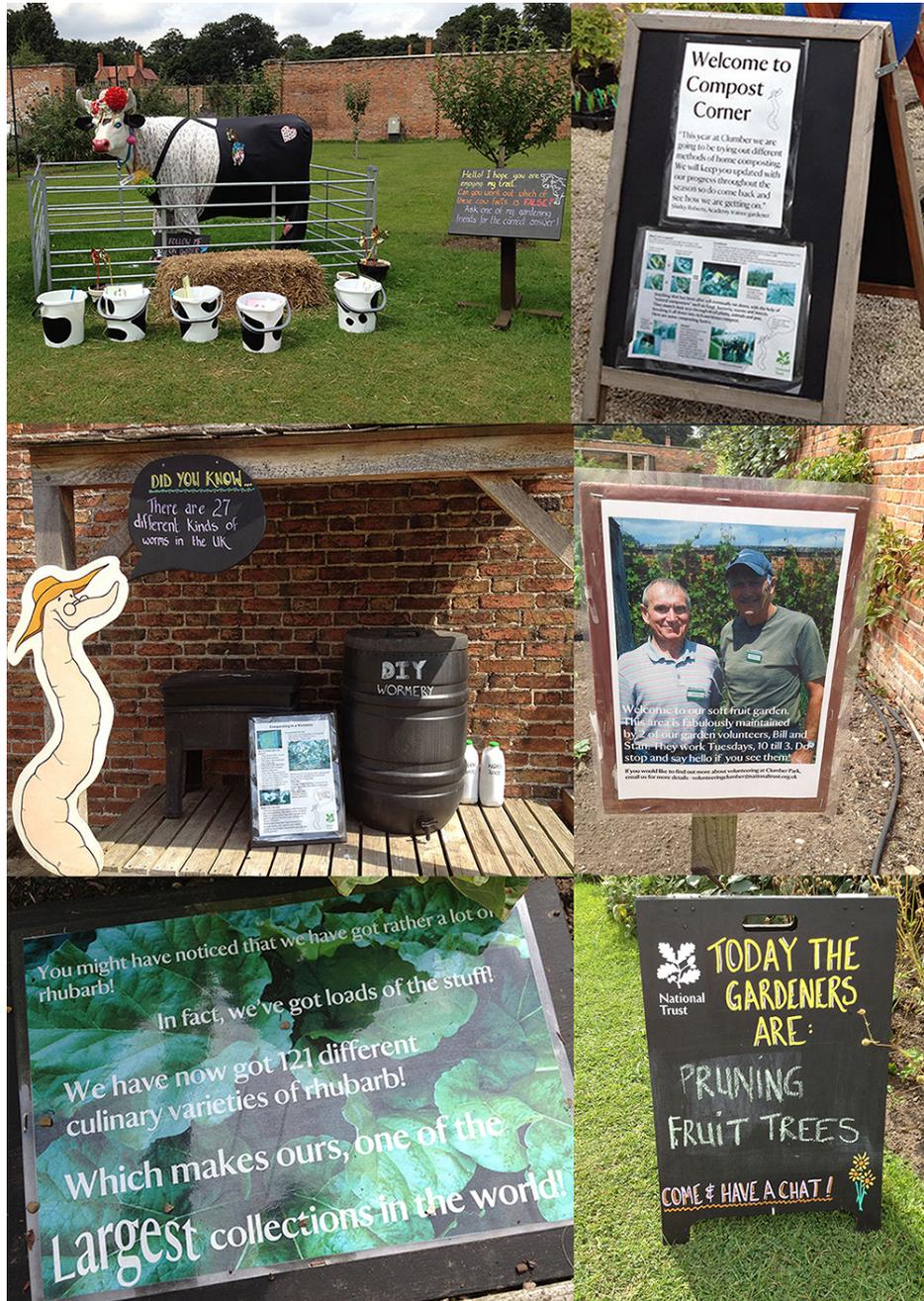


Figure 3.8: Interpretation in the Walled Kitchen Garden

In the past there had been an audio tour, a DVD running in a side room, off the glasshouse and there had been activity rucksacks for children to borrow. These were no longer in use when I visited.

A new area called Compost Corner had recently been established in the garden to show principles of composting and wormeries. Different kinds of composting were in operation on a domestic scale, as a form of interpretation.

Other garden communication occurred through activity days, like Apple and Rhubarb Weekends which included games, tastings, demonstrations (like pruning talks) and Gardener-led Tours. Another important point of communication was through informal conversations with gardeners and volunteers as they worked in the garden.

Trails and special weekends (like Apple Weekends) were financially important because there was an additional cost for non-members to enter the Walled Kitchen Garden, so events were planned to attract visitors. (It should be noted that the pricing policy changed in 2017, so there was no additional cost to visit the Walled Kitchen Garden).

My guides also showed me the side rooms of the glasshouse, which housed a museum collection which was managed by the property archivist, though the team collaborated with the archivist to exhibit particular artefacts.

Over the next few months I began with a ‘getting to know one another’ phase at Clumber Park. This involved spending time exploring the site, observing the life of the garden, participating in garden activities like harvesting, and getting to know people. During this time, I was invited to join a workshop with senior team members from across the National Trust about Spirit of Place and was given access to the intranet to read documentation about interpretation and Spirit of Place. This proved significant because it helped me to see how the philosophy that was driving my research might be realised in an applied form, that could be used practically by the gardeners and the wider National Trust.

3.7.2 Spirit of Place

“We’re setting out to transform our interpretation - the ways in which we tell stories of our places. For our visitors, we want to spark

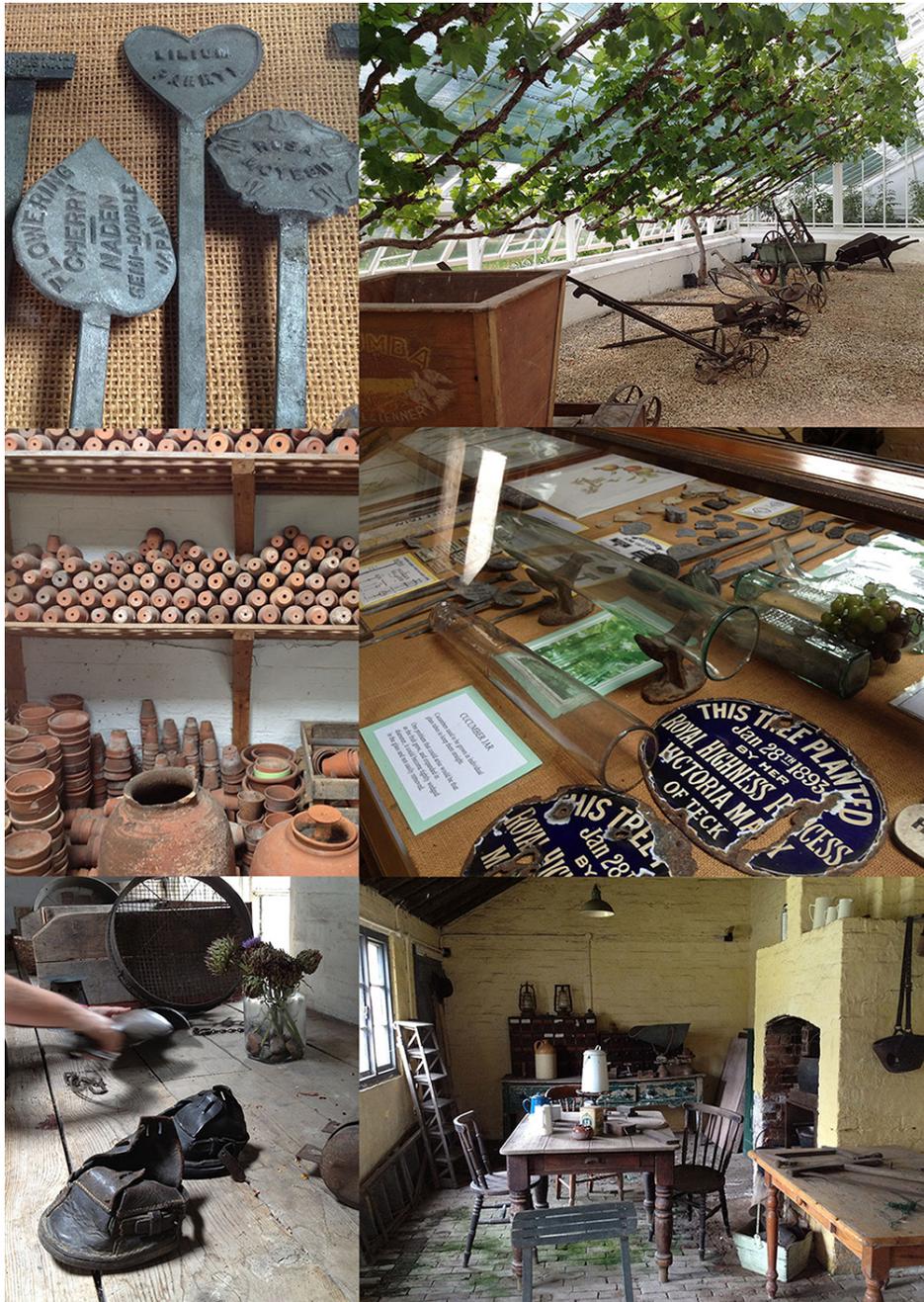


Figure 3.9: Artefacts in the glasshouse and garden museum

a closer connection with our places, to touch their emotions, to influence the way they think about places, the past and the world around them.” National Trust internal briefing about the “Seven principles of interpretation”, launched in 2014 [187]

National Trust introduced a set of principles to guide interpretation, following the doctrine that “Everything Speaks”, hence the need to really understand why each place (property) is special, so that the messages that are propagated through signage, programming, ways of working, and visual language consistently reflect the property’s true spirit.

The principles address a range of things relating to visitor experience and worker experience, but the most relevant in relation to my thesis is “Does the spirit shine through?”, which tackles Spirit of Place.

National Trust cite the ICOMOS, Quebec ‘Declaration on the preservation of the Spirit of place’ [188] in the introduction to their own document explaining Spirit of Place:

“Spirit of place (or *genus loci*) refers to the unique, distinctive and cherished aspects of a place. It is thus as much in the invisible weave of culture (stories, art, memories, beliefs, histories etc.) as it is in the tangible physical aspects of a place (monuments, rivers, woods, architecture style, pathways, views, and so on) or the interpersonal aspects (the presence of family, friends and kindred spirits).” ICOMOS, Quebec Declaration on the preservation of the spirit of place, 2008, [188]

National Trust documents expand upon the Trust’s use/interpretation of the term:

“Spirit of Place is at the heart of how people feel about and experience our properties and why they are relevant. It captures what is special and ultimately why people should love that place. To understand spirit of place we need to start with understanding significance and the people who come to our properties.” Internal National Trust Spirit of Place documents

The document continues:

“Spirit of Place will be built by both its tangible qualities, such as its scenery, buildings, land-uses, colours, textures and smells, and also by intangible cultural elements...” Internal National Trust Spirit of Place documents [189]

Spirit of Place suggests the essence of a place that emerges from human and non-human configurations. The process of creating a Spirit of Place document involves writing a statement of significance which identifies the features that make a place important. This is reviewed with visitor insights so that agreement is reached about what is “unique, distinctive and cherished” about the place. This is encapsulated in a short Spirit of Place statement which acts as a “touchstone for everything that happens at that property”. It is important for articulating “mutual feelings” about the property and sharing them with new team members. Spirit of Place should be a living thing. In my experience, everyday reference to Spirit of Place varies between people and for some it means more than for others.

The process of co-creating a Spirit of Place involves being fully present to a place. For this reason I drew parallels with Erikson’s “Lingua Francas for Design: Sacred Places and Pattern Languages” [190] and Alexander’s, “Pattern Languages” [191, 192, 193]. Both describe processes for paying attention to a place and creating an agreed-upon picture of a place.

I initially viewed my research as a project to generate a set of transferrable principles, in the form of a Pattern Language, with which teams could generate a Spirit of Place document for digital interpretation at their property. I also planned to begin by generating the Spirit of Place digital interpretation document for the Walled Kitchen Garden. As time progressed the formality of those forms of documents no longer seemed appropriate for the context and I dropped my plan to create formal Pattern Language documentation for embedding Spirit of Place into digital interpretation.

However, they stayed in my mind because of the correspondence with my use of Heidegger’s philosophy, particularly the idea of being present to the essence of things, explained in the following chapter.

3.7.3 Ways of working

I discovered quickly that one of the most valuable activities was walking and talking in the garden with different people. Neil Lewis [27] wrote that, “To engage with the world tactually is to situate oneself consciously and to have a potentially unmediated relationship with it” [27]. As I walked with gardeners and volunteers they couldn’t help interacting with things. They were constantly looking at the garden, noticing, and assessing it. They would ‘dead head’ flowers, tidy and make little adjustments as they became aware of tasks that needed to be addressed later. They were, to use Lewis’ words, consciously situated, and this quality of engagement made things vividly present to them. Seeing features in the garden prompted my walking companions to point them out and it enabled the knowledge sharing to take on a more embodied, sensory aspect. I found after the first two walks that people took slightly different routes and drew attention to different subjects depending on their passions and interests, which added richness to the accounts. For this reason I decided to use the walking and talking method more widely to get insights into different people’s connections to the garden. It was also effective because walking and talking meant interviewees were not taken away from the garden space and were more likely to talk for longer and in a different manner than in an office. Artists and researchers have used walk and talk as a research method, as well as a means of creating artworks. I had in mind several things when I took this approach. One was Jen Southern’s, “Surface Patterns: Walking Tours” [194], subtitled, “10 People, 10 Walks, 10 Stories Told” where interviewees talk about their experience of living in Huddersfield. Another influence was an event in Falmouth for artists and designers working with environmental issues called “these will attend, you may”. One of the activities involved planning a shared walk and picking spots en route for individual artists and researchers to talk about their work. Making the natural environment part of the conversation gave the work immediacy, which is often lost in more typical research presentations in university buildings. Bringing specific places to attention enabled sensory and physical conditions, like topography and weather to be brought into prominence. A senior member of the team signed an organisational ethics form giving permission for me to gather data from staff and volunteers

and I was introduced to the team. When I talked to individuals I explained my research and asked permission to take notes or make recordings. Some people were happy for me to take notes but didn't want to be recorded or to have photos taken and I gathered data according to their wishes. (When it came to gathering data from visitors, a notice was put up in the entrance shed and the staff on duty told visitors about my research. Each visitor was given an information sheet and consent form, an example of which is in the appendices).

In addition to walking and talking, I spent time sitting in the garden, watching, listening, touching, smelling and sometimes tasting things. I took photographs and made notes and tried to get a feel for different parts of the garden. As stated in the Review of Literature, Ingold [28] and Lewis [27] talk about place making through interaction with environment as a result of movement through a space. Tuan [88] on the other hand talks about the importance of stillness and the moments of absorption and reflection that occur during pauses, even in the moment when one gazes on a landscape. I believe both build connection to place and I tried to do both, though my physical interaction was limited to walking, a little harvesting and some weeding, because I wasn't a gardener and didn't have the skills required to prune important heritage trees or tend to delicate and rare plants. I was taken on guided tours of the wider property. I trailed the Seasonal Gardener responsible for harvesting crops and I wandered around, exploring different parts of the property. I met the Regional Gardens Coordinator and talked about my work and ideas. I followed groups on pruning workshops with the Senior Gardener and went on various garden tours. I documented existing interpretation, particularly digital technologies for interpretation. I attended other events such as a Yarn Bombing and Wassailing Day in the garden. I followed the rhythms of the garden, taking breaks and lunch with others in the Mess Room, seeing how people interacted and shared information, while getting to know people and becoming a familiar face. I also introduced myself to the core team and volunteers by bringing my work to the garden. I brought artefacts, prototypes and photos of things I had made and talked about them and the design choices. I brought various digital technologies and other materials to play with, and to show less conventional forms of interpretation. If people expressed an interest I talked about research questions and the theoretical underpinning for my thesis.

During this ‘getting to know one another’ phase, I began to realise some of my preconceptions about how I planned to conduct the research might need to be reconsidered. I have grown up through a school and university system that reinforced the scientific method and gave me preconceptions about how ‘proper’ research ‘should’ be done and these assumptions fed into my initial research plans. I had anticipated that the initial getting to know one another phase would lead to a more formal stage of participatory design workshops with gardeners and volunteers. I didn’t think that observation and conversation would disappear but certainly thought group design workshops in a separate space would be part of the process. However I decided to change that plan and work more informally.

The parameters that I had established from critical theory literature not only informed the artefact design but also the design and research process. The influence from Heidegger and Feenberg emphasized the need to pay attention to context and when I paid attention to context I realised that at that moment in time the formal workshops would not be appropriate. Ingold [186] wrote, “It is, in short, by watching, listening and feeling - by paying attention to what the world has to tell us - that we learn.” I believe this is also true in relation to deciding how to proceed with research. The initial conversations and encounters with volunteers and gardeners showed two important factors. First the volunteers were passionate about being in the garden and that was their reason for coming to Clumber. To take them away from their activities in the garden would have been to work ‘against’ rather than working ‘with’ and I felt it might have been counterproductive because there mightn’t have been a wholehearted commitment to that kind of research process. The second factor was the lack of resource available for the garden. There were three full time gardeners, a seasonal gardener responsible for harvesting and a student who had study release, and a large group of volunteers, to manage a four-acre kitchen garden and other gardens in the wider park. To take a group of people away together would have had a significant impact on the work in the garden, particularly in some seasons where the garden is changing rapidly and needs constant attention. Spending money on workshop resources might have been insensitive at a time when the Garden Team were working hard to get maximum output from a limited budget.

By paying attention to the day-to-day life of the garden I shaped the research methods to be less intrusive and more in-tune with the context.

During the early visits several themes stood out including:

- the garden's contribution to the Heritage Seed Bank
- the significance of the National Rhubarb Collection
- the Georgian and Victorian garden design and equipment
- the cultural significance of the Regional Apple Collection
- the history of the garden, particularly the hidden history
- the organic gardening methods used in the garden
- the wormery and composting demonstrators
- wildlife in the garden

Some snippets from the very first conversations captured my imagination and stayed in my memory:

“You know our apples...Well one layer is you tell people about apple trees and the heritage varieties, and that's quite obvious. But then you say Ulland* was the name of a pit pony. So then underneath that there can be other information about pit ponies and how they relate to Nottinghamshire and the coal industry, and how come, how come this place was funded and stuff.”

*Ulland is the name of an apple in the garden.

Gardener 1: “I think the important thing for us are regional apples. And if we could tell the story of apples I'd be very happy and I've actually, I think we've got a volunteer who is into interpretation and research.... my - first thought was “aaaha, she can do something” because we've got an apple called Mr Sissons Worksop Newton, who was a guy in Worksop in 1900...”

Gardener 2: “I’ve told her this story of the Portuguese wife.”

Gardener 1: “Yeah, yeah. It’s the whole story, it’s interesting. It’s interesting its local.”

Gardener 2: “That’s what I was trying to... It’s multilayered isn’t it?”

Gardener 1: “Yeah.”

Gardener 2: “That’s the thing. But there’s lots. ‘Ellis’ Orange’ is local, and others I can’t remember. Even if we only did four or five.”

Gardener 1: “Yeah”

Gardener 2: “It would give people an idea that, you know, that they’re not just about fruit trees. You’re looking at somebody’s passion or a piece of history.”

The themes for the installations came from the priorities expressed in conversations with gardeners and volunteers some of which were clear from the start. One of the things that struck me was the knowledge that the individual gardeners and volunteers carried with them. I thought, “If only everyone could hear the gardeners telling these stories personally.” These experiences of listening to the team and spending time with them in the garden fed directly into the designs.

I made prototypes based on the information from conversations and explorations. I intended the early designs to act as stimuli to encourage others to get involved in the design process. The team were involved in giving feedback and suggesting content but it took much longer than I expected for other kinds of participation to develop, and this is discussed in Reflections in Chapter 8.

3.7.4 Data collection and analysis

As described above I collected data in several forms including interviews, written and audio field notes and photographs. I also documented the iterative development of artefacts using photos and reflective notes.

I made field notes in several ways. I wrote in notebooks, during conversations, if this was appropriate and not intrusive. These notes were written up when I returned from the property and stored digitally. I took digital photos to accompany

the field notes. Often it wasn't practical to make written field notes (for example because of the weather), so I made audio recordings. During visits, I would go to a quiet part of the garden and audio record observations, information shared by the team, and reflections. Sometimes it was difficult to make recordings during the visit because the day was filled with practical activities or the garden was too busy to make private recordings. I developed a habit of switching on the audio recorder as I got in my car to drive home to make audio notes, which I typed up on return home.

I made twenty-two initial semi-structured interviews with volunteers and gardeners on different days of the week, because volunteers attend on different days. The interviews were conducted in the garden, (sometimes walking around the garden), to keep the garden present in the mind during the interviews. These interviews were analysed inductively to see if common themes emerged to do with connection to the garden. The interviews were used to identify themes that were important to the team, and later this data collection process formed the basis of one of the interpretation artefacts.

When the artefacts were installed I timetabled days for data collection with visitors, in the garden. I conducted forty-four semi-structured interviews with people who had used at least one of the artefacts. These interviews focussed on reason's for their visit, connection to the garden, experience of the artefacts and interpretation preferences. These interviews were transcribed and analysed in different ways. They were analysed for feedback that would improve future iterations of the design, that could be characterised as 'research for design'. The texts were subjected to another theory-driven thematic analysis that focussed on philosophy and design criteria. During the analysis of the philosophical writings about technology and nature some key principles were identified and translated into design criteria. The visitor's interviews were analysed with reference to these design criteria.

Although I made field notes which documented conversations and included feedback from the team as part of my routine practice on visits, I also conducted ten longer interviews with volunteers, gardeners and rangers. The first set of seven interviews corresponded with the installation of the artefacts in the garden. The

interviews were transcribed and analysed on themes extracted from the guiding philosophy and design principles.

At the end of the five year period I made three more long interviews with gardeners and volunteers. The people interviewed were chosen because of their particular experience in relation to the research. One of the interviewees had been a member of staff throughout the research period and had detailed knowledge of the research aims, the artefacts and their development. Staff move on to gain more experience or promotion so very few members of staff were part of the team at the start and end of the research period. Volunteers tended to stay for longer periods of time, though most had less direct contact with the artefacts. The volunteer interviewed for the final set of long interviews was chosen because she had been recruited specifically to work with interpretation in the garden. She had the most intimate experience of the artefacts, learning how to make and maintain the underlying digital technologies. She had adapted the existing interpretation and created new interpretation. The third interviewee from this group was another gardener, who at the time of the interview had some responsibility for daily management of the artefacts. These interviews were transcribed and analysed on pre-determined theory-driven themes that related to the broad aims of the research, as well as the specifics of particular designs. The themes were much broader, encompassing themes that had emerged during the research, relating to process, participation and sustaining designs. Although the interviewees at the end of the project had the opportunity to talk about all aspects of the research, in these interviews they concentrated on the artefacts embedded in the garden over time, rather than discussing the school (Boggarts) workshop.

The Boggarts project, a school workshop, was treated as a stand-alone project, within the longer-term collaboration. Two members of staff from the school were interviewed about the project and the transcribed texts were thematically analysed. The research team and a gardener recorded reflections immediately after delivery of the workshop. Children were asked to reflect on their experiences of the day in drawn and written form. The children's reflections were analysed to identify emerging themes from their experience of the workshop.

The reflections were ongoing throughout the research and they helped stimulate the formation of new research questions and new research projects. The

development of this work is documented in subsequent chapters.

3.8 Summary: Establishing the methodology

In this chapter I established the worldview and paradigmatic commitments that inform the research. The chapter divides into two broad sections, the first part up to and including Section 3.4 addressed general factors that informed my approach to research. The second part, from Section 3.5 onwards, addressed the specific research case, particularly the research conducted at Clumber Park.

The chapter showed the messiness and tensions that can exist within one's worldview and the way I managed and made sense of these tensions. Guba, Lincoln, Denzin and others have produced clean, distinct paradigm profiles, that I straddled, sometimes uncomfortably, though my position is firmly within the 'new-paradigms', that lie in opposition to positivism and post-positivism. The chapter also showed that the subject of research influenced the way the research was conducted. My research drew on critical theory, constructivism and participatory paradigms. In practice this meant that the research was shaped by a critical lens but conducted in using a constructivist approach that constructed understandings from different stakeholders. My paradigmatic perspective explained my position within the design research community and my allegiance to Research through Design (RtD) and an epistemology of practice.

I established an overview of the research programme, showing through a diagram the relationship between the design and installation of interpretation artefacts and the emergence of new research questions through the process. This highlighted the value of an open and responsive approach that allowed for movement in the research direction.

I explained how I came to work with the National Trust Garden Team at Clumber Park and how the research methods unfolded over time, in response to place and people. I intuitively shifted and adopted new ways of working so that they would be more compatible with the research context.

The chapter introduced the research partner and research site, drawing attention to National Trust's use of 'Spirit of Place' and signposting the connection to

the guiding philosophy, which is described fully in the following chapter, “Philosophical Interlude.” It documented the qualitative methods of data collection and analysis from “walk and talk”, designing artefacts, conducting semi-structured interviews and making reflective field-notes to thematic analysis of texts. The chapter aimed to show coherence between the theoretical grounding for the work and the research techniques used to gather data.

The next chapter, Philosophical Interlude, introduces the specific philosophy that informed the research and it shows how the philosophy was translated into design guidelines.

Chapter 4

Philosophical Interlude

This chapter introduces the theoretical foundations that inform the design lens. The chapter draws on selected writings from Philosophy of Technology, particularly positions that critique the impact of technology on society and behaviour, including work by Heidegger, Borgmann and Feenberg. I do not claim that this is a comprehensive account of the works of these theorists, but I aim to see if attending to particular texts and ideas can offer new ways forward for designing technologies. By embracing, rather than challenging criticism of technologies, I seek to identify principles for the design of technology to support connection to natural places.

I use the term technology, rather than digital technology, because it is commonly used within the source texts, several of which were written before the widespread adoption of digital tools and communication. But when considering the design output, I have in mind digital technologies or technologies which have a digital component because they are at the heart of the current connection debate. I did not specify the category of design at the start of my research, only that it must have a digital component, but over time the focus narrowed on the design of digital interpretation. Interpretation has different meanings but in this case it refers to “a communication process that helps people make sense of, and understand more about, your site, collection or event” [195].

4.0.1 The guiding philosophy

At the start of my research I intended to work with the writings of many different philosophers to see how their philosophies might manifest in designed artefacts. However it became clear that that would be unrealistic in the available timeframe. Also, I was concerned that some philosophies were not compatible with the aims and values of my partner organisation. Although other philosophers, like Marcuse and Dreyfus have influenced the research and are referenced throughout the thesis, my guiding philosophers were Heidegger, Borgmann and Feenberg.

I felt there was coherence and continuity in these choices. All wrote in the twentieth century as technologies of all kinds gained increasing importance and Borgmann and Feenberg have continued to write about technology and contemporary life. All were known for writing about philosophy of technology, and criticism of technology. I wanted to include perspectives from an earlier and more recent writer and I felt there was a lineage between Heidegger and the others. Both Borgmann and Feenberg have written about Heidegger and they have drawn on his philosophy in their work. In addition, Feenberg was taught by Marcuse who in turn was taught by Heidegger. Heidegger's influence is evident in Marcuse's work, though his philosophy takes a different turn.

I was interested in the way themes in Heidegger's writing were developed and taken in different directions, that seemed to open up more positive possibilities for technological life, as opposed to retreating from technology. I was interested in the parallels between Heidegger's 'Gathering the fourfold' and Borgmann's Focal Practices, and the way Feenberg deconstructs Heidegger's 'Standing Reserve' to arrive at 'Instrumentalization Theory', which presents ways to counter the framing that Heidegger argues is inevitable in the technological world.

Feenberg offers most possibilities for ways forward, and I think I am probably closest to his position though I am sceptical about some of his arguments.

The chapter is divided into four sections. The first part of the chapter will introduce relevant theory from Heidegger, Borgmann and Feenberg, leading to summaries of how these theories contribute to the design lens. The fourth section will reflect upon the preceding literature in relation to selected natural history writings. This is not a systematic review but is used to reflect upon the

philosophical texts.

4.1 Heidegger

This section will incrementally unpack the principles that combine to produce Heidegger's philosophy on technology, starting with an introduction to the concept of being and dwelling, and going on to explain how dwelling reveals worlds, and makes 'things' present, using the notion of techné. This will lead to Heidegger's differentiation between things and technologies, including the human state provoked by technicity. It will conclude with a summary and discussion of Heidegger's philosophy in relation to the research questions.

It starts with a diagram that acts as an overview of the section. It introduces the key themes from Heidegger that have informed the research and it provides a summary of the main messages or arguments in that theme. It includes visual elements associated with the theory.

HEIDEGGER OVERVIEW

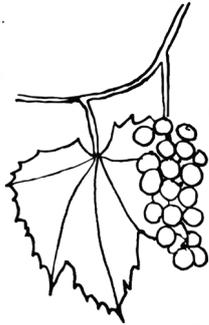
BEING AND DWELLING

Being is dwelling

Dwelling is preserving 'things'

Dwelling "safeguards each thing in its nature."

Building/dwelling means "to cherish and protect, to preserve and care for, specifically to till the soil, to cultivate the vine."



THE FOURFOLD

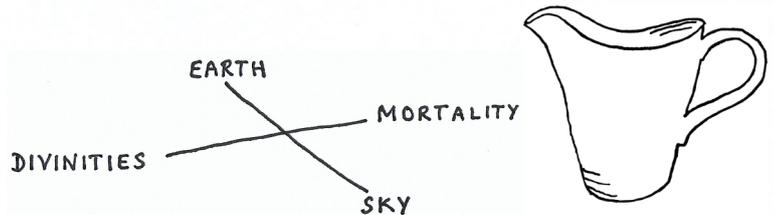
The fourfold are earth, sky, divinities and mortality

When the fourfold are gathered together we see a thing in its own right; we see "its essential being"

When humans dwell they become aware of the conditionality by which things exist.

The fourfold are gathered through social practices

"Each of the four is, I think, intended to put us in mind of some of the particular conditions that make possible the actual thing - jug farmhouse, sonnet before us."



THINGS AND TECHNOLOGIES

Not everything is a 'thing' - technologies are not 'things.'

'Things' interrupt us and cause us to reflect on ourselves and the conditions that have made them present.

Technologies don't interrupt us. Their flexibility makes them appear to be free of any ties to context.

Technology disconnects us from the things that matter. Technology stops us from seeing things 'in their own right' because technology frames every thing as a resource that Heidegger calls 'standing reserve.'

IMPLICATIONS

Heidegger believes technology's essence is overwhelmingly powerful so retreat from technology is the only escape

Spinoza, Dreyfus and Flores speculate about how technologies might 'gather the fourfold' and they suggest examples of technologies 'thinging.'

Is 'another technology' possible?

DESIGN CRITERIA

Figure 4.1: Heidegger overview: summary of theories that have influenced this research project

4.1.1 Being and dwelling

The theoretical/philosophical journey begins with the German words ‘baun’, meaning building, and ‘bauen’ meaning dwelling. By drawing out the shared root Heidegger links the concepts of building and dwelling. An earlier understanding of the word building was ‘being in a place’, so Heidegger asserts, “Building is really dwelling” [196, 197].

He also draws on etymology to make a distinction between building as a form of construction and building as “cultivating”, “nurturing” or “preserving” [196] for example he explains bauen as follows:

“to cherish and protect, to preserve and care for, specifically to till the soil, to cultivate the vine. Such building only takes care - it tends the growth that ripens into fruit of its own accord. Building in the sense of preserving and nurturing is not making anything.” Heidegger [196]

Heidegger dissects the meaning of ‘being in a place’, again with reference to historic language. This time he explains that the word ‘wunian’ means to stay in place and be at peace and then he connects the word for peace, ‘friede’, to its underlying meaning of being “preserved from harm” or left in peace, “in its own nature”. One key idea that comes out is that building/dwelling preserves things ‘in their own right’ [196].

Next Heidegger makes a connection between dwelling and being through the shared origin of the verb ‘sein’ (to be), showing that although ‘ich bin’ is understood to mean ‘I am’ it literally translates as “I dwell”. Through this Heidegger shows that “Dwelling is the manner in which mortals are on earth”. If we bring these ideas together, as Heidegger does under the term “dasein”, to be human is to dwell and dwelling is inextricably linked to place because humans cannot exist outside a place, hence ‘being’ means ‘being-in-the-world’. Dwelling evokes

a particular way of being in which humans ‘stay with things’ or are present to them. Dwelling is an act of nurturing that preserves things and enables those things to ‘be themselves’ [196].

4.1.2 The fourfold: revealing worlds and making ‘things’ present

According to Heidegger, humans dwell in a unity called the “fourfold”. The fourfold of earth, air, divinities and mortals are conceived as points along two axes that bisect one another, with earth and air in opposition along one axis and, the divinities and mortals in opposition along the other. The fourfold are also inextricably linked and “belong together”.

Theorists interpret the fourfold in different ways, the detail of which is beyond the scope of this work but an important message to take away is that when thinking of one of the fourfold we inevitably think of the others. The fourfold work together as a unified whole.

How they work will be discussed shortly, but first it is useful to note the connection made between the fourfold and “absence and presence” and things being “veiled and unveiled” [198]. Edwards’ [199] commentary explains how these characteristics reside within each of the fourfold. He begins by linking earth to materiality and the idea that things come out of darkness and withdraw back to darkness, after a period of time when they are illuminated through language and social practices.

The sky points to the illumination by sun and moon. The difference in brightness from sunlight and moonlight is ascribed to the difference in human practices that illuminate the world to differing degrees. The paths of sun and moon hint at natural cycles and human concordant or asynchronous relationship to those cycles. The significance of this will become explicit later in this section when Heidegger’s beliefs about the impact of technology on humanity are exposed. In summary, earth conceals, and in opposition, the sky reveals.

On the other axis, the divinities may represent a form of enlightenment brought about through transformative phenomena like poems and politics. The

idea of things coming into the light of revelation as a consequence of human activities is a significant take away from Edwards' exegesis.

Mortality refers to the inescapable presence of death, which will come to all humans. Their death is the final withdrawal and it emphasizes the conditionality of existence, that "everything: every thing - is contingent upon a constellation of circumstances that will someday no longer hold together" [199]. The idea that everything is contingent or dependent is another important consideration that will be returned to when the philosophy is applied to technology.

The fragments from Edwards and Harman seed the main message that the nature of things is revealed through human activity. Through dwelling and social practices we see the life in things because the fourfold are gathered together and are presenced into things. According to Heidegger, when the fourfold are presenced into a thing we see that thing in its own right; we see "its essential being" [196]. The fourfold work together, as an indivisible whole, refracting and reflecting back on each other and the thing. We humans, are part of the fourfold so we see the thing reflected in the fourfold, but we also see ourselves reflected back through the thing. Humans dwell and by dwelling they stay with things. In this way humans become aware of the conditionality by which things exists. They become aware of the dependencies, past and present that enable it to exist.

"Each of the four is, I think, intended to put us in mind of some one of the particular conditions that make possible...the life that brought to presence the actual thing - jug, farmhouse, sonnet - before us."
[199]

The idea of presencing has its foundations in Aristotle's theory of techné, which refers to the revealing that arises from the experience of the essence of something. The word technique comes from the same root and is connected to the idea that craftsmen enable an object to come into being, which "realizes the inherent potentialities of the thing" [200]. This process implies production and though Heidegger initially uses the term in this sense (as an object made "accessible in the course of usage" (Kissel in [200]) he later steers from this use and emphasises its meaning as "revelation".

4.1.3 Things and technologies

Things are at the heart of dwelling, but not everything is a thing. A thing becomes present through the gathering of the fourfold. Heidegger describes “a thing thinging”, when a gathering around everyday things “temporarily brings into their own both the thing and those involved” [201]. A specialised form of this is “shining forth” which occurs when our “demeanour changes” in response to the thing. Spinoza and Dreyfus [201] cite the example of turning off from a busy street into the cool, quiet, calm of a cathedral, where meditateness takes over.

As the thing gathers and presences, it “stays for a while” [196]. It stops us as we pause to notice it and reflect on it. We are “interrupted” by it, and as we are interrupted it causes us to become present to ourselves. By contrast, technologies neither interrupt us, nor stay a while [199].

These products are so effortless to use and easy to incorporate into our lives that they slip into the background anonymously. “The more “unconditional” and “smooth” the appearance of the thing, the more readily it disappears into our use of it.” [199] Heidegger argues that this has an impact on the way we relate to ourselves. We lose sight of the framing that technology enforces and so technology “obliterates even us” [199]. Though we perceive it as liberating, it actually disconnects us from things that matter. From Heidegger’s perspective technology gives a particular slant to the way we see the world. When things gather the fourfold they are confronted by the conditions that have made them present. They cannot avoid acknowledging the debt to “something prior” [199]. This is not the case with technology. Technology is designed to be flexible and efficient, so it can be used easily, anywhere, independent of context. Technology presents itself as detached from setting, unencumbered by any debt to people, place, environment, history, culture, knowledge and traditions on which it stands. Once divorced from its conditions of being, technology reframes the world so that we no longer see things in their own right, but instead unwittingly adopt a mindset where everything is seen as a potential resource, a “standing reserve” [202] that Heidegger called “Bestand” [199, 202]. In this frame “everything is ordered to stand by” [199, 202] so that it may be on call for further ordering. A computer

waiting to be turned on and a “garden waiting for an orderly touch” are examples of standing reserve [199]. Technology’s mode of revealing, causes everything to be transformed into a raw material to be harnessed by humankind, in an ongoing, never-ending process. In this way, human’s relationship to the nature of things changes. The release from conditionality appears emancipating because nothing can exert any demand on the human, but this causes a self-centered attitude, where there is no need to care for anything other than oneself. This has profound implications for social and environmental wellbeing. The illusion of human control over this process enslaves humanity and potentially transmogrifies it into a standing-reserve. Consequently technology threatens to drive man and society.

These concerns echo Simmel’s [29] earlier fears about the impact of urban, industrial, technological life at the turn of the twentieth century. He contrasted the fragmentary experience of working on discrete tasks in the machine age with the experience of making the whole object, as was the norm prior to the Industrial Revolution. He described the sense of dislocation experienced by workers as production was removed from context. Simmel believed this had an impact on the self and society, characterised as alienation that undermined “the harmonious growth of self”. The pace of industrial/machine life distracted and bombarded humans to the point where they had no mental space for reflection and they withdrew emotionally from work and other aspects of life.

The idea reoccurs later in Marcuse’s “One Dimensional Man” in which “democratic unfreedom” [158] is exercised through the machine process. Consumers are consumed by their consumption. Operationalism, which Marcuse links to rationality and technology, dominates ways of thinking. As humans become accustomed to working with technologies, meanings become synonymous with operations and behaviours, and anything that cannot be accounted for in these terms is “eliminated” [158]. This way of thinking, pervades and becomes accepted as normal. Marcuse makes direct reference to Marxian theory of technological rationality under which “technical apparatus engulfs” to the point where only a change to the structure of technology could free people from immersion [158].

These writings bolster the idea that context matters and its removal changes human relationships to objects, other people and the self. Standing reserve wipes out any suggestion of conditionality or indebtedness to that which has gone before.

Technology is consumed through use, as is its user, so that its context falls away, unnoticed. People lose fixed identities and that makes it difficult for them to act as world builders or world revealers. By contrast, ‘things’ “resist this double obliteration” [158].

Heidegger’s use of the terms “ready-to-hand” and “present-at-hand” [203] contribute to an understanding of the dichotomy between things and technologies. We know, through the explanation of the fourfold, that things gather and stay with us for a while, in contrast with technologies and technological products that are consumed through continual ordering. These technologies disappear in their use because they function so effectively that they are no longer seen. They exist as an unconscious extension of human activity, as tools that are ready-to-hand. They are understood immediately, entirely for their function and significance to human practices. By contrast, present-at-hand describes things that exist and have meaning “independently of human practices” [204] and human significance.

4.1.4 Future Implications

In his final interview with *Der Spiegel*, Heidegger does not appear to see a way in which humans can change their relationship to the essence of technicity because humanity does not have power over it [205]. In fact the smooth functioning of technicity “dislodges man and uproots him from the earth”. If we follow Heidegger, it seems that the essence of technology is so detrimental to the human condition that retreat is the only option, because technology enframes the world in a way that ultimately obliterates humans.

This does not bode well, if the aim of this research is to embrace criticism of technology in order to design different kinds of technologies to establish different kinds of relationships with the world, because Heidegger believes this is impossible. Humans cannot disable the overwhelming, consuming power of technicity. We live in a world built on technicity and cannot step outside to remake the world another way.

Heidegger appears resigned to the improbability of overturning technology’s dominance so in his writing he looks to ways to moderate against its consumption of humanity and the natural world. For example he advocates use of the flexible

identities created by technicity to keep technological skills in the background where they can be used to give insights without subsuming people's whole identity.

Dreyfus and Spinoza [206] see possibilities for extending Heidegger in ways that envision a more positive role for technology. They speculate about how technology might gather the fourfold, though they acknowledge that gathering the fourfold was supposed to be limited to 'things' and activities of local worlds, and so appears to be at odds with our understanding of the technological things. I'm not sure I accept Spinoza, Dreyfus & Flores' [201] particular examples of technology 'thinging' or Spinoza and Dreyfus' [206] vision of the fourfold gathered through the technology of a motorway bridge (chosen in reference to Heidegger's account of bridges), but I am open to the possibility that technology could be different, and could both 'thing' and 'shine forth'.

I find in Heidegger a slim hope in his mention of "another technology" [205]. It holds onto the slight possibilities for a different future. I take from Heidegger the condition of dwelling, which frees and cultivates. Heidegger shows how things can presence and stop us in our tracks, and cause us to reflect on our selves, our relationships and our histories.

I am more attracted to the potential of technology as a conduit for experiences, that enable gathering and presencing of other things. Experience is at the heart of this, and that also ties into the writings of Simmel, Marx and Borgmann. I associate Heidegger's 'thinging' with Borgman's focal practices and focal things, discussed later in the (Chapter 4.3). Borgmann says that devices detach from context and are so 'easy' they require no engagement or focus. But if technologies are designed to promote engagement, and if they can sustain focal practices, then technologies of connection are attainable.

4.1.5 Design criteria and questions drawn from Heidegger

Heidegger's philosophy makes clear the difference between technologies and 'things' and this begs the question, can technologies, specifically digital technologies ever be 'things', and can they be designed to help us thing other things? Heidegger thinks not, but writing decades later I wonder whether it might be feasible, if the digital technologies are intentionally designed to respond to the problems

perceived by Heidegger. This is obviously an enormous challenge because any technology on which this is built is likely to have its roots in the same society that has created the current ‘problematic’ technologies. Setting this elephant aside, if it were possible, what would make technology a ‘thing’? Or, what would give a digital technology ‘thingness’/a ‘thing-like’ quality? By identifying the desirable and undesirable characteristics I hope to set the parameters for the design of digital interpretation for the Walled Kitchen Garden.

One of the root problems that is evident in Heidegger’s writing is that technologies are ubiquitous and global, which means they have no ties to place. To challenge this my digital interpretation technologies will need to be local, specific and grounded in the world around them. If ‘things’ are connected to the things that matter, then the digital interpretation will need to draw people in and connect them to the things that matter in the world that surrounds the interpretation technology. The digital interpretation will need to incorporate or inspire social dimensions that give people pause, prompt reflection and revelation. In short it will need to gather the fourfold.

Digital interpretation which is local, particular and grounded in context will inevitably have dependencies, and the short connections to its immediate context will make those local dependencies and debts to people, place and culture more apparent. It is hoped this will challenge the dominant technological lens through which everything is viewed as standing reserve. To be certain of countering the tendency towards standing reserve, the digital interpretation should be preserving and cultivating of itself and its world. It should allow people to dwell.

The next question is how might these principles manifest in a design. Designing with materials that are connected to the context is one possible way to ensure the artefact is contextually connected and the use of these materials may help the artefact fit within its location without dominating. Making the design site specific and contextually relevant is another strategy. In the research site this means exploring the potentials offered by locally sourced materials, culturally relevant forms, and local knowledge including personal and experiential knowledge. To authentically achieve this degree of connection it is desirable that people who are embedded in the site contribute to the process.

As described in chapter two (2.2.4) placemaking is variously associated with pauses, embodiment and inscription. Designs that encourage these experiences may stimulate the reflection and revelation associated with ‘things’. This might be achieved by using materials that promote sensory connection, or awareness of place. Designs that have a social function may have the potential to gather the fourfold. This is another instance of the importance of involvement of people from the site.

4.2 Feenberg

This section will introduce Andrew Feenberg’s Philosophy of Technology, beginning with his dismantling of arguments for technological determinism to show that technology can be shaped and controlled by people. It will describe his use of “double aspect theory”, “trade off theory” and “instrumentalization theory” [207, 208] to explain the relationship between the function of objects and their social meaning. This will be used to show how a democratic approach can be applied to re-work technical codes to incorporate a greater range of voices and values, creating the potential for new forms of technology. The section ends with a summary of some of the criticism of Feenberg’s philosophy and a review of what his position might confer to a set of design guidelines for digital technologies to support appreciation and connection to place.

Feenberg seeks a new way forward that brings together elements from the traditions of critical theory, and science and technology studies (sts). He contrasts the perspectives of Heidegger and Marcuse with Latour, Haraway and social constructionists, and seeks a middle way between these perspectives. He especially references Marcuse, and uses his philosophy to suggest the emancipatory potential of unified “Aesthetic Technology”.

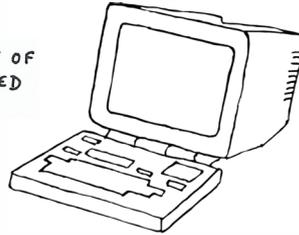
The following diagram acts as an overview of the section. It summarises the key themes from Feenberg that have informed the research. These are explicated and interpreted through the chapter. Images are used as visual cues that connect to Feenberg’s theories.

FEENBERG OVERVIEW

TRADE-OFFS, TECHNICAL CODES AND DEMOCRATIC RATIONALISM

Technologies change to reflect societal values and priorities.
Democratic rationalism is needed to counter the control exerted through technical systems (technological rationality).
Technical codes prescribe expectations for technologies.
Technical codes incorporate "social demands" and technical specifications.
Privileging excluded values and voices within the technical specifications can reshape technologies.

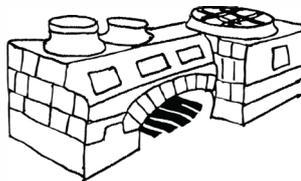
MINITEL - FEENBERG'S EXAMPLE OF
END USERS CHANGING INTENDED
USE OF A DESIGN



INSTRUMENTALIZATION THEORY

Primary Instrumentalization shows that focussing on affordances can 'de-world' an object.
Secondary Instrumentalization shows that interplay between systemization and valuative mediations enable the world of an object to be incorporated in its technological design.
In short technical networks it is easier to support valuative mediations (social priorities) in design.
Longer technical networks can accommodate a greater breadth of voices to inform technological designs.

EXAMPLE OF SYSTEMISATION AND
VALUATIVE MEDIATIONS PRODUCING
DIFFERENT KITCHEN DESIGNS



CRITICISM OF FEENBERG

Feenberg's beliefs about the democracy of the Internet have been challenged because the Internet has become a space to consume. Opening systems may make them vulnerable to new power grabs.

Figure 4.2: Feenberg overview: summary of theories that have influenced this research project

4.2.1 Trade-offs, technical codes and democratic rationalism

Feenberg believes greater democracy, based on a new form of democratic rationalism, is needed to counteract the power of those controlling technical systems. He undoes the arguments for technological determinism to show that technologies change over time to reflect the changing “imperatives” of society. He shows how people can determine the meaning of technologies, rather than the creators. “What the object is for groups that ultimately decide its fate determines what it becomes as it is redesigned and improved over time” [208].

Feenberg discusses “double aspect theory” [208] to show that social meaning and functional rationality of technology are self-perpetuating and inextricably linked. Referencing Marcuse’s critique of Weber, he shows that technological rationality has become the dominant paradigm that forms the cultural horizon, (the unchallenged assumptions that define cultural norms). He believes that under a democratic technical control, things could be very different.

From Feenberg’s perspective some of the problems stem from the management of “trade-offs” [208]. When new technologies come into being trade-offs are introduced but as technical codes become embedded through legislation the trade-offs are resolved. Technical codes embed a set of expectations about the technology and as those expectations become norms that are no longer thought of as things that might be traded against other things. In other words, trade-offs evaporate as technical codes becomes concrete.

Feenberg illustrates this using the example of early steamboats in the United States. When they were first introduced there were many accidents because of exploding boilers [207]. Initially there was a trade-off between safety and the low-cost of the new form of transport. Eventually legislation was used to ensure the safe design of boilers. This meant the safety of boilers was taken out of the

trade off that existed at the time. Now it seems unthinkable that unsafe boilers would have been sanctioned because safety is taken for granted in our cultural horizon.

Feenberg argues that a major problem has been the fact that norms and expectations are shaped by the dominant technological rationality. If those codes are the product of a more democratic process, we may be able to build a different kind of technology.

Feenberg draws on de Certeau's "strategies" and "tactics" to develop his ideas for a technical code which describes both "social demand" and "technical specification" [207]. While acknowledging the bias of dominant values Feenberg argues that "privileging...excluded values and realising them in technical arrangements" [207], can undermine the bias.

Feenberg asks rhetorically why environmental values appear as values at all, and answers by saying that civilisation was built by people who were indifferent to the environment. As a consequence environmental considerations were not included in technical codes, and hence "today they appear to come from outside the economy" [208]. Feenberg believes this is a temporary situation and that environmental values will become incorporated into the codes. Our descendants "will accept environmentalism as a self-evident advance" [208], just as our predecessors eventually accepted the need for health and safety laws as a part of the industrial technical code.

Feenberg criticises Heidegger's reification of technology, which he believes condemns human agency. Feenberg believes that "reform of technological society can support a broader range of values" (Ibid., p.53) including democracy. He discusses the need for participation in achieving democratised technology, including resistance, which is reminiscent of Marcuse. He believes a new style of rationalisation, "democratic rationalisation" [207, 208, 209, 210] is needed.

Feenberg is opposed to retreat from technology, which he believes comes to strengthen trade-offs. Feenberg connects trade-off theory to cost-benefit analysis, showing the impact of societal influence on a supposedly neutral method. He goes on to talk how things can be taken "beyond the boundaries" of the trade-off when society deems them too important to be open to debate. Feenberg believes we

can create “a better future by realising environmental values in the technical and economical arrangements of our society” [208].

Feenberg discusses the changes brought by the Internet. He cites the open-source movement and online activism as examples to substantiate his belief that the Internet has enabled greater democratic agency. From his perspective the network of the Internet has enabled representation in a way that wasn’t previously possible and has opened participation to far wider sector of the population. However Feenberg notes Dewey’s concerns about the loss of local community in the face of technological networks. The longer networks enabled by the Internet permit participation by a greater range of voices, some of which were previously excluded or hidden, but there is a danger that physical contextual factors may be lost [208].

When planning the design of digital interpretation technologies, networks are an important consideration. There is a question of how to balance a network to increase a breadth of participation (toward democratic rationalism) without losing the ties to local, immediate and physically contextual.

4.2.2 Instrumentalization Theory

Feenberg introduces Instrumentalization Theory [207, 208], as a way to consider the technical and social.

Instrumentalization Theory has two interacting aspects, Primary instrumentalization and Secondary instrumentalization, explained as follows. Primary instrumentalization “de-worlds” to reveal affordances, for example when a fallen branch is used as a hammer to bash in a tent peg and in the process loses the associations of its original world (the world of the tree, woodland, garden etc.). Secondary instrumentalization recontextualizes to reveals new potentials based on social choices. “The primary level simplifies objects for incorporation into a device, while the secondary level integrates and simplifies objects to a social environment” [208]. Feenberg, following Heidegger, calls this “disclosure” or “revealing”. Secondary instrumentalization has two forms, known as “systemisations” and “valuative mediations” [208], the first of which describe the systems of

interconnected things that form part of that world. For example a cooker's systemisations could include its power source and cooking utensils. The second are the norms that inform the cultural horizon, in the case of the cooker this might include aesthetics that encompass the norms within a particular society. These interact and inform each other iteratively. Drawing on Latour, Feenberg differentiates between the short technical networks of premodern societies, which can easily support valuative mediations, with the immensely complex and extensive technical networks associated with modernity.

Two important things arise from this; the importance of enabling the social to exert influence on the technical; and the length of technical networks. From Feenberg we understand short technical networks are closer to source and can more readily incorporate what is meaningful and valuable within that context.

For Feenberg the problem occurs when "society is organized around technology" [211] because in that situation power is exerted through technology, shaping everything. While he recognizes that technology is currently the dominant paradigm Feenberg does not believe this has to be the case in the future. This is one of the points of difference between his and Heidegger's Critical Theory of Technology. Heidegger does not believe the essence of technology can be changed, so by nature it will always fragment and consume. Feenberg believes that technology's meaning is socially constructed, not determined, so other forms of technology are possible. He believes inclusion of "a wider range of interests and concerns would lead to its redesign for greater compatibility with human and natural limits and powers". [208]

4.2.3 Criticism of Feenberg's work

Feenberg's work has been criticised by both sides he seeks to unite. He is accused of falling "into the same trap as constructionists" by celebrating local, which "obfuscates the hegemony" [210] of the global; a criticism he refutes [209]. Feenberg's celebration of the Internet as a democratic technology has been seen as misguided because the space is perceived as "becoming colonized as just another space to consume" [210]. From Science and Technology Studies (STS), Feenberg

is perceived as being constrained by nostalgic modernist views that include the idea that nature and technology are separate [212].

4.2.4 Influence of Feenberg’s philosophy in relation to research/ the design criteria

Feenberg studied under Marcuse, who was taught by Heidegger so he follows in the Heideggerian tradition, but he brings something new and important to the creation of a guiding design framework. He shows that technologies change over time to reflect cultural norms and he articulates the possibility for different kinds of technology that do not perpetuate the power systems and values that currently dominate. As explained above, this prospect is not offered by all proponents of critical theory of technology.

Feenberg goes beyond describing the problematic traits of technology and the characteristics that would improve technologies. He crucially sets out the way in which technologies might be designed and developed to introduce alternative values. He does this by breaking down and explicating the relationship between the social and technical that combine to form the codes that shape the design of technologies.

In some ways Feenberg’s reasoning presents problems because although it shows that technologies are malleable, his work makes it apparent that change is not easy. The interrelationship means that culture informs technology and technology informs culture, in a self-perpetuating cycle, so in a cultural horizon where technological rationality prevails it may be difficult to see the inherent biases built into technologies that continue to reinforce technological rationality. It appears that a wholesale cultural shift would be necessary for a change in technology to occur, but Feenberg shows instances in discreet communities where this kind of change has happened, for example in AIDS medicine where the gay community challenged the medical system “collectively and politically” [213] to make it suit their needs, or on a larger scale where the French public “hacked” the Minitel telephonic network [213] to make it a technology for communication, rather than a technology for dissemination of centrally held data, as had been

originally planned. These examples offer the possibility that a change might be achieved within a particular context so that the meaning of technology within that setting changes. In this case the setting might be at the scale of a single National Trust garden, or across the National Trust organisation as a whole, though it should be noted that the examples described by Feenberg cover a much broader scale.

There are reoccurring constituents in Feenberg's examples, most importantly the need for participation. This is at the heart of Feenberg's philosophy. Democratic approaches can rewrite the technical but in order for that to happen the infrastructure must enable participation. If systems for the design and development of technologies are open enough to enable participation by a diverse range of voices, the technologies that are produced may be representative of a greater range of values than would be the case if the development were left to a homogeneous group. This is a clear guideline for the design of digital interpretation to support connection to nature and place. Inclusion of a range of voices, particularly those of people who understand the environment should be a priority. However the guideline presents the challenge of how this might be achieved and how direct the participation should be in order to influence the design of technologies. This is considered further within the methodology, but is also informed by other literatures and discussed in subsequent chapters.

Feenberg draws parallels between technical codes, design codes and laws in democratic places, which are "durable" but responsive to changing social conditions. All reflect lifeworlds, but if social desires and expectations aren't reflected in these codes or laws then there is a state of tension that requires resolution, often through revision of the codes. When translated to the guidelines for the design of digital interpretation it means, the design should be grounded in the lifeworld of the site but it must be flexible enough for it to become something else. There must be space for change to occur.

One of the major propositions in Feenberg's analysis is the importance of resistance in the process of changing technologies and challenging the hegemony in which technical rationalism dominates. This recalls the difficulty of challenging established, unquestioned norms, but it also alludes to Marcuse's "democratic unfreedom" [158] and "euphoria in unhappiness" [158] where people are unable

to see that they are trapped by structures imposed by technologies. Marcuse suggested that artists could offer resistance because their detached position in relation to mainstream society meant they could shine a light on uncomfortable truths and repressive structures. Resistance is a recurrent theme and so should be considered but how it might be applied to a set of design criteria for digital interpretation is unclear.

Other things to be taken from Feenberg include paying attention to relationships. Are trade-offs happening and if so what is being lost or compromised? When is deworlding occurring and what are the social values at play in reworlding? When are things being used instrumentally and what social factors are influencing design choices? Do the design choices comprise a lifeworld? Feenberg forces consideration of design process itself and reflection throughout the process.

4.3 Borgmann

This section presents selected topics from Albert Borgmann's philosophy of technology, beginning with an account of the paradigm of technology, which Borgmann calls the device paradigm. In order to characterize the nature of the device paradigm it will be necessary to differentiate between 'things' and 'devices' and this will require an introduction to focal things, focal practices and different forms of consumption. The account will refer to some rich illustrations used by Borgmann. These are included to make the concepts more concrete, but also because they have relevance in subsequent sections referencing natural history writing. The groundwork will form the basis for a discussion about Borgmann's vision for new forms of technology and how they might be created, which will inform design criteria for this research project.

The section starts with a diagram which provides a summary of the main themes covered in the section. These are expanded upon in the subsections that follow.

BORGSMANN OVERVIEW

DEVICES, THINGS AND ENGAGEMENT

Technological devices are not 'things.'

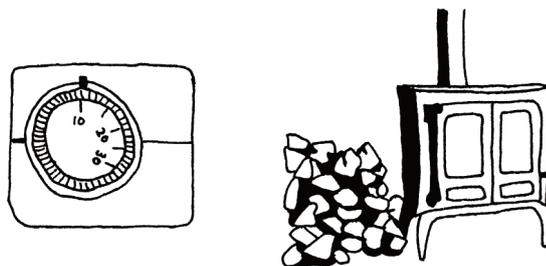
Devices create a sense of detachment.

Technological devices are safe, instantaneous to use and require little effort and engagement.

Experiencing a 'thing' provides bodily and social engagement with its world.

In devices commodity is foregrounded and the mechanism is hidden.

Devices are detached from their content.



BORGSMANN USES THE HEARTH AS AN EXAMPLE OF A FOCAL THING. IT BRINGS PEOPLE TOGETHER AND IS ASSOCIATED WITH PRACTICES THAT REQUIRE EFFORT, LIKE STACKING WOOD. THIS IS IN CONTRAST WITH A THERMOSTAT THAT REQUIRES MINIMAL EFFORT.

LIFE SUSTAINING CONSUMPTION, PARADIGMATIC CONSUMPTION, FOCAL THINGS AND FOCAL PRACTICES

Focal things are connected to the world around them and are a focus for family and community life.

Focal practices revolve around focal things.

Focal practices are effortful, and require engagement. They are associated with life sustaining consumption.

The same activity can involve life sustaining or paradigmatic consumption, depending on circumstances and intent.

Devices are detached from the world around them.

Devices require little effort and engagement. They are associated with paradigmatic consumption.

TECHNOLOGY, CONSUMPTION AND FOCAL PRACTICES

Focal things can be associated with technology.

Technology is problematic when it is used to shortcut a process that would otherwise require more commitment and deeper engagement.

If technology is used to shortcut an otherwise engaged process it can cause decontextualisation.

Technology may be used to support focal practices if paradigmatic consumption is challenged.

Figure 4.3: Borgmann overview: summary of theories that have influenced this research project

4.3.1 Devices, things and engagement

Engagement is at the heart of Borgmann’s message about technology and modern life. Borgmann describes technology as “the way we take up with the world” [214] and because it is taken for granted that ‘this is the way we do things in the world’, it can be difficult to distinguish as something distinct that can be changed. Technology is the backdrop to life and the lens through which we see the world, but it is through technological devices that the archetype of technology becomes palpable. Borgmann compares these devices to other ‘things’ to illustrate the matters he finds problematic with the technological paradigm.

Whilst recognising the benefits brought by technology Borgmann is concerned that the engagements with and expectations of devices create a sense of detachment. Technological devices, unlike ‘things’, provide “easily available commodity” and require little exertion. They are easy and safe, instantaneous to use and require minimal engagement. They make a promise of future “liberation” and “enrichment” [214]. They provide instant, but ultimately temporary, gratification. By contrast ‘things’ are entirely embedded in their context and experiencing the ‘thing’ provides “bodily and social engagement with the thing’s world” [214].

Borgmann illustrates this through comparison of a record player and a group gathering to play music to celebrate a birthday [214]. The playing device can be turned on at the touch of a button anytime, anywhere, repeatedly, whenever desired, which gives a sense of liberation and enrichment to life. The live music requires far more effort and coordination to gather people together and it relies on them having the skill to play together. Planning is needed and the players can’t be called back on a whim whenever the mood for music strikes. It would appear that the former is extremely desirable, but things are lost in this engagement. The social dimension of people coming together to share in the music performance is lost, as is the particular quality of the sound that is affected by the acoustics and atmosphere in that particular venue. The individuality of the performance

is lost. The playing device mediates the music, changing the sensory experience of the sound. The social aspects of the engagement evaporate, leaving only the music, in a process that could be considered commodification.

The machinery of the device slips into the background, as its commodity comes to the fore. The mechanism of the device is almost immaterial as long as it continues to deliver the commodity, which means the device is not part of a world or context in the same way as a 'thing'. Borgmann argues that the increasing complexity of the device means its workings are unintelligible to average people and that reduces the conspicuousness of devices, thus reinforcing end product over means of production. He considers whether the concealment of the device is due to "technical illiteracy" [214] but decides this is unlikely given the increasing number of disposable items that cannot be fixed regardless of skill.

The emphasis on ends over means changes human relations to every part of the device from production to end of life. Borgmann believes it is problematic when commodity is made available "without the encumbrance of or the engagement with a context", as is the case generally with devices. Devices are detached from their context, which makes it easy for them to co-opt everything as a raw material or resource. Hence "the sacredness of a temple becomes a resource for tourists" [214].

4.3.2 Life sustaining consumption, paradigmatic consumption, focal things and focal practices

Consumption itself isn't the trouble, because as Borgmann says, "to live is to consume" [215], but the mode of consumption establishes a particular kind of relationship to the world, encompassing different values. Borgmann distinguishes between life sustaining consumption and paradigmatic consumption, which he describes as a facet of materialism [215].

In order to fully understand the difference between these forms of consumption it is necessary to explain focal practices and focal things. The term is derived from the word 'focus' or 'hearth', the place in the home where people formerly gathered together through their daily work and relaxation. Borgmann pulls images from

Roman Greek history to show the ‘focus’ as a place of rituals, founding acts and social practices that centre and orientate people. He points to Heidegger’s reference to the hearth as a way to make the connection between Heidegger’s “things” that gather the fourfold and focal things and the focal practices that surround them. Borgmann decodes the lifeworld of the hearth providing a way to understand focal practices [214].

Keeping a fire brings experiences, from the sensory engagement and bodily experience as the fire heats the rooms and carries the smell of burning wood, to the effort exerted by each family member in their role to sustain it by cutting and collecting wood, setting the fire and cleaning the hearth. More of its world is revealed, as skills are developed through habitual engagement, for example, knowledge of qualities of types of wood as kindling or fuel or awareness of the airflows in rooms and how these interact with the fireplace to make the fire blaze or burn gently. This experiential knowledge is hard won, often the product of hours of effort and exertion. Borgmann claims focal practices ground us and give our lives meaning. They may form the focus of family and community life. A social world revolves around them.

George Sturt’s account of the lives of wheelwrights gives an insight into the kind of consumption associated with focal practice. Wheelwrights intimately knew the woods where they watched for trees growing in ways that would give particular affordances that would suit the needs of individual customers. As they worked with people they developed an understanding of different occupations and “their relation to nature” [214]. They read the land, paying attention to the interaction between the wheels and landforms, slope and soils on individual farms and tracks and brought stories from the countryside back to town. As they worked with the wood it “disclosed qualities”. Borgmann draws attention to Sturt’s description of the wheelwright’s relationship to the timber as an “understanding friend” and certainly not “prey” [214]. The essence of the relationship is respect. Borgmann reports Sturt’s contrasting account of the timber industry during and after the First World War when trees were “felled at the wrong time of year” [214] and the skill of wheelwrights was replaced by machines that blindly forced their way “through every resistance” [214] which led to workmen becoming more interested in higher wages and less interested in the work itself. Borgmann uses

this to underline the difference between the life sustaining consumption associated with focal practices and the paradigmatic consumption where things and practices are displaced, and the vitality of pretechnological life is depleted as a result of the device paradigm [214].

The example also underlines the idea that the same activity can involve life-sustaining consumption in one situation and paradigmatic consumption in another, depending on intent and the deployment of technology. This is also true for focal practices. It isn't possible to definitively categorize types of activities as focal practices because detail about how the practices are enacted may change the way the activity is understood. Borgmann illustrates using the example of running where the experience has the potential to build engagement with a place through combined physical and mental concentration that is at the same time fulfilling and tiring. By contrast the same activity can be disengaged in the setting of a gym. Although physical exertion is a constant, there is no imperative for mind and body to work together because the machines provide an even and controllable running surface, in an unchanging environment, leaving the mind free to watch TV or read a book. The emphasis shifts from a holistic experience of engagement to one where commodity (the fit body) is prioritized. The ends and means have become dislocated/disjointed. Even when the mode of activity is engaged and there is coherence between ends and means, the focal experience may be "momentary" and it may be hard to find the persistence to build this into an ongoing focal practice. Even if one manages to maintain a practice its essence may be hard to maintain. If it isn't nourished it may become an empty, dead ritual, rather than a truly focal practice.

The running example serves to illustrate a change between pre-technological focal practices and contemporary focal practices. Previously the social impact was an important feature of focal things and practices, but now these practices may be "private", "limited", and lacking in "social richness".

4.3.3 Technology, consumption and focal practices

The presence/involvement/inclusion of technology does not determine whether the consumption is paradigmatic or life-sustaining and it does not prescribe

whether or not something is a focal thing or practice. However Borgmann finds it “dispiriting” [214] that Heidegger asserts the need to seek out “pretechnological enclaves to encounter focal things” [214] because he believes this approach reinforces the power ascribed to technology, and technology is a part of life that cannot be ignored. Focal things “can attain splendour in technology if we grasp technology properly” [214].

However Borgman warns of the consistent “destabilizing tendency” of technology and its all-pervasive presence. He notes that technologies involve practices but they aren’t focal practices and they don’t produce focal things. A particular concern is for focal events that “fall under the rule of technology” [216] where technology is used in an instrumental way to shortcut a process that would otherwise require more commitment and deeper engagement. Using devices to elicit a “state more instantaneously, ubiquitously, more assuredly and easily” is dangerous because it often leads to de-contextualization and puts in peril the integrity of the focal things. For this reason Borgmann believes focal practices may be nurtured through opposition to technology. Also paying attention to focal practices may increase awareness of the inadequacy of technology for giving our lives meaning. There is a tension in Borgmann’s position. He sees two alternate, potential futures, one in which there is an increasing separation of commodity from context, brought about by technology, and another where focal practices are asserted within technology, regaining primacy in the process.

Borgmann recognises that it is neither possible nor desirable to return completely to a “life of engagement” [215] but he seems to suggest a positive role for technological instruments in support of focal practices. If technological settings leave space for other engagements, the dominance of paradigmatic consumption can be challenged. If the engaging life can be given an initial foothold, the intrinsic reward of focal practices will “break the spell of paradigmatic consumption” [215].

4.3.4 Influence of Borgmann’s philosophy in relation to the design framework

If we use Borgmann’s philosophy to generate design guidelines, the foremost principle would be to pay attention to the kinds of engagement instigated by the designs. Mind and body should work in tandem and activities that promote sensory connection to the world should be valued. Sustained, effortful activities should be favoured. Technologies should not be hidden away so that commodity overshadows means of production. This ties to Kittler’s concern [58] about embedded power structures hidden beneath user-friendly interfaces, described in Chapter 2.2.1.

Paradigmatic consumption should be avoided so every effort must be made to ensure means and ends are cohesive. Once these have become fragmented it is more difficult to avoid paradigmatic consumption. Things must not become detached from their context because their nature changes and the influence of their world is lost. They become ambiguous and malleable.

There is a difference in the kinds of practice that emerge when there is coherence between ends and means and when there is fracture between ends and means. Consequently modes of design practice to create digital interpretation, as well as modes of interaction with the digital interpretation, are of concern.

Designs that support focal things and their practices should be encouraged. Where possible, designs should enhance the social richness of focal things.

4.4 Connection to nature in Natural History writing, and parallels with contributions from philosophy of technology

Factual writing about the natural world, known as Natural History writing is a growing genre in publishing. Though the genre has existed for centuries, it goes in and out of fashion. It has experienced a resurgence in popularity in the last twenty years. Although there are several sub-genres, one of the popular styles is

first-person accounts of experiences in nature. One of the appeals of this style of writing is that many authors are experienced in natural environments and the writing communicates their connection. I wondered if there might be useful insights from people's writing about experience of nature connection that would be useful for understanding the characteristics of nature connection and how this relates to philosophy of technology. For some texts I highlighted passages that related directly to the themes identified through the theoretical texts, as shown in Appendix A.

The Natural History texts paint a picture of what it means to be in tune with nature. The accounts describe effortful experiences, attentiveness and sensory and bodily connection, leading to deep engagement, characterised by illumination and revelation in which the person sees something anew, 'in its own right'. The effort is often associated with acquiring skills needed in the environment. The writers typically write about past and present, identifying socio-cultural and historical practices grounded in places and things.

I found the Natural History texts resonated with the themes that emerged from theory. For example, Jean Sprackland spent a year walking on beaches between Blackpool and Liverpool and writing about her experiences. In one chapter Sprackland describes the sensation triggered when she found footprints of people and animals that walked the lagoon 7000 years ago. The footprints were uncovered after a storm and would be washed away with the next tide.

“So here I am, alone on a shore on this freezing January day, looking back at a time before recorded history began. As I stand staring at the shapes of the feet of the long-dead, unknowable people, I'm reminded of that strange, unsettling image from the Hubble telescope: the 'Ultra Deep Field' image, which peers back thirteen billion years and captures a litter of oddly shaped galaxies that existed shortly after the Big Bang and are now vanished.” [217]

“I'm standing here, as I stood in the cave at Font-de-Gaume, right in the middle of my blip of a life, with the deep past all around me. I can trace a footprint with my fingers, put my own bare right foot inside it. Its the nearest I can get to time travel.” [217]

4.4 Connection to nature in Natural History writing, and parallels with contributions from philosophy of technology

For me this feels like an account of a ‘thing thinging’, or given the exceptional nature, a thing ‘shining forth’. The fourfold are gathered as past and present come together in the footprint. The author sees the beach in a new light as she becomes aware of its history.

Another passage, from Robert MacFarlane’s ”The Wild Places” illustrates the character of nature connection, that has parallels in the guiding philosophy of technology.

“As the tree had fallen, it had torn up in its roots a circular cliff of mud. The upper rim of roots had dried as hard as rock, and had turfed itself over, providing a roof of a foot or more. The snow was faster now. I cleared an area at the foot of the bole, cast around for fallen pine branches, and layered them so that they formed a springy mattress. Then I leaned larger boughs against the sides of the bole to provide a triangular porch.

I was glad of the shelter, even within the wider shelter of the forest.....In those minutes before sleep, I felt accommodated by the forest, and watched it move into night: the dark settling like fur on every object, the dropping snow, the quick adroit movements of birds between trees.” [218]

The passage describes effort in making the shelter and suggests material, practical knowledge and prior experience. Detailed observations and noticing with different senses are also evident. The description culminates in the author’s feeling of being accommodated by the forest, and connected to it. The passage hints at Borgmann’s value in effort and focal experience.

The examples are too extensive to be documented here but the main insight was the echo between the writing documenting nature experiences and writing by philosophers who were critical of technology. The resonance between the writing gave me confidence in the value of applying criticism of technology to the design process.

4.5 Summary: Establishing a theoretical grounding for design

Writings on philosophy of technology are as much about people and society as they are about technologies themselves because technologies are created within cultures and they are steeped in the dominant values and mores of the culture. Through analysis of various writings that critique technologies, we can learn more about the social and psychological differences between encounters with the world that are mediated and unmediated by technologies. By examining these texts in detail it is possible to identify relationships between design, design process and impact of design in order to suggest alternatives with the intent of producing different relationships and behaviours.

In this chapter I identified three academics who have written critical philosophies of technology and I examined their writings to understand the perceived problems caused by technology as well as the desired state of being needed to connect fully with the non-human world. I could have picked other writers but I found coherence and areas of overlap between these three, that I believed was valuable for building a rich picture needed to establish new criteria for digital technology designs.

From Heidegger I drew out the difference in state of being associated with ‘dwelling in the fourfold’ where the essence of things becomes illuminated because of the interrelationship between the dimensions of the fourfold, the thing itself and the human who discloses the world through their relationship with the thing.

Heidegger’s work distinguishes things and technologies, and provides ideas which have similarities with Borgmann’s ‘device paradigm’ and ‘focal things’. One of the main lessons from this is that one’s engagement with the world differs with devices when compared to things. Devices ask little of us resulting in superficial engagement, whereas things require time, effort, focus and social relations which ultimately make for stronger bonds.

There are also parallels between the Heidegger’s ‘standing reserve’ and Borgmann’s explanation of the form of paradigmatic consumption induced by technology. Feenberg’s work moved beyond identifying problems associated with technology

to suggest ways to counter the perceived problems. In the chapter I described Feenberg's 'technical codes', 'Instrumentalization Theory' and 'democratic rationalism'. By drawing attention to the interconnections between social norms and technical function, Feenberg showed how technical codes might be reshaped if more voices and values were included in the design process. This concept was fundamental to the pursuit of new design criteria.

Each philosophy section ended with knowledge to be taken forward into the design phase such as the importance of maintaining a close connection with context, in materials, interaction or content.

The section finished with a diversion into Natural History writings in order to re-ground the work in the realm of nature connection. Nature writers communicate aspects of nature connection through their writing so the section sought to see if there were parallels between the insights from technology criticism and nature writing. The section identified several crossovers to do with experience, effortful engagement and multi-sensory stimulation.

This chapter provided the grounding for the design of digital interpretation artefacts, described in the next chapter.

Chapter 5

Digital Nature Hybrids

This chapter begins with an illustration that was first drawn to show moments in the design process of some of the digital nature hybrids [2] created as part of the research into use of design criteria drawn from philosophy of technology. It is not a comprehensive diagram covering all designs or even all iterations, but it shows the influence of theory on practice and the development of ideas between iterations and parallel designs. The diagram includes designs of artefacts that were abandoned, or put on hold, like the ‘Bark Bands’, as well as artefacts that persisted through numerous iterations.

It isn’t possible within the thesis to discuss all the designs so this chapter addresses three hybrid artefacts; the Nature Meditation Egg, the Rhubaphone and Audio Apples. The diagram indicates the relationship between these three artefacts and its inclusion is a reminder that the design process incorporated a broader range of prototypes and artefacts.

Figure 5.1: Moments in the design process. This shows iterations of designs and the influence of thinking transferring between designs.

MEDITATION EGG

Exploring the design space
KEYWORDS: Focus, effort, senses

Storytelling + Sensory connection to place

Touch + Storytelling

AUDIO APPLES



Gardeners + volunteers are disclosers of the garden.

KEYWORDS: fourfold earth, sky, mortality, divinity, get off the path



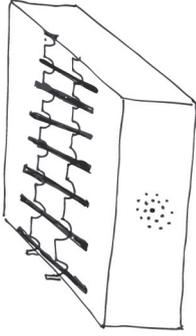
MATERIALS:

Power of materials and design to embody values.
Interaction to emphasise intimacy of story and space.



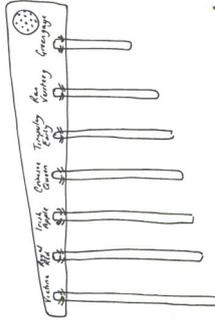
Apple made from wood from the garden. Turned by one of the N.T. team. Apples hang from charging cable. Solar charger reflects organisation's values.

RHUBAPHONE

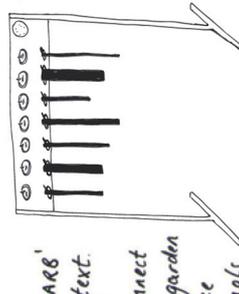


Dominance of box disrupts presence of rhubarb.
KEYWORDS: Presence, sensory connection

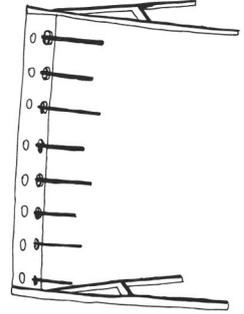
Increased prominence of rhubarb. Individuality emphasised by proximity



Less information
More emotion

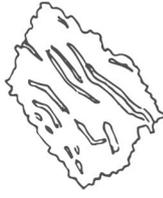


'TALKING RHUBARB'
Influence of context. Exploration of materials to connect to heritage of garden. Labels reference Museum originals



Importance of place
- Change of scale
- Change of stand to suit context
- Change of interaction in response to observation of use
Stand made from oak from the garden. Standing reserve or connection?

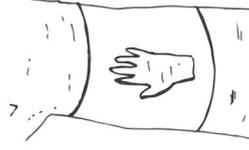
BARK BANDS



2mm casts of tree bark used to make interactive handprints

TENSIONS:

- Interface creates a barrier with the tree
- Potential damage to the bark
- PROCESS + INTERFACE AT ODDS WITH GUIDING PHILOSOPHY



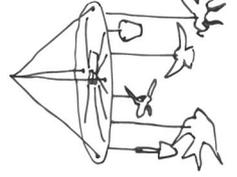
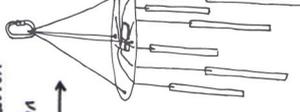
The 'thing' is the interface. It is the means of connection. Bark bands reference the 'grease bands' traditionally used in the garden.

'RHUBARB CHIMES'

Rhubarb interface for mixing sounds from garden

TENSIONS:

- Rhubarb brought into 'standing reserve'



'MOBILE MIXER'

Rhubarb removed. Replaced with objects that represent the audio files and draw attention to activity in the garden. Fun but sounds are dislocated from their place.

5.1 Nature Meditation Egg

The Nature Meditation Egg was created in order to explore design criteria drawn from criticisms of technology, to see if an artefact with a digital element could epitomize a philosophy that ran counter to the prevailing technological horizon. It was useful as a personal exercise to make sense of theory, explore materials, and reflect on design criteria, but it was only a first step towards working with National Trust on the design of objects to foster interpretation which support connection and place making within one of their properties.



Figure 5.2: The Nature Meditation Egg

Although this is recounted in a linear text, in reality activities overlapped,

and I made visits to National Trust's Clumber Park property before I began work on the Nature Meditation Egg, though the Egg was complete before I began designing artefacts for the gardens.

5.1.1 Rationale

Originally, in the early prototyping and experimentation phase I wondered if I could make a set of artefacts, each exemplifying the philosophies of one of the key theorists who influenced the design lens, but I found it wasn't straightforward because of the overlaps between philosophies. The Nature Meditation Egg was an attempt to design with Borgmann's philosophy, described in detail in Chapter 4, in mind, though ultimately it came to incorporate other ideas.

Borgmann's writings unpick his concerns about technology, some of which are encapsulated in the idea of the Device Paradigm. Technological devices often replace effortful activities to deliver commodity without exertion, and to achieve this they cut away and isolate the commodity from the social and contextual factors that had previously been part of its lifeworld. As a result, skills and social bonds (around the thing or activity that has been supplanted) that bound people to each other and connected people to places are lost.

Borgmann thinks it is unrealistic to retreat from technology, so if humans are to avoid the fragmentation and dispersal associated with the technology's cleaving of commodity from context, it will be necessary to address technologies in new ways that leave space for other engagements that support focal practices and disrupt the tendency towards paradigmatic consumption. Focal practices and paradigmatic consumption are explained in Chapter 4 but focal practices are best understood as the rituals, acts and social practices that ground and connect people, and paradigmatic consumption refers to commodities that are easily accessed without the exertion or skill acquisition. Paradigmatic consumption is a threat because it displaces focal practices and creates an imbalance between humanity and material environment [215]. The idea of addressing technology differently was taken up by Dreyfus and Spinoza, [206] who juxtaposed Heidegger and Borgmann's work, to question how humans might relate to technology in a positive way, whilst resisting the Midas-like touch of technology to transform

everything to “standing reserve” [202] or commodity. Dreyfus [206] asks how a technological device might “gather the fourfold” (see Chapter 4) to reveal something’s true nature to provide a “temporary focus” though he acknowledges that exploring this goes against received understandings of the relationship between technologies and focal practices.

In the light of these theories, the Nature Meditation Egg was conceived, as a hybrid digital-nature artefact to kindle connection and a sense of emplacement to counter the detachment associated with digital technologies. It was designed to explore the possibility of using technologies to nurture a focal practice. One of the fundamental questions I faced was whether it was appropriate to even attempt this because Borgmann is clear that technological practices differ from focal ones, and he particularly warns against the use of technology as a shortcut to achieve the state that would otherwise require effort, practice and commitment. I decided to explore Dreyfus’ questions through design, holding close Borgmann’s critiques and concerns about devices to guide the process. Although Borgmann’s focal practices were central, I also paid attention to theories about nature connection, place making and mediation, as well as more specific theoretical overlaps from other philosophers, for example Heidegger’s writings on the conditions under which “thing’s thing” [196] or become present to people. Feenberg’s concepts of “technological rationality” and “instrumentalization” described in Chapter 4 are relevant for their connection to Borgmann and Heidegger’s philosophies, but Feenberg’s work was also important in shaping the values that inform the design process, particularly the aspiration to keep the designs open so that they might be sensitive to values and adaptable to change.

As part of the preparatory research for design, I read Natural History books and looked for examples that illustrated connection to nature and I found many examples in Roger Deakin’s “Wildwood” [219]. The sense of active engagement with environment, particularly sensory engagement, resonated with things I had read in Borgmann about focal practices and life sustaining consumption (Section 4.3.2). So I annotated some of Deakin’s texts to highlight the parallel themes to keep in mind during the design process. The paragraph immediately below exemplifies Deakin’s writing, and the paragraph below that, is a section from

my reflections on the chapter from which the Deakin paragraph is taken. A full example can be found in Appendix A.

“Fashioning the rudimentary spoon felt a suitable Robinson Crusoe sort of activity. Creative in the most primitive sense, it purged my mind of all other thoughts but the here and now of this beautiful wood. Sitting here as night falls, all I hear is the river rushing over the boulders and stones below. The steady sound could be rain, or it could be wind in the trees. No doubt when all these come at once, they harmonize in a single chord.” [219]

From my notes:

“The sense of engagement, particularly sensory engagement is a strong theme running like a seam through the text (marked in red). It underlies all activities recounted like wood-chopping, walking and carving. It is also underpins the periods of reflections, for example when Deakin listens to the “steady sound” of the river, feels the warmth of the sun on the veranda or pauses to notice the dor beetle which “keeps turning up, clambering over shivers of oak where the wood is chopped”. There is a sense of rhythm to Deakin’s time, as he falls into patterns set by the environment, which also suggest engagement with location.” [219]

Reflecting on these I decided on the initial criteria to guide the design of the first artefact:

- the design should support active engagement with a place/places
- the design should activate different senses, and should privilege auditory and tactile senses
- the design should encourage effortful activity
- the design should encourage the development of skill
- the design should encourage pauses and reflection

- the design should encourage being ‘in nature’
- the design should support focal practices
- the design should explore ambiguity and flexibility
- the values in the design should be compatible with respect for the non-human world and natural environment (eg in respect of components, cost, production)
- the design should not be easy and mindless to use
- the design should not encourage paradigmatic consumption

5.1.2 Design: The Nature Meditation Egg

The design idea was driven by a desire to create a digital artefact to support my own connection to natural places using meditation and mindfulness. I meditate when I am away on retreat and have found it a helpful way to continue being present to the environment but have struggled to maintain the practice at home. For a time I found it useful to hold a rock I picked up from a beach, because I liked its texture and the coldness it held, and when I held it for a time and closed my eyes I was almost on the beach again, with the smell of salt and sound of waves.

Bidwell [70] asked research participants to collect an object, “nature probes”, from a walk in nature to increase bodily involvement with nature’s materiality [70] as a way of reflecting on affective responses to place. Although the context is different, Bidwell’s research method suggests the potential for natural objects to act as a link or physical connection to places in nature.

I wondered if I could make a digital object that had similar properties, to support sustained, mindful engagement and connection to my home environment. This led to the creation of an artefact to encourage me to spend time outside ‘in nature’ listening mindfully to the sounds around, with the additional aim of using recordings made within this practice to help strengthen connections to my local environment at times when I couldn’t be outside. The Nature Meditation



Figure 5.3: Inspiration: stone and the beach where it was found

Egg was intended to be a focal object. Holding the hollow wooden Egg for a sustained period of time causes recordings gathered on walks to playback, while letting go causes the audio to fade. The interaction, which uses capacitance, requires patience; it emphasizes slowing down and giving time to the process as a counter to instant gratification. The Egg was made from partly seasoned wood because of its sensory qualities; the way it warms in the hand, its smell, texture and weight, and the way it ‘lives’ and changes over time. Its resonant qualities were also attractive, and the shape was designed to fit well in hands. Critically wood is a poor conductor of electricity and focus is needed to hold the object so that a capacitive connection can be made with the metal contacts inside. In the most recent iteration, audio was stored on an SD card, controlled by a Bare Conductive Touch Board, powered with a rechargeable battery. The following sections will expand on the iterative process in relation to the design principles.

5.1.3 The iterative process

The Nature Meditation Egg was developed through an iterative process involving contemporaneous reflections on guiding philosophy and evolving design. The first tests used a hollow ostrich egg, which was chosen for its physical characteristics; the way it heated when held; the way it fitted in my hands; and its

millimeter-thick shell, which demanded care and attention. However, the shell bore no relationship to my local environment and consequently was at odds with Borgmann’s philosophy, which emphasizes the importance of context. The size and shape of the ostrich egg was carried forward into the next iteration, a hollow wooden egg shape, turned from wood that had been sourced locally.

The digital technologies within the Egg were reconfigured several times as a result of reflection on the experience of use or function, particularly with respect to design criteria. The first version incorporated an Arduino with Wave Shield, capacitance sensor, copper strips, speaker and power supply in a modular design, that spoke to Feenberg’s call for flexible designs that could be reconfigured at a point in the future.

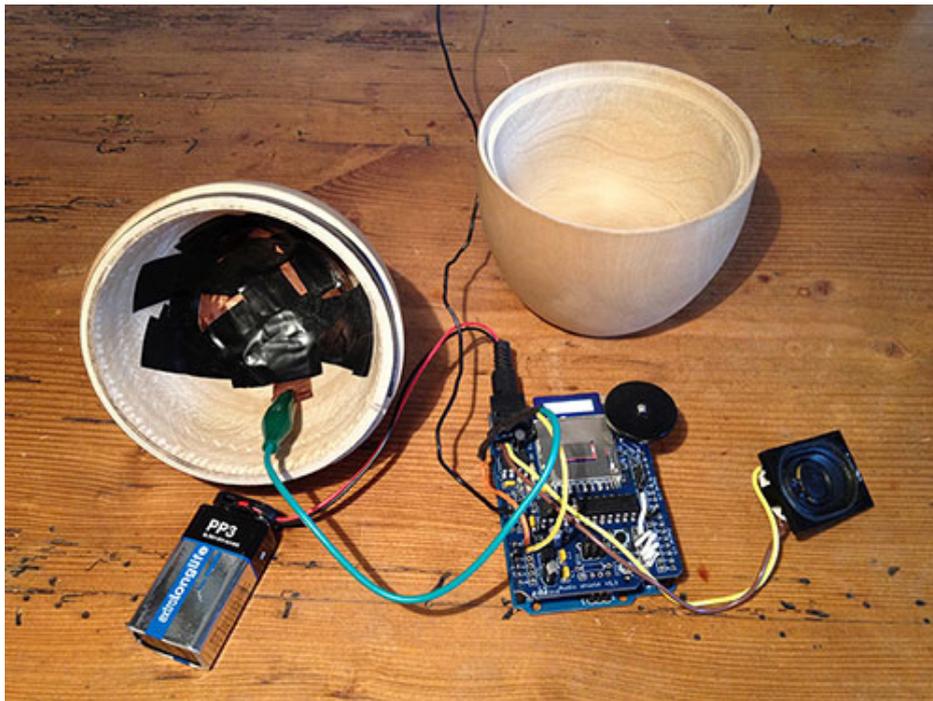


Figure 5.4: First version of the wooden Egg using Arduino Uno, Wave Shield, capacitance sensor, copper strips and power supply.

The design required audio files to be converted and compressed to a very specific wav format, from the original format of the recording. I found the time spent changing files took time from meditating, so the technology interrupted the connection to nature. The second iteration replaced the wave shield with an mp3

shield, but pin incompatibility between the mp3 shield and capacitance sensor made this unreliable and once more detracted from the focus on nature.

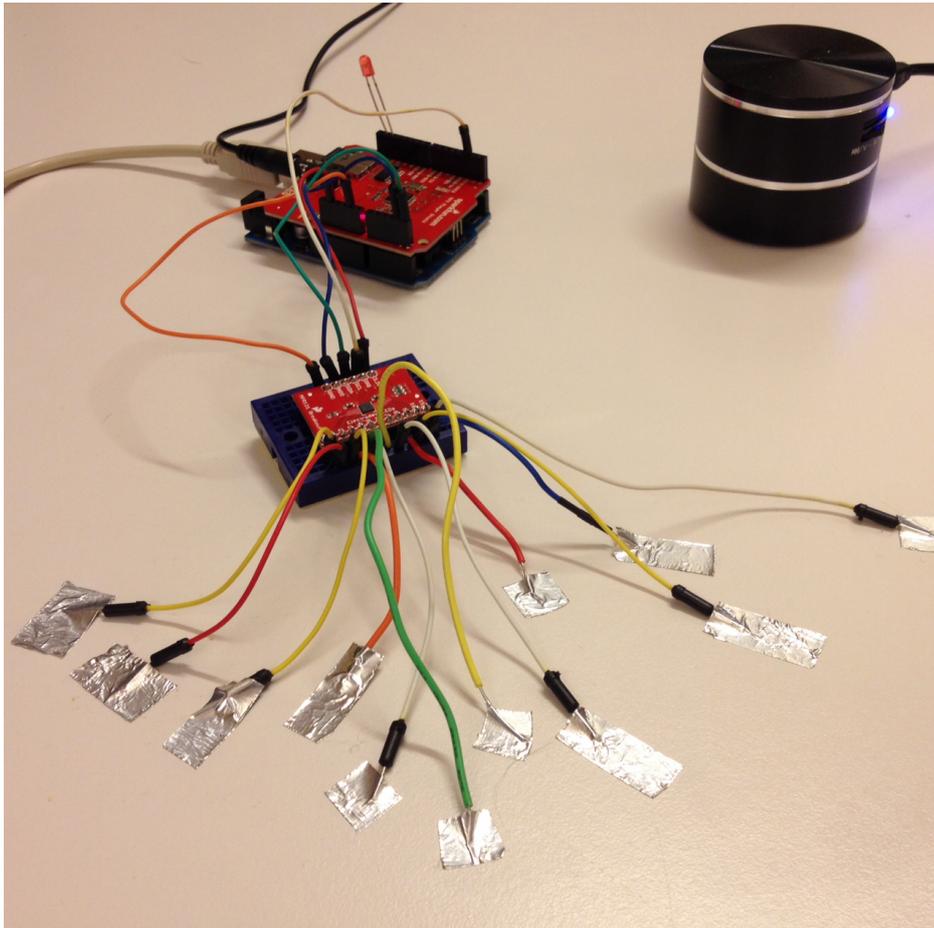


Figure 5.5: Testing the mp3 shield with capacitance sensor

The Touch Board resolved these issues, and supported a more immediate reconnection to the audio, and place, but the reliability and ease came at the expense of design flexibility and openness, and I questioned whether the awkwardness of the first iteration was actually more in keeping with Borgmann's philosophy because an effortful process was required to deliver the 'delight' of the recording. Ultimately, I decided that it was most important to keep present the natural environment, so retained the Touch Board.

5.2 Reflections

5.2.1 Experience and engagement

I loved the feel of the Nature Meditation Egg and the experience of holding it. I liked the small crack in it that will grow over time, and I enjoyed the sensation of it warming in my hand if I held it for an extended period of time. Seeing it on my desk reminded me of being outside, and I wanted to pick it up and listen. It called me to practice, and I saw it as a focal object to stimulate focal practice, (though this could be contested because social practices were not necessarily central to its use). Using the Egg switched on my sensory receptors for smell and touch which was useful for grounding myself to the immediate environment at the start and end of mindfulness practice. I thought of it as a “physical hyperlink” to the outside world. During the time I used it I found that the egg prompted a more focused attention on the auditory landscape. I paid attention to storms, river levels, non-humans and humans, and became aware of differences at the same place, between days. I valued the engagement because it made me pay attention to places I know well, but sometimes take for granted, and I experienced these places differently because the conscious act of recording made me listen more carefully. This draws me back to Mason’s words (in [13]) “enabling one to step outside the familiar, the repetitive and the routine-like, instead of existing in an auto-pilot mode, one is suddenly awakened to the world and sees it anew”. Aaltola [13] used Mason’s writing to explain how certain kinds of experiences in nature can awaken humans to ‘nature for itself’. I felt that making recordings for the Nature Meditation Egg helped me to see the place anew. Although I probably didn’t spend more time outdoors because I already walked most days, using the Egg caused me to explore places away from the beaten track, that I would overlook on my regular walks.

Back at home, holding the Egg also required focus, to maintain the connection needed to keep the recording playing, so I had to be attuned to my body position, meaning the activity was not passive or mindless. Using the Egg, I was taken back virtually to places on my walk, and I was able to reflect in a way that nurtured my connection. I suggest that the slowing down and attending to



Figure 5.6: The Nature Meditation Egg: The image shows the Egg, the internal components and the Egg in use. Image: [2]

place, that are designed into the interaction make it easier to appreciate different values that make a place, because the place is made present through a form of communion, that echoes Heidegger’s gathering of the fourfold. This concept is explained in full in Chapter 4 but can be summarised as the confluence and correspondence of relations that illuminate the true nature or “essential being” [196] of a thing. I argue that gathering the fourfold is an integral component in place-making, because places are “centres of value” [88] that are created as the result of engagement and familiarity. Tuan describes how places emerge through habitual embodiment of space, initially through landmark-making that, over time, result in a cohesive whole as landmarks are joined together. I believe these landmarks of emotional connection emerge when the fourfold is gathered into them, so that they are revealed as people become aware of their innate value. Using digital technology, the Egg amplifies the auditory sense (a response to McLuhan [60]) to interrupt and draw attention to locations on a walk, which ignites the possibility of creating personal landmarks, especially when used habitually.

As I negotiated and appreciated mud, flood and land lit by sun, I was reminded of Borgmann’s [215] description of the “burden”, “delight” and skill acquisition associated with focal practices, described earlier in this chapter and in more detail in Chapter 4. At home the artefact took focal position in my workspace, though the Egg did not provoke the associated social practices that make hearths focal places. The early design required ritual reformatting the audio, which was effortful but distracting, rather than complementary to the meditation practice. Natural England [8] describe the need for intentional rather than passive interactions to grow connection to nature and the Nature Meditation Egg is designed to set focus on the natural world and drive active engagement.

I have questioned whether framing the Egg within meditation practice promotes inward-looking, that is potentially self-interested, (for example in terms of personal well-being), with a tendency towards instrumentalizing the natural world. There are instances where processes are corrupted, but in theory, the aim of mindfulness and other branches of meditation, such as ecospirituality, is to reconnect people with themselves and the wider world, and Aaltola’s work [13] (Chapter 1) specifically points to attentiveness and mindfulness to counter

ego-centred behaviour. However, the potential threat reinforces the importance of one's initial intent at the outset.

In summary, the Nature Meditation Egg has the potential to increase time spent with nature, but even if this is not the case the experience of using it can contribute to building emotional connections and associations with a locale.

5.2.2 Commodity and standing reserve

When I considered the Nature Meditation Egg with regard to Borgmann and Heidegger's philosophy I felt unsettled because the Egg acted, or could be interpreted as acting in different ways, some of which undercut the guiding design principles derived from their writings. The relevant theory is addressed more fully in Chapter 4 but can be precised as follows.

Borgmann differentiates between "life-sustaining" and "paradigmatic consumption". Life-sustaining consumption often involves hard-won skills and focal practices, attained through significant investment of time and a close familiarity with materials that form the context for the practice. The skill is bound up with engagement in material and social worlds. By contrast, "Paradigmatic consumption 'attenuates human engagement with material reality'" [215]. Paradigmatic consumption occurs when humans are 'liberated' through the creation of commodities which require much less engagement, dedication, commitment and active attention, such that these commodities pass barely noticed in the background of our lives. The disconnection from context, associated with paradigmatic consumption, brings commodity to the fore, and in the process displaces focal practices. Technological devices have a tendency to bolster paradigmatic consumption at the expense of life-sustaining consumption.

The development of Borgmann's theory of devices and consumption has roots in Heidegger's philosophy, one constituent of which is the concept of standing reserve [202], which is the tendency to perceive everything as a resource, "standing by", waiting to be put to use by humans. There is correspondence between Borgmann and Heidegger's descriptions of the way in which technology's flexibility and groundlessness enable the world, including humans, to be reframed as

reserves to be easily and mindlessly consumed, rather than valued as things in their own right.

The Nature Meditation Egg can be construed both as a focal object with the potential to support ongoing engagement with natural places, and a device that rips audio from its time and place, transforming it into a commodity.

In defence of the former, using the Meditation Egg took me repeatedly into nearby natural spaces and made me more attentive, so that I noticed things I hadn't previously. I felt the experience caused me to pay attention to interconnections and interrelationships, that form the world of the place, and the activity itself was physical and effortful. It could be argued that careful listening is a skill developed through recording and certainly the meditation with the Egg required practice. At the RTD conference I was challenged on the absence of a social world around the Egg, given that the recording and meditation were solitary processes, and that Borgmann emphasises the social within focal practices. In answer to that I wondered if communion with non-humans on walks could be considered a social dimension, even though it couldn't be considered truly social.

On the other hand I felt sincere concern that recording audio and "removing it" to listen to it elsewhere was problematic because of the tendency of things to lose their identity, time, place and essence when dislocated from their context or world. I notice that even in the description above I have talked about "gathering" audio, which positions it as a commodity, or standing reserve, which was not my intention.

Borgmann described how the Industrial Revolution led to machines replacing the context for engagement [214]. At a micro scale, is the technological Egg replacing the original context of engagement? If it is, does it matter if it leads me, to re-engage and connect with the original natural context at a later date? Or is my recording part of a slippery slope towards commodification of my environment? Borgmann expressed concern that through technological life "the majesty of mountains becomes a recreational resource". Once I found myself listening to the audio on my laptop while I worked away from home because it made me feel closer to home. But the audio was background, not foreground and it wasn't accessed through the intentional, focussed practice through the Meditation Egg. At that point I felt it was in danger of becoming an audio backdrop, so I stopped

listening in that way. Some people liked the Egg very much and wanted to borrow it, and it appeared there could be a market for the Egg. This made me reflect on how easy it would be to move from a bespoke creation, made in part by me, from local materials to a mass produced wooden egg, where the purchaser's involvement was only on recording audio. The materials would no longer be of the place where it would be used and although people might go out into nature and record the audio landscape as part of meditation practice, they might equally download music, or self-help guides or any other content that had no connection to nature or local places. This made me see how the flexibility of technology that so concerned Borgmann and Heidegger, could play a part in transforming 'something' or 'someplace' into standing reserve. It also showed how initial intent was central because it could override values that had been built into the design. The process also made me reflect on the rights of those recorded and the privacy of the non-human and human inhabitants of the places in which I recorded, and it raised personal ethical questions about when and what, is and isn't ethical to record.

5.2.3 Skills and making

Ingold [186] described basket making on a beach on a cold, windy day and the material knowledge that could only emerge directly from the experience of making, and that text resonated with my experience of building knowledge through making. I believe that my connection to the Egg was built from my direct engagement with digital materials and the making process. I developed a greater awareness of materiality as I improved my soldering skills and experimented with the properties of copper, aluminium tape, wire and wood. Even the coding required a greater physical sense of the electrical pulses that translate between physical and digital than I had previously experienced. The physical design and code were tweaked and adjusted in response to how it felt to use the Egg, keeping in mind the philosophy guiding the design. For example, the activity should be concentrated and effortful, completely unlike turning on the switch of an iPod, so I had to consider how much time was appropriate to pause before starting the audio, and how much copper or aluminium should be used to ease the connection. The

less copper the more specific the hand placement needed to be, and as there was no other indicator that a connection had been made, the more patience and care was needed to hear the audio. I considered using a combination of heat change and time as a way of starting audio but in the end, I simplified it to timing alone.

I did not learn to turn wood or build the circuit from scratch with components. I suspect that level of commitment would increase my emotional connection further, but learning every skill needed to make every part of the Egg, would come at the expense of time spent outside, getting to intimately know a place. The joiner who turned the Egg relished the opportunity to use woodturning skills that he rarely uses in day-to-day work. Borgmann [220] fears that previously nurtured crafts and skills have been relinquished in the face of commodious technological devices, but in this instance one craft was re-kindled and another was learned.

5.2.4 Flexibility and ambiguity

I will introduce some of the theory regarding flexibility and ambiguity and then discuss it with respect to the three iterations of the Nature Meditation Egg.

Andrew Feenberg believes society is dominated by technological rationality, which validates technologies and perpetuates the development of similar technologies that reinforce similar values, in a self-fulfilling cycle. Feenberg argues that the technical codes and values embedded into the technological rationality worldview hinder environmental care and protection.

Feenberg's theories are documented more thoroughly in Chapter 4 but one of the main propositions advanced in his work is that greater democracy is needed in the design of technologies, to counter the preeminence of technological rationality, and to "support a broader range of values" [208]. For this reason he advocates flexibility in technologies, so that there can be more participation in the design process by a wider range of people, encompassing a greater range of values. He argues that requirements and functionality should not be set in stone at the outset by designers and engineers, but should create work ambiguous enough to permit socially-driven evolution and transformation. Technologies which can be taken apart, remade, remoulded or fixed, embody a design ethos that is flexible and open enough for democratic intervention. Dreyfus and Spinoza

[206] describe flexibility as a characteristic of postmodern technologies, that cause transformation as communities coalesce around an activity for a period of time before dissipating, only to come together in a reconstituted form around the next point of convergence.

Ambiguity in design has been embraced by others [126] as a provocation to encourage people to “start grappling conceptually with systems and their contexts, and thus to establish deeper and more personal relations with the meanings offered by those systems”. This is reminiscent of ideas addressed in the Introduction and Chapter 4 about the importance of context and deep focus. Feenberg’s beliefs about inclusion and values reverberate in Gaver’s arguments that ambiguity “allows designers to engage users with issues without constraining how they respond” and enables “users of different sociocultural backgrounds to find their own interpretations”. Sengers [125] proclaims the value of multiple, heterogeneous design interpretations, because these perspectives “may be useful in highlighting aspects of how systems will be understood, be used, and find roles in individual’s and community lives” and this opens up possibilities beyond those envisaged by the creator. All three iterations of the Nature Meditation Egg had a degree of openness and flexibility built in, but the extent of flexibility varied according to hardware choices, though all hardware was programmed with the same freely available, open source software, which could be overwritten. The first two versions combined an Arduino, with audio shields and a capacitance sensing breakout board. (My earliest material explorations, used a homemade capacitance sensor, but I couldn’t control the interaction consistently enough to use it within the Nature Meditation Egg.) The designs were flexible enough that the component shields, power supply and speaker could be taken apart and re-purposed, but although the PCB could be reprogrammed or recombined in another circuit, the PCB design itself was fixed and immutable. As far as possible, the designs were kept open and flexible, so they could be altered (but ultimately the project was a personal exploration of materials and ideas, that weren’t reconfigured by other people).

The choice of the Touch Board for the third iteration came from a desire to improve accessibility and reliability. The first iteration, used a Wave Shield and required arcane audio formatting that wasn’t intuitive to a general user. This led

to a substitution for an MP3 player shield, which was replaced because of a pin conflict between the shield and capacitance sensing board. The third iteration, using a Touch Board, was far less flexible (in terms of hardware) than the others because the components (microprocessor, SD card reader, sensor and touch pads) were embedded within the board.

The Touch Board has the advantage of being, reliable and really easy for a novice to get to grips with, but it comes as a pre-packaged piece of technology with the pre-determined purpose of sensing capacitance and playing audio. It is more limited than an Arduino, which uses the same processor, but within the parameters of sensing and playing audio, it can be used for a multitude of different outcomes and may ultimately be considered a more open and flexible option for people with limited experience of electronics. In relation to critical theory, this is a dilemma because the lower baseline for using the Touch Board technology, enables individual creative control and wider participation from people who might find the technological approach of Arduino or other electronics platforms off-putting. Another view on this is that the technology is being made opaque and people are being locked out of the understanding that would give them real control and power. [58, 59]. This was the thinking behind the Shrimp, [221] which has similarities with an Arduino Uno, but is built from individual components in a kit, in order that users might engage more fully with the technology. It is also a theme in Friedman's discussions on autonomy and Value Sensitive Design [136] which acknowledge core level skills may be deliberately relinquished in exchange for control of "higher order desires" to enable greater autonomy towards a final output. Friedman's conclusion is that "autonomy is protected when users are given control over the right things at the right time" [136] but she concedes the tension in this position. Taking the argument further Marcuse's "One Dimensional Man" [158] warns that choices made for ease, in the guise of liberty, result in the loss of skills and autonomy and individual "incorporation into established order". In the case of the Digital Nature Hybrid Egg I learnt new skills through each design iteration, but that wouldn't have been true if the Egg had been lent, given or sold to someone else. The flexibility dilemma will be discussed further. Returning to the Nature Meditation Egg it begs the question of the extent to

which it is possible to create new outcomes, or affective responses, when incorporating existing technologies, that have been created in the current climate where technological rationality prevails.

Another problem with flexibility is that the design can be co-opted, and the intended values hijacked or undermined, so with minor modifications, the Nature Medication Egg could be used as a point of sale display, or a home jukebox, and the Egg itself could be used as a jewellery box, or fuel on a fire. This illustrates Heidegger's concern that objects cannot resist technology's impetus to be ever more flexible and efficient, resulting in "ordering for the sake of more ordering and reordering without limit" [206] as objects are inevitably absorbed into standing reserve, and in the process lose their identity or essence [206]. The flexibility of my Nature Meditation Egg meant I hacked it whenever I needed a Touch Board or battery for another project. Despite my desire to use the Egg as part of an ongoing meditation practice, every time I got a new Touch Board to wire into the Egg, it was absorbed into something else, leaving a hollow wooden egg, waiting on the windowsill and occasionally, while prototyping I 'borrowed' the Egg to try ideas.

I haven't resolved my position on fixity and openness because I can see that strategies to keep things open have the potential to make technologies more representative of heterogeneous values, but my own experience was that the flexibility resulted in the loss of the Nature Meditation Egg as its parts were ordered up as resources for other purposes.

5.2.5 Undisclosed values

This section is tightly tied to the previous one and extends some of the themes introduced in that section.

Borgmann expressed concern that when the mechanisms of a device are out of sight, and the device is easy to use, its technology slips out of consciousness. [214, 220] which means that hidden power structures and undisclosed values can be channelled through designs, without user cognisance [58]. This is even more of a worry when digital devices are embedded in non-traditional objects and places. As Farman puts it, "Perhaps the "interfaceless interface" of pervasive



Figure 5.7: The dangers of flexibility: repurposed Egg

computing carries with it the threat of exercising hegemony by receding to the background and avoiding critique” [89]. If values are made explicit or one is able to deconstruct the subtext it may be possible to make an informed choice, but often they are not apparent. Bidwell’s accounts of working in rural environments with indigenous communities, reveal the Western and urban structures [74, 75], politics [?] and perceptions that have been embedded in technologies and can marginalise rural people and their practices [76]. One example shows how Western cultural logics are inherent and taken for granted in electronic archives designed to store knowledge about medicinal plants and indigenous knowledge. This results in the erasure of the logics ingrained within traditional knowledge, because they aren’t captured by the digital architecture, and once the content is stored in a particular format it isn’t apparent that something has been lost.

I intentionally chose some technologies for the values and ideals built into the materials, for example Arduino, for its Open Source ethos. I was conscious that many components I bought had been manufactured thousands of miles away and the carbon emitted, in both production and transport, were problematic because they contributed to global warming which threatens the natural environment, when the aim of the work is to reduce threats to nature, by nurturing nature connection. Feenberg warns that technological rationality creates trade-offs, in which the environment almost inevitably loses, and this could be seen to be the case here, where the negative impact of my decision to use hardware that had travelled long distances and probably contained rare earth metals, was minimized because of the technology’s hypothetical power for societal change. My decisions weren’t made lightly, and the tensions in decision-making are not obvious in the final design, so the technologies become accepted or regarded as a necessary evil.

The electronic workings were encased within the hollow wooden egg and I struggled as to whether it was dishonest to ‘hide’ the workings of the Egg or appropriate to foreground the wood, because I wanted to draw attention to its sensory qualities and make an emotional link between them and the nature experiences. I’m still not sure if it was right to hide the mechanism, but I felt there was partial mitigation in the fact that the electronics were not boxed in and were present every time the Egg was opened to change the audio or recharge the battery.

If the Nature Meditation Egg had been given away or sold, the new user's connection would be different to the one I established through making, because the design decisions would be invisible to the new user, added to which the design only requires a limited engagement with the technological workings. I suspect that the more agency and active participation in making, the greater the appreciation of the design choices and values embedded within the object. In retrospect, this might suggest that making should be an integral part of the process for creating digital nature hybrids, with the guiding mantra 'It ain't what you do, it's the way that you do it'.

5.2.6 Comparison of hybrid Nature Meditation Egg to selected digital apps

One of the biggest most immediate questions that comes to mind when I reflect on the Meditation Egg, is why make it at all when it is perfectly possible and probably desirable to meditate on nature without 'aids'.

One of my answers is that I have not found it possible to build that rhythm into my daily life at home and for the time that I used the Egg, (before I reused its components), I found the object acted as a focus for the activity; a visual reminder or beacon calling me to practice and the physical engagement with the Egg felt more appropriate than using a mobile phone or just playing audio on my laptop.

I have used other purely digital apps that have similarities with the Nature Meditation Egg but my relationship to them is not the same, for example I have played tracks from the 'Nature Space' holographic audio app on my phone, as a background while I work, and have perceived it as a commodity, the equivalent of a music track.

The layered audio feels inauthentic because it is 'too perfect', and the unspecific track titles reinforce the dislocation or separation from context so it hasn't encouraged me to think about the audio and its 'real' context. I found 'Nature Space' pleasant enough and relaxing, but it didn't challenge me to think about

potential realities of the place. It made me think of Marcuse’s “democratic unfreedom” where we slip unconsciously into a pleasant state as we meet false needs that push us towards uni-dimensionality.

By contrast I found the ‘Headspace’ app less troubling. The timed, daily, guided mindfulness meditation is structured to encourage and support meditation as a regular focal practice. The phone medium doesn’t feel incongruous because the experience is voice led, predominantly with eyes shut, (though there are additional animations to visualise key principles that can be viewed outside the core practice time).

Overall, the sensory aspects of the Nature Meditation Egg bring an additional dimension, that is not present in the purely digital apps and the individual connection to place is significant. For this reason, I think the Nature Meditation Egg should necessarily remain a bespoke, rather than mass-produced artefact, if it is to adhere to the guiding philosophy and values.

The Nature Meditation Egg was encouraging because it suggested the potential to create designs that encompassed values drawn from philosophy of technology. However, it also brought to the fore potential tensions and conflicts between design and theory.

The Nature Meditation Egg was the only design created for a location away from Clumber Park and it was devised as a bespoke device for engaging personally with the local environment. In this it differed from the digital interpretation artefacts designed for visitors to the Walled Kitchen Garden.

5.3 Rhubaphone

This section introduces the Rhubaphone, the first of the digital interpretation artefacts created for the Walled Kitchen Garden at Clumber Park. An introduction to Clumber Park can be found in (Chapter 3).

This section sets out the principles that guided the design of the Rhubaphone. This is followed by a description of the design and selected iterations. It concludes with a series of reflections that reference the underpinning theory explained in (Chapter 4).



Figure 5.8: The large Rhubaphone beside rhubarb plants



Figure 5.9: The large Rhubaphone in use

5.3.1 Rationale and design principles

Working at Clumber introduced additional dimensions beyond those adopted from Critical Theory, because the values, needs and expectations of individual gardeners, volunteers, visitors as well as the National Trust organisation came to the fore. There was a high degree of compatibility between thesis aims and organisational aims with regard to nature connection, as evidenced by National Trust publications on “Natural Childhood” [15] and “Reconnecting children with nature” [222]. But there were areas of difference because of National Trust’s imperative to generate income and return visits, which are not a principle guiding the research. Although National Trust raises money to sustain itself and its conservation programme, in pursuit of that aim it potentially encourages casual consumption so “the majesty of mountains becomes a recreational resource” [214], which contravenes the ambition of the design principles. I felt it was important to heed tensions, but also respect the values of my partner organisation, because to fail to do so would be unilaterally imposing my values on the designs in a way that shut out other voices, violating Feenberg’s principles of democratic rationalization.

The Walled Kitchen Garden holds currently the second largest collection of rhubarb in the world and at the end of 2013 it was awarded National Collection status, so I decided to draw attention to the rhubarb for the start of the new season. Over 130 cultivars, including rare heritage varieties, are grown in the garden, but visitors often asked if there was really a difference and how to distinguish between varieties. There isn’t a widespread culture of presenting rhubarb as distinct varieties, as is common for fruit like apples, and when rhubarb is growing the large, floppy leaves make it hard to distinguish between cultivars, so it is easy for visitors to walk past without really noticing the differences. On my visits I learnt some of the ways of distinguishing between rhubarb varieties, for example by colour, length, thickness and curvature of stalk.

I wanted to create interpretation to “interrupt” people so they could see the rhubarb in a new light, as individual cultivars with particular qualities, stories and cultural relevance, because this tied in with Heideggerian concepts about the revelation that happens when humans become present to the essence of a thing.

I wanted to create something that would cause people to pause for a moment and see the rhubarb in a way they hadn't previously. Heidegger talks about things "thinging" when the fourfold (of earth, sky, divinities and mortals) are gathered around something commonplace which, "temporarily brings into their own both the thing and those involved" [206], and though it seemed far-fetched to imagine something as mundane as rhubarb "thinging", it also seems entirely appropriate and possible, given the social practices, history and culture that surround it.

Borgmann's work emphasises the importance of engagement which I have connected to physical, tactile, sensory stimulation, that causes one to observe carefully and notice details that reveal a thing in its own right. Sensory experiences make a difference to personal connection as is exemplified in contemporary natural history writings for example in Jean Sprackland's writing about seaweed:

"Back then, I knew seaweed in that intensely physical way, the way children know the world. It was slippery and dangerous, you could get caught in it and almost drown, it hurt when it hit you in the face." [217]

In nature writing, descriptions of sensations reveal much about experience, knowledge, attention and connection, and in my own life, nature connections are permeated with sensory-laden memories and experiential understandings. So designing interpretation to encourage direct, sensory stimulation accorded with the philosophical direction.

Another passage from [217] resonated with the work on rhubarb.

"Seaweeds are slippery customers. They exist in unimaginably huge quantities, more or less unmapped and unexamined...They may look roughly alike but when we see them cast on the beach, they are remarkably various." [217]

Rhubarb are similarly plentiful and diverse but unnoticed until they are put into a context where their differences shine through. Hence the rationale for the design was to draw attention to the sensory qualities and particularities of individual rhubarb cultivars by designing an installation that caused people to pause to notice the colour, smell, size, shape and texture of the rhubarb.

I anticipated the greatest engagement would come from actually planting and growing the rhubarb but it wasn't possible to manage visitors to do this in the garden, however I felt that if visitors were awakened to the diversity of cultivars and historical connections, they might be encouraged to consider seeking out different varieties to plant or consume.

There is a tension because rhubarb cultivars, whether in fields, forcing sheds or people's gardens, are almost always seen as a standing reserve, because the varieties are created through human intervention and "stand by" waiting to be consumed as a medicinal or food resource. Wild rhubarb, growing on Chinese hillsides, may be the exception to this rule, and rhubarb at Clumber is in a strange middle ground, where it is grown for conservation and preservation, but is an "attraction" that encourages visitors to "consume" the garden. Looking to the philosophers, Edwards specifically mentions a "garden waiting for an orderly touch" [199] as an example of standing reserve, so to design in this space would seem to conflict with the design principles.

I have reconciled the tension by drawing on Borgmann's differentiation between life-sustaining and paradigmatic consumption. Borgmann says "to live is to consume" [215] but life sustaining consumption demands engagement with context, labour and frequently necessitates social coordination, whereas paradigmatic consumption "attenuates human engagement with material reality" [215]. Gardening in the domestic context and at Clumber are most closely aligned with the definition of life-sustaining consumption and further to that, gardens are a liminal space where 'wild nature' meets 'domesticated nature' and 'human life' making them important spaces for initiating and sustaining nature connections.

Critical theorists distinguish between "things", that are part of a world and devices which are generally not embedded in a world [215] in order to illustrate their concerns about the tendency of technologies to exacerbate the transformation of everything around them into standing reserve. They argue that a device's dislocation from context cuts its ties to the history, culture, environment, society, nature, and traditions that have gone before, presenting the illusion that it is not indebted to anything prior [203]. Once liberated and context-free, devices tend to frame the world in a way that privileges commodity over everything else, and

the intrinsic value of things is obscured [214]. Consequently, the design criteria emphasised the importance of designs grown from and embedded in context, and this tied in with National Trust guidance about the importance of Spirit of Place. The influence of Spirit of Place on the design process is discussed further in Chapter 4.

The initial design criteria to guide the design of the first artefact at Clumber Park are as follows:

- the design should support active engagement with a place/places
- the design should activate different senses
- the design should be rooted in its context and part of the ‘world of the garden’
- the design should uphold the values of the Walled Kitchen Garden and the National Trust
- the design should ‘interrupt’ people and make present the rhubarb in the garden
- the design should encourage pauses and reflection
- the values in the design should be compatible with respect for the non-human world and natural environment (eg. in respect of components, cost, production)
- the design should not encourage paradigmatic consumption

5.3.2 Design: The Rhubaphone

Scott Garner’s ‘Beet Box’, an interface for sampling music clips using beetroot plants, was an early inspiration, because it looked fun and the tactile interaction demonstrated the potential for drawing attention to smell, colour and texture. Part of its appeal was that it surprised people and the simple design meant the beetroot were prominent. I considered appropriating the idea to draw attention

to the rhubarb collection, but my notes from the time show my uncertainty about whether this would be in keeping with my design criteria.

“I am not sure how I feel about the fruit/vegetable instruments in relation to the idea of connection to nature. The Beet Box is fun, and I want to play with it, but I don’t think it makes me think about growing veg. It doesn’t really ‘interrupt’ me. (Also, the vegetable is a resource. The standing reserve has been ordered up.) But fun isn’t to be underestimated. The emotions one feels as a result of the experience resonate and contribute toward building a bigger picture...Also, I am trying not to lose sight of my guiding design principles. Trying to pitch this appropriately is going to involve more conversations and experiments. At the moment I’m thinking of making two versions of rhubarb interpretation - one playful and the other more informative. (Could it be both at the same time?)”

Ultimately, I did make a rhubarb interpretation installation, called the Rhubaphone, based on the principles of the Beet Box. There are two current iterations of the Rhubaphone in the Walled Kitchen Garden, one located in a shed beside the beds of heritage rhubarb, and the other smaller Rhubaphone in the ‘Traveling Garden Shed’, located in the Glasshouse. Both designs comprise a wooden back board, with holes drilled through for laboratory clamps, which hold rhubarb stems side by side for easy visual comparison. Above the clamps are laser-cut plant labels, sprayed to look like metal, replicating a design from the garden’s museum. At the back of the wooden board, the clamps are wired to a Bare Conductive Touch Board, as used in the Nature Meditation Egg, which is programmed so that holding each stem of rhubarb will cause a different audio track to play and letting go will cause the track to stop, giving the illusion that the rhubarb is talking. The leaves have been cut from the stems to aid visibility and to prevent signals crossing if leaves touch inadvertently.

There are differences between the two designs in terms of content, structure and function. The large Rhubaphone holds ten rhubarb stems at a wider interval than the eight in the mini Rhubaphone. Both Rhubaphones are made from wood from Clumber Park but the larger Rhubaphone is mounted on a thin oak



Figure 5.10: The Rhubaphone: interactions, maintenance, the rhubarb trail and the Rhubaphone shed

stand made from Clumber wood, whereas the smaller Rhubaphone is mounted on a shelf in the Travelling Garden Shed. The former plays recordings about individual rhubarb cultivars made by the Head Gardener and the latter plays more general rhubarb content as part of a garden trail. Both Rhubaphones can be wired to speakers or headphones but the big Rhubaphone is designed to be used with listening devices made from speakers enclosed in watering can-roses, attached by wires encased in hosepipe.

5.3.3 The iterative process



Figure 5.11: The Rhubaphone is designed to show the differences between rhubarb varieties

The design is intended to present rhubarb in a way that causes people to pause and pay attention to it in a way they may not have done before, using the surprise element of the rhubarb ‘talking’ combined with the visual presentation which draws attention to differences between varieties. The proximity means it is possible to see more subtle differences in stem colour, size and curvature. Unlike a button, the interaction requires sustained contact with the rhubarb stalk, bringing the user close enough to feel the rhubarb skin and smell the juice from the cut stalk. The installations attempt to show rhubarb cultivars as plants ‘in their own right’, but also employs narrative to root it to places, people and times.

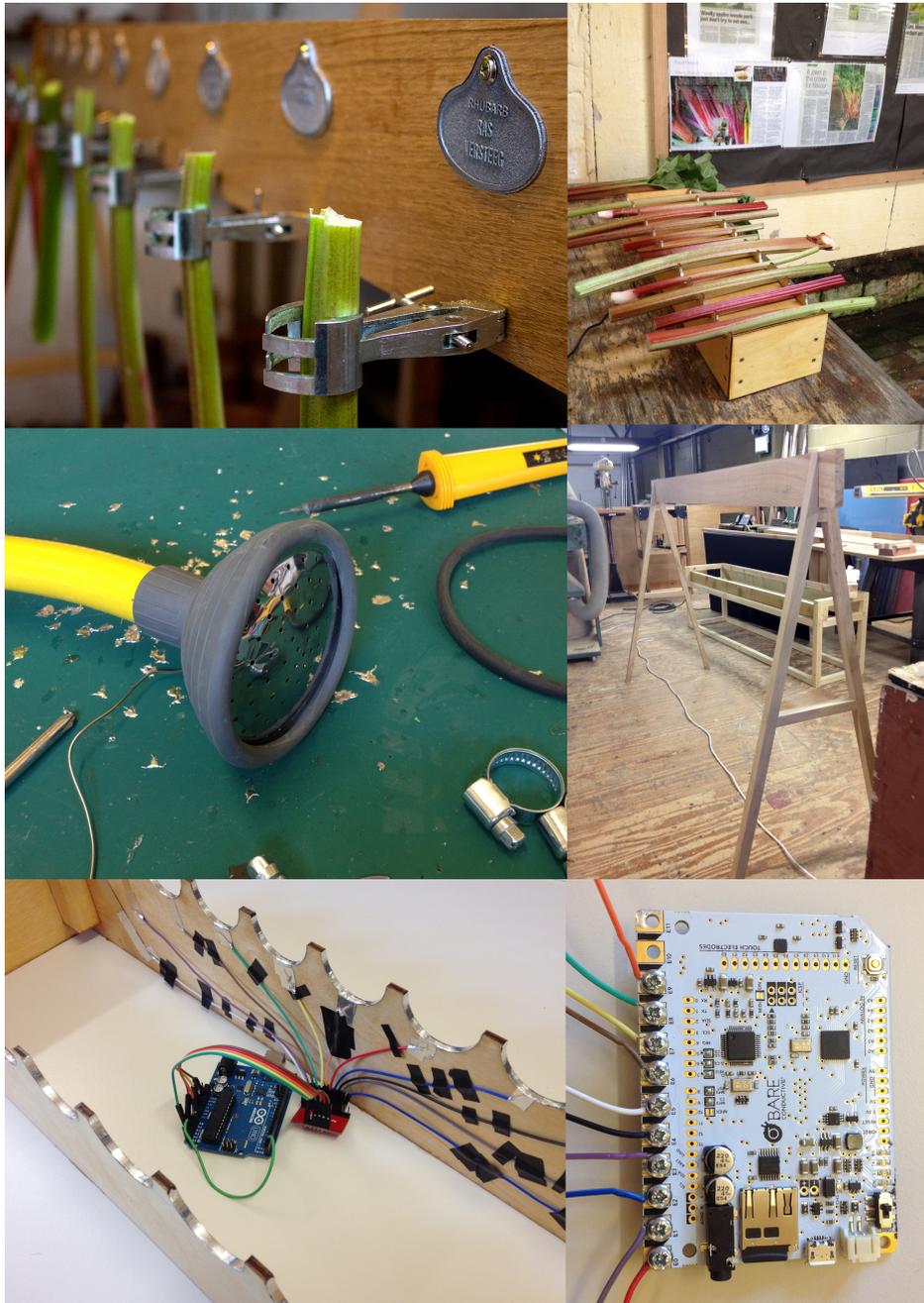


Figure 5.12: Designing the Rhubaphone

The Rhubaphone has gone through at least seven iterations and adaptations between 2014 and 2018 including aesthetic, practical and technical iterations, which could be defined as “research for design” in addition to iterations derived from learning through the design process that relate to the application of philosophy of technology. Iterations that responded to design criteria were driven by reflections on observations, conversations, interviews and other contributions from people including Clumber employees, NT volunteers, visitors and designers.

It isn't feasible to document all the design considerations during this time period, but some decisions are documented to show points of external influence by humans and non-humans as well as the development of the design in relation to the design criteria. Recounting the process in a linear written form gives the illusion of a linear design process proceeding forward from iteration to iteration, but the reality involves multiple concurrent and overlapping designs with revisions and backtracks to designs that had been superseded. The iterations included:

- Change in form

The design changed from xylophone style to a form reminiscent of musical chimes in order to increase the prominence of the rhubarb and to reduce the dominance of the display structure.

- Change in location

The Rhubaphone was originally displayed in the museum rooms within the glasshouse but was moved to a shed in the garden, beside the rhubarb beds as a result of conversations with the Clumber team, observation and reflection on theoretical principles. The shed was developed as a space to display information about Rhubarb including newspaper cuttings and interpretation produced by the Gardens Team.

- Addition of a travelling Rhubaphone

One of the early prototypes was adapted as a mini Rhubaphone for use within a Travelling Garden Shed at outreach events. When it isn't on the road the shed incorporating the mini Rhubaphone, is installed in the Glasshouse.

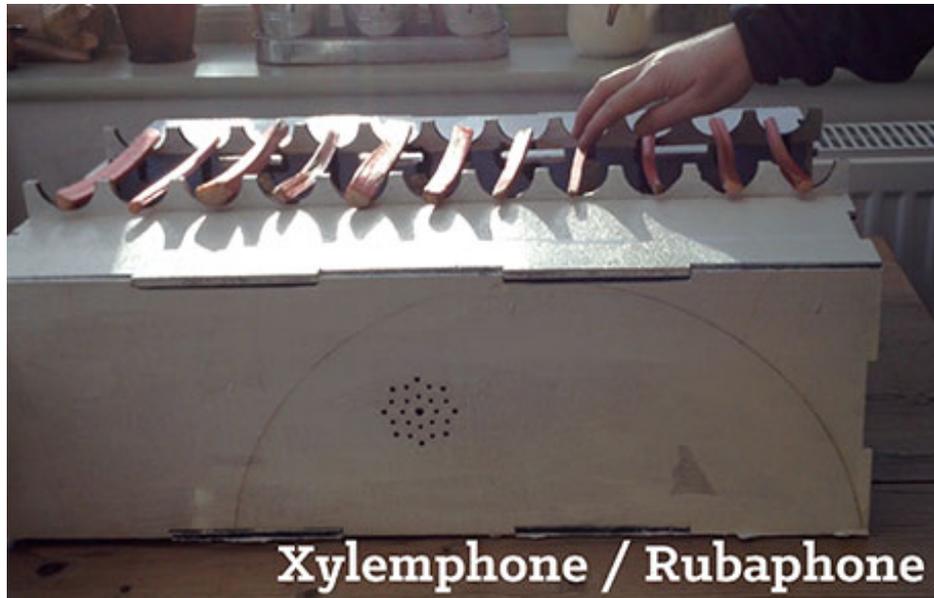


Figure 5.13: Still from video clip showing first prototype. The subtitle shows its name was not yet settled.

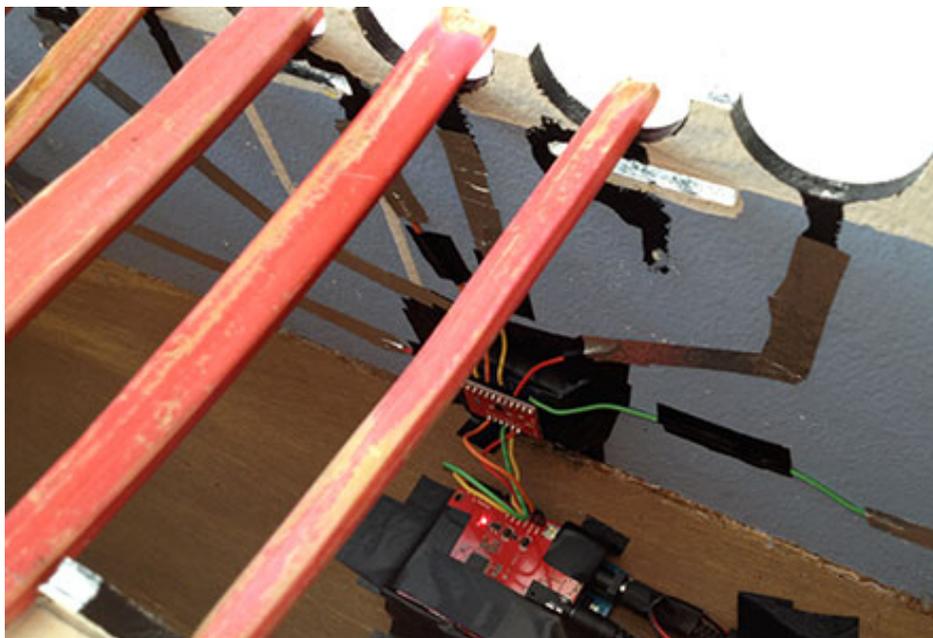


Figure 5.14: Electronics and aluminium tape inside the first prototype

- Change in function and content

In response to visitor comments, I made two musical versions of the Rhubaphone for younger children, as alternatives to the original ‘Talking Rhubarb’ installation. One was designed to hang like a wind chime which could be played by mixing sound samples recorded in the garden including the non-human sounds like bees buzzing, and the sound of gardeners working in the garden. Another had a narrower form that looked similar to a traditional Xylophone and was played as a musical instrument, by lifting and dropping the rhubarb stems. More recently the content in the mini Rhubaphone within the Travelling Garden Shed was changed by the Gardens Team to form part of a trail about rhubarb. This version can hold any rhubarb variety and is used to check answers to a rhubarb quiz.



Figure 5.15: A Rhubaphone prototype designed to look like a wind chime. This iteration uses a Raspberry Pi, Arduino and sensor.

- Change in technology

Although the principle of using capacitance to control audio files was a constant, the means of doing this changed from a circuit incorporating Arduino, mp3 player and capacitance sensor, to a system involving an Arduino with sensor to take readings and a Raspberry Pi to control audio, to finally a Bare Conductive Touch Board. The first change was for reliability, because of a compatibility issue

between hardware, and the second was for ease of management because the Raspberry Pi took time to load and required a screen, keyboard and mouse to check code and make changes, which wasn't practical in the museum building. The design of the Touch Board was less intimidating than the interconnected circuits which had more potential points of failure, and it was easy to change audio and identify physical errors like touching wires.

- Change in interaction

In the earliest iteration the Rhubaphone was programmed to start playing when a rhubarb stem was touched, and continue till the end of the track, to avoid visitors 'channel hopping' through the tracks, because that would imply superficial paradigmatic consumption [215]. But it also meant people did not have to hold the rhubarb or even stay close by to hear it, and from a practical perspective, if users were not holding the rhubarb other people could arrive and be unclear what is going on or which rhubarb was being described. For this reason, the Rhubaphone was reprogrammed so that content only played when someone was holding a rhubarb stem. The change came as a result of observations at the Rhubaphone's first outing at Rhubarb Weekend.

- Changes in response to setting

Several design developments were made in response to context, such as the use of oak from Clumber Park, to make the back board and later a frame. The suggestion about the use of wood from the property and the re-design of the frame was made by gardeners. A wood technician at an art school, who had formerly worked as a National Trust joiner, suggested referencing old plant labels to connect to the heritage of the garden, so the design and typeface were replicated, using laser cut sprayed wood so the designs could be easily generated as needed, without the cost of metal pressing. The structure of the large Rhubaphone was redesigned to make it waterproof, so it could be kept outside near to the rhubarb beds, but it was kept in the Rhubaphone Shed. When the Rhubaphone moved from the museum buildings to the Shed, the audio delivery changed, from a large speaker with amplifier, to a listening device comprising a small speaker, hidden

within a watering-can rose and connected via a wire enclosed in yellow hosepipe. Although the speaker could be used for visiting school groups the listening devices provided a more intimate listening experience that was less intrusive for other visitors.

5.4 Reflections

5.4.1 General reflections on theory, design and the Rhubaphone

The Rhubaphone was designed to explore the impact of using design criteria drawn from criticism of technology, and one of the main criticisms from both Heidegger and Borgmann is that technological devices disconnect us from each other, from ourselves and from the world. The argument behind this is that technologies are designed to be flexible and useable in any context, and because they are not dependent on a context or rooted in a context they don't acknowledge any debt to history, culture and things that have gone before [202, 205, 214, 220, 223]. If they are free of a wider socio-cultural world they can be perceived in isolation and they can create a lens whereby things within their sphere are also seen in isolation, as standing reserve waiting to be called up for use, as opposed to things in their own right, with their own essential nature.

Hence the Rhubaphone was designed to emphasise context and dependencies, particularly through materials. If the Rhubaphone had been designed as a screen-based application, it would have been easily transportable and usable in any location at any time of year, but the connection to place and the dependencies on place would have been lost. As it is, the Rhubaphone is tied to Clumber in that it depends on rhubarb grown in the Walled Kitchen Garden, that cannot be found elsewhere. It is put into hibernation over winter because it cannot be used (as a Rhubaphone) out of the rhubarb season, so the design emphasises the seasonal nature of rhubarb. The hybrid digital-nature character introduces some of the contextual dependencies that could be lost in a purely digital device. Maintaining the Rhubaphone requires “bodily and social engagement with the thing’s world”

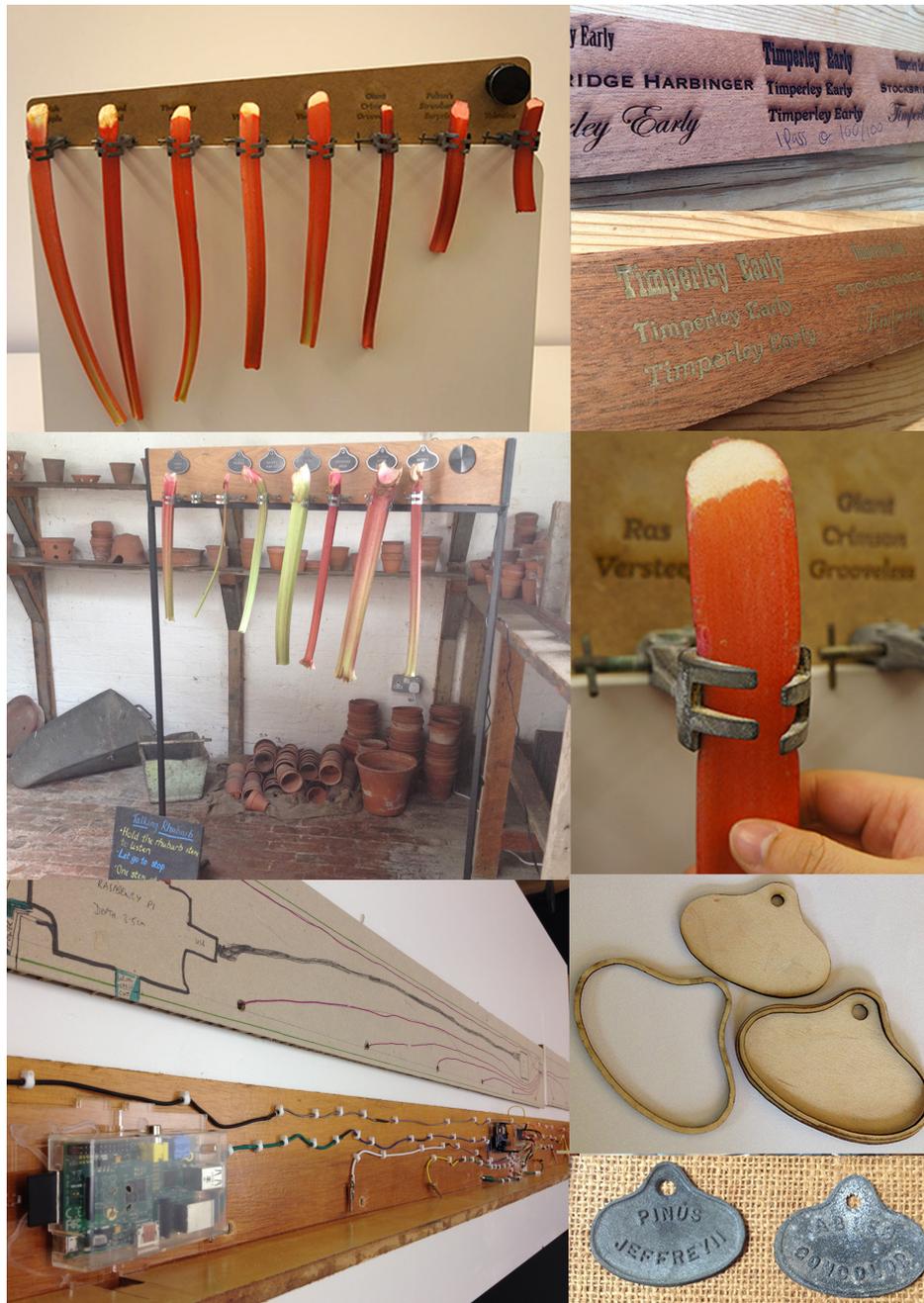


Figure 5.16: The iterative process

as exemplified by the fact that gathering rhubarb for the Rhubaphone has been incorporated into the tasks for those working in the garden.

I have taken the Rhubaphone out of the garden several times, to events with National Trust like the East Midlands Show, and to research events such as the Research Through Design Conference, and I have mixed feelings about it. We have used the Rhubaphone as part of outreach activities in places that are within range of Clumber Park, for example Newstead Abbey and Ecclesall Woods in Sheffield, and each event has involved careful logistics and early morning harvesting to ensure the rhubarb is fresh for the event, which again emphasises the ties to context, and the nature of rhubarb, which will wilt over time and therefore limit the length of any engagement. Preparing the Rhubaphone for use involves efforts not typically associated with digital technologies and this gives it a different character described to the easy and ubiquitous technologies described in Borgmann's Device Paradigm [215]. Nevertheless, removing the Rhubaphone from the garden changes it. It probably won't be obvious to people who haven't seen it in the garden, especially as the novelty of the interaction is appealing, but when I see it elsewhere I know it doesn't fit properly. If the Rhubaphone is being used within range of Clumber in a way that may bring new audiences to the garden, it seems acceptable because the installation is invisibly tied to its context by the need for the fresh rhubarb of the correct varieties grown at Clumber. Taking the installation to academic venues generally entails using a single variety of rhubarb available nearby, which is problematic because it changes the nature of the actual installation, but as long as I am present to explain that in this context the installation is merely a physical prompt through which to talk about the research, then it is easier to accept. However, the bottom line is that the Rhubaphone is not the same elsewhere as it is in the Walled Kitchen Garden.

5.4.2 Rhubaphone reflections: gathering the fourfold

Humans 'dwell' in a way that brings earth, sky, divinities and mortals (the fourfold) into things so we see the life in things, a concept Heidegger calls 'thinging.' Therefore, humans are disclosers of the essence of things, and the worlds in which

those things play a part. Through social practices and other ways of being, humans reveal the contingencies, dependencies, debts and worlds that surround a thing, and they also come to see themselves through the thing. As the fourfold is made present into things, humans are interrupted and “stay a while” through their attention to the thing. In contrast it is said that devices neither stay with us nor gather the fourfold.

So, the challenge for the design of the Rhubaphone was to create something that interrupted people and in so doing drew attention to the essence of the rhubarb and the world within which the rhubarb lives; the world of the garden. The Rhubaphone alludes to the history of the Walled Kitchen Garden and rhubarb cultivation over centuries and continents that has resulted in the development of cultivars, each rooted in a particular time and place. It speaks to the garden of the present and the work in tending the National Collection and visitors are reflected in it as (potential) rhubarb growers and gardeners and cooks. It speaks to different temporalities; the centuries during which rhubarb spread from China through Russia to the UK, and the seasons that transform the rhubarb from a hidden promise in winter to a crop so dense in summer that the ground is hidden.

The Rhubaphone presents rhubarb in a way in which it isn't usually seen, and the surprising interaction brings people up short and holds them for a moment. In that moment where they ‘stay a while’, they may think of the garden, the gardeners, the history and culture, the rare cultivars, the magic of a crown of rhubarb emerging in Spring, childhood games hiding beneath the leaves, the future of gardens, and themselves in relation to those things, or they may simply play at touching the stems and listening to a few seconds of audio and move on without much thought. To expect a short interaction with the Rhubaphone to deliver in the same way as a thing that people live with and encounter repeatedly over time is asking a lot, and from observation and conversation I think that the experience may be related to intent, prior experience and readiness to be interrupted. A few interviewees spoke in ways that suggested ‘thinging’ but for the majority the experience was superficial, though for almost all it was an encounter that caused people to pause and spend time paying attention to the rhubarb.

5.4.3 Rhubaphone reflections: commodity and standing reserve

According to Heidegger, technology creates a lens which encourages humans to see everything in the world as a resource that is standing by, waiting to be consumed and when humans see the world as resource or standing reserve they no longer see things in their own right. In this philosophy, technologies are rootless and liberated from ties to place, and their disconnection is contagious. Technologies do not ‘gather the fourfold’ to illuminate the essential nature of things but instead ‘de-world’ things revealing affordances that encourage paradigmatic consumption.

From a design perspective this meant the Rhubaphone should not de-world or portray the rhubarb as standing reserve.

Of all the design criteria, this presented the most tension and ambiguity. Rhubarb is a cultivar, which means that plants are the result of selection in which desired traits are propagated. Although these plants are genetically linked to the wild rhubarb that grew on Chinese hillsides, in recent centuries rhubarb has been bred as a commodity and it could be argued that it is inevitably standing reserve.

However other things used by Heidegger as illustrations to explain the concept of thinging, such as the jug, exist now as mainly mass-produced commodities, though these co-exist with less intensively produced pieces that still have roots in the clay, glazes, production techniques or aesthetics of an area.

In parallel, rhubarb can be intensively produced with commercial motivations driving the selection of cultivars, or as is the case at Clumber, they can be grown deliberately to emphasise culture and history. The Walled Kitchen Garden holds the National Rhubarb Collection and its job is to preserve and value the individual cultivars. A few contemporary varieties are sold in small quantities, so people can taste the rhubarb, but the priority is preservation, and the rhubarb stems will be managed in a way that benefits the long-term strength of the plant over any commercial value. Again, one could argue that the rhubarb is automatically a resource because people pay to see the gardens through membership, but the counter to that comes in the mission of National Trust to protect and open up the heritage and open spaces of England, Wales & Northern Ireland. [35] Further,

Octavia Hill's words, written in an essay prior to her co-founding of the Trust, resonate with the tone of Heidegger's dwelling in the fourfold: "the need for quiet, the need for exercise, the need of air, the sight of the sky and of things growing, seem human needs, common to all men". (Hill, 1888, *More Air for London*, [35])

From a Trust perspective, the rhubarb and the garden are not intended to be standing reserve, so the issue reverts back to the design of the Rhubaphone. I feel the location for the Rhubaphone is significant in relation to standing reserve. When the Rhubaphone was in the museum room, it didn't seem to fit, partly because the space was used for implements, but also because the rhubarb in the Rhubaphone was so far from the growing plants. It was as though the rhubarb was on its way out of the garden and was no longer connected to the place. The fact that the room next door had been a fruit store, added to the sense of commodity. When the Rhubaphone was put at the bottom of the garden, visitors walked from the shed directly past the rhubarb beds, so they could appreciate the growing plants. The Rhubaphone is designed so that the rhubarb stems, with leaves cut off, hang side by side and it could be argued this echoes the aesthetic of shop displays, but I would argue that rather than encouraging paradigmatic consumption it enables people to appreciate the individuality of each cultivar. If it does suggest consumption, I think it shows the effort and pleasure of life-sustaining consumption, in the work and pleasure of gardeners and volunteers.

5.4.4 Rhubaphone reflections: experience and engagement

Versions of the Rhubaphone have been installed since 2014 and the visitor demographic has included adults and children, gardeners and non-gardeners, people who had never visited the Walled Kitchen Garden before and people who are regular visitors. Most, but not all visitors were National Trust members, and many had an interest in the natural world, and human interventions in landscapes.

The responses to the Rhubaphone were almost entirely positive and as intended, it caused people to notice the rhubarb in a way they hadn't previously, with many commenting that they hadn't known there were so many varieties of rhubarb, or in some cases that there were varieties of rhubarb.

“The talking aspect and the novelty of it, it holds your attention. Or it sort of grabs you, makes you think.” Visitor comment

“But I thought rhubarb is rhubarb. You see a stick of rhubarb stick up, it’s a stick of rhubarb to put with custard and things like that. But in the event now, I see there’s different sorts, and that’s what I want to know when I get home, what sort is...(in my garden).” Visitor comment

“In the natural old fashioned one its lovely to go along because I’ve got an allotment...So I do like to go and see different varieties, but it’s nice to go and have some interactive...and make you look at something in a different way.” Visitor comment

Walled Kitchen Garden 24th - 30th June 2016		
	Tell us what you think. Is there anything particular you liked?	Are there things we could have done better?
23/05/2016	Wonderful looking well from an allotment from home.	Love the fact that you're trying to grow a small amount of one of your Rhubarb but you still get them to look very healthy. I was very disappointed after coming to the
	Fantastic, so much to see all beautiful will really recommend this place. The talking Rhubarb is the cleverest thing I have ever heard.	
21/05/2016	Most impressed! Loved the talking rhubarb	
13/05/2016	Excellent idea, so much to learn and hear, see and touch. I'm going to see what type rhubarb I inherited when I bought my house. Its very hard, always a food crop last 12 yrs and loved by neighbours to cook favourites.	

Figure 5.17: Comments about the Rhubaphone from Walled Kitchen Garden Visitor’s Book

Speaker 1: “It makes you inquisitive...”

Speaker 2: “...it speaks!”

Speaker 1: “...about the item, which then makes you listen to what its saying. Whereas you might not have stopped at something else.”

Speaker 2: “Yeah, if it were on a board, I probably wouldn’t have stopped and read it.” Visitors comments.

Several interviewees commented that using the Rhubaphone made them want to find out what kind of rhubarb was growing in their gardens and I noticed that the Rhubaphone (particularly the version with the large speaker) provoked conversation between groups of visitors. For some it would trigger memories from childhood, such as eating rhubarb dipped in sugar, or hiding under the leaves, while for others it initiated conversations about growing rhubarb, or questions about rhubarb. It achieved its aim of encouraging people to be more present to the rhubarb and was described as “novel”, and “fun” and “engaging”.

The medium was significant, with several visitors repeating the opinion that reading about rhubarb wouldn’t have caused them, or others to stop and engage in the same way, and interestingly one couple felt the audio gave them permission to make noise in the museum room, when they would have otherwise felt the need to be quiet.

Some visitors listened to every track in full, but most listened to snippets from two or three rhubarb stems. Often families with children played for a while, with children controlling the interaction and adults listening to the audio. Several thought the medium and novelty were significant in holding attention. One visitor noted “it’s kept us here quite a while, just looking at that one thing...Everybody seems to want to do it...”

The sensory aspect was reported as adding to the sense of engagement. “...to actually hear his voice and hear his passion by grabbing the sticks of the Rhubaphone machine, I think that’s really a much more memorable way of absorbing information.” The tactile quality and visual appearance were remarked upon, and when asked if an iPad would be as good, one visitor said that the Rhubaphone “brings it more to life. You’ve got the actual rhubarb, you’ve got the stems there. It’s more real”.

Staff at Clumber felt the Rhubaphone was an effective interpretation artefact. A senior gardener said it had proved “very popular” and was a “really, really good alternative way of, you know, engaging with different groups”. A ranger said she believed interpretation in NT gardens, in general, needed to encourage

more interaction and she felt the Rhubaphone did that. “They come in and they see this rhubarb hanging there, and they put their hand out and then there’s just like this, “Oh my God. Rhubarb’s talking to me.” And yeah I love it...” Another gardener commented that it was really good with groups because it created a “positive vibe”.

“It’s almost like there’s a real lift in energy...volume levels will go up and people’s inflexions will change to a much more positive inflexion, people are moving around more, laughing more, and being sort of amazed as well.”

Although it was generally perceived as something that would appeal to children a gardener observed that it

“seems to delight a very particular kind of older generation. Folk who are still kind of young at heart and they’ll come across it and it delights them.”

In the early iterations, content wasn’t really aimed at children, but when the mini-Rhubaphone was installed in the Walled Kitchen Garden new content was added as part of a rhubarb trail and this was aimed at a wider audience, particularly children. This Rhubaphone was kept in the glasshouse but the content was designed to encourage people to go into the garden and find out about rhubarb.

The interaction was unusual and initially people wanted to press the stem as a button but after I added an instruction graphic, people found it easy to use and I felt that the interaction was important in creating the reaction of and provoking attention.

As far as the design criteria are concerned, the Rhubaphone did cause people to pause and pay attention to the rhubarb in a way that most hadn’t done previously. For some, using the Rhubaphone caused reflection or a desire to learn more, but for most it was a superficial engagement that didn’t lead people to think more deeply about National Collections and conservation, but rethinking the content could make those connections more overt. The Rhubaphone has caused people to notice the rhubarb and hear about its social, cultural and historic importance but I don’t think it is necessarily a ‘thing thinging’ in Heidegger’s terms, because

people have different reasons for visiting Clumber and arrive in such different mental states that the Rhubaphone can affect ‘readiness’ to fully see the place and notice ‘things thinging’.

Nevertheless, it partially achieves the aims for engagement and activating sensory connection. Visitors commented on physical differences between the cultivars, showing a degree of awareness of the individuality and a small proportion of total visitors described a personal connection to a variety that they grew or that they would like to grow.

5.4.5 Rhubaphone reflections: context and artefact

There are different facets of Clumber that comprise the context and its ‘Spirit of Place’ such as the fact it is a heritage garden, designed to provide a window onto the history and culture of the area, whilst retaining relevance for contemporary gardeners. The temporal, particularly seasonal aspect creates a constantly changing context, and the different groups of non-humans and humans mean the garden is a dynamic space that needs constant attention.

Understanding the context was crucial for building the trust needed for the ongoing collaboration that would ensure the designs ‘lived well’ in the garden and the process took time and required immersion in the world of the garden. After a year I realized that I hadn’t properly understood until I had experienced all the seasons, because that exposure revealed the changes and maintenance needed to sustain the Rhubaphone. The time spent enabled me to observe the garden and participate over a longer period. This gave me a deeper understanding of the place, the values held and processes like knowledge transfer, and that informed design decisions.

I think the Rhubaphone fits well within the garden environment, in part because the structure and materials are aesthetically coherent with the tools and implements found in the garden. The wood used is Clumber wood. Hosepipes and watering-can roses are seen elsewhere in the garden, so the Rhubaphone doesn’t look out of place. The labels are not made out of metal like the original functional pressed plant labels and I was concerned that pastiche would disrupt the design, but they have fitted well since they were screwed into place, because

it gives them a sense of weight. From a values perspective the lasercut design can be reproduced easily and cheaply which means it is practical for future development. The team are very sensitive to anything that goes into the garden and they were very positive about the Rhubaphone, in terms of its design and the process.

“The fact that every part of the Rhubaphone has been so well thought out and well executed that nothing is random or left to chance or, sort of “Oh well that’ll do”. That’s really helped, I think, in the trust process as well as the fact that so much of what is made and delivered is rooted in Clumber so the care of the materials (mattered).”

When visitors were asked about the appropriateness of the design, most seemed to interpret the question as being about whether the interactive audio interpretation is appropriate in the garden rather than the appropriateness of its material design, but one visitor commented, “I think that is ideal, because it’s quite rustic as well, isn’t it? It’s not fancy. It’s just basic information and the rhubarb there, I think, it’s very, very rustic”.

Another linked it to changes within National Trust,

“Oh yeah, I think natural choices in quite a lot in this sort of thing. It’s all great for the National Trust. It wasn’t long ago when the National Trust was just kind of “keep off the grass” type environment. Whereas, now there’s loads of stuff for you to do. Interactive bits and pieces and I think it’s better”.

In terms of location, there were divided opinions on whether the Rhubaphone should be in the museum rooms attached to the glasshouse. One couple said it didn’t sit well with the flowerpots and museum artefacts but would be better with the apples (displayed for Apple Weekend) in the room next door. Someone else suggested it would work well in the Discovery Centre, which is a bespoke interpretation centre with many interactive installations, and while I can understand the thinking, the importance philosophically is that the Rhubaphone is embedded in the garden, rather than elsewhere in a separate centre. One of the criticisms of technology from Heidegger and Borgmann is the dislocation from

context, which contributes to dislocation and ultimately commodification. One visitor said it gave permission for visitors to talk, while another felt it might be invasive to others. I felt that in the quiet mornings it could be intrusive but on busy afternoons, it fitted the activity and noise levels. I was more bothered that positioning the rhubarb away from the growing plants emphasized the standing reserve. Surrounded by human artefacts it seemed to present as a commodity, rather than something with intrinsic value. One of my most persistent concerns was that anything I did that removed the rhubarb from the ground would result in it being perceived as commodity because it was no longer growing.

We had conversations about the location and between us decided to move the Rhubaphone to the shed by the heritage rhubarb beds for the following season. I redesigned it so that it could ‘live outside’ under a minimal shelter, but in the end the gardeners developed the shed as a rhubarb interpretation space with photographs and articles about rhubarb. The proximity to the rhubarb beds seemed more appropriate, because in this situation, the Rhubaphone prompted more attention to the growing rhubarb.

The new context had design implications because the garden is a quieter space and it would have been intrusive for the Rhubaphone sounds to extend to people enjoying a quiet time listening to wildlife or focusing on the plants, near to the shed. This led to the addition of hosepipe listening devices which gave a more intimate, focused listening experience, at the expense of some the conversations that occurred when groups encountered the Rhubaphone with large speaker.

Latterly the team decided to install the Travelling Garden Shed with mini-Rhubaphone with a speaker in the glasshouse. I wasn’t sure this would work, because I thought the Rhubaphone audio would dominate the space but that area within the glasshouse has become an area for activities so it works well.

5.4.6 Rhubaphone reflections: context and processes

Feenberg expresses concern about the reproduction of prevailing technological rationality in designs and he proffers democratic rationalism as a way to disrupt assumptions about the character of technologies and values embedded within

them. His work influenced the way I carried out work at Clumber from the outset.

Listening to people and place were integral to my approach to try to ensure the designs responded to values and context. I'd initially planned to develop designs through co-design workshops, but realized that this wasn't appropriate for the context, because gardeners had so much pressure on their time and the volunteers came to the garden for the pleasure of gardening and didn't want to lose time in the garden.

This meant I took a slower, more anthropological approach, hanging out in the garden, following people around and talking to them as they worked, and occasionally working with them. Key to this was taking breaks and lunch time in the Mess Room, where lots of discussions, decisions and planning took place. The initial designs were my response to the garden and things I heard from gardeners and volunteers. People within, and external to Clumber, made suggestions about materials and design features for example using wood from Clumber, making plant labels that referenced historical designs from the garden, and moving the Rhubaphone to a shed near the rhubarb beds, which ensured the design was a manifestation of multiple voices. The embedded design approach helped build understanding and trust.

“You're as much a part of the team as any other volunteer and everyone sees you in that way, ergo everyone trusts you. Everyone now trusts without having to think about it, that you love the garden as much as them, because you don't need to say those words anymore, because we know.” Gardener

The Rhubaphone became a familiar feature in the garden, the team added it to their work schedule and design was received well by the team.

“The time is needed, we need to put the time in to get benefits out. I think we've all recognized that this is absolutely huge and could...present us with far more benefits than we can even imagine at the moment. I haven't really seen any negative sides to it I mean, turning the Rhubaphone on isn't a huge issue. Spend a little bit of

time, sometimes if something isn't working, but most of the time it's a question of turning it off, turn it back on again and then check and it's fine..." Gardener

However, I had not communicated the underlying rationale for the design to everyone and this meant that some of the team took shortcuts collecting a single variety of rhubarb for the Rhubaphone, thinking visitors wouldn't notice, but in effect undermining the design. This happened partly because of the time involved going to different parts of the garden to collect different cultivars and partly because in an enormous collection, not everyone knows where all the varieties are located. I talked to people to reinforce the aim of the design and made a map to help people find the individual cultivars to aid the harvesting process.

Over time the question of how the artefacts would be maintained, sustained and extended became more prescient and this is discussed in more detail in Chapter 6, Sustaining digital interpretation.

5.5 Audio Apples and the Listening Orchard

This section introduces the rationale that informed the design of the Audio Apples. It describes the design, reflections on the design, the impact of the Audio Apples on the Gardens Team and reflection on visitor's experience of the Audio Apples.

5.5.1 Rationale and design principles

The concept for the next digital nature hybrid came about as a result of the design process, which involved 'hanging out' in the garden and talking to gardeners and volunteers. Although the initial design criteria were kept in mind, this design seemed to emerge, from the bottom up, from experience in the garden. The origins for its development are explained in an extended passage taken from my notes:

"The idea of dwelling and presencing, through the gathering of earth, sky, mortality and divinity has been a constant image in my



Figure 5.18: An Audio Apple in the Listening Orchard

mind throughout the process. I have asked myself what dwelling might mean in the context of the Walled Kitchen Garden (WKG). For the gardeners and volunteers working with Clumber's WKG dwelling could be almost integral. The nurturing that is the focus of the work in the garden is in harmony with Heidegger's dwelling as cultivation. The gardeners are literally working in the earth, through the changing weather and seasons as part of a lineage of gardeners who have trod the same paths and dug the same ground for over a hundred years. The garden is revealed and made present to the gardeners throughout the day, as they work. One gardener commented on the redwings flocking to the apples in the early morning. Another talked about concerns for the fragility of ageing grape vines. The continuity of the garden and its attendants was made even more real at a recent morning meeting at Clumber when one of the gardeners read from the diary of a former Head Gardener, and though separated by decades, the work for that day was remarkably similar to the work for the same day all those years ago. (The meetings are a daily event to pass on news and organise tasks for the day ahead, over tea, coffee and conversation. Other breaks are also taken together.) I think the fact that the preservation of heritage fruit and vegetables and education is above any commercial agenda (in terms of income generation

directly from crops) helps gardeners to see essence rather than standing reserve. The development of gardening craft and skills feeds into Heidegger's use of *techné* toward revelation, though Heidegger does veer away from his early argument that craft enables things to come into being... The garden could even be seen as an example of a 'thing thinging' through the social practice of gardening.

Some visitors may experience 'thinging' or 'shining forth' because of their engagement with the garden, but I think the relationship for others may not be so engaged; the garden as a decorative backdrop, kept at arm's length by paths that can reinforce separation from direct engagement with the garden. This reminds me of another passage from Relph. "Heidegger states that environments can be defined simply in terms of their observable features but "when this happens the nature which...assails us and enthralls us as a landscape remains hidden" [224]. Immediacy of experience is thus not destroyed but concealed from us" [224].

During my visits I have thought of the gardeners and volunteers as conduits or disclosers, (translating and) revealing the world of the garden. Walking around the gardens I see things in a new light. I have started to learn a new language, so that I start to see the difference in shape between a 'Bess Pool' apple tree and a 'Bramley's Seedling'. I have heard stories about the garden that have built a closer emotional connection, and been part of a personal act of 'placemaking'. I feel a much deeper personal connection to the apple trees in the garden than to other parts of the garden, (such as the rose garden, or soft fruit garden), because I have spent more time with them, and got involved in more activities connected to the trees, using a greater range of senses.

Although the gardeners conduct tours and frequently talk with visitors, it isn't possible to talk personally with every visitor, and so much of what I have experienced as opening (toward the possibility of presencing) remains hidden.

The new installation was envisioned as a way to channel the gardeners' experiences to the visitors, revealing things that couldn't be seen or felt directly by visitors. The aim was to harness the fact that gardeners are 'world disclosers' to make visible invisible dimensions of the garden. I had been shown the garden in a new light by spending time with the gardeners in the garden, and the installation was supposed to give visitors a sense of that world disclosure.

The focus for the installation was the orchards, in order to draw attention to the regional apple collection, but the focus extended beyond the apple collection to the wider garden and its history.

The design criteria for the new installation were as follows:

- the design should support active engagement with a place/places
- the design should activate different senses
- the design should be rooted in its context and part of the 'world of the garden'
- the design should uphold the values of the Walled Kitchen Garden and the National Trust
- the design should encourage pauses and reflection
- the values in the design should be compatible with respect for the non-human world and natural environment (eg in respect of components, cost, production)
- the design should not encourage paradigmatic consumption
- the design should 'interrupt' people and reveal unseen dimensions of the garden
- the installation should disclose the garden through the gardeners



Figure 5.19: Listening to an Audio Apple

5.5.2 Design: The Audio Apples

The Audio Apples hang from trees in one of the mature orchards in the Walled Kitchen, and when plucked from the tree and held to the ear, play audio recordings on a range of themes. The hollow apples, which are the size of a large cooking apple, are turned from wood from Clumber Park and contain an mp3 player controlled by an Arduino and switch, a speaker, battery and Bluetooth beacon. The base of each apple has a coloured Perspex disc, indicating the type of content and the apple is connected to the tree via wire and guitar jack. Each apple holds three recordings.

The aim was to take the visitor off the path, onto the grass, under the canopy of an apple tree, to interrupt their usual experience of the garden. Heidegger introduced the term “shining forth”, as a specialized form of “thinging”, where a person’s “demeanor changes” in response to a thing, and Spinoza and Dreyfus illustrated the idea with the example of a person walking on a busy street and turning off into the cool, quiet, calm of a cathedral, where meditateness takes

over. The connection between shining forth and a shift in senses, seeded the idea to take people off the paths so they would experience change as they moved from the bright heat of the paths to the cool shade beneath the trees in summer, or as they were hit by the colour and smell of the blossom in spring, or the architectural shapes of the branches in winter. The design sought to create an intimate listening space beneath the boughs, to draw attention to the voices of gardeners and volunteers talking about their personal connection to the garden.

It was hoped that this would create a pause feeding into Tuan's ideas about places as pauses. "The pause makes it possible for a locality to become a centre of felt value." [88] For Tuan, the pause could be a time of bodily stillness or a fleeting moment when our eyes rest on something in the landscape [88]. It should be noted that Tuan has stated that place-making is the result of a slow, habitual process, building from spatial knowledge, through landmark recognition to place making, as values are assigned over time, and consequently they cannot be artificially created. "One can no more deliberately design such places than one can plan, with any guarantee of success, the occasions of genuine human exchange" [88]. However, Tuan observed that authors often create settings to facilitate particular interactions and the installation was conceived in a similar vein, with the intention of creating conditions conducive to making a connection. The hope was to "interrupt" people, so the trees and garden "stay for a while" as people reflect on the garden and their time within it.

The idea for the audio came directly from my experiences of walking and talking with gardeners and volunteers in the garden. I came to see the garden through their eyes and the stories people had told me made me see and feel the garden differently. The transformation occurred through the recording process which involved spending a lot of time in the garden, but I hoped the recordings would give visitors a sense of the gardeners' 'dwelling' that would encourage them to attend to the garden with renewed focus.

The design was inspired by two artworks, the first Susan Hiller's "Witness" [225] and the second Alex Metcalf's "Tree Listening Project" [226]. 'Witness' is a gallery installation, in which hundreds of speakers hang from the ceiling, producing a muffled hum. When a listener stands very close to the speaker, the sensation is of someone whispering in their ear, telling a story. In this case

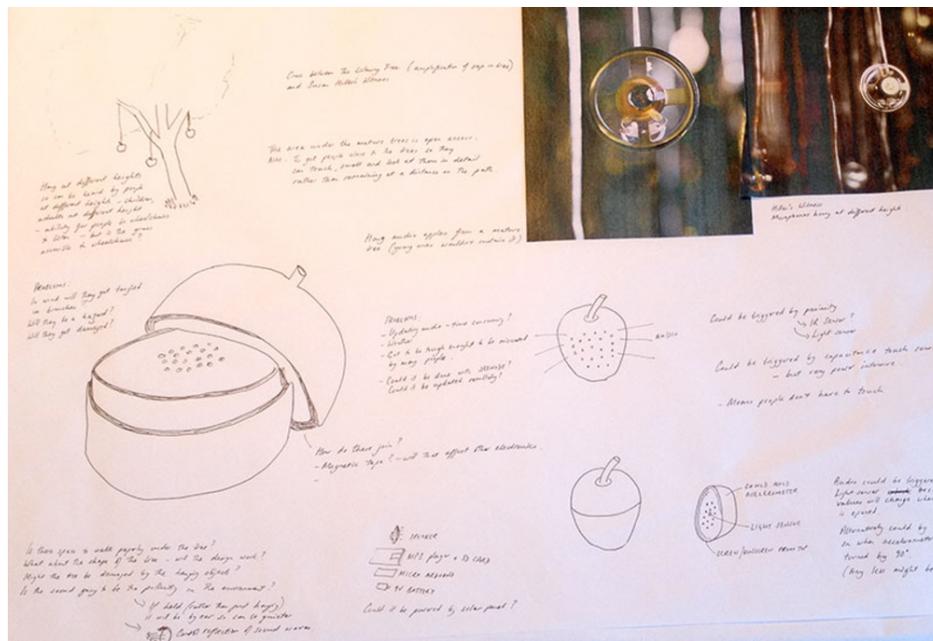


Figure 5.20: Worksheet sketches including reference images from Susan Hiller’s “Witness”

people from around the world, speaking in different languages, are telling of their encounters with UFOs. I loved the intimacy of the experience and the different voices, recounting personal stories. ‘Tree Listening’ enables the listener to hear the hidden, and normally inaudible life of growing trees, either using a listening device held like a stethoscope to the bark, or via headphones dangling from the tree. The pops and clicks of the tree seemed magical because they were unfamiliar. From a philosophical perspective, it seemed the technologies were opening up a secret world and the attention to a particular tree, reinforced the individuality of the trees.

5.5.3 The Audio Apples: The iterative process

This section does not attempt to document the detail of every iterative change, but it highlights points that are relevant for the discussion of theory, experiences and values.

Development for the Audio Apples began in the Spring of 2014 and they were

launched in the Listening Orchard in 2015. They were used in the garden until 2017 and at the time of writing they are not in use, as we discuss the next iteration of the Listening Orchard. This will be explained in more detail in the following chapter, “Sustaining digital interpretation”.



Figure 5.21: Early prototyping of Audio Apples

The iterations included:

- Experiments with form and interaction

In the initial stages the Nature Meditation Egg was adapted to test the appropriateness of different sensors to trigger the audio, but eventually a quarter inch audio jack was used as a switch, so the act of plucking the apple started the audio. Aesthetically and tactually it seemed important that the apples were detached from the tree but this caused issues because apples were dropped and damaged and some weren't replaced properly. Therefore the final version incorporated a garden tie that meant the plucked apple was still connected to the tree. We experimented with materials, including bakerlite to make the function of the ear-piece more obvious, but after finding out that bakerlite gives off polluting gasses, we abandoned this idea and focused on using wood from Clumber.

- Addition of new content and creation of content for children

The original idea was to use recordings of gardeners and volunteers sharing stories of special moments and special places in the garden. The diaries of a previous Head Gardener and those of a contemporary student gardener also seemed appropriate. Content suggested by volunteers and gardeners was incorporated, including snippets from the *Wipers Times** in memory of the gardeners lost in the First World War. (* The *Wipers Times* was a trench magazine started by the local 12th Battalion Sherwood Foresters).

Feedback from visitors suggested the need for content aimed at children. Author, Claire Dean spent time in the garden and wrote two children's stories rooted in the history and physical features of the garden. These stories, "The Scarecrow and the Garden Boy" and "The Weeder Woman" can be found in Appendix B and C.

- Addition of tracking device

One of the major concerns expressed by the whole team, was that the apples would be stolen. Even though the material cost was comparatively small, I was told that if a single apple was stolen it would be an affront to the team and garden and that faith in me would diminish if I didn't take steps to prevent thefts. Bluetooth beacons were added with an app based alarm system.

- Changes to charging regime

The apples were designed to trickle charge from a power supply hidden at the base of each tree but worries about rodents eating through cables led to a redesign. This caused more work for the gardeners gathering and putting the apples out on a daily basis.

5.6 Audio Apples Reflections

The Audio Apples encapsulated the philosophy above most closely, and I anticipated they would have the greatest potential for transforming perceptions and connection to the garden. Although they were well received, interviews and

observations suggested quite varied responses to them, from very superficial engagement, to complete absorption, with reports of a transformed outlook in a small minority.

5.6.1 Audio Apples reflections: Experience and engagement

In my own experience, listening to the audio tracks under the trees was completely different to listening to the same content elsewhere and the trees, as anticipated, created an effective personal listening space, with different sensory qualities across the seasons. In summer the effect was particularly dramatic when the tree canopy was dense, and the long grass created a cool shady place below the trees. The gardeners let the grass grow long but cut paths to the trees that held Audio Apples to encourage visitors to step off the main path and into the orchard. A gardener also reported a surprising contrast between listening in the orchard and inside the Mess Room and Offices. However, many adult visitors stayed on the fringes of the orchard, listening to the Audio Apples positioned on the outer bounds, rather than entering the orchard fully, so the experience was less immersive than the experience of those who fully entered the space. In fact, when the Gardens Team began to place branded deckchairs around the garden, that was more effective in bringing adults into the orchard to pause and be still for a while. Children by contrast, tended to run between trees finding and plucking the apples, as if that were the game, and their explorations tended to be far more immersed and active.

“I think, it’s quite good actually. I’ve never seen anything like it before. To be actually able to explore little things, it’s quite good, hearing different things rather than just sit down, maybe somebody tell you a story. There’s actually things to make you explore the whole garden. So it’s good.” Child visitor with parent

The Audio Apples were often perceived as an activity for children, though they weren’t created with children as the prime audience.

“It’s bringing things to today’s youngsters. They are used to technology and things. Its good. Its interactive for them, gets them interested in nature.” Visitor

“I think it’s really creative and its good for kids to be able to hear it. They might not listen to the whole thing, but at eight, you know, it’s good if its making an eight-year-old who would prefer Minecraft to this, (garden), bring him here.” Parent visitor with child

“I think they are good. They encourage, probably the younger generation, um, to be more involved in their environment, which this sort of thing does.” Parent visitor with children

“...the boys are quite young, seven and nine, so um, they listened to a few minutes of it and put it back then explored the next one. I don’t think they really took on much of the story but, um, maybe if it was more children themed, because although like the head gardener talking is fine for adults.” Parent with children

I think the combination of novelty and use of technology contributes to a sense that the Audio Apples are for children, and maybe this inhibits some adults from participating fully. It might be perceived that going into the space and holding a strange object to the ear exposes the visitor to ridicule or vulnerability, creating a barrier. In recent months we have discussed getting rid of the Audio Apples as an interface and playing audio directly in focussed sound pools from the trees, and I wonder if this will increase adult engagement, and whether it will come at the expense of children’s explorations. Further discussion about the tentative plans for evolution will be discussed in the following sections.

The design was intended to be open and adaptable so that the team could add new content through the season, and the first additions were two magical children’s stories about the Walled Kitchen Garden created by writer Claire Dean, following time spent in the garden, and with gardeners. Conversations with families showed this had the potential to prompt reflections on the story and attention towards the garden as indicated in comments by a child about ‘The Weeder Woman’ story.



Figure 5.22: Audio Apples in the Listening Orchard

“If you ask me, (it would be) chaotic, think about it, trees dancing, think about it, if they danced all their apples would be flying everywhere, on the roof, hitting people in the face, knocking people out...” Child visitor with parent

The interaction from adults varied, though the feedback was overwhelmingly positive.

“It is really inspired I think. ...I mean the apples themselves are beautifully crafted, aren't they, so the presentation and quality of the actual tool if I can call it that is really high. It is just a great way of getting people into the orchard and learning stuff about the orchard, about the garden. Er, it's a great way to use technology I think to get people involved in the garden itself. It makes it more interactive obviously.” Visitor

Most adults who stopped at the Listening Orchard listened to one recording, (recordings were one to four minutes long), but didn't explore or listen further, however some went to every tree and a few listened to every recording. Their reactions were generally positive about the experience but the degree to which the content they heard 'spoke' to individuals affected response. Generally adults either commented that they found the content interesting, or not of particular interest to them, and they suggested things they would like to hear, but occasionally people talked in more depth and for some the experience was transformative.

Speaking about the diary recordings (from a Clumber gardener in 1888 and a contemporary gardener) one visitor said

“its like having a conversation. I mean that one in particular felt like having a conversation with the whole garden and that was interesting as an experience...as I said I was listening to them and I thought wow, I wish I could have this on a bit of paper...something to think about at different times of year...it just seemed the story was so tied to the whole garden and the season and it was like a person's life tied to a plot of land that they were centred around. I thought

that was really quite incredible...you start seeing the effort and the people behind it and people's stories...what it all means. It's not just a landscape but it's the apples on the tree ripening and turning into cider and pies and that sort of thing, and the flowers and everything, and the usefulness of it all." Visitor

This particular excerpt suggests the visitor has seen aspects of the garden in a new light, through the gardener's accounts of their lifeworld that provide glimpses of their 'dwelling' in the garden. Interestingly, the visitor wanted to be able to take away the words to reflect on them. It appeared from her interview comments that she was aware of the natural world and was open and primed to be present to the garden and the installation helped feed her connection. Others who approached with a different mindset or intent, or who listened to content that didn't 'speak to them' personally didn't have the same experience and it was a lottery as to whether the visitor came across the 'right' content to awaken new insights.

While installing the apples I had a conversation with a couple who asked what I was doing. When I told them, one said she didn't like the idea of intervening in the space with something she perceived to be a gimmick. She felt the space should be left naturally so that people could experience the garden directly. We had an interesting conversation about the project and its intentions which ebbed and flowed between positions. When the precepts were explained she thought it was an interesting idea and asked to try listening to an Apple. She listened to a poetry apple and said it completely changed her opinion, because of the positive and transformative impact of listening to the garden poetry under the trees. She tried another apple, this time a gardener's recollections, and disliked it intensely, feeling it was an indulgence because it was too particular to the gardener, rather than the place. This illustrated the influence of content on people's ability to connect.

Practical issues also affected engagement. The volume of recordings was affected by physical characteristics of the design and by the degree of battery charge held and there were problems achieving a consistent volume that could be heard

by everyone, without pervading the wider space. In some cases this limited accessibility, though the medium engaged some people who were excluded by text.

Using a philosophical approach to try to design differently can present challenges if the process results in atypical designs with unfamiliar interfaces. People didn't know how to use the Audio Apples, because the design did not replicate familiar interactions, so some people were unable to access the audio, despite illustrated signage.

“It only took us a few seconds to recognise. ‘Ooo, you can do that’, but maybe a bit more instruction on ‘pluck the apple and do that’” Visitor

On the days when I monitored the orchard, I plucked apples to show how they worked and once people were using them, other visitors passing by could see what to do, but on reflection the interface presented an obstacle for some visitors.

Overall it seemed the Audio Apples went some way to achieving their objective of making the garden present through the gardeners' dwelling.

“You're picking up people's personal inspiration and personal knowledge of the garden” Visitor

However, more work is needed to refine the installation to improve auditory quality and interactions.

5.6.2 Audio Apples reflections: Context

The Audio Apples were designed to be rooted in the 'world of the garden' and to that end the wooden apples were turned by a member of the Estate Team using wood from the surrounding land. The gardeners and volunteers, who are part of the garden, made their recordings in a fruit store within the garden, so the mud was still on their boots and the garden fresh in their senses as they spoke. A sound recordist, who was new to the garden, did the recordings in order to capture the immediacy of a 'first-telling.'

The electronics were brought in from around the world and I knew this was problematic but the parts aren't manufactured locally and cost was prioritised in order that the team could replace and sustain parts, which was a key value.

The Audio Apples succeeded the aim of fitting subtly into the space.

“...the thing that most impresses me with it because it doesn’t look out of place. It draws you in but not in a garish sort of way. It looks, it fits in with its landscape really well...” Visitor

“... it is eye-catching, so it immediately does command your attention but in a very sensitive way...” Visitor

“I think it’s really good, as long as it isn’t too intrusive, but they aren’t, you know, if you choose not to look at them, you could just walk on by and not participate. It’s not too in your face is it.” Parent visitor with children

However, fitting well can also mean not standing out, and some visitors reported that the Audio Apples were not bold or visually appealing enough to grab attention.

“Maybe make it slightly clearer that they (the Audio Apples) are there.” Visitor

“I thought it could be much more interesting if for a big apple why not paint just like an apple?...the material doesn’t matter” Visitor

When asked about using more familiar technologies in the garden, for example tablets, instead of the Audio Apples, the response was that the Audio Apples offered a different kind of experience that fitted the situation.

“I think because natural space becomes less natural then. It is proportionate. I think the more the technology and the less natural the space becomes...” (Visitor speaking against the use of iPads)

There was a sense that there should be a balanced approach to these forms of interpretations.

“I think if every tree had them (Audio Apples) and there were no differences (and) that would be too much...” Visitor

5.6.3 Audio Apples reflections: Medium and interruption

McLuhan [60] refers to the ‘translation’ effect, whereby different senses are extended, depending on the dominant sensory outputs of different media channels. It is important to carefully consider communication because the effect of translation can be jarring or immersive and consequently has an impact on the sense of embodiment experienced.

Rodaway [227] described the qualities and particularities of different kinds of sensory engagement: the reciprocity of touch, the “local geography” created by the olfactory sense; the imprecision but omni-directional ambience of sound compared to the precise landmarks and concentrated but distancing focus afforded by sight, the dominant human sense. The intent with Audio Apples was to bring people under the tree canopy and activate all the senses to draw attention to the orchard at that particular moment in time and tap into sensory memories. However, the wooden apple interface focussed on sound and touch. Touch has immediacy [27, 28] and requires the participant to be proximate, allowing a degree of control over people’s position, to create a pause (though it should be noted the Apples could be carried a little way, when they were first introduced).

The auditory medium creates space differently to vision. “It is not pictorial space, boxed in, but dynamic, always in flux, creating its own dimensions moment by moment” [228] Sound can be disorientating and ambiguous. It is less fixed and didactic than vision which “focuses, pinpoints, abstracts” [228] so it gives the listener an opportunity to pause, reflect, make connections and absorb. The children’s stories and recordings of diaries and garden memories allow the visitor to be transported to another time, another season, encouraging the listener to make their own images of the audio world. The listener has to make sense of indeterminate and unfamiliar sounds in recordings of the garden at dawn. Some recordings required effort and participation on the part of the listener to ‘fill in the gaps’, which I believe characterizes them as a “cool” medium [228], though I accept that the one-way communication could be perceived as closer to radio, which McLuhan identifies as a “high definition”, “hot medium”. I have reflected that the audio may be affected by the way one listens and one’s mindset at the

time of the visit because it is possible to approach with a more passive or active intent.



Figure 5.23: Audio Apples turned by a member of the Estates Team with wood from Clumber Park

5.6.4 Audio Apples reflections: Impact on the Gardens Team

For the team, the attention to context was appreciated, because it showed respect for the place they valued.

“They can now appreciate that apple for what it is. A really beautifully turned object. They, even more, respond emotionally to the fact that (name anonymised) made that apple and we all know who (name anonymised) is, but (and) we all really love him and respond emotionally to the fact that that’s a piece of apple wood from the orchard in Clumber Park.”

The Audio Apples produced unanticipated consequences, revealing group and individual values within and beyond the team. The team had the opportunity to hear their colleagues talking about the garden in ways they hadn’t heard before, about significant places and special moments. “We usually talk about work in the garden, I never knew [name] felt that way.” For this gardener, the artefact “made present” a previously hidden aspect of the garden. Another unexpected impact, from my perspective, was learning that the installation prompted gardeners to value the garden stories differently.

“...until this morning, I’ve never had these types of conversations with anyone within the team, apart from (name anonymised) about a) that different varieties of apple that we have in our orchards have a story at all or b) that anyone would be interested in them. But now ... and I think that comes from the work that you and Dave (the sound recordist) have done about gathering material ... people’s stories, I guess. Not just the people reading poetry and things... is people now beginning to see that there is value in it. Whereas before, it’s not that they thought there was no value, but it was kind of “Oh, yeah it might be interesting to us because we’re gardeners”, but it’s not. It’s people, respond to stories, don’t they? So, this morning, it started after (name anonymised) said that “You know that apple...

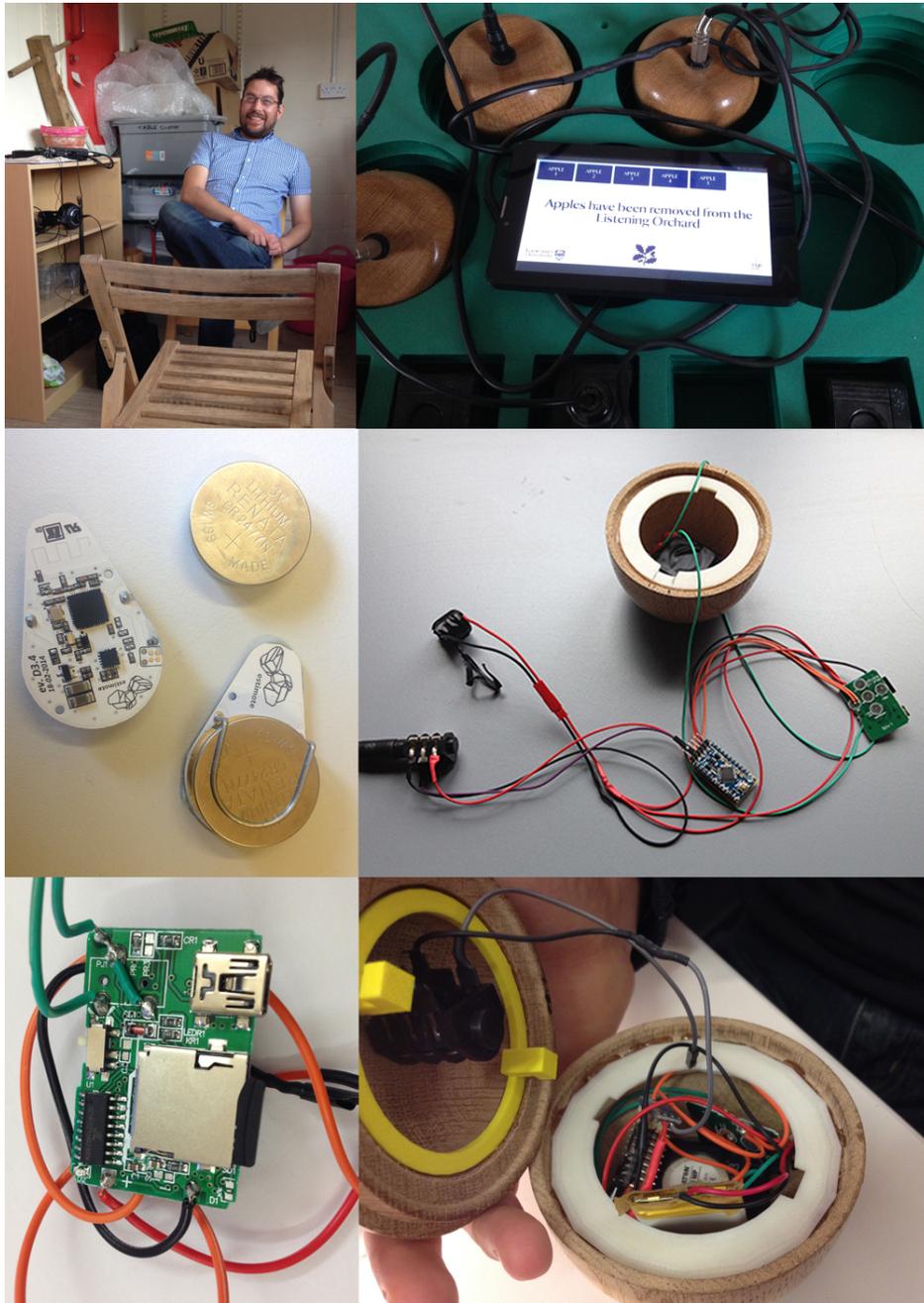


Figure 5.24: Fruit store recording studio; security for the Audio Apples; Hacked mp3 players with memory card; internal components of Audio Apples

We've had the first ever crop off those this week" (and that could be a story we tell) They're also, now, really comfortable with the idea of gathering reminiscences, of people reading Noel Shaw's (gardener from 1880s) diary or whatever and can see the real value in them. The intrinsic value of them."



Figure 5.25: Audio Apple with charging pack. Every night the apples were put on charge and every morning they were put back in the Listening Orchard, creating additional work for the team.

Insights about group values emerged through conversations during the development of the Apple prototypes. For example, gardeners and volunteers asked us: "How will you stop them being stolen?" The potential for theft or damage was also noticed by some visitors "There is the danger that people abuse them

accidentally or intentionally.” The monetary cost of the individual apples was kept deliberately low because I felt it would be offensive to spend large sums on electronics when resources for core activities were stretched. (The electronics were paid for through my budget and the Gardens Team provided the wood and paid the team member who turned the wooden apples.) However, I didn’t really take the idea of the Audio Apples being stolen, or the impact of them being stolen seriously, until a gardener explained that the theft of a single apple would be an affront to the team because the Apples were “from the garden and people”. To ‘allow’ them to be stolen would compromise trust, because it would show I had been too casual and I hadn’t listened properly to the concerns of the team and their values. It was a clear moment where values were revealed as a result of the design process. The launch of the Listen Orchard was delayed until security issues were resolved, using audio reminders and loud alarm sounds as a ‘soft’ reminder to return the Apples to the tree and Bluetooth beacons with a tablet app as a ‘harder’ tactic to warn the team at the entrance if apples were being removed. The tracking system cost more than the cost of replacing the Apples but the value of keeping them safe and the value of the work of the team member who turned the wood outweighed the material costs.

The Audio Apples created additional work for the Gardens Team, because the planned ‘in-situ-charging’ had to be abandoned because of fears about rodents eating through wires and inadvertently starting a fire. The new charging regime involved Audio Apples being collected nightly, so internal batteries could be trickle charged, but this task took time away from other jobs. The Apples also required maintenance, particularly if they were dropped, because although the wooden structure would survive falls, sometimes memory cards popped out or joints came unsoldered.

When the pricing policy at the park changed, last year, the visitor numbers in the Walled Kitchen Garden increased and the demographic changed, resulting in some intentional damage to the Apples and pressure on the team who needed to monitor them. Consequently, the Apples have been taken out of daily use until we have decided as a team how to develop the interpretation for the changing context. This illuminated the fact that contexts change and a seemingly unrelated

change elsewhere on the property can have unpredicted impacts, including those on interpretation artefacts.

I thought the Audio Apples marked an important step in the development of the design relationship because the design required the participation and involvement of many members of the team, raising the profile of the interpretation work. The main phase of making recordings took place in summer 2015 and required the sound recordist and I to spend days on-site using a fruit store as a recording studio, which made the process visible and a topic of discussion. This prompted some volunteers to share and suggest content for the apples or other potential interpretation. One volunteer asked if he could record a poem learnt by heart at school many decades before, and it was moving to hear him recite. Another made recordings of articles from the *Wipers Times*, to remember soldiers from the garden who had fought and died in the first World War.

The Audio Apples presented the opportunity to introduce an external lens through which to re-interpret gardener's stories. Claire Dean's stories, edited by Andy Darby, showed how fiction could be used to grab children's imaginations and draw attention to the garden's past.

When the Audio Apples were installed together with the Rhubaphone, the need for someone to manage the artefacts became more noticeable, leading to the recruitment of a digital interpretation volunteer. One of the first contributions initiated by this volunteer was in the iterative development of Dean's stories, following feedback from the Gardens Team. The volunteer wrote background music and re-recorded the stories, in parts that could be split between apples to break the story into manageable chunks and to encourage more exploration in finding the apple that held the next part of the story. She also re-designed the signage because the signs I had made had deteriorated, despite being varnished and cut from marine ply. The materials used on the new signs did not fit the original design criteria, but they better met the needs of the Gardens Team.

Over time there were more instances where the philosophical design criteria did not align exactly with the priorities of the team, but Feenberg's assertion that the design should be open to the influence and change by people other than designers, was held a touchstone in these circumstances. Some of the design features that I felt precious about at the start, like the need to pluck the apples

5.6 Audio Apples Reflections



Figure 5.26: Signage: Earlier designs met design criteria set by design framework but weathered rapidly. New signage was developed by the Gardens Team as they took ownership of the installation

from the tree, later came to be seen as design weaknesses, and it was a lesson to me in seeing why openness in the design was needed in order that the design could be reshaped. The next Chapter will discuss the development of the role of the digital interpretation volunteer in more detail.

5.6.5 Audio Apples reflections: Summary

The idea of working with the orchard was conceptually strong and ties in with Ingold's "Dwelling Perspective" [66]. Cooke, references Ingold's use of Breugel's painting 'The Harvesters' to illustrate the idea of dwelling, as follows:

"The very form of the tree-tended over time, picked of fruit and situated amidst a field that has been cultivated-reveals how the life of the tree is deeply entangled with the life of the people. Moreover, as a site of shade and rest, the tree has become a 'place'; a place that was not pre-given, but that has materialized with the maturation of the tree. The relationship between the people and tree is not static or defined by a particular point in time. Nor is this relationship characterized only by a mental connection or reconnection between people and nature-it is also an intimate, physical and bodily relationship."

Cooke et al. 2016 [229]

The account of the Dwelling Perspective deconstructed through Breugel's painting resonated strongly with my observations in the garden. I witnessed the entanglements between humans and non-humans in the garden that resulted in the materialization of places. I hoped that the Listening Orchard might become a place for visitors and though the interaction may have stimulated emotional or intellectual connection, visitors are unlikely to have made a place in the trees through the listening practices, because it is too easy for visitors to be passive. They are not working as the gardeners or the workers in Breugel's painting. Nothing is required of them. Listening to the stories isn't an effortful pursuit and an extended connection over many visits is not required.

However the Audio Apples reveal parts of the garden that were previously hidden and for some visitors this was significant. As the Audio Apples played an

important part in stimulating participation in the design and creation of garden interpretation and content in the team. The impact of the Audio Apples is discussed further in the reflections Chapter 10.

5.7 Summary: Digital Nature Hybrids

In this chapter I showed how the critiques of technology from the guiding philosophy were applied to create interpretation designs with the intention of supporting awareness of nature and emotional connection to place. I introduced three of the main digital nature hybrid designs that were part of the early phase of research. These were created to answer the initial research questions about the influence of critical philosophy of technology on design, design practice and experience. The artefacts included the Nature Meditation Egg, created for my personal exploration of a woodland, to see if it was possible to create a digital design that responded to the criticisms of technology raised by Borgmann. The other artefacts described in the chapter, the Rhubaphone and the Audio Apples, were created in partnership with gardeners and volunteers based in the Walled Kitchen Garden at Clumber Park.

Using a repeating structure I established the rationale for each design and documented its iterations. The descriptions were followed by detailed reflections on each with reference to categories taken from the guiding philosophy, such as ‘commodity and standing reserve’, as well as reflections on people’s experience of use, taken from interviews and observation. The process revealed complexity because the design criteria are sometimes in conflict, and they don’t always account for the partner organisation’s needs and priorities. Another factor that emerged in the reflections was the prior experiences and intent of visitors encountering the artefacts as that also affected people’s responses to and experiences of the digital nature hybrids. The reflections showed that it was possible to design contextually relevant interpretation that caused visitors to see new aspects of the garden. If the visitor was already primed this could have a meaningful impact but for the majority of visitors the encounters were short and superficial. However, an unexpected outcome was that the process of creating the content for the artefacts had

an impact on the staff and volunteers. Through the Audio Apples people learned about their colleagues' feelings about the property and that helped to build a sense of value amongst the team in the stories they held. It catalysed discussion about the possibilities for digital and other interpretation.

Although the designs were well received they didn't achieve the degree of engagement I had hoped for and I didn't feel they had sufficient impact to significantly build connection to the garden, so I began to think about new forms of interpretation that would involve deeper connection through longer interactions. Observing the maintenance of the artefacts also raised new research questions about sustaining digital interpretation, documented in the next chapter. The findings from this research phase resulted in the formation of new research questions, which are addressed in subsequent chapters.

Chapter 6

Sustaining digital interpretation

6.1 Overview

My thesis set out to explore the impact of using a particular set of philosophies on the design of digital interpretation and the process for designing digital interpretation. As described in the previous chapter, the process involved me being embedded in the garden as a volunteer. I attended morning briefings and was party to informal conversations, as well as formal meetings and through this exposure I learnt more about the values and policies of the National Trust as an organisation and the values and capacity of the Gardens Team.

One of the issues that arose from an organisational and team perspective was sustainability. The Trust have a sustainability agenda which has been rolled out across properties, with targets for many dimensions of sustainability such as reduction in waste and transference to renewable energy supplies. Within the Gardens Team there is a culture that values sustainability. Financial resource is limited so people are careful to maintain resources and are creative at reusing materials. In part, these behaviours are ingrained because gardeners work in an environment that is constantly changing and they are used to working with the (impact of the) seasons. The longer I spent with the team the more I noticed how careful they were with available resources and this made me conscious of how I worked with the resources at my disposal. It became increasingly obvious that it

would be important to find ways to sustain the work and support the development of new work after my thesis ended. At the start of the project my tentative aim had been to develop a Pattern Language document to transmit values, design philosophy and Spirit of Place to inform the design of future interpretation, particularly digital interpretation in the Walled Kitchen Garden. Through the experience of designing in the garden I came to see that this would be insufficient to carry things forward because of the time, specialist skills and money needed to take action. My growing awareness of this issue and my concern about how it might be resolved can be seen in this passage from my reflective notes.

“The next iteration for use at Rhubarb Weekend elicited lots of mixed feelings. It has taken a long time, and I have fallen behind my timeline. The process seems to have taken me away from the direct focus of my thesis, but at the same time it is relevant, and I don’t know how it could be avoided. I have mainly enjoyed learning a new set of skills, though the pressure of the deadline has at times detracted from the pleasure of making. However, I have been dependent on lots of people - their skills, time and availability - and I have been anxious about being so dependent. People have helped with coding, audio correction and advice about materials. They have helped with physical construction including metalwork and woodwork and have made design suggestions. In some ways this has been a collaborative process. At the same time, it has made me aware of many problems that people could face trying to produce a values-led design from the ground up.

First, this has been extremely time-consuming. Every step has required iterations and tests, and many have needed the development of new skills. This is a major issue when trying to work with an organisation that already has a lot of pressure on volunteer and employee hours. (This process of iteration, testing and skill development is visible in other work at Clumber, for example the design of the Gourd Tunnel. The difference is that growing and maintaining the garden is

the primary focus, and it is determined by an external seasonal timeline, which will necessarily take precedence over other self-generated timelines.) Perhaps there needs to be more volunteers interested in different kinds of interpretation. But maybe these should be embedded like ‘artists-in-residence’, so that they are fed by the values and needs of the garden etc. (rather than being placed within the management and administration offices - which may happen).

Another major issue is cost. I put in a proposal for a budget to cover some of the costs of developing these projects. I have taken main costs from that budget and have left a little for further work. However, I have bought lots of other bits and pieces myself, and this adds up. People have given their skills for free, so this has kept costs down. Also, I have free access to workshops at Lancaster University. What happens if the people I am working with wish to realise a design without this access to resources and facilities? One answer is to apply for funding for particular projects. But this may not help the team to work out what skills are needed and where to go to find makers to work with them. One of my main thoughts in the week before installation was how much had been needed (time, skills, money) to realise a relatively simple project. I felt a bit disheartened, because I had hoped the prototype installations would act as a springboard, but in reality, I couldn’t see it continuing after I left because of the obstacles. In terms of wood and metalwork, there are plenty of people on-site who have those skills and there is appropriate equipment and spaces for working with wood and metal. I’m not sure about the extent of digital skills.” Notes 29th May 2014

Although this was quite a negative moment, it was also a catalyst. As my thesis research progressed these concerns coalesced as a new research question: How can digital interpretation be sustained in the Walled Kitchen Garden? Although this question is framed on a particular setting I anticipated it might yield knowledge that would be transferrable to other similar contexts. The question breaks down into different parts:

- Technology and sustainability in the Walled Kitchen Garden
- The practice of sustaining interpretation in the Garden

6.2 Technology and sustainability in the Walled Kitchen Garden

I considered technology and sustainability from the perspective of the sustainability of materials used and the ability to sustain the technology of interpretation artefacts, the latter becoming the prime concern. There were two main reasons for concentrating on the latter, the first being that things would fall into disuse if they weren't easy and cheap to maintain and sustain, which would be wasteful and also disrespectful to the culture of the place. The second reason fed into the first. The design choices to make things easy and cheap to maintain and sustain might limit the ability to prioritise other sustainability dimensions, like air miles travelled by components. The reality was that even if boards or kits were manufactured in the UK, many of the components that went into those kits were made thousands of miles away and using any digital components would inevitably have had an impact on the environment there through mining and production of materials. This was a point of tension, because the aim of the work was to support connection to nature in order to protect and value the natural environment, so the paradox of using technologies whose production could result in environmental damage was not lost on me. At some points in the design process I experimented with making my own components, like Tilt Switches and etched copper boards, but mainly I worked within existing technology frameworks, reluctantly accepting the inherent limitations and focussed on areas where I had more control.

In the next section I will use examples to illustrate technical considerations in respect of sustainability.

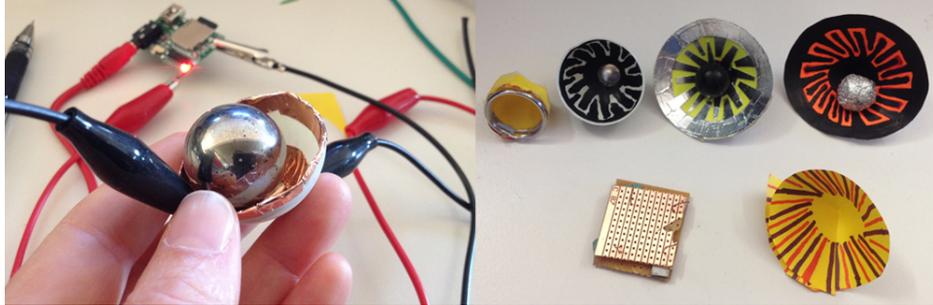


Figure 6.1: Home made Tilt Switches

6.2.1 Example 1: Rhubaphone technology

The early iterations of the Rhubaphone were made to test the concept for the artefact. The next phase involved making a more stable design, that could be managed on site by the team. As described in Chapter 5, this version used an Arduino and capacitance sensor to detect change in capacitance and a Raspberry Pi to control interaction and audio playback. Although the gardeners developed a routine that incorporated care of the Rhubaphone, (switch on in the morning and off at night, tighten clamps to adjust for the stem losing moisture, replace rhubarb after a few days and perform basic maintenance on clamps and connectors if they become loose) other adjustments were not easy in the museum room environment where the Rhubaphone was located in the first season.

Debugging required plugging in a monitor, keyboard and mouse and if changes were needed to the audio tracks another memory stick needed to be plugged in. The limited USB ports available meant using hubs. In an office environment this would have been relatively straightforward but in the museum room it was much more difficult and time consuming. Museum artefacts had to be carefully moved to create a workspace on which to balance a monitor, keyboard and mouse. Getting to the power supply involved climbing into the space behind the Rhubaphone, whilst trying to avoid triggering the sensors.

Powering up the Raspberry Pi to begin debugging took several minutes, so restarting the Rhubaphone and resetting the capacitance sensor involved waiting for the software to load and repeating the process again if there was a problem. A couple of restarts meant interruption for more than twenty minutes for the gardeners. (The sensor needed to be re-set when rhubarb stalks were replaced



Figure 6.2: Editing and debugging in situ was inconvenient due to lack of working space for monitor, keyboard and mouse.

with fresh stems or if visitors pulled out the rhubarb by mistake.) Just adding new audio to Rhubaphone’s audio folder involved a process of several steps.

This version of the Rhubaphone was used for several months but it didn’t seem sustainable because of the time it took to manage. I didn’t introduce the Python code to anyone on the team, because I felt the coding process would be intimidating for most of the team, but this decision limited the team’s control over future developments. So, the next iteration was designed as much around the team’s needs as visitor experience.

- The Bare Conductive Touch Board was designed specifically for the task of sensing changing capacitance to trigger audio tracks. Because it was designed for this purpose everything was in one single board, which meant less wiring and fewer potential points of failure in the circuit, so for the gardeners it was easier to spot physical problems.
- The micro SD card in the Touch Board, used for changing audio, was a familiar technology because it resembled memory cards commonly used in

cameras and mobile phones.

- The coding environment for the board was Arduino, an open source language with a big support community and most significantly it was developed for artists and others with no other coding experience.
- The Bare Conductive Touch Board loaded almost instantly, so restarting after changing the rhubarb only took a second or two, rather than many minutes.
- Editing code on the Rhubaphone needed one long cable to connect to a laptop and although working in the shed wasn't as easy as working in a lab, the Bare Conductive Touch Board required fewer peripherals.

The upshot has been that the Rhubaphone became more reliable. The team were able to change the audio and create a new trail activity around the Rhubaphone. A volunteer has begun to transfer the principles and code to create a completely new interactive installation about herbs. The choice of technology makes the artefact more easily manageable by the team, and worth maintaining. The technology choice meant that no expensive software was needed, so anyone interested could get involved, and the gentle learning curve for Arduino meant that the team could envisage how they might use the technology for new displays. This has the potential to increase the life of that technology in the garden. From a sustainability perspective it means the technology may be kept in use longer and not abandoned or sent to landfill.

6.2.2 Example 2: Audio Apples

The technological sustainability of the Audio Apples was broken down into cost and ability to maintain and sustain.

- The technology for the Audio Apples was designed to be cheap and modular so parts could be replaced. If the technology was prohibitively expensive the artefacts would inevitably fall into disuse. The audio players were hacked from very cheap mp3 players and the tracks were controlled by Arduino

minis with copper shields cut ‘in-house’. The shields couldn’t be purchased off the shelf, but a batch were supplied for running repairs and new Audio Apples. If parts failed they could be cut out and replaced, so the working sections would be conserved.

- The Audio Apples were programmed in the Arduino environment because this language was used for the Rhubaphone and would therefore be easier than a completely new language. The aim was to enable consolidation of knowledge and skills.
- The audio content was stored on SD cards, familiar from the Rhubaphone, and also from the use of everyday mobile phones and cameras. The design was intended to ease the process for changing content for the team.

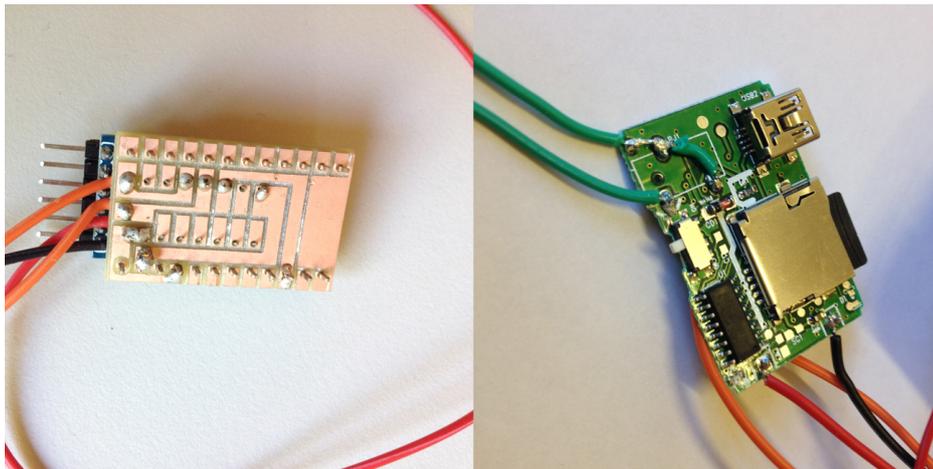


Figure 6.3: Cheap, replaceable parts: cheap mp3 player with SD card and copper boards cut in house to reduce costs.

The upshot of these decisions was that a volunteer learned how to solder the components to make new Audio Apples from scratch and to run through a debugging sequence to identify and fix problems. The volunteer took control of the maintenance for the Audio Apples and made changes to content over several months, so the principle worked. However, the biggest failure with the Audio Apples was their lack of robustness and their opening/closing mechanism. Audio Apples were frequently dropped and though the wooden outer, mp3 player, SD

card and microprocessor survived these falls sometimes a wire would be disconnected, or the SD card would pop out of the holder. In itself, the fixing job was usually easy and quick but getting to the inner part of the apple meant cutting away a sealant band and then re-sealing afterwards, and these were fiddly and time-consuming jobs. The team is in the process of re-evaluating the design and use of Audio Apples.

The examples above illustrate design decisions intended to sustain the technology on which the artefacts run. The next session addresses practicalities of sustaining technologies.

6.3 Exploring ways to sustain interpretation

As exemplified in the section above, the selection of digital materials can influence the ongoing use of designed artefacts. However practices also play a part in how interpretation lives or dies.

As explained in Chapter 3, I had anticipated running co-design workshops to involve the team of gardeners and volunteers with all phases of the design process, from criteria setting, ideation, and development of concepts, to prototyping and production, because I adhere to the view that people who will ultimately live with the designs are experts of their experience and their spaces [230]. I wanted to promote design and making skills so that the people connected to place had the power to realise their ideas for digital interpretation. I found this wasn't practical, so I looked at other ways to work with the team to develop and sustain designs.

In the passage from my notes at the start of this chapter I speculated about possible ways to develop digital interpretation, including making joint bids to fund interpretation and finding volunteers interested in interpretation who would be “embedded like ‘artists-in-residence’” so they would be “fed by the values and needs of the garden”. Although this is in my notes from 2013 and must have been in the back of my mind it slipped out of consciousness and it wasn't until 2016 that we recruited this kind of volunteer. In the meantime, we discussed and tried other options.



Figure 6.4: Modes of volunteering: Design student project

- We considered setting up a designer-in-residence programme, because of the ideas and practices that external people bring that can be seeded and cross-pollinated with existing activities in the garden. The team previously brought in artists, Nu Urban Gardeners, to lead a one-day wassailing ceremony in the garden to draw attention to traditional garden folklore and seasons. (Wassailing is a traditional activity to ‘wake up’ apple trees and warn off bad spirits. The traditional practices were adapted for the contemporary context and included music, ritual and performance.) There is a financial cost to these activities, so a funding plan needs to be developed in tandem. Also, designers-in-residence and visiting artists, designers and practitioners are not permanently embedded in the garden. They may come with other agendas and aims for short term relationships, that have varying degrees of coalescence with the aims of the team and Spirit of Place. Through negotiation these may be aligned, but it can take time to develop nuanced understanding of context and values. During the research we did not work with artists/designers-in-residence for the reasons above, but at the moment discussions are in place to establish a two-year residency with an artist already based in the grounds of the property. The artist is familiar with the site, its spirit and values and the length of the potential residency addresses some of the challenges of shorter residencies.
- I attended a Volunteer Coordinator meeting and learnt about the new modes of volunteering within the National Trust. These include micro-volunteering, volunteering holidays, virtual volunteering, work experience

and placements. I thought about how I could potentially bring in other volunteers through the project, for example from universities, or community groups. To try this we brought a mini-bus full of undergraduate students to the garden from a design department in a university, to see if there was interest in collaboration that would also contribute to coursework. Some students were very enthusiastic about working with the Gardens Team, but only one persevered with repeat visits and delivered. The student delivered some useable short films for a Walled Kitchen Garden YouTube channel and he made a prototype for an installation that was well received, but ultimately more time was needed to refine the designs with the team. The student graduated and found work so was no longer able to continue as a volunteer designer. Location was an inhibiting factor in maintaining the connection.



Figure 6.5: Designs driven by the Gardens Team: Nursery Rhyme Telephone and tree face created by a gardener

- I worked on projects initiated by the team, including a student gardener's project to design a garden for children, a travelling shed for outreach work, and some other projects for the museum rooms, including lighting for a memorial to gardeners lost in the First World War. I viewed this as a step between me creating designs that responded to the team and garden, and the gardeners creating their own designs. The collaboration with the trainee

gardener worked well until the garden was vandalised and the trainee moved on to other employment. The trainee made the non-digital interpretation and had plans for the digital interpretation which included flower-pot-on-a-string-listening-devices (to mimic the idea of a string and cup telephone), an interactive audio bug house, and a hacked button telephone to dial up nursery rhymes and songs about gardens sung by local primary school children. The shed was a success that has since been incorporated within the garden and developed by a volunteer. Some of the other projects initiated by the team appeared beyond the scope of my thesis and I felt unable to give them sufficient time. In retrospect, I think these projects could have been given more time.



Figure 6.6: Travelling Shed developed for outreach and promotion activities

- We tried to recruit for internships and summer schemes. The gardeners attended college careers/recruitment/open days trying to recruit students with an interest in digital technology and maker culture to work in the garden. The team offered a summer internship, which was unpaid but

included free accommodation in the grounds of the property. I circulated the details at selected universities and though there was tentative interest from a couple of people we didn't recruit.

- In 2016 we recruited a volunteer who loved the garden but didn't want to volunteer as a gardener. She had a background in education and performance and wanted to bring her skills to the team. She hadn't much experience with microprocessors and interactive digital technologies but was keen to learn and she had strong skills in audio composition, audio production, editing and physical making. Three years after speculating about creating roles digital interpretation volunteers based in the garden the plan came to fruition.

6.4 The practice of sustaining interpretation

Finding a volunteer who is a part of the Gardens Team, but who works across digital and other media has been significant for maintaining and developing new ideas. Embeddedness is key because it means the interpretation volunteer is party to team conversations about plans and priorities for the garden and everyone has come to know her through team briefings and her presence on site. This means she knows the garden from the inside and can design in a way that is sensitive to context.

We have worked closely together, and I have tried to manage the knowledge transfer incrementally. I did a show and tell of artefacts and talked about the guiding philosophy for the initial artefacts. Early in the process I lent the volunteer a spare Bare Conductive Touch Board to play with because I thought it was the easiest entry point for digital technology. The volunteer began working on tasks that brought her skills to the fore. She re-recorded the children's stories with a soundtrack and broke the story into three parts that children could search for in the orchard. This built in more exploration and required shorter periods of concentration, making the activity more accessible. The volunteer redesigned the signage for the orchard. She took control of the deployment of the Travelling



Figure 6.7: Poster for recruitment event

Shed in the glasshouse, creating graphics and audio for a rhubarb trail that ended at the mini Rhubaphone. The volunteer learned to maintain the Audio Apples and Rhubaphones and consolidated those skills in the development of a new piece of interpretation that used a Touch Board, like the one in the Rhubaphone.



Figure 6.8: Travelling Shed reconfigured as a focal point for interpretation in the glasshouse

The volunteer continues to develop interpretation in different forms. She was given a budget for electronics, tools and has established a workspace and place on site to store the tools. During write-up I had little time to visit the garden and wondered whether things were well enough established to be self-sustaining. I visited the garden in the early summer of 2018 to interview two gardeners and the interpretation volunteer to find out if my reflections on the

experience of working together matched theirs and also to find out more about continuity and future development of interpretation in the garden, which speaks to questions of sustainability. These reflective interviews, which include discussion of sustainability are discussed in Chapter 10 (Reflections on collaboration with the Gardens Team) but one finding is that the interpretation work is ongoing and is driven by the team and the interpretation volunteer.

The next chapter diverts from the current trajectory and it may feel like a jump because it returns to an earlier line of research. This is the challenge of recounting a non-linear or multi-linear narrative. The initial phase of research into the design of digital technologies for interpretation stimulated several new research pathways. One path, (discussed in this chapter) related to design practices to sustain projects beyond the end of funded research.

Another parallel path reflected on the outcomes of the initial research into digital interpretation and revisited the theme to address perceived weaknesses or failings in the earlier designs. The following chapter, Digital Boggarts (Chapter 7), is concerned with this parallel research thread.



Figure 6.9: New configuration of Rhubaphone and Audio Apples for a fund-raising drive for an Education and Interpretation Hub. This new phase of work is an innovation of the Gardens Team.

6.5 Summary: Sustaining digital interpretation

This chapter marked the point where the research evolved from the initial questions. The understandings about the site revealed through the Research through Design process led to the emergence of new questions including, ‘How can digital interpretation be sustained beyond the length of a funded project?’

In this chapter I considered the sustainability of the digital interpretation technologies. Sustainability is important if the designs are to live properly within the site and align with the organisation’s values (in other words to fit comfortably the context).

This chapter described two approaches to sustainability, technological and practice-driven. It reflected on the inherent challenges and the approaches that have been most successful.

Even if one were able to design all the interpretation technologies ‘in-house’ there would still be an environmental impact because of the transport of components. Ultimately it was decided that sustainability was best achieved by making the digital interpretation useful and practical so it was kept in use and not abandoned, creating waste. Technologically this presented two ways forward. The first involved using cheap, modular technologies that could be hacked so that broken parts could be replaced. The second involved using robust technologies that were accessible for people with limited technological experience. In the chapter I described examples of both options.

The second dimension to sustainability related to the practicalities of how things could be maintained and developed, and who would do this work. In the chapter I described the many strategies attempted. This included the approach, which was adopted, of recruiting an interpretation volunteer, trained to use the technologies and based in the garden.

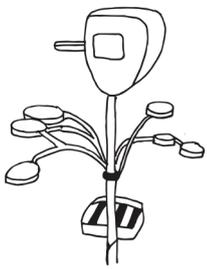
The next chapter also addresses a new research question that emerged from the reflections on the Digital Nature Hybrids. It forms a diversion from the narrative about the pre-installed Digital Nature Hybrid interpretation, in order to present a new means of creating interpretation and encouraging more active participation in the garden.

Chapter 7

Digital Boggarts

This chapter will show how the insights gained from the initial designs illuminated new directions for investigation, initiating a new phase in the design process. It will begin with a brief recap of the salient reflections from the first designs at Clumber Park and will describe the design journey from those reflections to revised design criteria. This will lead to a description and reflection on the Digital Boggarts project.

The following diagram gives an overview of the Digital Boggarts project. The top of the page shows four of the main influences that inspired the project. These influences come from the earlier research phase, as well as events and literature beyond the work at Clumber. These influences, and others, are detailed in sections 7.9.1, (The influence of Ambient Wood) to 7.1.6, (The influence of the 2015 Research Through Design Conference) inclusively. The illustrations in the middle of the diagram show iterative development, discussed in sections 7.2 (The development of Digital Boggarts), 7.3.1 (Initial considerations), and 7.3.2 (The internship). The bottom half of the diagram shows the activities that ultimately comprised the Digital Boggarts workshop. These are detailed in sections 7.3.3 (Implications of digital material exploration), 7.3.4 (The workshop) and 7.4 (Discussion of the workshop).



INFLUENCE OF AMBIENT WOOD

Similar concerns:
digital hybrids, extending senses,
active engagement in an outdoor
setting, avoiding the dominant
pull of technology on attention



INFLUENCE OF PREVIOUS WORK

Value of personal stories and
voices, Material sensitivity,
Designing for context



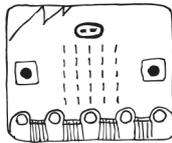
**INFLUENCE OF NATIONAL TRUST
BOGGART-MAKING**

Designs that respond to place
Artefacts as carriers of story

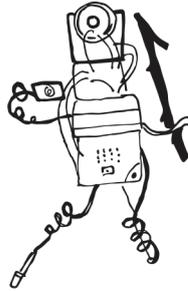


INFLUENCE OF NATURE MINDFULNESS

Paying attention to nature at
different scales.
Micro-climates and micro-environments
Focussing attention. Constraints
as a value. Time.



DIGITAL MATERIAL:
BBC Micro:bit
Designed for work with
schools + distributed
across the U.K.



HYBRID MICRO:BIT BOGGARTS:

Digital nature creatures to
disclose the garden.
Characters that represent particular
habitats in the garden.

TENSIONS:

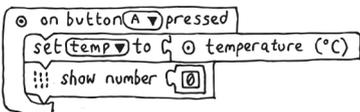
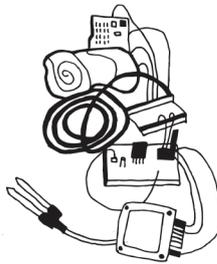
Uncomfortable material juxtapositions.
Fragile. Limited sensing capability.
Time consuming construction. Limited
connection and storage capacity.

DIGITAL BOGGART ECOSYSTEMS:

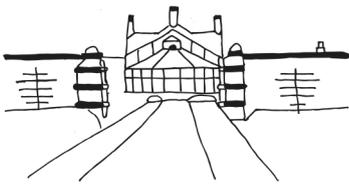
'Smart' Arduino boggarts that hold and
share data. Located in the garden.
'Dumb' boggarts that switch on smart boggarts.

TENSIONS:

Fragile. Maintenance beyond workshop,
Participants disconnected from programming.



PROGRAMMING MICRO:BITS IN SCHOOL

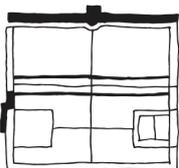


GARDEN TOUR



DIGITAL BOGGARTS WORKSHOP:

Workshop for Year 5 students
½ day in school
1 day in Walled Kitchen Garden



MAPPING INFORMATION IN THE GARDEN

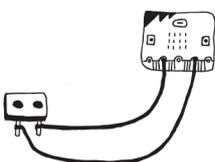


Multi-layered approach incorporating
programming, garden tours,
exploration and sensing, story-making,
digital boggarts to share stories,
and reflection.

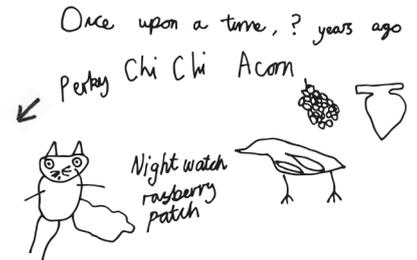
Opportunities for different kinds of
sensory connection.

Reflection, collaboration, imagination.

A new form of interpretation of
the garden.



USING MICROBITS TO EXPLORE THE GARDEN



STORY-MAKING



DIGITAL BOGGARTS INCORPORATING NFC TAG



REFLECTIONS ON THE WORKSHOP



Figure 7.1: Digital Boggarts overview.

Reflection on artefacts and design process is inherent in RtD and reflection iteratively provokes the creation of new designs. Gaver describes individual artefacts occupying a “point in the design space” [184]. He argues for the use of annotations of a collection of designs to establish an area in the space and clarify the dimensions of that space. In this way he sees possibilities for making theoretical contributions without abstracting or generalising in a way that obscures the ultimate particulars of individual designs. The image of designs occupying points in space resonates. I imagine points of light on a map, each point illuminating a small area. The more points of light in close proximity the more the territory is revealed. Each design in the series of designs that form the research programme [184] of this thesis, contributes knowledge in response to the research aims and in turn prompts new research questions leading to new designs which build a picture in the space of inquiry. Earlier chapters outlined the first underlying theoretical lens, and initial designs and insights from those designs; the first points in my design space. Digital Boggarts was intended to further illuminate the research space.

Data gathered through observation, semi-structured interviews and conversations indicated a positive response to the hybrid artefacts from visitors, volunteers and gardeners and my personal reflections were positive in respect of the way the designs fitted the garden location, revealed hidden facets of the garden and supported multi-sensory engagement. However, I felt that the designs failed to achieve some of the initial objectives that emerged from the theory. Although visitors reported that they liked the interpretation and found the designs “fun” and “novel”, the artefacts didn’t engage the majority of people for extended periods of time. Some people listened to all the Rhubaphone recordings in full and a few listened to all the Audio Apple recordings, but the majority listened to audio fragments from a few of the Rhubaphone recordings and a single audio recording in the Listening Orchard. The length of interaction with the installations was less than five minutes for many visitors. Short interactions can have a lasting impact on an individual, but these engagements were fleeting and seemed too

insubstantial to nurture a relationship to the place. If a visitor chanced upon the particular story in the Audio Apples that ‘spoke’ deeply to them or caused them to pause and reflect on the garden and their place in it, it was possible to achieve an emotional impact that might seed an emotional memory and connection to place. Occasionally interviews hinted at the Apples as a seed for initiating deeper connection with the garden, but the people who reported the Apples in revelatory terms were often primed for deep engagement because of prior experiences or existing values. This suggested that if people came to the Apples in a frame [134] where they were receptive to connection they might find it with the Apples, but the engagement alone probably wasn’t robust enough to establish a new connection. However, it would be necessary to conduct a longitudinal study with returning visitors to understand this fully.

Although the designs stimulated senses, they did not require effortful engagement advocated in Borgmann’s writings. People could experience the artefacts superficially. They could pluck an Audio Apple, “consume” a few seconds and move on to the next, like someone picking their way through a selection box of chocolates. The activity didn’t require the kind of commitment through which the garden would be bodily and emotionally inscribed on the visitor. As established earlier in the literature (Chapter 2) placemaking can’t be forced because it describes a relationship and it isn’t possible to determine a human relationship. Nonetheless it is possible to create and nurture a culture which allows places to shine and show their spirit and true selves and this can kindle a bond.

Reflecting on the designs for Audio Apples and Rhubaphone together with the theoretical grounding, I identified criteria that I thought would increase the potential for connection to the place and resolved to ensure the design met the following criteria:

- The design should require more effort and active participation from participants.
- The design should require more time spent in the garden.
- The design should create a layered experience, targeting physical, cognitive and emotional dimensions, with the aim of creating more opportunities

for making personal connection with the garden, recognizing individual responses to stimuli.

7.1 Influences on the design development

7.1.1 The influence of Ambient Wood

Early in the design process, the initial prototypes were introduced in a Work in Progress paper accepted for the Designing Interactive Systems Conference [231]. A review of this work pointed to a research project, led by Yvonne Rogers [232] that brought scientific education and digital technologies out of the classroom and located them in a woodland with the aim of showing how pervasive technologies can integrate learning in different settings. The team produced several digital artefacts that were used to support a computer enhanced field trip. These included; The Periscope [233], a Local Area Network (LAN) enabled video display, incorporating an RFID reader, which showed content by rotating a periscope column; the Ambient Horn [234], a handheld device that transmitted sounds representing ecological processes; PDAs enabling input from external contributors; and probes for taking readings from the environment.

At the time of the review the paper seemed interesting but not directly connected to my research. Rogers' paper was education-oriented and focused on the contribution to science education of a particular way of working and a particular use of technology. As time passed, especially after the installation of the artefacts at Clumber Park, the papers produced by the Ambient Wood research team gained greater significance because the research overlaps came more clearly into focus. Some of these overlaps are detailed below.

Ambient Wood sought to support learning through active engagement in an outdoor setting to reveal characteristics of the woodland that might otherwise go unnoticed. "Physical engagement with something creates an involvement and activeness in learning that passive listening or watching does not." [232] In part the work was about the connection between physical and cognitive processes towards

enhanced learning, but it also resonated with aspects of the philosophical framework used at Clumber Park that emphasized the need for sensory engagement with the environment. One of the ideas behind Ambient Wood was that creating “a more intimate relationship with the abstract data” [232] by “knowing how they were physically created” [232] could “trigger strong associated memories” [232]. The desire to make information meaningful by connecting it to context tied in with placemaking theories that informed the designs at Clumber.

Ambient Wood addressed the tensions that arise when introducing digital hybrids, like the Periscope, [233] into a natural environment. In contrast to the approach at Clumber, the team decided to actively move away from their original intention to integrate the Periscope into the environment. Although the design echoes natural curves and organic shapes it was presented as an alien technological incumbent. The authors’ deliberations over “harmonious” and “discordant” design reflected some of the considerations and dilemmas in the design of the Rhubaphone and Audio Apples.

Another shared consideration was the desire to enhance an experience in nature in a way that avoided treating nature as a product to be harvested, and resisted superimposing technology in a superficial but dominating way. They kept technologies in check through careful design, but the authors acknowledged that technology continued to exert a pull on participants.

I was struck by how the technologies set up a way of being that emphasized discovery, exploration and attention, through which children gained a deeper understanding of place. The technologies appeared to increase a sense of embodiment, even though this was achieved artificially through technological superpowers that ‘virtually extended’ vision and hearing. It was as though the augmented sensing devices switched on the children’s attention to sensory stimuli, causing them to perceive the world differently. Ambient Wood showed that technologies could be used to amplify and extend senses. McLuhan [60, 228] refers to the ‘translation’ effect, whereby different senses are extended, depending on the dominant sensory outputs of different media channels.

I wondered if I could use Digital Nature Hybrids more effectively to amplify senses and promote more sustained and active engagements, of the type described in the Ambient Wood project. I wanted to explore the characteristics of Digital

Nature Hybrids further and was interested in making hybrids that opened up emotional and subjective understandings of place through the use of the stories, character and designs rooted in place. Children involved in the Ambient Wood project were given the tools with which to explore the woodland. I speculated that involving participants in the process of creating the tools they would use for exploration, would provide opportunities to talk about all the aspects of the garden that were unknown and might be explored.

7.1.2 The influence of Nature Mindfulness

Ambient Wood made me reflect on the use of technologies to promote more active engagement and attention in an environment, over an extended period of time. I was reminded of another activity that produced a similarly focused experience in nature, but involved no digital technologies. In my first two years at Lancaster University a student within the Centre for Doctoral Training led 3-day Nature Mindfulness retreats in the Lake District. One of the activities involved spending dawn till dusk alone in a 10m area, without food or digital technologies. The spatial and temporal constraint enforced or encouraged a different relationship to the environment. I found I paid attention in a different way. The enforced pause gave time to attend to the surroundings at different scales.

My gaze alternated between things in my immediate field of vision and the far horizon. I looked close up at the shape of seedheads and the movement of grass stalks and I looked far over the landscape at wild ponies grazing and weather fronts passing and in this way I gained an intimate sense of place.

I reflected on this in light of the work at Clumber and wondered how Digital Nature Hybrids could be used to reveal the garden at different scales to uncover other interrelationships and dependencies. I reflected that the next iteration of designs should help the visitor get to know the garden more intimately, in part through helping to sustain longer and more focused activities in the garden.

On the face of it Ambient Wood and the Nature Mindfulness activities seem decidedly different; one is scientific and technological and the other spiritual and contemplative. One is active and the other depends on stillness, but both are revelatory and involve time spent in a place, attending to the environment and



Figure 7.2: Sketch drawn on Nature Mindfulness retreat

its ecology. Both involve ‘getting to know an environment’ in ways that can build meaningful connections.

Given that a similar relationship can be achieved without technology one might question the justification for using technology as a route to building a connection to place, especially when technological interventions in rural locations can be experienced as barriers. Coeckelbergh [235] refers to attempts by people to try to “reenchant the world” and “get closer to nature” by rejecting science and technology, though for him “technology does not exclude wonder and mystery” [235]. This thesis seeks to explore what technologies might offer to enhance the interpretation of natural places and whether they can be designed in ways that avoid all-consuming tendencies, especially if they have been designed specifically to fit rural rather than urban settings. Some people will take part in activities in rural environments that are unmediated by technologies, but hybrids have the potential to engage new audiences who feel more comfortable and familiar with digital technological mediation.

7.1.3 The influence of National Trust Boggarts

Boggarts are ‘spirits’ or folkloric creatures associated with a place, like hobgoblins or brownies, though unlike brownies, Boggarts can be mischievous or malevolent, as well as helpful. A number of National Trust properties run Boggart-making workshops using natural materials, some of which are collected from nearby woodland.

Traditional tales about Boggarts can be found across the United Kingdom making them a useful ways to talk about place, nature and history. Often the stories have local variations, such as The Farndale Hob, which has versions from Yorkshire, Lincolnshire and Northamptonshire, the counties surrounding Clumber Park. The fact that geography is important to their identity means they might be thought of as ‘spirits of place’, suggesting a symmetry with the concept of Spirit of Place used by National Trust to convey the unique character of individual properties.



Figure 7.3: Boggart made on National Trust workshop

Although Spirit of Place is mostly used to talk about a whole property or its

most significant qualities I thought the principle could work on a much smaller scale to draw attention to the heterogeneity within the Walled Kitchen Garden. Boggart spirits of a place offered opportunities to explore ‘Spirit of Place’ at a micro level. They could set into sharp relief the different areas in the garden and through comparison draw out the individual character of places like the Fruit Garden, Rose Garden and Glasshouse to make these places present to the visitor. The idea of attending to the Walled Kitchen Garden at a micro level resonated with the experience at the mindfulness retreat in the Lake District, where time spent attending to a tiny area of land created intimacy and made it present.

7.1.4 The influence of story

Claire Dean wrote two site-specific children’s stories for the Audio Apples, “The Scarecrow and the Garden Boy”, and “The Weeder Woman”, (See Appendix B and C) which had an impact on my thinking about future designs.

The scarecrow story was designed to take the listener on an auditory chase around the garden using magical props to subtly hint at real things that might be seen by visitors on a walk around the garden. A careful listener can follow the route taken by the story’s protagonist. Listening to the story made me think about the particular essence of territories within the garden. In the past, the household had to be self-sufficient which meant they depended on meticulous land management to stagger food ripening and avoid glut and paucity. Although the garden has changed substantially since early days the microclimates remain giving areas in the garden a different character. Somewhere in my reflections on this and the Mindfulness workshop I began to think about Boggarts living in these different parts of the garden and I started to ask the question, ‘Who would live in a place like this?’ for all the microclimatic zones. The Walled Kitchen Garden was planned so as to create microclimates, along the walls and sections of glasshouse, to manage food production throughout the year.

The second story, ‘The Weeder Woman’ was located in a small section at the top part of the garden where the glasshouse meets a section of the orchard. It used magic and fantasy to create a rich depiction of the real orchard. In the story, ‘The Weeder Woman’ was rewarded because she paid attention and

noticed the garden creatures and living things. Though written as a fairy tale it can be read as an allegory conveying the idea that the attentive visitor will be rewarded, perhaps through unique, personal encounters and experiences. Both stories reveal realities of the garden past and present using fiction. The process of writing the story involved spending time in the garden and with it building familiarity. The author walked in the garden, talked to gardeners, sat in different parts of the garden, drew pictures of trees and plants and made multiple maps. The process of writing the story involved immersion in the space. The creative process required careful thinking and imaginative leaps incorporating reflection. It involved paying attention and being aware of experiencing the garden using all the senses; touching, smelling, tasting, feeling and seeing. Dean's work provided two insights. The first was the possibility of using fiction to talk about things based in fact. The second was the value of the writing process as a way of coming to know a place.

7.1.5 The influence of the 2015 Research Through Design Conference

At the 2015 Research Through Design Conference [236, 237] I was excited by the materials research in several presentations including Norris's "Making Polychronic Objects" [238], and Peeters, "Reflections on designing for aesthetic engagement" [239], and I reflected that this attention to material characteristics was underdeveloped in some of the Clumber designs. Although the iterative design process involved material investigations, these were problem-driven rather than possibility-driven.

I had used materials exploration when confronted with a design challenge such as powering the Audio Apples or joining halves of the Audio Apples, but discussions at the conference reminded me of the possibilities of starting with materials. I wanted to explore to discover the material qualities and possibilities presented by some technologies in order to tease out the design, rather than exploring materials just to solve problems. This was another consideration at the start of the new phase of design.

7.2 The development of Digital Boggarts

The influences from Ambient Wood, the Nature Mindfulness retreat, Natural Trust Boggart-making and Dean's stories, in parallel with reflection on the Rhubaphone and Audio Apples led to the development of 'Digital Boggarts: Understanding microclimates in a National Trust Garden' (abbreviated to Digital Boggarts). The aim was to explore the potential for Digital Nature Hybrid Boggarts, creatures with special powers, to act as guides to the garden through their ability to sense the environment and draw attention to the Spirit of Place. The idea might seem contradictory because Spirit of Place should be felt and shouldn't need deconstruction or signalling, however as explained in previous chapters, it is possible to be in a space without really noticing it or making connections, especially when the environment is unfamiliar, and the interrelationships are not immediately perceived. Usually Boggarts are associated with areas or villages but I wanted to connect them with much smaller patches within the garden, in order to reveal different micro-climates, micro-environments and ecological interrelationships.

One shift from the previous work was the focus on a particular audience. The earlier designs were designed for general audiences that might include adults or children, (though Dean's stories were written for primary age children to address concerns that the content on the Audio Apples wasn't suited to a younger audience). I wondered if children might have a different relationship to place if they designed their own technology-nature hybrids for exploration. This was the seed for the Digital Boggarts project. I decided to frame the work as a school's project, as a way of directly targeting people who were not necessarily National Trust members, and who would potentially cover a wider demographic than the current visitor population. However, I hoped that the activity would be designed in a way that it could also be run with families as part of a National Trust activity offering for holidays.

The work was funded through a summer Internship and a successful EPSRC Impact Acceleration Account bid for creating an organisational framework to bring together computing and storytelling with environmental education. The Gardens Team at Clumber Park was a named partner and the bid included two

others, Claire Dean and Andy Darby. Both had spent time at the site, knew some of the Gardens Team and had contributed to earlier work. We iteratively formulated an activity plan, starting with identifying appropriate technologies and relevant curriculum aims.

7.2.1 Initial considerations

At the start many of the project parameters were pending. The technologies, workshop, and exact age range of children had not been settled. Early discussions focused on upper primary school age range because the children were still comfortable with stories and magic. After conversations with a researcher about the new Computing Curriculum we began to consider BBC Micro:bits as a base technology from which to build hybrid Digital Boggarts, because they were created for children to use, were more versatile than other technologies designed for a similar ability, such as Cubelets.

Micro:bits offered the option of a Scratch-like visual editing environment and had traction because all Year 7s were about to be given Micro:bits as part of a nationwide initiative to promote computing.

We presented the idea to a Computing at Schools (CAS) group at Lancaster University who gave favourable feedback and suggested the project might fulfil the Key Stage 3 Computing Learning Outcome to

“undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users.”

We had made a decision that story creation should be part of the Digital Boggart activity and we were concerned that Year 7 students might not participate as wholeheartedly in this activity as primary school students. However we weren't sure the coding was appropriate for a younger group, so we left decisions about the exact age group open until we had done further experimentation.



Figure 7.4: BBC Micro:bit

7.2.2 The Internship

With these ideas and uncertainties in mind we began an exploratory design phase. An undergraduate intern was employed to work on the project, with the particular emphasis on material investigation.

The intern visited the Walled Kitchen Garden to understand the underlying values and design principles. Then he began to experiment with different sensors, microcomputers, motors, power supplies, screens and other technologies to see what they offered. He concentrated on technologies that would reveal aspects of microclimate such as temperature, light, rain, soil pH and humidity and technologies that would show other characteristics of a place including noise levels and movement. The majority of time was spent investigating Micro:bits, but he also scrutinized Arduinos, Bare Conductive Touch Boards, Raspberry Pis, Lilypads, Cubelets and their associated programming environments.

Boggart constructions combining natural materials were tested, and two primary school children, one in Year 5 and the other in Year 4, were invited to make Boggarts to see if they enjoyed the activity and could manage the requisite technical skills.

7.3 Initial reflections

The material investigations proved useful in shaping our design decisions for the Boggarts activity. Some of the findings are summarized below.

7.3.1 Micro:bits negatives

- Micro:bits' on-board temperature readings were unreliable because they were calculated from the temperature of the silicon die on the main CPU rather than from a dedicated sensor.
- If a Micro:bit's processor worked hard, or if the silicon die was covered, internal temperature readings could be incorrect though temperature changes were broadly consistent.

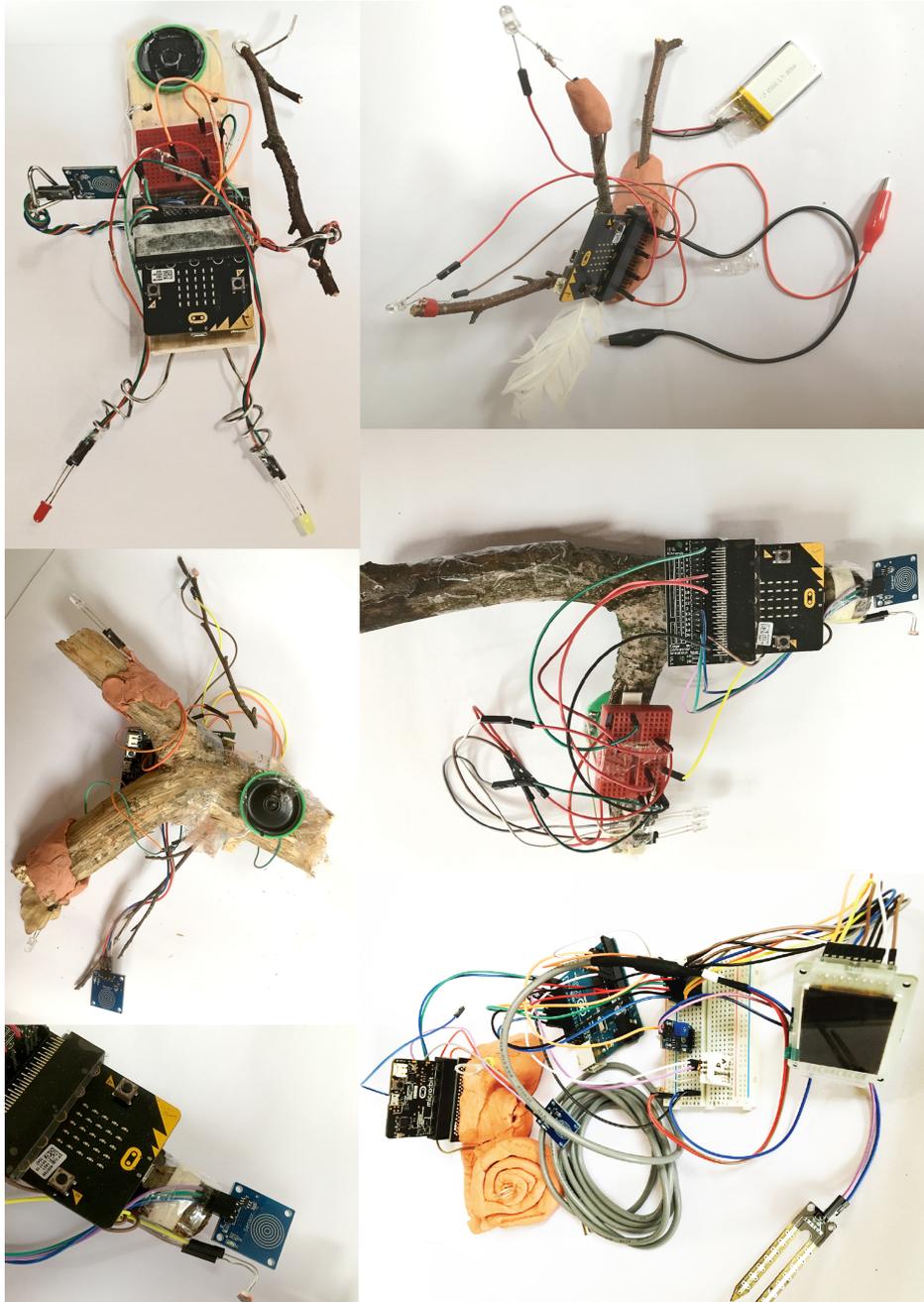


Figure 7.5: Digital Boggarts: Initial technology and material tests

- Micro:bits didn't easily network
- Micro:bits couldn't store data
- The LED configuration on the micro:bit was good for drawing icons but wasn't very legible for text
- By default, Micro:bits only had 3 analogue input/output pin connectors which limited options for sensing and displaying environmental information.
- Edge connector increased the bulk of the micro:bit and made hybrid integration difficult because pin access was reduced.
- Micro:bits had only recently launched and there were fewer specifically configured accessories than for Arduino hardware.
- Sensor readings could take significant time to update on micro:bits.
- Arduino offered far more possibilities but was less immediately accessible to the user group.

7.3.2 Micro:bits positives

- The small size, light weight and thin profile made them practical in 'field' settings.
- The friendly face-like screen gave them an anthropomorphic quality, appropriate for a Boggart.
- Micro:bits were easy for little hands to hold and were also easy to wire because of comparatively large analog pins.
- Micro:bits could be programmed using different computing languages and could be edited with block editors that would be familiar to many primary school children.
- The inbuilt compass was useful for showing the importance of aspect on microclimates.

- Their form made them easier to incorporate in hybrids than Arduinos or Cubelets.
- Micro:bits offered more potential for sensing and exploring an environment than Cubelets or Touch Boards and an easier coding environment than Arduino.
- Primary school-age children were able to work with Micro:bits.

7.3.3 Implications of digital material exploration

Our early plan revolved around children making hybrid digital nature creatures inspired by the garden in order to discover more about the garden.

Children would have creative ownership, deciding on their Boggart's design features, character, and special powers. The Boggarts would be kept by children and brought to the garden. On every visit to the garden they would unlock hidden stories or offer opportunities for exploration, particularly of microclimate. The Boggarts would be able to share information with each other, so a visitor with a Boggart could contribute to a bigger picture of places in the garden that would get clearer over time.

The knowledge generated from the intern's explorations muddled this vision. Increasingly it appeared that one technology could not achieve all the early ambitions. In addition, the rectangular and rigid form of many technologies seemed incongruous when juxtaposed with the curved irregularity of natural materials when joined as hybrids.

We explored several ways forward, such as using 'smart' Arduino sensing hubs in the garden, woken by robust but 'dumb' Boggarts, but ultimately, we settled on a plan to separate the digital technologies for exploration from the digital technologies for story sharing. We decided to use Micro:bits and sensors for the discovery activities, which removed the hybrid aspect, but made the creations less fragile and a realistic design prospect for a short workshop. The hybridity was retained in the Boggarts, but the technological aspect was reduced to an NFC tag embedded within the Boggart's body. The Boggarts design combined

Table 7.1: Workshop Programme**Day 1 (afternoon):**

Introduction to Micro:bit

Learn to programme Micro:bit to read temperature, humidity and direction.

Learn to wire Micro:bits to temperature and humidity sensors.

Day 2:

Garden tour led by Gardens Team

Mapping and sharing discoveries

Digital Boggart making

Story making

Story recording

Garden reflections and drawing from observation

Sharing story recordings with Boggarts

quick-drying clay with materials pruned from different parts of the garden, to create characters that reflected their home environments.

7.3.4 The workshop

This section summarizes the workshop activities and preparation. A primary school teacher, who volunteered in the Walled Kitchen Garden, offered her school for the pilot. The school was ideally positioned less than 30 minutes from Clumber. We offered 12 places on a day and a half workshop to children in Year 5 or 6 and the school arranged to send pupils from two Year 5 classes with a near even number of boys and girls. Form teachers who were not involved in the workshop selected children on the basis that they would benefit from the computing and outdoor challenges on offer at the workshop.

We ran the Micro:bit programming activity in school to maximise activity time and reduce costs but all other activities were run in the garden and glasshouse at Clumber Park.



Figure 7.6: Digital Boggarts Workshop: Programming Micro:bits in school and exploring the Walled Kitchen Garden



Figure 7.7: Digital Boggarts Workshop: Making Digital Boggarts, recording stories in the garden, editing audio, triggering Boggart story, drawing and writing reflections

7.4 Discussion of the workshop

7.4.1 Overview

Our initial aim was to reach a new audience who were not regular visitors or who had not made an independent plan to visit the Walled Kitchen Garden. We strove to encourage active, rather than passive engagement involving multi-sensory stimuli. We wanted the activities to promote physical, cognitive and emotional engagement achieving the kind of embodied engagement that might create memories and support place making. The workshops sought to encourage exploration and discovery, using technology to extend or amplify senses. We wanted the focus to be on the garden rather than the digital technologies.

Initial baseline questions established that none of the children had visited the Walled Kitchen Garden before, though many had visited other parts of Clumber Park and all had some experience of a garden. Some had previously grown plants though there was mixed enthusiasm for gardening. All pupils had used a block editor to write computer code but only one had used a Micro:bit and two did programming outside computing classes. The team at Clumber Park is aware that some visitors to the property never come to the garden, as was the case with our workshop participants. Through the project we succeeded in bringing 12 new visitors to the garden. Visitors often spend an hour or less in the garden but the workshop programmed a full school day of activities, increasing time spent in the garden. There was positive feedback from teaching staff and gardeners.

“Brilliant, basically. Uh, the kids were animated, um, they were motivated, they were pleased to be learning new skills, eh, and obviously pleased to be in a new location, in the garden, cause having been to Clumber they’ve never been to the garden, which I think will have changed now. I think they’ll hopefully be taking their parents round- and you know, explaining some of the history and the past of the gardens to them. Um, so yeah, I think very, very positive experience.”

Teacher

Gardeners saw the potential for repeating and extending the activity to open up different perspectives on the garden.

“Because on different days we could focus on different things. Like we could have 12 different days in the garden, couldn’t we, and focus on different things. There’s so much, if the museums are open, we could have artefacts. We could have a day just on artefacts, and you’d still have had something similar, I think.” Gardener

“That as a structure is nice and flexible, it can be turned to many things. But depending on what sensors you plug into it, and what focus around story you make to it, or the kind of elements that you put into it, of context of whether you’re in different spaces. You’ve got lots of flexibility.” Gardener

The lead teacher commented on the “nice range of activities” that meant “kids could feel comfortable with some and maybe stretch themselves a bit with others.”

Since the workshop, the facilitation team have documented the Digital Boggarts workshop in the form of a Digital Boggarts Service Design Blueprint and the National Trust Gardens Team have requested a copy in order to investigate the possibility of running further workshops. The Micro:bits and related sensors used by the participants were given to their school so that others would have the opportunity to use them. All additional equipment, including Micro:bits, NFC tags and readers were given to the Gardens Team as part of the ongoing collaboration towards sustaining digital interpretation.

7.4.2 Placemaking and sensory connection

The day in the garden invoked opposing theories of place making by interspersing periods of movement advocated by Lewis and Ingold, with periods of stillness and reflection, endorsed by Tuan.

The children walked around all parts of the garden, putting sensors in soil and against walls, in grass and on tree trunks. They spotted birds, bees and insects. They traversed the space listening to historical facts about life in the garden a hundred years ago. They looked at plants and passed around flowers to smell. The children built embodied knowledge and developed kinaesthetic awareness

as they picked their way carefully across beds and navigated tall grass and low branches in the orchards to take readings. The physical connection with the land gradually gave them a sense of place, reminding me of Lewis' words, "To engage with the world tactually is to situate oneself consciously and to have a potentially unmediated relationship with it" [28].

In contrast with the physical activities, the pauses to look or sit and listen provided opportunities to feel the value of the place. In one such period of stillness, the children listened to a fictional story, sitting close to the place for which it was written. Writing stories and making Boggarts, though active, were also opportunities for pausing to remember and reflect on things seen in the morning exploration.

The activities were designed to create moments where workshop participants might make connections in the garden, recognising that it isn't possible to determine connection, only to set up conditions that encourage connection.

"Design in this context is about creating circumstances for particular kinds of interaction, because it is through practice in space that places emerge, but it is also the space that enables the practice to emerge. So "place can't be designed, only designed for" [240]" [89]

In part, creating those conditions meant paying attention to opportunities for different kinds of sensory connection. Although observation was important for getting to knowing the garden, other senses were deliberately targeted because of the intention to build a more personal relationship to place, recognizing that sight objectifies and creates distance [27, 28, 88, 227], whereas touch and smell are more intimate because they occur within one's personal space [227]. One of the team recalled an instance where this kind of intimacy was spotted. A child who had been making notes had missed the chance to smell a carnation that was passed around the group. As soon as she was able, she retrieved the flower and paused, on her own for several seconds, smelling the flower. She didn't talk about it, but it clearly had an impact on her because her focus on the carnation was complete and absorbing. She kept the flower and continued to smell it from time to time, ultimately incorporating it in her Boggart.

Placemaking generally happens when familiarity with a place is nurtured through “fleeting and undramatic” encounters “day after day over the span of years” [88] so is unlikely to happen in a single day, but some encounters can have lasting impacts because they cause situated reflection or “implacement” [Casey in [89]], which is related to Heidegger’s “being-in-the-world” [196].

7.4.3 Active engagement

To assess the long-term impact of the visit, it would be necessary to return to the school group and ask questions about their memories of the place, subsequent visits to Clumber and other impacts. This hasn’t been possible, but it is possible to assess the workshop against the aims for the project. The workshop comprised hours of active participation and a more substantial engagement than the previous garden installations. The activities were layered to include practical, creative, cognitive and reflective tasks that stimulated mind and body and provided multiple opportunities for personal connection. One of the team reported instances of connection:

“They’d made those Boggarts real in this place. It was like they’re living here now. So every time they let the kids come back to the garden, they’ll know their Boggarts are there. They were just like, “Ah!” Going out like, “I never want to leave this garden”. One of them said to me.” ” Project Facilitator

One of the important aspects was focussing on stories told aloud. This ties back to earlier work in which gardeners and volunteers who were connected to the garden became a conduit for sharing their connection. The gardeners ‘dwell’ in the garden and literally, as well as philosophically, cultivate the garden through their activities. In so doing, they presence the fourfold and reveal the garden for itself. In the Audio Apples digital technology was used to disclose and transmit personal stories of connection. In Digital Boggarts sensing technology was used to explore micro-environments and share stories that expressed real and fictional aspects of the garden. The story making drew on personal experiences but also called for imagination and reflection that brought the garden to life and made it



Figure 7.8: Digital Boggarts

‘present’ to others. The children’s voices emphasised the personal character of the stories

“Yeah, those moments that are really story-full, that are just kind of ripe with it, with the possibility and the potential of story. It was amazing, because you’ve drawn out all that stuff, and then talking to the kids they were like, “Oh, the carnations, the carnations!” So then to read them the Scarecrow and the Garden Boy at the end as well, tied that up really nicely, because it all fitted round in a circle with what you told them in the morning. And all the things they’ve put into their own stories, and then they heard it coming back to them in my story. They were like, “Ah!”” Project Facilitator

The stories were like hidden gems discovered through the children’s engagement in the garden. The medium amplified this idea of hidden treasures because each group’s story was hidden until unlocked by the touch of a Boggart on the ‘special flower pots’.

7.4.4 Children’s stories and reflections

The three stories made by the children named locations in the garden, including rose garden, herbaceous border and conservatory (glasshouse), plants including roses, carnations, rhubarb, strawberries and foxtail lilies, and other living things including blackbirds, squirrels, butterflies and gardeners. Some stories mentioned temporal changes like night falling and stars shining and meteorological features like rain dripping or the rose garden being the warmest place in the garden. Direction was mentioned in one story. Sometimes these descriptions sounded contrived, and some words may have been taken from story counters, but there were instances where the stories revealed knowledge about the Walled Kitchen Garden, that may have come from direct experience or from things told by people the children encountered in the garden. One example is the story of blackbirds and squirrels ‘stealing’ strawberries and raspberries from the fruit garden, something that could be seen on the day of the visit. The microclimates within the garden did not feature greatly but they may have been harder to incorporate in

the kinds of stories created and microclimates may have had less resonance in the children's minds because the variation was less pronounced on the day of the workshop. All the stories included magical elements, such as the transmogrification of squirrels and blackbirds into rhubarb and in all stories the Boggarts, were protectors of the garden and were connected to the garden. The stories suggested awareness of the garden as a whole but did not specifically indicate a connection to the garden.

Children made comments and drawings on luggage tags as reflections on the workshop. They were asked to name activities and things in the garden that were memorable or enjoyable. The comment tags list Micro:bits, Boggarts, story and garden, so different activities resonated with individuals, which points to the value of a multi-dimensional approach. The tags included names of plants and wildlife that children found significant including bees, moths, hollyhocks, roses and carnations.

The roses and carnations made appearances in most group stories and in many of the children's reflections and this may be because, as well as having a sensory impact, these plants were introduced through gardeners' stories about the garden and its history. For example, the group were told the story of a Head Gardener in the 19th Century who was recruited because he was one of the best carnation-growers in the country and the duchess of the Estate loved carnations. He was offered an impressive house as an inducement for the job, but the house only had a back door to remind him of his social position. Big glasshouses were built adjoining hollow brick walls in which fires were set, and children were employed to keep the fires going day and night, within a two-degree range to produce the spectacular carnations. This snippet of historical information sounds like the seed of a children's story and it captures the imagination, and for this reason it appears to sit powerfully in the children's memory.

Sharing historical stories and making up fictional stories both played a part in establishing the garden in the minds of the participants.

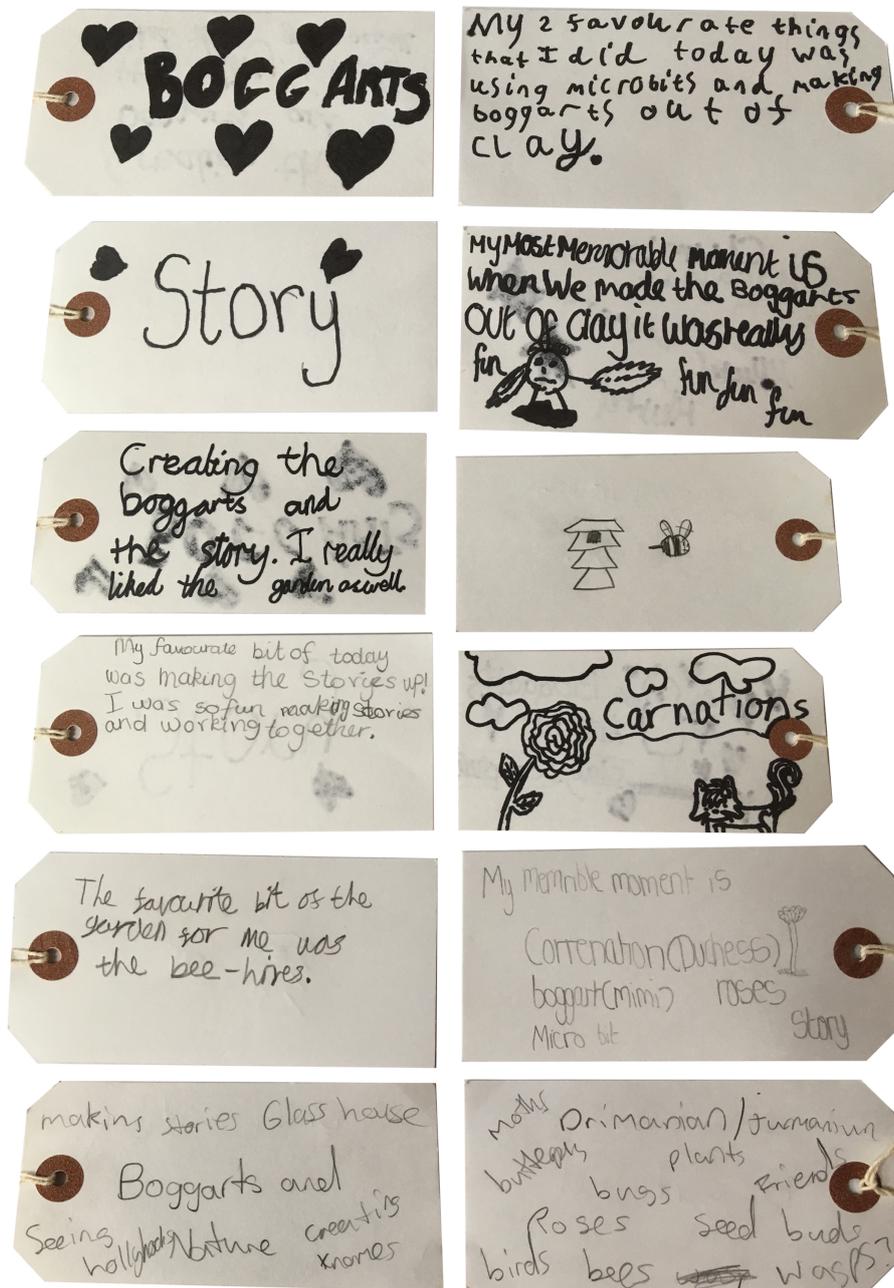


Figure 7.9: Workshop reflections

7.4.5 Digital Boggarts and Ambient Wood

One of the original inspirations for the new phase of work at Clumber was the Ambient Wood project. I aspired to use design to facilitate opportunities for increased discovery, exploration and attention, that were evident in Ambient Wood. I sought to extend sensory awareness of the garden and encourage repeat visits using digital technology. I wanted to build on Ambient Wood by enabling participants to create personal digital nature hybrids, rooted in the garden's micro-environments, to act as conduits through which to unlock aspects of the garden through the seasons. Although both Ambient Wood and Digital Boggarts were collaborations with schools the emphasis differed, with the former focusing on science education and the latter intended to support presencing, connection and valuing in the garden. Ambient Wood was a project for Year 8 Secondary School students, whereas Digital Boggarts was designed for Year 5 Primary School students.

We found the Micro:bit programming environment accessible to the group, but the time available was insufficient for children to make bespoke personal technological probes. If the project was structured over a longer period this might be possible. The limitations of the Micro:bits meant the activity had to be reshaped and the core principle, creating a sensing hybrid, rooted in a garden microclimate, had to be discarded. Merging heterogeneous digital sensing tools and natural materials was impractical and the hybridity felt contrived so the digital sensing capacity was removed from the Boggart and sensing became purely technical. This inevitably shifted the focus away from technologies grown from a context, resulting in an activity that failed to make a significant technological leap on from Ambient Wood. In fact, Rogers' creations achieved better hybridity and contextual appropriateness. However, the collective components in the workshop succeeded in supporting active discovery and exploration in the garden. The temperature, humidity and direction sensors contributed to dispelling the idea of the garden as a homogenous environment by uncovering discreet places with their own character. The sensors prompted children to touch soil, tree bark and grass to physically confirm readings. "Is this wall warmer than that one. Is this soil really wetter?" In so doing, they started to develop experiential awareness of garden

microclimates, though the association with particular plants was only addressed superficially. With more time additional sensors could have been incorporated to give clues about other characteristics of habitats and the plants that thrive in them.

One of the most significant differences with Ambient Wood is the use of technology and story making in combination. At the start I had not anticipated the overwhelming power of the story to bring together past, present, shared and experiential knowledge. Stories proved to be the glue that held the parts together. Digital technologies were used to gather data and facilitate experiences. This knowledge was enfolded within stories and then the digital technologies were used as a form of interpretation, sharing the children's stories within and beyond the group. The digital technologies maximised the possibilities for and from story making and were an important factor in creating the intimacy and meaning that paralleled Ambient Wood's intimacy with data.

7.4.6 Digital Boggarts, critical theory and connection

The Digital Boggarts project was a response to perceived weaknesses in the original designs and it successfully addressed some of the shortcomings in earlier artefacts. Story making isn't passive. It involves thinking, reflecting and actively imagining the garden, from different perspectives, in ways that resonate with gathering the fourfold, because the story results from a communion between the participant and the space, in which the world of the garden is made present to that participant. The active participation in creating the story involves the visitor creating something for or about the garden which changes the balance of the relationship because the visitor is no longer a passive consumer. Story-making invited opportunities for otherworldliness and reflection, both of which are noted as contributing factors in building nature connection.

7.4.7 Reflections

The Digital Boggarts work achieved some of its initial aims of supporting active participation in the space, increasing attention, and boosting sensory awareness.

The activities brought new audiences to the Walled Kitchen Garden and had an impact on the child participants.

The role of technology in this could be questioned. It would be possible to achieve something similar without the technology, for example by inviting the children to garden with gardeners for a day, but this misses the point because we already know that connection to nature without technology is possible, as illustrated in the Nature Mindfulness section. The issue is the question of the role of digital technology in supporting connection. I felt that the digital technologies were the catalyst for exploration of the garden. They set a purpose and they also revealed things that couldn't be known fully by walking in the garden. They focused attention in a way that brought out the particularities of different places within the garden. They provided an opportunity for sharing with others. The technologies could act as conduits to share stories and inspire others to look differently. For this reason I think the technologies were valuable.

However the choice of Micro:bits was pragmatic and involved compromise. More work is needed to investigate the potential of alternative technological approaches that could come closer to the initial hybrid vision. I think the work only skimmed the surface of how sensing might reveal aspects of the garden in magical ways. I would like to explore the hybridity of the Digital Boggarts further. The garden environments did not appear as strongly as I would have liked, in part because I didn't communicate well enough to the team the importance of using materials from the garden. This would require additional preparation from the team. The Boggarts built on some of the strengths of earlier designs but there is a need for further work.

In respect of the the wider learning for interpretation, the Boggarts offered up some useful insights. I found there was a parallel between making the Nature Meditation Egg and making the Boggarts. Both involved material engagement and exploration of an environment. Both required a commitment of time. In both situations, the making activities promoted a similar engagement that built connection to place.

I found that as a designer I made a deep connection with places through the act of making, both with the Nature Meditation Egg and the artefacts at Clumber. In the Boggarts work I found a way to translate this experience to visitors

to the garden. The workshop participants are effectively creating their own interpretation. In this instance the interpretation was created for the group but it could be created for others. It is effective because the participants discover the place for themselves, through making and doing, rather than having it presented to them. This idea speaks well to some of the audience segments identified by National Trust, for example Explorer Families.

The idea of actively creating interpretation for yourself and potentially sharing that with others is something that can be transferred, expanded and applied to other settings. The Digital Boggarts workshop included diverse activities, which not only meant there was something for everyone, but it also meant that the activities created different layers of understanding that came together becoming greater than the sum of their parts. One layer of understanding came from exploring and sensing in the garden. A different kind of understanding came from talking about the characters who might live in the garden, and another came from the garden tour. These different perspectives combined to give a richer experience and hooks to seed connections to the garden.

This approach to interpretation presents several opportunities, for organisations, as well as participants. Bringing people together to create interpretation is a way of seeing a property or exhibition through the eyes of visitors. It can be used to ask the questions, "Are we telling people what we think we are telling them?", "What aren't we telling people?", "What do people notice that we don't tell them?" "What matters to our visitors?" (In fact, this idea was mentioned in an interview with a member of the Gardens Team.) This goes beyond standard visitor feedback and reflections because the visitors are creating something new. Interpretation created by visitors has the potential to bring in completely new perspectives. There can be echo chambers in organisations where people have a similar worldview and values. This interpretation could cut through repeating narratives to bring fresh ideas to be pursued through new interpretation created by teams, possibly in collaboration with visitors.

There are obviously concerns about visitors creating interpretation so this would have to be managed and curated carefully. This isn't the same as volunteering but perhaps it brings some of the feelings that volunteers experience, like emotional investment in a place, and pride in sharing. Reflecting back on

the other work in the garden, visitor generated interpretation is the next logical step from the Audio Apples in which the volunteers personal experiences of the garden was used as interpretation.

Visitors who participate in this kind of activity are shown aspects of the property or exhibition than may be hidden to others and they are introduced to new skills that may enable them to discover more. The skills acquisition and time are intended to foster personal pride as well as connection and care. Participant's interpretation may speak more directly to other visitors. This approach encourages inclusiveness, participation and personal investment that foster wider social engagement, beyond individual connection. Silberman (2013) makes the point, in respect of heritage interpretation that, "For any particular visitor or community member, the epistemological and even ontological framework for understanding a heritage site may be different." It will be shaped by culture, class, religion, ethnicity, folk traditions and family memories. All activities are shaped by our past experiences so the merger of the activities delivered to visitors with those past experiences can result in a new reading that is recognised and appreciated by other visitors. This is to do with interrogating 'authorised' representations of a site or collection.

Future research will explore different workshop configurations in different locations using different digital technologies.

7.4.8 Summary: the impact of the Digital Boggarts workshop

The chapter began with an account of the reflections that led to the Digital Boggarts project. By analysing influences, including the initial Digital Nature Hybrids, my own nature experiences and inputs from academic texts and the RtD community, I established some criteria needed for active engagement and exploration and I used these to create the Digital Boggarts workshop.

Digital Boggarts was a modular workshop that combined time spent in the garden with different kinds of creative and technical activities intended to reveal new perspectives on the garden. The workshop resulted in groups creating a

fictional audio story that incorporated factual elements drawn from the participant's experiences. The story was accessed by a Digital Nature Hybrid Boggart character made from clay and garden materials, and incorporating an NFC tag. The workshop was aimed at primary school children and targeted a National Curriculum learning outcome.

In the chapter I described the frustrations experienced when the original project vision was found to be unachievable with the available technologies. However, the reconfigured project yielded valuable insights that are transferrable to other contexts. The combined activities provided opportunities for making sensory connections, for gaining new insights and experiencing emotional connections.

Although the workshop needs further exploration, the early indications are that this is valuable in terms of building deeper connections to place. In addition it enables visitors to create new interpretation that incorporates their own perspectives on place. There has been a move within the field of interpretation to become more inclusive of a range of voices and perspectives. The Digital Boggarts flexible workshop structure provides a method for achieving that. The interaction goes beyond shared visitor feedback because the interpretation created by visitors is built on knowledge derived from an intimate encounter in the place that goes beyond the experience of an average visitor. This package can be adapted for different demographics and can be used to target new audiences who may be attracted by the activities. This chapter reinforced the earlier insight from the Nature Meditation Egg that making one's own interpretation is valuable for increasing a sense of connection to place.

Chapter 8

Reflections on collaboration with the Gardens Team

This chapter draws on interviews that took place in July 2018 to reflect on lessons learnt during the research collaboration. These interviews, with two gardeners and a volunteer, primarily address the original artefacts and design processes. They speak to issues of sustainability and look forward to an ongoing relationship. The reflections are broken down by theme.

As briefly explained in the Methodology these interviewees were chosen for longer interviews because of their particular role or experience with the design and research project.

One of the people interviewed had been employed as a gardener throughout my research and had held different positions over the years. This gardener was a student when I began the research and a Senior gardener by the time the research documented in this thesis was complete. (It should be noted that student gardeners at the National Trust often have considerable prior gardening experience.) This person was familiar with the detail of designs and their development, but also had a perspective on how the designs fitted into interpretation plans and other wider plans for the garden. This interviewee was able to reflect and comment on the designs over time, from the perspective of management as well as aesthetics and interaction.

The second interviewee was a volunteer who had been recruited specifically to work with interpretation in the garden. This included maintenance of the artefacts made through the research, development of those designs and initiation of new designs. Although this volunteer did not start until after the Rhubaphone, Audio Apples had been installed and the Travelling Shed had been used at Newstead Abbey, this volunteer has detailed, hands-on, knowledge of the artefacts. This volunteer had learned to assemble the components, diagnose and fix problems with the Audio Apples and Rhubaphone and had created new content for both. This interviewee had the most practical, working knowledge of the designs. In addition this person had created new interpretation and consequently had reflected on the use of interpretation within the garden.

The third interviewee was a student gardener who had been in the garden for approximately two years. The volunteer who worked with the digital interpretation did not work in the garden on a daily basis, so other gardeners also played a part in maintaining the digital interpretation. This gardener had thoughts on the designs based on experience of working with them and observing their use, and was included in the interviews for this reason.

The next section documents the interviews.

8.1 Philosophy and values

The thesis began with research questions about the potential for a critical philosophy to influence design artefacts and process. I came to view the guiding philosophy as part of sustainability because it carries the values that inform design.

When I introduced the principles, I talked to people about the philosophy to differing degrees and in different ways, depending on their interest and the degree of detail they needed. I communicated by word of mouth so I was unsure how much traction the principles would have and which parts would be remembered. I talked to some people about the individual philosophies of my key influencers, but more often I talked about the fundamentals that I had derived from their work. In the reflective interviews towards the end of my thesis, I was interested

to find out how the interviewees reflected back the philosophy I had introduced and how accurately these reflections represented my original ideas. I also wanted to find out what parts of the philosophy are useful to the National Trust team and the extent to which they are being used and sustained.

Two of the interviewees talked about the impact of the philosophy on themselves and the wider team. In relation to the group one said

“I think, people see that as part of Spirit of Place... I now hear people...reference your philosophy and say things like, we don't want our interpretation, however that manifests itself, whether it's an information board, or whether it's a piece of tech, we don't want it to act as a barrier between our visitors and the garden...and just your average volunteer believes that now.”

The gardener continued,

“...the other thing as well, that has become embedded, and I genuinely think that's the right word. What's become embedded in my team when they talk about any vehicle (is) that we think about (it) in terms of telling our stories, (and) they are very particular about its making.

They've become very particular about, the Listening Orchard, for example (and it's the example that they always use), the apples were made by (anonymised name). Not only were they made by (anonymised name), but they were a piece of oak that fell in the park. They've really, really embraced that.”

When asked to give details about what they remember of the original guiding philosophy the gardener said,

“The philosophy has been about uncovering the garden for anybody who visits it in whatever capacity they visit it, in innovative ways that hasn't detracted from the garden...the way we've created things and applied that philosophy it's all about Spirit of Place. I think for me it's about revelation. It's revealing the garden in a way

that doesn't hide it simultaneously...I think that the philosophy as well has been around if you want to interact with the story telling, you can choose to do that, but it's embedded in the garden in such a way that you can ignore it. I think that's equally important.

And the other thing was stepping off the path, as well wasn't it? Getting people beyond the 'do not walk on the grass' mentality. Get them to experience the change in atmosphere when you step into an orchard. That's worked really well as well. And the comments that we get from visitors about that have been really overwhelmingly positive because until you do it you never know how different it can be. So, there are those things really about the revealing without hiding is what I call it. No, revealing without obscuring, I think is probably a better way of describing it."

The volunteer was also asked to explain the guiding philosophy and described it as follows:

"(It is the) experience, of being as close to the place as is intended, if you like. So not trying to force...It's about connections as well, and... for me, it is. Of making that, enabling that connection with the place, and an experience, as true to what it originally is as possible, if that makes sense?

...it's about connection, and it's about representation of the place as well, for me. And that is really new.

It's been a real eye-opener, the idea of picking something off a tree, and that for me is really important. And that's why the hub, (the newly planned interpretation building) although it's great, it needs to be done right. Does that make sense? I don't (want) it to just become an 'info shed' where you walk round and there's loads of things. It needs to be an experience of the place, still. Yeah, it definitely does. Otherwise you lose that sense of what we do well, really. Because the idea was within the hub, I kind of wanted to keep the ideas of the Spirit of Place."

The importance of the relationship between the design of technology for the garden context is probably the strongest ‘take home’ for the team. The interviews reiterate two of the main design principles that guided the designs; that designs should be ‘rooted in its context’ and part of the ‘world of the garden’ and should ‘disclose the garden’. The language used by the gardener about revealing the garden, and the volunteer’s comments about experience that is true to what the place is, strongly resonates with Heidegger’s descriptions of things becoming present to us through the experience of the essence of that thing, outlined in Chapter 4 (Philosophical Interlude). The interviews hint at another design criteria; that ‘design should activate different senses’. The interviewees point to the importance of materials, experience of place, connection and ensuring the garden retains prominence over interpretation technologies.

The interviews don’t mention pauses and reflection, interruption, active engagement, paradigmatic consumption, respect for the non-human world and natural environment, compatible values, participation, openness and adaptability of designs. This is to be expected because some of those principles were more relevant to me as an outsider coming into the garden, where the values are part of the culture and are lived by those embedded in the place. Some of the themes to do with process and openness were more significant for me at the start because I was responsible for technology selection and attending to ways of working, but as we transition to team ownership of all artefacts, these themes may come to the forefront for gardeners and volunteers. The parts of the philosophy that have gained purchase are the ones that resonate most strongly for the garden’s team in their roles and they are the parts that are likely to be sustained in new developments, especially if the team are aware of the parallels with Spirit of Place. The desire to work with the design philosophy is evident in the interviewees comments about future interpretation plans. At present the philosophy is being carried forward by word of mouth but for that to continue it must remain useful enough to be discussed in a changing team.

After talking about how commonplace digital technologies are in everyday life the volunteer says,

“Actually, the magic is in getting back to what you’re interpreting, and why you’re interpreting it”

and that seems to summarise the message that is being carried forward.

8.2 Way of working

I talked to a gardener who had been present throughout my time in the garden about the process and pace of work. I explained that in the early days I had anticipated recruiting a group from existing staff and volunteers and running workshops to co-create designs and share skills. I said I’d decided against that route and asked for thoughts on working methods. The gardener reflected on the way of working and means of introducing digital technologies as follows:

“Involving people has had a big impact. Working alongside them, because you’ve done that to a degree. You’ve been in the garden with them, just talking quite informally about things, rather than ...cos I think my volunteers are fab. They are very, very able. Not just as gardens volunteers, but they are really able people. Some of them are retired from really powerful positions and stuff. But a lot of them, if we sat them down in a room and talked to them about some of the more technical aspects of what we were trying to do, they’d have switched off.

I think part of the key is, you were in the garden, and that instantly made it non-threatening. I think that was part of how they got under its skin. So, there’s that element, and then when we set up the little room with the recording booth, it was a really powerful signal to them, that we valued their memories and their thoughts and reminiscences about the garden.

That came to the fore I think, and pushed anything else about the method that we might be delivering those... that was really secondary. And as a result, I don’t think they worried too much about how you made the rhubarb talk. I don’t think they were bothered then. But



Figure 8.1: Using a shed in the garden as a base for making, enables people to find me, give feedback and share ideas.

if we'd done it the other way around, I think they might have got hung up on, "oh my God"...they would have seen technology first, and then, not quite seen it really as just a vehicle for us to tell the garden stories.

You hear that phrase a lot more now. Certainly, from the team, but I'm hearing it now, from people beyond these four walls... "telling the garden stories". I'm hearing that phrase a lot, which I like. Because, what it's done is, they've stopped talking about the Listening Orchard, the Rhubaphone. They are both fab and we love them, but they are just a means of telling the garden stories. So, I'm really pleased actually, that we as a team, have moved away from (that)...It's almost like, "Yeah, yeah, we know we can get the tech to do whatever we want. But what is it we want?" So, we now, I think, we are all about helping others to see the garden differently. But the tech has become secondary.

I don't think we could have got here any faster. And I don't think we'd have got here if we'd done it differently. I don't think workshops and stuff would've worked because, where we've got to, is people thinking about the stories first and not worrying about the tech. It's almost like they think to themselves, "If you want to talk

about the Land Girls, yeah, we can work with Liz on finding a way of doing this.” But the way doesn’t matter, the story... So, they started focusing on those stories, which is brilliant because, it’s bringing all sorts of other things to the fore...”

So I think the pace of the change and implementation in those first few years was a lot slower than in the last two years. So in the last two years, it can be as fast as we like...It couldn’t have accelerated in the way it has in the last two years without it having gone at the pace it did in the first three years. So I think it’s probably a good thing that I wasn’t Senior Gardener in the first three years because the pace was the very thing that allowed it to embed quite deeply. I think if we’d started when I was Senior Gardener, I might have tried to accelerate the pace and the degree to which philosophies and methodologies were embedded, (and) I think (it) would be a lot more shallow. You know we would have been at soil level. Whereas now, I think we’re at root level.”

From the gardener’s perspective the embeddedness, pace and participation were essential for the process and concepts to take root, in order to be resilient into the future. While the digital technology is a major concern in my research it isn’t a priority for the gardener, but a means to an end. This is interesting because this means technology slips out of consciousness. Both Heidegger and Borgmann suggest that it can be problematic when technologies fade into the background because it obscures the role of the device in pushing forward commodity, leading to situations like that cited in Chapter 4 of a sacred temple becoming a resource for tourists. In a place like Clumber that is conserved through a degree of commodification this has the potential to be a problem. However, the garden is revered by the Gardens Team and their values appear to keep in check commodifying tendencies, (albeit within the context of a place that has some inbuilt commodity). This raises the question about the strength of internal cultures to resist the force of pressure exerted through technologies.

Another notable factor that comes out from the interview is the importance of working with the pace of the garden and gardeners, recognising that this pace

is not constant. Working at an appropriate pace allows the absorption of the design philosophy. This is especially important when attempting to be inclusive of multiple voices. This is a message to be carried forward to future work involving values and philosophies.

The gardener reflected on the inclusion of visitors' voices in the design process and of strategies for including new voices from people who are new to the garden.

“I think one of the things that we've learned as well is we don't necessarily know what our audience wants. That's a big learning thing for me. I think we were going at this from the perspective of just thinking, 'Hey, we think this content is really great, or this way of delivery is really great', without asking our audience. So that's been really interesting...You know from us being so flipping, I suppose, arrogant as to think we know what audiences will and won't benefit from. I think that's another area of flipping arrogance. I think that we've learned and then the next time we work on a project either on our own or together, I will insist on there being an element of talking to our visitors first.”

This recognises the limitations of our collaboration to date, and gets much closer to the philosophy of inclusion advocated by Feenberg. In our conversations we didn't know exactly how this would be achieved but the gardener felt it would probably be linked to the introduction of new audiences visiting as part of collaborative projects, such as one with the National Health Service.

“I love the responses that I get from the people who come regularly but how much of those responses have been influenced by the conversations they've had with me, say. Whereas, if I could start having those conversations really early with the new service users, I am getting something more authentic, aren't I?”

When I talked to the volunteer who works with digital interpretation we spoke in a more focused way about the process of learning about the technology, which had included showing and lending pieces of digital technology that were used within the Rhubaphone or Audio Apples.

“It (the learning process) was good. It was good. I was able to go and play. A couple of more days (would be good). We (volunteer and I) used to have the days where we used to focus on one thing in terms of what went wrong at that time (with an installation), what we had to get fixed. It would have been nice to have a couple of days going, “Right, okay. Let’s play at what we could do with it”. Do you know what I mean? The more experimental days. That might be quite nice in the future, just having a day where we can go (and experiment.)”

The interviewee talked about gaining confidence with hardware, wiring boards and changing content but did not feel confident working with code or uploading code and requested more time to work together on this and to develop ‘self-help-type’ guides, partly for troubleshooting and debugging, but also for development work because “that’ll allow any vols [volunteers] in the future that want to get involved.”

It appears that we have reached a time where workshops may be appropriate, for a self-identifying interest group, but I anticipate the mode of work will follow the patterns that fit the garden.

8.3 Learning from the designs:

8.3.1 Reflections on the artefacts

The act of making and installing artefacts was intended to create pauses in which visitors might be made present to the garden, however the process of iteratively making and consciously siting and attending to the artefacts created pauses for the team and I to reflect on the ways visitors use the garden, impact on non-human life in the garden, as well as the strengths and weaknesses of individual artefacts. So, enacting the philosophy also had an impact on the team in the garden.

The extended time period during which the artefacts were developed and moved provided opportunities for reflections on the location of artefacts and their impact on space. For example, a gardener said, “You know, in that shed, people

didn't always know the Rhubaphone lived in there, did they?...The shed wasn't the right vehicle for the Rhubaphone." We agreed that the shed was better than the Rhubaphone's first home in the Garden Museum rooms, but the period of reflection prompted the gardeners' conclusion that it still wasn't in the right spot, (even if the old shed was replaced after the storm), leading to decisions that the interpretation should be co-located near Compost Corner and the demonstration 'no-dig' beds, because it would create a focus where people could go expecting to find opportunities for learning and interacting with interpretation.

The same thoughts applied to the Audio Apples and Listening Orchard. Although it is uncertain whether the Audio Apples artefacts will definitely be a feature it has been decided that they, or their replacement will be moved to the orchard beside Compost Corner, to consolidate the interpretation, and I believe to improve management.

"Because quite a few of the [Audio] Apples are broken, so (anonymised name) is...I think she's got three working. So I'm going to have all three on one tree. And not too far into the orchard either so that you can experience the orchard, but without interrupting the bird life..."

The gardener reflected on people's use of the orchard.

Gardener: "It comes back to what I was saying about thinking we knew what visitors wanted. Even our mown paths, they didn't prove to be an enticement. They were enticing and they were a good way for people to get to the apples without being stung by nettles and things but they weren't, in and of themselves, an enticement. So that was interesting because I thought, "Well, people will just follow the paths". But they don't."

Interviewer: "Do you think that was to do with not knowing what to do with the apples or not seeing the apples?"

Gardener: "Yeah. And I think maybe (people) still having that Keep Off the Grass mentality, even though there's a path there to entice you down because I hear people do that all the time; little kids, in particular, like to run through long grass. I like to run through

long grass. But they get shouted at. So, that's an interesting one I think..."

A volunteer noted the unusual interaction required to operate the Audio Apples.

"I've noticed it a few times with the apples when they've been out, is people are quite reluctant to go ... it's very unknown, it's that really unknown of going into an orchard and picking an apple and listening to it. It's a real unnatural thing... it's funny how many people will walk past the apples and go, "Oh, that was a really good idea but do we touch it, or..." "

Another gardener suggested self-consciousness as a reason for visitors not going into the Listening Orchard. "There's got to be some psychology to do with exploration into other spaces. So when you present it [the Audio Apples] in the garden, it's a big, large, wide space and you can see everything. You're less likely to interact with it. Whereas if it's in different spaces, like our museum room, it's little spaces that tease you in, that engage you..." This led to a discussion between volunteer and gardener about the problem and how it might be resolved:

Volunteer: "I think ... Yeah, and I'm incredibly British, when it comes to feeling socially awkward. So actually walking into that, it's funny, isn't it? The orchard. It's almost like walking into sacred ground."

Gardener: "Yeah."

Volunteer: "...to walk into that space I think is ... and then pick something off a tree, when you've probably been told, "Don't pick apples off a tree," as a kid ..."

Gardener: "Yeah. It does, it does blur the boundary lines. [inaudible]"

Volunteer: "And it's weird ... But that doesn't necessarily mean it's a bad thing."

Gardener: "No."

Volunteer: "Because I think that's a challenge ... Why not challenge that? That's a really nice thing to challenge. And that's part

of my fear, that the hub (new interpretation space) is too safe. To me ...”

Gardener: “They’re (the Audio Apples) not telling you in advance, (what) the interaction (is) [inaudible]”

Volunteer: “So if we can make a balance between, we have stuff in the hub happening, and then every now and again we’ll go, “Right, we’re gonna get the (Audio) Apples out in the orchard,” and make a deal of ... making that process easier for somebody. So let’s say we have a ‘stories from the orchard’ morning, where we do take the apples out, and we have a volunteer with them saying, “Yep, it’s fine, come on in.” Do you know what I mean? And I think that’s quite interesting.”

Gardener: “Yeah.”

Volunteer: “But, yeah ... So there’s two sides. I think it’s also about don’t let people ... I don’t know what I was gonna say. Don’t ... Trying to think of a word to put it ... I think if we had more continuity, in the (Audio) Apples’ work and the Rhubaphone work, and we built up people’s, or visitor experience, of this is how we do interpretation in the garden, I think those boundaries would come down, and people would be ... Do you know what I mean?”

The other gardener had an alternative solution.

“I’ve also come to wonder what happens in the (Listening) Orchard, whether it’s the old version or any new version that we can create, should be linked with seating because that what I’ve noticed about our visitors is that anywhere where you can sit and reflect will draw people in. The board about the Listening Orchard won’t necessarily entice them into the orchard to listen to the content. Talking about what we did earlier about the philosophy about making, there’s a part of me that thinks that it would be really great to have a very rustic bench but the top of it was engraved with maybe quotes that were in the (recording on the Audio) Apples, or just quotes or whatever, so that it had its own identity.”

Interviewer: “Yeah, for sure. Do you mean attached to a listening thing?”

Gardener: “No. Its maybe underneath the tree that has the listening thing in. So, you would either lift something to your ear or as soon as you sat on the bench, then audio would begin or whatever; I don’t know. But the audio would be co-located with a really enticing bench.”

This shows the gardener’s observations of visitor behaviour and use of those observations to hypothesise about people’s reluctance to use the paths in the Listening Orchard and of interactions in the garden and use of space.

These conversations suggest ongoing observations, reflection and consideration of the artefacts, leading to hypotheses about behaviour that is made possible by living with the artefacts for some time. The artefacts give pause for reflection on people’s movement through the garden as a whole and use of particular interpretation. The artefacts prompted reflection about potential impacts of interpretation on wildlife in the garden.

“Because I don’t think there has been an impact on birds or anything. I can’t say that I’ve always been able to identify birds giving the orchard a wide berth or anything. And footfall hasn’t increased so much in orchards that ... because that would be another thing for me now. So, it was a great aspiration to have people go into the orchard. But what effect is that going to have on our flora and fauna. If the Listening Orchard had become a real destination, I think that would have been...catastrophic to particularly the goldfinches and the kind of bird life that we have nesting in the orchards. That would then have had an effect on our pests would have gone up because obviously the more they nest in the orchard their first port of call is the pests in the orchard because that’s their food source. So that’s been interesting. So, in a way, I wouldn’t want projects like the Listening Orchard to become any more popular than they already are...Interestingly. I

know some of my colleagues would say that that was about maintaining the state of your grass, but for me that would be about frightening your fauna away.”

This reflection contributed to the decision to locate audio devices on a single tree, close to the edge of the orchard in a future iteration of the Listening Orchard.

Reflections on the artefacts also helped the team to learn what physical and human infrastructure was needed to allow the designs to ‘live’ in the garden. When a robust and practical hardware configuration had been established the Rhubaphone was relatively easy to manage.

“I think some things have worked out incredibly well. You see, I think the Rhubaphone is really easy to manage. Especially the mini Rhubaphone is really quite ... A, size-wise, I think it works really well. Also, design-wise, I find that the easiest thing to maintain.”

By contrast, the Audio Apples and Listening Orchard never achieved the same degree of stability and reliability. The additional work needed to manage and maintain them means they have not bedded into the routine of the garden in the same way as the Rhubaphone. That said, the Audio Apples were well received as a concept, and have had an impact beyond the orchard (discussed on the following section). One of the gardeners reflected on the artefacts as follows:

“They (the Audio Apples) were less reliable, but they were more ... what’s the word?...The Rhubaphone, you go down in the morning, you know the rhubarb will last a specific amount of time at a specific temperature, you switch it on, you walk away. Whereas the (Audio) Apples you have to go and get them, take them out, put them in, make sure they’re working, and then go back and check in again. And there’s the whole taking them out of the garden thing, (security system to protect against theft) which hasn’t really been an issue at all, but ... And you gotta make sure the person in the admin shed knows how to work the alarm system on the tablet...”

A gardener summarised as follows:

“I think the only thing that hasn’t gone well is the Listening Orchard but only from an operational perspective and it would be a different matter if I had more staff or had been able to recruit a volunteer who worked differently with the garden. But that volunteer would have to be here every day; so, it’s been the impact of the need to bring the apples in and out. Not so much the charging; we really got into the groove with the charging. So that was an operational problem; it wasn’t anything that we’d got wrong with the Listening Orchard...It’s not something that went wrong or anything like that but I think my only other concern is then the quality of the content and that’s down to us. The quality and the quantity that we have available in the library (or audio content for the Audio Apples) that allows us to change it; I don’t think we change it often enough.”

The volunteer talked in detail about the challenges of managing the Audio Apples.

“(There’s)loads of challenges. I think that was around being in a space where if it’s handled a lot, it’s got to be robust enough for that. Then also, there’s got to be somebody that’s confident enough in not just fixing it, but switching it on every day. I know that sounds daft, but it’s that, or we won’t put it out because we’re not sure whether it’s charged. If it doesn’t work, then we’ve got that conversation with somebody, “Oh, it’s not working today.” I’d say that has been the biggest thing. Particularly if you’ve got a volunteer doing it, it’s great, but they’re in one day a week, and so there’s that...”

Part of the challenge, therefore is the lack of depth to the team responsible for maintenance and the lack of confidence amongst the wider team because of the increased complexity in management when compared to the Rhubaphone. Another seemingly simple problem that has proved a major obstacle is difficulty in gaining access to the electronics within the Audio Apples. The Apples need to be securely shut to withstand falls and to prevent interference from visitors but they need to be easy to open for the person carrying out maintenance. This has not been resolved as indicated by the volunteer’s comments.

“I think what stops you is that I’ve got to get it in, and I’ve got out of it. That’s where the, “Oh God, that’s going to be a two, three-hour job.” Rather than if you could unscrew it or do anything like that, it would be, “Right, okay. It’ll take me half an hour to figure out what it is, and then however long to fix it.” That’s the big stumbling block, I think. What happens then is, well they’re not working so we’ll only put those two out today. To me, I think that’s where it’s a simple fix really for the future. It’s quite a simple one really. As long as they’re able to get in and out of them okay, easily, quickly, they’d work really well. There wouldn’t be that sense of, that’s a couple of hours trying to get in and out, make it look decent. Is it going to dry correctly, that kind of thing. As for fixing them, the debugging process, that’s pretty, it’s all right. It’s not too bad”.

This challenge of opening and closing the apple evokes words from the proverb ‘for the want of a nail’ because the challenge seems eminently surmountable and the failure to transcend it has made the interpretation almost unusable to the team. We spent time trying to resolve this in different ways but were unable to do so, and the guiding philosophy didn’t help. It was important that the artefacts were made by the people of the place, in the place, with costs kept within the means of the team who were to sustain it. So a member of the team made the hollow wooden apples, but he didn’t have the tools or knowledge of how to create a screw mechanism, which might have aided access to the workings. So I invoked a trade-off of philosophy against function, in contravention of Feenberg’s principles. We are currently at a point where those choices are being reassessed.

8.3.2 Impact of artefacts

The artefacts have had an impact beyond the team, as well as within the team. One of the gardeners said they didn’t think they would have got funding for the Oral History Project without the previous work. “...it’s made them (the decision makers who distribute funding) see the value of the Rhubaphone, the Listening Orchard, in terms of being vehicles for recording people’s reminiscences, or stories

suddenly waking (them) up to the fact that, we could lose these if we don't capture them.”

The Rhubaphone shed was destroyed in a storm, and on the day it was dismantled a member of the senior team from the wider property was in the Walled Kitchen Garden and their first reaction was “Where's the Rhubaphone going to live?” The Rhubaphone and Audio Apples have become part of the garden. The loss of the Rhubaphone's 'home' prompted a drive amongst the team for funding for a new interpretation space to house the Rhubaphone and other new pieces of interpretation. There has been continual reflection on the artefacts but the push for the new space has prompted more focused consideration of how the current interpretation has and has not worked.

8.4 Evidence of self-sustaining design practices

The reflective interviews with gardeners and volunteer revealed some of the activities (connected to interpretation and philosophy) that have been undertaken in the last twelve months, when my visits to the garden have been infrequent. The interviews also introduced future plans. This section consolidates that information in tabular form. The purpose is to show the impact of the long-term relationship. In previous sections within this chapter I have reported on interviewees' assertions about the impact of philosophy and design process on work in the garden. This attempts to show tangible examples from the team's on-going work.

It is important not to over-claim the impact of the thesis work as some of these activities would probably have happened regardless, for example the recruitment of the Volunteer and Community Engagement Manager (VCEM). However the way in which these things are happening has, in many cases, been influenced by the collaboration. For example VCEM is being tasked with making new links that increase opportunities for designing new interpretation involving a wider range of voices. This speaks both to Feenberg's philosophy of technology and to the National Trust's aims to reach out to different audiences.



Figure 8.2: Dressing one of the garden's museum buildings ready for projection to accompany performance.



Figure 8.3: Actors in the garden for the play.



Figure 8.4: Old style television prop made by volunteers, controlled with a Raspberry Pi.



Figure 8.5: Projections in the museum room: This was produced by the Gardens Team and additional volunteers.

Activities undertaken	Future plans
<p>Pledger fundraising meeting for 30 individuals for ‘The Core’ interpretation space. Volunteer did development and maintenance work on mini-Rhubaphone and Audio Apples for demonstration for the event. Planning for the ‘The Core.’</p>	<p>Plan to develop new interpretation hub:</p> <ul style="list-style-type: none"> ● Create an interpretation hub close to Compost Corner because that is the demonstration area where techniques are shown on a domestic scale. Create focal point for interpretation so other visitors can enjoy the garden without disruption. ● Put Rhubaphone in the hub ● Create espalier tree inside hub with wooden apples ● Sometimes put Audio Apples outside in nearby orchard, on a single tree

Activities undertaken	Future plans
	<ul style="list-style-type: none"> • Design carved bench in orchard beneath Audio Apple tree: carved quotes from oral histories/visitors • Design changeable displays - some with the capacity to be located outside, but in the vicinity of the Core for periods of time • Develop content including 'seasonal stories' e.g. about dormant trees • Trial audio umbrellas, or similar, instead of Audio Apples
Volunteer and Community Engagement Manager (VCEM) has been employed	
VCEM and gardener have connected with people from within National Health Service (NHS) to plan projects.	<p>Collaborative projects in the garden with the NHS.</p> <ul style="list-style-type: none"> • Projects to include interpretation and creativity projects as well as gardening projects. • Collect data, have conversations with new visitors who visit as part of NHS projects to get fresh perspectives from people who haven't previously visited the garden.
CEM has started to build partnerships with a University	CEM to work with local university to establish visits and collaborative projects including interpretation

Activities undertaken	Future plans
Purchased a label engraver and started making labels for garden plants in house. The team have made a decision to use English (common names) instead of Latin to widen access.	Use label engraver for making creative signage as well as labels.

Activities undertaken	Future plans
<p>Volunteer wrote play on NT theme “Strong women” about the Women’s Land Army and submitted to local competition</p> <ul style="list-style-type: none"> • The volunteer won a competition which led to the play being staged with a theatre company and other volunteers. • The volunteer who won the competition brought someone on board as a technical volunteer to assist with the play. That person worked on image mapping, projection and programming audio and lighting around the garden. • Another volunteer made two props that looked like old-style televisions (for use in performance). • Permission has been granted to use the old televisions in the garden/museums for future activities. • The success of the play led to the volunteer (who won the competition) being given a free oral history training day in London at the British Library in order to give the volunteer the skills to do oral history work back in the garden. 	<p>Plans to do a project on oral histories and Clumber Garden which will seed new interpretation and activities</p> <ul style="list-style-type: none"> • Create an oral history archive for the garden • Tell stories about people who have worked in the garden and contributed to its development (past and present) eg Ethel Jackson and Noah Shore • Curate stories from the garden. Use stories. Make installations with stories. • Use the garden stories in different ways.
Talking herbs designs started (see below)	Finish talking herbs installation.

Activities undertaken	Future plans
Plans to work with a jeweller as artist in residence - initial conversations underway for 2 year residency, rooted in the garden.	Artists in residence to be based in the garden. <ul style="list-style-type: none"> ● First collaboration could include work with the pelargonium collection ● Potential for collaboration between author, digital interpretation volunteer and jeweller.
Securing Audio Apples with clear tape to ease access and maintenance	
Senior gardener visited Lancaster University to discuss designs and future plans with design researchers	Interpretation volunteer to visit Lancaster University to meet design researchers and visit design studios.
	Interpretation about seed-saving and future conversations (maybe using materials that the team have been shown, like conductive paint).
	Have experimental making days: <ul style="list-style-type: none"> ● Sessions on learning and experimenting with code. ● Changing and adapting code.
	Develop code instruction / self-help guides: <ul style="list-style-type: none"> ● guide to debugging Audio Apples ● guide to changing the code on Arduino etc.“
	Installation to show temperature differences on the north and south walls

Activities undertaken	Future plans
	Recruit more interpretation volunteers (perhaps through CEM's university links and NHS collaboration)

Table 8.1: Sustaining interpretation: Recent activities and future plans that have a connection to interpretation. The left column shows activities connected to interpretation, undertaken at Clumber since my regular visits ceased during thesis 'write-up'. The right hand column shows future plans connected to these activities. Some of these activities are directly connected to thesis work. Others are indirectly connected but have a bearing on future interpretation. The table shows that some of the practices and philosophies introduced during the thesis research have become embedded and are self-sustaining.

The table provides a summary of current and planned activities that have a connection to the thesis collaboration and it suggests that momentum has built in the area of garden interpretation.

The following sections move away from the reflections from gardeners and volunteers, to concentrate on my reflections on lessons learnt and contributions arising from the research. Some of these are discussed in Edwards et al. 2017 (submitted to RTD2019).

8.5 Reflections on longterm collaboration

At the inception of the research programme I planned a scheme of work for the research including multiple rapidly repeating cycles revolving around workshops that features different approaches, for example, 'a critical design cycle' and a 'reflective design cycle'. In this timeline data gathering and work at National Trust would have been completed in one year.

It became clear within the first six months that I needed to rethink my way of working because it wasn't appropriate for the context and consequently didn't conform to Feenberg's guiding philosophy, (which emphasised end users within the process) or Heidegger's guidelines (which stress the need to attend to context).

The consequence was a change of pace and process, resulting in a much longer five-year engagement, (though there has been much less direct involvement on-site

in the last 12 -18 months). One of the contributions of my thesis is an illustration of the value of longterm design research projects, and the compatibility of Research through Design across extended research timeframes in dynamic contexts. Not all research is suited to longitudinal engagements but this thesis argues for the value of longterm design research in opposition to normative modes of research, particularly for work where growing seasons or life cycles are a feature of the research context.

By extending the timescale in my research I was able to attend to different temporal scales and flows, which was particularly important for the garden context. It is necessary to pass through the year at least once to understand the seasonal changes, microclimates, plant growth, wildlife behaviour and visitor behaviour and other rhythms that affect humans and non-humans in the garden. The first year was a period of particular uncertainty. For example, it wasn't until the rhubarb had fully grown that I could be sure the Rhubaphone was an appropriate height, could hold the weight of the stems and that the clamps would accommodate the smallest and largest cultivars. It was possible to move designs to different locations and give them sufficient time to bed before making a judgement on the success or otherwise of the move. A more thorough understanding of people and place developed over time.

Extending the timeframe meant I was able to observe how one design decision could continue to have impacts over months and years. For example Figure 10.6 shows moments (or iterations) in the life of three of the main interpretation artefacts designed within the research project. It takes a single event (movement of the Rhubaphone to a shed beside the growing rhubarb) and shows how ripples from that event continue to exert an impact for more than two years, (ultimately influencing the design of interactions in the small Rhubaphone in the Travelling Shed).

DIGITAL RHUBARB INSTALLATION MOVED TO SHED IN THE GARDEN, CLOSE TO GROWING RHUBARB



Team member leaves | Shed not used | New team member joins

HOW IS KNOWLEDGE TRANSFERRED?
HOW IS PHILOSOPHY [BASED IN DESIGN] COMMUNICATED OVER TIME?

Impacts of selected iteration unfolding over time

IMMEDIATE IMPACTS

LONGER TERM IMPACTS

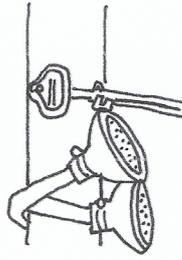
Impacts of one iteration over time

The graphic gives an overview of the incremental development of selected artefacts within the RtD process. One iteration is unpacked to illustrate how insights accrue over time and generate new research questions.



Each colour represents an artefact. Each symbol represents an iteration or significant moment in the life of the design.

Design adapted for new location.
Added hosepipe for outdoor environment to make audio less intrusive.



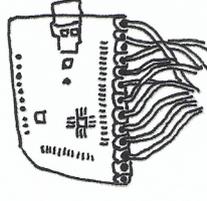
HOW DOES THIS AFFECT ENGAGEMENT AND EXPERIENCE?

Design adapted for outdoor environment.
Rebuilt. Varnished.

WHAT ARE THE PRACTICES THAT SURROUND THE ARTEFACT?
WHAT IS NEEDED TO SUSTAIN THE ARTEFACT?

Design adapted for outdoor environment.
Rebuilt. Varnished.

Listening device rebuilt.
Less intrusive.



New Digital Interpretation
volunteer learns to use Touchboard to maintain the rhubarb interpretation.

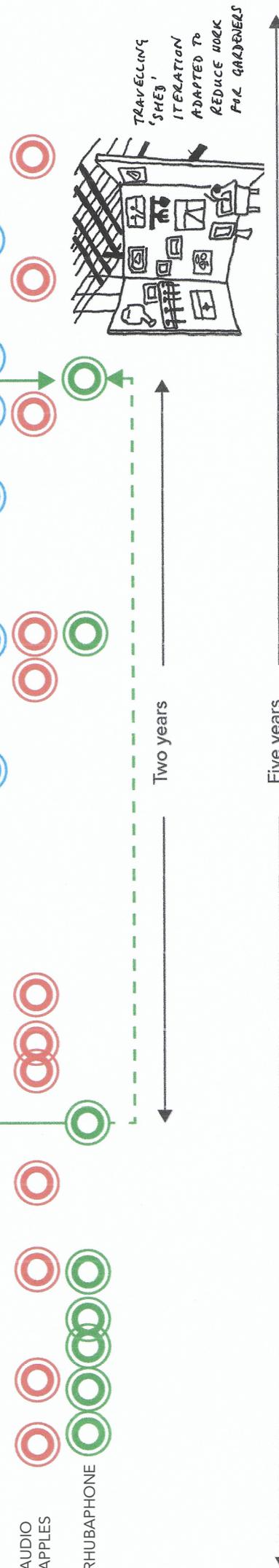
Next the volunteer uses skills to design an interactive herb display.

HOW CAN TECHNICAL SKILLS BE DEVELOPED AND TRANSFERRED WITHIN NON-SPECIALIST TEAMS?

TRAVELLING SHED

AUDIO APPLES

RHUBAPHONE



TRAVELLING 'SHED' ITERATION ADAPTED TO REDUCE WORK FOR GARDENERS

PRIORITIES, VALUES IN TENSION REOURCE PRESSURE

Figure 8.6: Timeline to show the impacts of a design decision over time.

These timescales enable the researcher to see the impact of external events on designs, something that is rare in projects with short phases of data collection. Figure 10.7 shows how something as mundane as a change in car parking policy (as described earlier in the chapter) contributed to decommissioning and re-evaluation of the Audio Apples in their current form.

Impacts of an external event

The graphic shows how extended engagements can reveal the impacts of external events on designs. The impacts can have longterm consequences,

In this case, a policy change, years after the Audio Apples were designed prompted a change that has led to the partial decommission of the Audio Apples in their current form.

It has prompted reflection on other interpretation artefacts with a view to developing a new interpretation hub.



Each colour represents an artefact. Each symbol represents an iteration or significant moment in the life of the design.

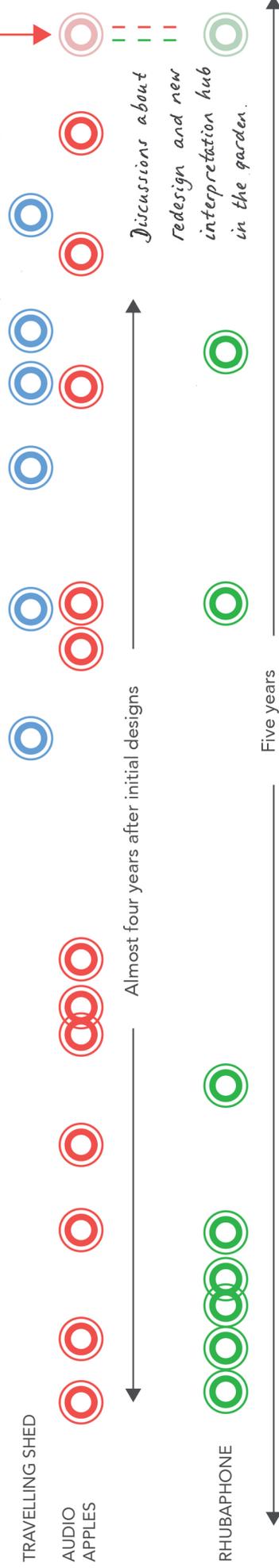


Pale symbol indicates work in progress and future planning.

TRAVELLING SHED

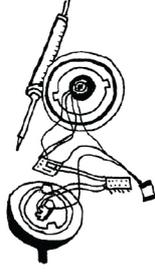
AUDIO APPLES

RHUBAPHONE

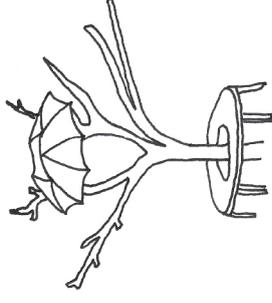


Parking policy changed to incorporate charges that had previously been 'add ons'. This meant there were no additional charges for non-members to visit the garden.

Visits increased. More pressure. More breakages. More maintenance.



Unsustainable to manage. Audio Apples removed from the garden.



Discussions about redesign and new interpretation hub in the garden.

Figure 8.7: Timeline to show the impact of external events on designs for interpretation.

The length of research means the researcher may see things that would otherwise be missed and can examine a design from a wider range of perspectives, in my case from the perspective of place, people, materialities and policy. For example I was able to learn about the work required to manage the artefacts at different times in the year and how materials weathered through the seasons. Studying more than one design meant I could begin to see patterns that could be transferred to inform future design of digital interpretation for outdoor settings or design of interpretation that will be managed by non-specialists in the digital domain.

I was also able to pursue new themes as they emerged from research findings. The outputs of the interventions became the subject matter that drove the next phase of research. Hence the Digital Boggarts project addressed the failings I perceived in the first phase of research related to superficial engagement.

The long engagement deepened trust with the team, and that meant people were more willing to be more open about problems with the design, as well as the positives. There can be a tendency to tell a ‘sweet story’ early in a co-design relationship when everyone wants the best for a design that has been newly installed. The reality of having to deal with an artefact that causes additional work over months or seasons makes it more likely that the negative stories will also emerge. It also changes the nature of the working relationship. As the partnership progressed we seemed to be working more closely to understand the impact of artefacts and collectively work to resolve issues and plan for the future.

Finally, time illuminated points of tension and competing priorities. For example, National Trust properties have targets relating to visitor experience and visitor numbers that are a priority. Designing something which may be intentionally effortful may conflict with easy, instant interactions that are typical of interpretation.

8.6 Reflections on RtD and the impact on my practice

When I began my thesis, my knowledge of Research through Design was limited and it wasn't until I spent time in the garden that I realised it was the most appropriate way of working for me, as a researcher in that context. I'd previously intended to use other research strategies. I appreciated that it wasn't tied to rigid cycles and that the pacing could have greater flexibility. Working over a longer time scale I appreciated the richness gained by observing the impact of multiple artefacts that were iterated with reference to each other as well as previous incarnations.

As years passed I became more committed to RtD in its own right, rather than a complement, or means to triangulate other research methods. In part I think this is because I interpret design as a holistic activity. For me, making is rarely a discrete activity, though I realise that for others that isn't the case. If designing is iterative and incorporates a participatory philosophy then it is likely to include discussion, reflection and some form of feedback and possibly ethnographic elements. Making is central, but it isn't done in isolation.

As the research continued I became more aware of the different ways that I was using 'making' and how it could elicit different kinds of information. Making to understand (the place, non-humans, people, practices etc.). Making to be part of the place. Making to start conversations. Making to explore theory. Making to gently provoke people to question their preconceptions. Central to this was the interiority afforded by my role as a designer-researcher and volunteer at the site. Designing with the team and working in the the garden gave me an internal vantage point and an opportunity to study the impact of designs on people and place and the impact of place on designs. The iterative process enabled me to gather insights over time. RtD is particularly well suited to following flows and studying the impacts of artefacts and processes.

Annotated portfolios [3, 241] have been used to illustrate RtD's potential for generative research as a "means for capturing the family resemblances that exist in a collection of artefacts, simultaneously respecting the particularity of specific

designs and engaging with broader concerns” [3]. The same features that enable this use of RtD can be harnessed for the study of a context at changing paces, through long-term collaborations.

Working over a long time frame means conferences can have an impact on the ongoing research, whether through direct responses to papers and artefacts presented to the community, or indirectly through reflections on research by other academics. The round-table, discursive-style of the RTD conference series is designed to encourage contribution and active participation. My subsequent approach to a new phase of work in the garden was shaped by experiences at RTD2015. Specifically I allowed the research to be led by material investigations. I explored different combinations of digital and physical materials to explore the properties and potentials they offered in response to the research question, rather than searching out materials to solve a particular problem.

8.7 Reflections on use of philosophy

One of most significant impacts of the philosophy was the way it informed the design process. The design philosophy also resulted in the designs of Digital Nature Hybrids with a ‘family resemblance’. They responded to people and place in a way that is not typical of digital interpretation but the family resemblance may also be a product of my influence as designer-researcher. The design guidelines could be transferred to other settings and similar characteristics might be evident, such as the use of local and organic material, but ultimately I would expect each set of designs to have a distinct character that connect them to the place of their origin. However this needs to be explored in future research.

The guidelines were most useful because they stimulated ongoing reflective practice and that ensured that people and place were kept at the forefront of the work.

Feedback from visitors indicated that the digital-nature artefacts affected the way they experienced the garden. Almost everyone became aware of something new, even if it was just that there were multiple rhubarb cultivars. It would be hard to build connection to place through a single interaction, and without

interviewing the visitors at a later date it is impossible to discover if the interpretation had had impact beyond the visit. Some people reported interaction having an impact on them and the way they saw the garden and other reported making multiple visits to the garden specifically to use the interpretation. Most of these visitors already had a connection to the garden. The review of the artefacts showed the interactions were often short and superficial, which led to the Digital Boggarts work. The workshop required effort and deeper engagement and reminded me of the qualities of the Nature Meditation Egg, in which digital technology was used as a catalyst for exploration and reflection. Reflecting on the main problem with Digital Nature interpretation in the garden, is its passivity. Little is demanded of the visitors and this makes me speculate about the possibilities of designing active interpretation that provokes response in a similar way to the Nature Meditation Egg and Boggarts.

The philosophy and design guidelines, and artefacts also had an impact on the team, as described earlier in this chapter. Philosophy drove the design process, which led to the realisation that there was value embedding design volunteers in the garden to work together, to tell the stories of the garden.

8.8 Summary: Reflections on the research

This chapter documented and discussed reflections of members of the team about the collaboration. It also summarised my reflections as designer-researcher. The start of the chapter draws heavily on interviews with three people who had a close connection to the research and could offer detailed insights, in one case covering the whole research period.

Some of the philosophical ideas I brought have been incorporated into the thinking and planning of those interviewed. Some parts of the philosophy had more relevance than others to the interviewees and those are the parts that have been retained. Technology is not the focus for the team. The garden and its stories are of prime concern and if the team get them right they believe the appropriate technology will follow. This is interesting because it posits putting context first and foremost to avoid being led by digital technologies. Introducing

the Digital Nature Hybrids has caused the team to reflect on the stories they tell and their use of interpretation.

The embedded way of working and the slow pace have allowed time for the ideas to become absorbed. The extended period of research has allowed for deep reflection on the digital interpretation at the time of its installation, and over the seasons as it lives in the garden. The extended periods of use have highlighted problems that affect the longterm sustainability of the artefacts, for example the Audio Apples take a disproportionate amount of time to manage and maintain and are consequently being re-imagined by the team.

In the chapter I reported on evidence that the activities begun as a result of the research are having impacts beyond the research period, in respect of particular digital interpretation artefacts, and of wider interpretation planning. I also reflected on the successes and limitations of the artefacts in relation to the initial research questions. I noted that while the Rhubaphone and Audio Apples have an impact on visitor's attention to and awareness of the garden, they do not necessarily stimulate long-lasting engagement, and this points to the Digital Boggarts-style workshops as an alternative for stimulating deeper connection.

I considered the impact of the collaboration on my research practices. I noted the value of the extended timescale for developing a deep understanding of the research context and how RtD was compatible with this style of work. For me, this was a key finding. I experimented with how I might communicate the consequences of design decisions over time to show the value of a long temporal perspective and the resulting diagrams are a technique I will carry forward into future research. One of my concerns through the research was trying to show how knowledge can be generated through RtD, and the diagrams are a contribution towards this aim.

The concluding chapter will summarise contributions, highlight challenges and limitations and identify areas for future research.

Chapter 9

Conclusion

This section summarises contributions, challenges and potential directions for future research.

9.1 Findings

I will address the findings and contributions with reference to the research questions. Findings come in the form of knowledge about the influence of critical theory on design and design practice. In addition, there are contributions for organisations involved in site-specific environmental, cultural or historical communication, researchers in the field of interpretation, and formal and informal educators.

- How does lens taken from critical theory affect the design of digital interpretation artefacts?
- How does lens taken from critical theory affect the design of digital artefacts to support connection to natural places?

One of the most significant consequences of using critical theory as a design lens was that the design context was prioritised and this had a cascading affect across all design decisions, through material choices, to process and work pace. This

gave the artefacts, designed for the Walled Kitchen Garden and for the woodland near my home, a distinct character. Many materials were locally sourced, and at Clumber the design elements were culturally relevant, resulting in a character that tied the digital artefacts to their place.

The consequence of being designed for a particular place and purpose is that they are not easily transferrable to other sites. As far as the theoretical guiding principles are concerned, this is a success because it locates the technologies and makes them part of the whole. The material of the digital technology acts as a connector between place and people, as exemplified by the pride expressed that the Audio Apples were made by one of the team, using wood from the park. Using contextually significant materials highlighted the potential to reinvigorate local and traditional skills, so that contemporary digital making provides a stimulus for using traditional local craft practices.

Using materials that are contextually relevant in a natural environment usually implies using natural materials, and that has the knock on effect of bringing attention to different temporal scales. For example, the rhubarb in the Rhubaphone wilts as water evaporates from the stem, which reduces lifespan. It establishes a local perimeter in range of the Walled Kitchen Garden in which the Rhubaphone can be used as designed, to show different rhubarb cultivars. Beyond that distance it becomes infeasible to replenish the heritage rhubarb stems and the design ceases to function as intended. The failure of the design outside its locale actually reinforces the messages about provenance, food transport and local food. Unlike the majority of digital interpretation, the Rhubaphone will not work anywhere, anytime. Out of the rhubarb season, its 'fallow time', emphasises seasonality.

It can be argued that the local and natural materials only encase digital devices, that are in themselves no different from traditional digital technologies, made thousands of miles away, and completely disconnected from their current context. This is undoubtedly a tension, and it is something I would like to investigate further in collaboration with engineers and programmers. In the circumstances, creating bespoke hardware would have presented maintenance challenges that would have conflicted with other design guidelines. Besides, I believe the

nature hybridity exerted its influence on the digital components by shaping interactions with the devices.

The artefacts displayed another commonality, linked to interaction. The design criteria drawn from critical theory suggested the benefits of multi sensory connection to deepen engagement, therefore enhancing emotional connection. In contrast to most contemporary digital technologies, the Digital Nature Hybrids carried smells of materials used or smells of the immediate environment within the personal space of the user, such as wood, wax, rhubarb or blossom.

Revisiting the idea of Gaver and Bower's Annotated Portfolios [241], it appears that these Digital Nature Hybrid artefacts, designed with a critical theory lens, do share family traits. However, as the main designer in each, the commonality may come from my design style. To see if that is the case it would be necessary to compare the artefacts designed by another designer, using the same guidelines.

In terms of connection to place and visitor experience, the determining factor was the intent of the artefacts and the effort involved in any activities linked to the artefacts. All the artefacts caused people to notice something new, and for some that was impactful. A minority stated an intention to do something as a consequence, for example find out what rhubarb was growing in their garden. For the majority of users the interactions with the interpretation was superficial and didn't cause a change in outlook or connection to the garden (though for some people who already had a strong connection to nature or the garden, the interpretation added to their connection). The hybrid installations did increase knowledge and they engendered appreciation and sometimes wonder, though this was as much wonder at the technology as wonder in the garden. By contrast, the Nature Meditation Egg increased my connection to place because I spent more time actively paying attention to the world around me. I spent hours in the woodland, making audio recordings and then listening to them in mindfulness practice. However it was exceptional for visitors to spend significant time interacting with the installations in the garden and the experience was comparatively passive. It isn't likely that increased connection to nature would occur through such a fleeting encounter. Therefore the lesson learned was that digital technology that was designed to encourage time spent in natural environments in active, attentive pursuits is more likely to play a transformative role in a person's

empathy for nature. Further research is needed to evaluate the use of the Nature Meditation Egg with other users.

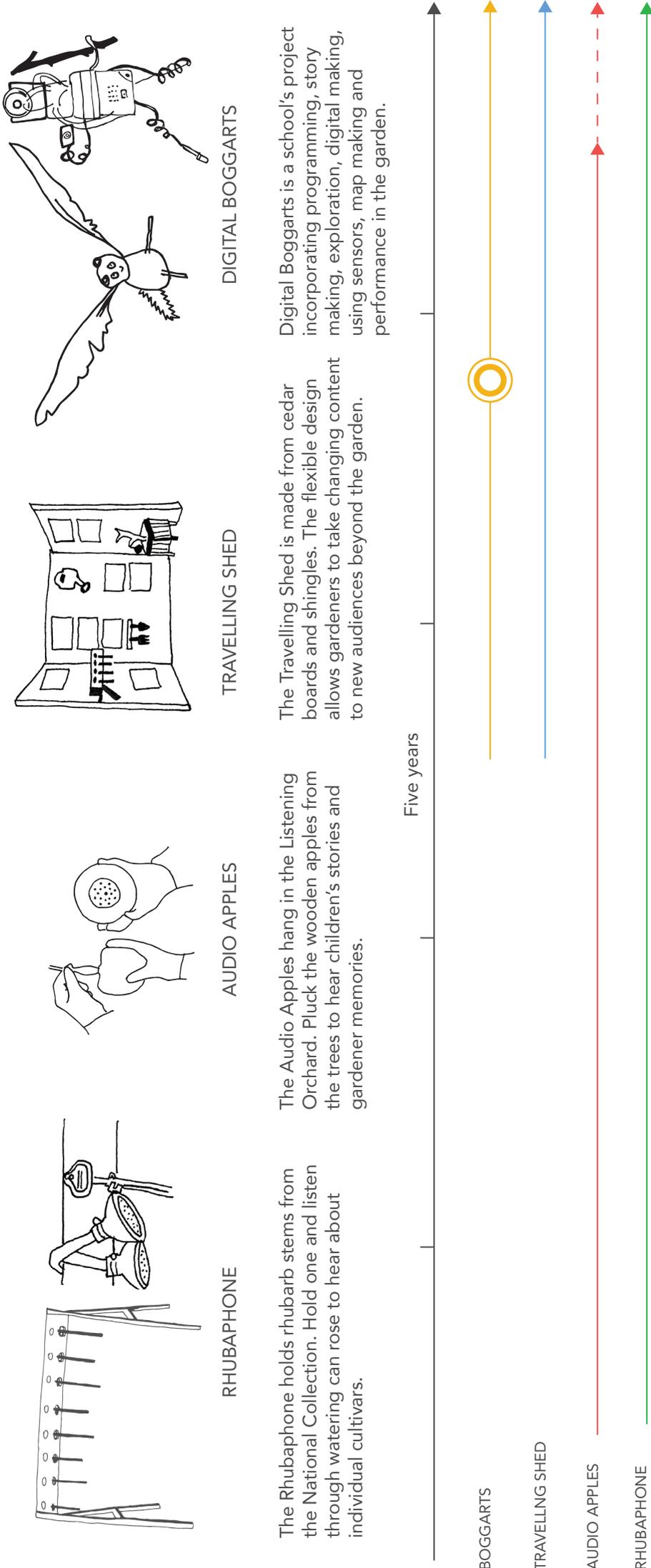
- How does lens taken from selected philosophy affect the design process?

Adopting the design lens from critical theory not only shaped the design outputs, but also had an impact on how they were designed, and how the design process was evaluated. Borgmann's concern about decontextualised technologies [214] and Feenberg's ideas about instrumentalization [208] and participation in design influenced my thinking about process. The result was a process that evolved and shifted to be more locally appropriate.

The process was slower than I'd anticipated at the outset and the participatory aspects did not unfold as I'd initially expected, but that was a consequence of my attempt to work with people and place, rather than imposing a process and expecting people to shift their practices to accommodate it. My interpretations of the theories are subjective and I acknowledge that other designer-researchers might have interpreted the philosophy differently. However in this conclusion I put forward the value of my interpretation of the philosophy and its manifestation in the process.

In order to pay close attention to the design context I adopted an embedded way of working, becoming a registered volunteer. I spent many hours on site, to allow opportunities for serendipitous encounters and different kinds of engagements and participation. I found that Research through Design was compatible with the philosophical commitments of the project, especially when combined with aspects of Alexander's 'timeless way of building' [191]. It afforded the flexibility needed to address temporal and other site-specific factors. Working as an embedded designer gave me a role within the team which enabled me to gain an interior perspective.

Temporalities: includes indicative images and timelines of main artefacts with research questions emerging over time.



Timeline to show lifespan of designs. Digital Boggarts was focused on a single event. The lines indicate preparation before the event and development towards next event.

RQ
How does lens taken from selected philosophy affect the design of digital interpretation artefacts?

RQ
How does lens taken from selected philosophy affect the design process?

RQ
What is the impact of the digital interpretation on visitor's experience of the garden?

RQ
How can digital technologies be used to promote active engagement and exploration in the garden?

RQ
How can the guiding philosophy be used to reach new audiences?

RQ
How can digital interpretation be sustained beyond the length of a funded project?

Figure 9.1: Timeline of the work at Clumber Park documenting the emergence of research questions.

Although I did a lot of making elsewhere (because the facilities and tools I needed were not on site), I found that the times when I was making or fixing things in the shed or other buildings gave me additional insights about the site and how the designs might function or fail in the environment. As the research progressed this was one of the things that convinced me of the value of embedded designers in order to bring the stories, values and priorities of the place to prominence. People within the team have varying degrees of interest in digital interpretation, but my presence on site meant that anyone could contribute to design discussions. Embeddedness as a designer enables one to absorb tacit knowledge to ensure designs speak to the context, and embeddedness as a researcher enables one to understand the day to day impact of the designs on the team, as well as visitors. In addition to studying the designs and their impact the researcher can uncover an understanding of the site and organisation, through the designs.

In the introduction I wrote about the need for connection to build care about nature and I think that there is a parallel in respect of design. Designing and spending time in the garden increased my understanding, but also nurtured my personal connection to the garden, so I offer the contribution of design as a form of placemaking activity. I began to apply this idea through the Digital Boggarts work, but it is an area for further research in relation to connection to nature, especially among young people.

Philosophy informed the embedded way of working and it also guided the pace of the research and this led to unexpected insights. I spent longer in the garden than originally planned and that enabled me to see things I would not have noticed during a shorter period of research. Figure 11.1 shows the timeline of the developments at Clumber and illustrates how the extended temporal connection gave space for new research questions to emerge. The time I spent in the garden made me far more aware of the work needed to manage the new digital interpretation and this led to the questions about sustaining interpretation. I moved from a focus on the impact of a design on visitors to a broader, 360 degree focus on the life of the designs and the impact of the designs on the local team.

The longer timeframe caused me to think more about the organisational roles and processes. Longitudinal research is not new in design but shorter research projects are more common. One output of this thesis is a reminder of the value of longer term research.

Gaver and Bowers suggest the use of annotated portfolios which can be configured in different combinations to uncover patterns about designs and their impact. I suggest that ‘staying with’ a place for an extended period of time provides an alternative way to build a rich understanding of a design context. Multiple designs iterated in a place can be interrogated for commonalities that uncover understanding about the place and the characteristics of designs for a particular purpose, for example digital interpretation for outdoor use. This may boost the transferability of the research.

- How can digital interpretation be sustained beyond the length of a funded project?

In the research site, a practical contribution from this thesis has been towards the recruitment of an interpretation volunteer with an interest in digital technology. The Gardens Team are ultimately responsible for this recruitment, but our work together made a contribution towards this outcome.

Through the thesis it became clear that unless ways can be found to support and sustain digital interpretation it will not persist when funding ceases, even if there is a desire to use the interpretation. This is because of the technological and practical challenges.

One of the contributions of the research is to put forward questions and recommendations to consider when designing digital interpretation for organisations. These are as follows:

- How much will it cost to maintain the interpretation and can the organisation afford it? Small charities or individual teams within larger organisations may have limited budgets and predefined priorities that mean they are unable to buy replacement parts if the interpretation fails. Robustness and replicability of components are therefore important factors when making design decisions, especially for digital technologies to be used in places that are subject to environmental wear and tear.

- What are the costs of the interpretation and do they present barriers to use? If the design of the interpretation creates additional work and there is insufficient resource to cover the additional resource, it won't be used. Therefore the design should seek to minimise additional costs (for example management and security).
- Does the team have sufficient skills to maintain the interpretation? The guiding philosophy argues for users to be able to control and determine the use of technologies. This means a bottom-up approach, so a local team are not dependant on the wider organisation. It should be a consideration in the design process to assess whether the team has relevant digital or electronic skills to fix problems, and if not, how this will be addressed. Designing to build skill incrementally, through re-use of coding languages (to reinforce and build skills) can help. Choosing digital technologies with a low barrier to use is also beneficial. Sometimes these technologies may be designed for other everyday purposes that are familiar to non-experts. If these can be appropriated in digital interpretation it may ease access.
- Can the team take ownership of the interpretation? This follows on from the previous question, but is distinct. It refers to the ability of a team to adapt the digital technology to a new purpose that will extend its life. This includes the ability to edit and replace content.
- Does the interpretation have an appropriate 'home' on site? If there is no space for the interpretation, either in use or in storage it may not be feasible to keep it, resulting in a wasted investment. Consider the use of the artefact. Where will it 'live' day to day? Where will it be stored in 'resting' periods. It is really important to be respectful of the available resource and design accordingly.
- Does the design conflict with the organisation's values? The interplay of values should be considered because if there are tensions between different values the interpretation may not be used.

9.2 Contributions

- How are the findings of the research project relevant and applicable within the fields of interpretation and environmental communication?

This was not one of the original research questions but brings together and applies some of the findings to the questions about the use of a critical approach to the design of interpretation technology. One of the main criticisms of digital technologies articulated through Borgmann's account of the device paradigm is that devices are not connected to the context in which they are used. They are divorced from and independent of places and that means they 'owe' nothing to the place and they do not belong to the place.

In theory, if technologies are tied to place in the way that Heidegger's things are 'of a place' it becomes harder to turn these things and places into standing reserve because they only survive physically and conceptually, in those places. From a theoretical perspective, designing with context is key. This principle is transferrable to other interpretation contexts.

In order to keep the interpretation contextually relevant, the designer needs to have a deep understanding of the place, its people, processes, materials and values. Usually there is a division between the staff conducting day to day conservation, public engagement, gardening and environmental work and staff producing digital interpretation (though sometimes non-digital interpretation is produced by teams on the ground).

In respect of the critiques of technology this is problematic because the people designing the technologies are not, 'of the place' and even if they are well briefed they do not have the same experiential understanding of a place. They don't have the same contextual knowledge of a staff member working on site so they bring a layer of disconnection that is perpetuated through the design of the technology. An intimate understanding of place is needed to create interpretation technologies that tell stories that authentically represent the place. However, there isn't always the requisite skills overlap in a team 'on the ground.' In small environmental organisations the technical skills may be limited [242]. A key finding of the thesis is in the value of having staff embedded with a team 'on the ground' in order to produce interpretation that represents their perspectives and stories.

My experience of being semi-embedded in the garden meant that I was in constant communication with others in the garden. I was able to take advantage of serendipitous events to build understanding, and to gather content or materials. People could find me and talk to me and as far as possible barriers were reduced. This research shows the value of team members, embedded within the immediate interpretation site, with the technological skills to create digital interpretation that speaks from the site. It isn't always possible for other team members to get involved in the hands-on creation of digital interpretation, but being present on site exposes the team to digital technologies and offers the potential for direct involvement in creating digital interpretation. This is beneficial because it attempts to democratise technological development by including more voices in the design of digital interpretation, thereby responding to Feenberg's call for more democratically designed technologies. Not only that it makes it possible to work with the structures and processes of the team 'on the ground' because it fosters a deeper form of engagement. This is incredibly important because, as I experienced in the research, many team values are communicated subtly through the way of working.

In this research project the role of Digital Interpretation Volunteer was created. The impact of the new role went beyond the creation of new interpretation that might be achieved in other ways through, for example, 'designer-in-residence'. It also tied into the commitments to sustainability because it ensured that knowledge about existing interpretation was carried forward. This concept is transferrable to a range of organisations involved in conservation, interpretation and environmental communication.

Another transferrable outcome of the work is the value of modular, re-usable technologies that can be managed by people with different skill levels, and can be built upon as skill levels increased. This means a greater range of people can be brought into the interpretation activities, including visitors.

- How can digital technologies be used to promote active engagement and exploration?
- How can the guiding philosophy be used to reach new audiences?

In recent years in the field of interpretation there has been a realisation that relying on a single voice of authority to interpret a place or collection can be problematic because it does not allow contested histories to be articulated and it can perpetuate dominant perspectives that exclude some visitors. There have been attempts to include a range of visitor's voices in public displays of visitor feedback and comments, some of which are collected around themes. These activities encourage active reflection and the sharing thoughts with others. This research presents opportunities to go further, by involving people in creating new interpretation artefacts that share individual stories and perspectives based on activities designed to stimulate deeper engagement than is possible for every visitor.

By comparing and reflecting upon the differences between the Nature Meditation Egg and the Digital Nature Hybrids in the garden I became aware that the interaction for the Rhubaphone and Audio Apples required less active engagement. The experience was more passive and fleeting than the Nature Meditation Egg. By contrast, designing and making artefacts strengthened my connection to place (and thing), because it required time and effort and these delivered moments of revelation, surprise and emotional connection. This insight, which ties directly back to the philosophical contributions from Borgmann's focal practices, led to the development of the Digital Boggarts workshop. The workshop illustrated how digital technologies could be used to stimulate more sustained and effortful interactions in natural environments. This has the potential for far wider application in the area of cultural, environmental and historical interpretation, particularly in outdoor sites. The Boggarts project was aimed at primary school children, but the workshop structure, is transferrable across different ages, interests, demographic groups and locations. This can be used to attract 'harder to reach' groups or particular segments, such as National Trust's 'Explorer Families'. The method can be used to design programmes that target National Curriculum learning outcomes and hence make connections between schools and environmental organisations, reaching more diverse audiences than are represented by an organisation's membership.

The particular workshop structure, which combines time spent outside in active exploration, research or investigation of a place is especially important for environmental interpretation because of the importance of experiences in 'actual'

(as opposed to virtual) nature for nurturing environmental connection and care. The other activities are part probe, part provocation, part reflection and part articulation, the aim being to trigger different kinds of sensory stimulation, with the potential for gaining new insights. This goes beyond trails and hunts because of the multi-activity, multi-sensory, approach towards the creation of a new piece of interpretation. Boggarts were designed to investigate microclimates but the approach could be applied to other themes such as biodiversity, seasonal change or adaptation. This particular use of technology in combination with creative and outdoor activities in these spaces is novel, and that is what adds to the richness of the experience. Sometimes people perceive differences between groups. One of the aims in the design is to ameliorate the primary instrumentalizing tendency of technologies by reconfiguring and shaping the technical through social and cultural dimensions during secondary instrumentalization. This is a response to the guiding philosophy of the project, particularly from Feenberg.

We found that when the Rhubaphone was used with a speaker (rather than with a personal listening device) it stimulated conversations between groups of visitors, about rhubarb, gardening and childhood. The Boggarts activities were designed as social activities to encourage discussion and sharing. Another potential of these workshops is to stimulate social behaviour and conversations connected to the discovering and creating activities.

It isn't possible for every visitor to invest as much time or to have the same access to a site as was possible for the workshop participants. However there are opportunities to extend the reach of the workshop far beyond the direct participants, through pieces of interpretation created by the workshop-participant-visitors. If these artefacts are left at the site they can speak to many more visitors, with the added advantage that they represent a wider set of views. This isn't necessarily straightforward and needs to be managed carefully. Interpretation created by visitors is still based on a limited engagement and experience and the values of the creator may not represent those of the organisation. These activities are not intended to replace expert voices but they are intended to complement them in the recognition that laypeople and amateurs can make valuable contributions to understandings of place or collection. This leads on to the next point.

Digital technologies can contribute to the expansion of what is meant by the term interpretation. Interpretation is usually understood as being for visitors. In this project one of the unexpected, valuable insights was the impact on the team and volunteers. Participation of volunteers and members of staff in the creation of the Audio Apples had a number of effects. First there was a sense of pride in the physical artefact created by a colleague that for some people engendered a feeling of team cohesion. Next was the value of sharing. The team learned more about their colleagues' personal connection to the garden. The artefacts prompted conversations about interpretation. However the potential of interpretation which has been created by visitors (for staff) may be the most important contributions to the research. Digital interpretation workshops, like Digital Boggarts, can hold a mirror up to a team. They can see what visitors are experiencing, learning and retaining so they can see how the stories that the team tells are received. They can also see the stories that they might have missed that their visitors tell each other. These can aid inclusivity and they can be used to involve visitors more closely in the development of collaborative interpretation.

The following section identifies challenges and limitations.

9.3 Challenges and Limitations:

Challenges and limitations affect several aspects of the work, starting with the timescale. This research has extended beyond the standard length of a thesis research project and that raises several issues. Although I have found value in extending the research, this isn't usually practical (financially) and often isn't desirable (particularly from an employment perspective). Consequently, although I argue for the value of longer research projects, I am mindful that this isn't always appropriate.

Even when it is relevant it presents challenges because academic structures in design and HCI support a swift process towards the production of novel outputs. Research that disrupts is favoured over incremental research. Carrying out longterm incremental RtD research presents several difficulties, mainly because publishing and funding structures are not designed to accommodate it. It

is easier to present novel work than unpick findings that have unfolded incrementally because the story often depends on detailed backstory and timelines and papers don't allow sufficient space for this narrative. Maintaining anonymity in the review process is challenging, especially when images of artefacts can reveal authorship.

Although there are some five-year funding awards this isn't common and the subject of funding-calls changes in relation to political priorities, so it can be difficult to sustain longterm research collaborations. The PhD gave me freedom to pursue research in a way that may be difficult in a future research role.

9.4 Future work:

The research has generated several directions for future work. The first Digital Boggarts workshop was run as a proof of concept. The next stage would be to run it in different settings and gather more comprehensive data about perceptions of environment before and after the workshop, followed up by longer term reflections about any impacts of the workshop. As part of this work it would be useful to investigate contextual variations to the workshop and explore variations on digital nature workshops.

Understanding the impact of interpretation over time is another research area which could yield useful insights for understanding connection to nature.

One of the outputs of the Hybrid Digital Nature Artefacts was the importance of active engagement, so a new phase of research into the use of digital technologies to stimulate active, rather than passive engagement is a potential research path.

Research into using digital interpretation volunteers embedded in the garden is a possible direction for research at Clumber. This would include studying knowledge and skills acquisition, knowledge transference and participatory-design processes.

The research revealed commonalities between the digital nature artefacts designed as part of the project but it is uncertain whether these are due to my role

as primary designer. It would be interesting to explore the designs created by other designers, using the criteria identified in this project.

Finally, the issue of measuring the impact of digital interpretation on people's experience of the natural world needs more work because it is hard to capture responses to installations from visitors who are 'passing through' and don't have sustained contact with a site. The work has yielded many insights but also opens up many possible directions for further research in the future.

Appendix A

Rodger Deakin Texts

Shelter



My friends the Randall-Pages have lent me their oak cabin in an old oak wood in the valley of the Teign near Drewsteignton. With a rucksack full of food I hike in past a pair of hedgerow wych elms, down a plunging field, into the flickering oak woods that line the river gorge along a charcoal-burners' path cut into the hillside. Every now and again there's one of their wide, level platforms beside the path, an area of blackened stones, often dark purple at closer inspection, many of them shattered by the slow heat. Until about eighty years ago the whole oakwood had always been coppiced for the charcoal the tin smelters needed on Dartmoor. Some of the charcoal was also exported off the moor by wagon to the south coast, where it was loaded on to sailing barges at places like Devonport and shipped to London for sale. Now the oaks have grown up from shoots on the coppice stools into an open wood of tall, slender, relatively straight-trunked oaks. The Dartmoor National Park Authority have been at work among the trees *singling* the oaks: reducing the number of limbs growing from any rootstock to one, which will eventually grow into a bigger, stronger standard tree. They are also engaged in something of a purge, cutting out any other species than oak, ash or hazel. Trunks of oak and sycamore lie about on the wood's floor. Birch logs are stacked to dry beside the path.

So well does the cabin blend into the wood that I hardly notice it as I approach. Trees and cabin are all of a piece. It is built on one of the old charcoal-burners' platforms, the wood falling away steeply below. From the plank veranda before the door I can see the river hundreds of feet below, racing over rocks. It has been sunny and very warm all day. Now, in the dusk, robins are singing all down the valley. One gives me a personal recital from an oak bough a few feet away.

The cabin is eleven feet wide and eighteen feet long, with a ridged, oak-shingled roof. It is built entirely in green oak cut in the wood here. Each shingle is cleft from a foot-long oak log and is five inches wide by half an inch thick. All the beams of the oak-framed hut have been morticed and pegged together by Cameron, who built it. The floor is of wide chestnut boards and the place is warmed by a wood-stove. I've been cooking on this too: kettles for tea, a tin of tomato soup heated to boiling point and ladled out with an oak spoon I made because there seems to be no cutlery. I spent a happy hour whittling it from a piece of firewood with my Opinel knife from the Dordogne. By luck, it just fitted inside my mug, so I could ladle the soup into it. I write at the kitchen table by the light of a paraffin lamp and a candle in a wine-bottle candlestick. They cast an orange glow on the oak table.

The walls of the cabin are of upright oak boards nine inches or a foot wide, with vertical weather strips fixed over the joints between the boards outside. Apart from the oak pegs in the mortices, all the fixings are forged iron nails. They bleed black stains of tannic acid where they have wounded the living oak, still half full of sap when the cabin was built. All the traditional oak-framed houses you see in English villages were originally built in green oak. The wood is much easier to cut and work, before it hardens into something more like iron with the action of its own tannin. As they season in the building, the beams flex and twist themselves into new shapes, and this is one of the things that gives timber-framed houses their organic character. People repairing oak-framed houses or extending them often make the mistake of building in

dead straight lines, instead of letting the line of a roof undulate gently, so that the tiles rise and fall and rearrange themselves with the passage of time like the scales on a fish.

Above the table I'm sitting at is a sleeping gallery reached by a vertical oak ladder. There is a single stable door to the low-roofed veranda outside and a window either side of it facing across the steep valley to more woods and cliffs, and the river. Opposite the door on the back wall is a wood-burner, crackling and bumping gently now and then, and glowing deliciously when I open it for refuelling. In one corner is the axe I have been using this afternoon, splitting logs of birch and oak for the stove. They are so dry, I only needed to let the axe fall with its own weight and the shivered wood leapt apart.

Fashioning the rudimentary spoon felt a suitably Robinson Crusoe sort of activity. Creative in the most primitive sense, it purged my mind of all other thoughts but the here and now of this beautiful wood. Sitting here as night falls, all I hear is the river rushing over the boulders and stones below. The steady sound could be rain, or it could be wind in the trees. No doubt when all these come at once, they harmonize into a single chord.

The night before, sleeping in the yellow spare bedroom just under the thatch at Peter and Charlotte's cob-built farmhouse, I had lain listening to the stream that flows within a foot or two of one end of their house. Over dinner, we had sat beside a fig tree, under the burgeoning new growth of a vine, pruned back hard last year. The sky was clear and starry. Peter brought out some oblong offcuts of Kilkenny limestone from his studio and pushed them together to frame a fire. He cooked mackerel and squid over a barbecue powered by an antique foot-treadle bellows that once supplied air to naval divers. Peter had taped a spout of iron piping to the rubber tube, which he plunged into the charcoal and oak, then pumped to fan the fire into instant red heat. We sat by the fig tree for a long time, savouring the first outdoor evening of the summer. 'I love being outdoors,' said Peter. 'I would live outdoors all the time if I could.'

The cabin falls into shadow at sunset, so I move thirty yards up the hillside to sit on a golden cliff-top overlooking the Teign and its wooded valley. The low sun renders all the foxglove flowers translucent pink, and the hillside bracken shines like the river. Back in the cabin, I keep the stove going, light candles, open some wine and sit out on the veranda, watching the bats go by and listening to the river as darkness falls. When it is truly dark, owls begin hooting in the wood, and fireworks boom in the distance at Teignton Fair, on the other side of the hill in Drewsteignton.

I wake up early, feeling at one with the roosting birds in the wood, perched as I am in the loft. During the night I heard only the steady song of the river, full of subtle variations played on the rocks, and the occasional bump somewhere deep inside the stove as it cooled and contracted its stove-pipe. Surveying an aerial view of the inside of the cabin from my bed, I admire the minimal furniture of the place. It is more or less the same as Thoreau's in his cabin at Walden Pond: a table and two chairs, one for himself and another for a guest.

The wood-burner does the heating and the cooking, and there's a high beam to sling the bedding over to air, well away from the mice, which I imagine will come out to play like the Borrowers the minute I leave. All I have brought, including food and drink, fits easily in a rucksack. This is one of those places where everything, even a single baked bean, tastes so good that you don't need much to eat anyway, and each cup of tea is a major ritual. This was especially true of the first of the day, which necessitated lighting the stove to boil the kettle.

The deck of the veranda feels warm to my bare feet when I climb downstairs. Blackbirds are singing all over the wood, a greater spotted woodpecker flies along the bottom of the valley, and a pair of buzzards ambles past, flying at the same level as my breakfast table. The sun lights up the leaves like stained glass, dancing on the mossy trunks of oaks, reflecting highlights off the river. In a wicker chair beside the door, I notice every living thing that comes past. Bees on their way to a clump of foxgloves to my right. A dor beetle

that keeps turning up, clambering over shivers of oak where the wood is chopped. A red admiral sails past. A yellow brimstone. As soon as the wind gets up, the insects disperse into the wide clearing of bracken, bluebells, stitchwort, foxgloves and saplings of silver birch before the cabin. A squirrel comes close to the door, quite bold, looking for crumbs.

Later, as I sit reading in the afternoon sun, a pearl-bordered fritillary comes and settles on my book, enjoying the reflected sunlight. Insects are often attracted to the brightness of books. At home in my garden, dragonflies and damselflies often settle on the page, and will stay there for some time. Such moments are leisure for them as well as for me. What else could they be doing but resting and sunbathing, perhaps even catching up on some lost sleep? I can never decide whether insects and small animals are profligate with their energy or highly economical. A fly will apparently buzz about far more than it really needs to, but a spider will sit still in its web for hours on end, only stirring itself to race out and capture a snagged fly, or to flee some danger. Spiders will build communal webs across whole fields, covering them in dazzling lakes of early-morning dew: as massive an expense in work and materials as when Christo wrapped up the Reichstag.

Wildwood - Roger Deakin: Shelter (see accompanying pdf)

Introduction

I hope to analyse selected texts from contemporary writings about experiences in and of nature with a view to exploring the following questions:

What do people's writings about experiences in nature tell us about connection to nature?

How does connectedness manifest itself?

How does this picture of connectedness relate to theories about technologies and nature and the relationship between them?

I intend to explore/investigate the texts from multiple perspectives or theoretical standpoints.

Text analysis of 'Shelter' by Roger Deakin, using the philosophy of Borgmann as a framework

The text, 'Shelter', is an account of a stay in a cabin in Oak woodland. By examining the text in the light of Borgmann's writings I hope to draw out themes that facilitate a discussion about connectedness to nature and the relationship between connectedness to nature and technology. The aim is to explore the place of technology in different nature/natural settings and the design of technology for use in nature/rural/wild places.

Borgmann contrasts between life-sustaining consumption and paradigmatic consumption. The former occurs through the interplay between labour and pleasure/satisfaction, bound to a context. The latter occurs where both labour and context have been uncoupled from commodity, where pleasure is unfettered by the moderating influence of exertion. Borgmann associates life-sustaining consumption with supporting welfare, or the ability to function (2000, p.418) and a way of life connected to place.

The burden of labour is intrinsic, as is engagement with context. Tools that aid this form of consumption are generally simple, with obvious functionality, although their effective use may require skill and hard won mastery. This contrasts with the "sophisticated impenetrable machinery" associated with paradigmatic consumption, which trades ease of use for opacity of technological machinery. This "device paradigm" liberates humans from the hardship of exertion and skill acquisition, providing safe and easy to access commodities. However, it also creates a detachment from context and an imbalance between humanity and material environment (2000, p.420) , because it displaces the focal practices which centre our lives (2000, p.421) and convey the essence of what is meaningful to us. Borgmann identifies modern technologies and de-situated ways of living as causes of paradigmatic consumption.

The strands comprising Borgmann's philosophy are interwoven and it is hard to draw passages from the text and match them to isolated ideas, however some extracts appear to suggest certain themes quite strongly. There are some references to activities, past and present, that Borgmann world term life-sustaining consumption (marked orange in the text). The charcoal burners who had earned a living in the woods were engaged in life-sustaining consumption of the wood; embedded in context through knowledge and physically engaged labour practices. It should be noted the engaged consumption of the charcoal burners may have helped to fuel/sustain paradigmatic consumption in industry further down the production chain. Elements of life-sustaining consumption are also part of the writer's stay in the woods, as dependence on a wood-burning stove for cooking and heat necessitates physical exertion to split wood and feed the fire. Fire has key significance because the origin of focal practices is in the wood-burning fireplace that formed the focus for family activities. Dreyfus & Spinoza (1997, p.161) point to the sliding transition from open fire, to stove, to furnace as an indication/illustration of technology's place in

the move to Borgmann's device paradigm.

The effort associated with life-sustaining consumption (marked green in the text) is also evident in the text, from descriptions of fanning the cooking fire with bellows on the stopover en route to the woodland, and the need to "keep the stove going". Heat could not be taken for granted and was not available at the flick of a switch. For Deakin "each cup of tea is a major ritual" especially on the first day "which necessitated lighting the stove to boil the kettle." (p.108) The lack of utensils meant Deakin had to make whittle his own spoon "from a piece of firewood", an effort which he describes with pleasure as a "happy hour". To reach the cabin Deakin had to hike in unaided, carrying everything he might need for the duration, but this is not described as a hardship, but an opportunity to experience the landscape. This mutuality of joy and toil echo the characteristics of Borgmann's life-sustaining consumption.

Skill and tools (marked yellow in the text) are an area of concern for Borgmann. In pre-technological times tools were simple and their functionality was overt, but their use required skill built from experience. By contrast, in this period of technological dominance, the mechanics of tools fade from view, in tandem with increasing ease of use and a decline in skill. Deakin's description of housebuilding from oak details work of considerable skill. Making oak pegs, shingles, weather strips and boards are all skilled tasks, yet this work was likely performed with a set of relatively simple tools. Cabin-building requires understanding of working with living green wood, which will continue to heave and flow "with the passage of time like the scales on a fish." Deakin points out the error of the inexperienced "building in dead straight lines, instead of "letting the line of a roof undulate."

The skilled work continues in the present, as the Dartmoor National Park Authority carry out "singling" to nurture, or cajole the growth of a "bigger, stronger standard tree." In both past and present the activity requires skill borne of attention to and engagement with context and experience of the materials of the context. These skills cannot be absorbed instantly. Proficiency requires time and effort in situ.

The sense of engagement, particularly sensory engagement is a strong theme running like a seam through the text (marked in red). It underlies all activities recounted like wood-chopping, walking and carving. It is also underpins the periods of reflections, for example when Deakin listens to the "steady sound" of the river, feels the warmth of the sun on the veranda or pauses to notice the for beetle which "keeps turning up, clambering over shivers of oak where the wood is chopped". There is a sense of rhythm to Deakin's time, as he falls into patterns set by the environment, which also suggest engagement with location.

Borgmann expresses concern that culture is diminished by technological life through which "the sacredness of a temple becomes a resource for tourism" and "the majesty of mountains becomes a recreational resource". There are suggestions of this within the text (marked in purple). The oak cabin is not a dwelling for charcoal-burners, but appears to be "second home" for retreat and recreation. The retreat might provide a space that maintains sacredness, and recreation might form a different kind of engagement, in an age where the the woods do not support a community of permanent or semi-permanent residents. But for Borgmann it is a symptom of progressive detachment of context associated with ease of access and instant gratification.

This text describes an experience in nature that involves continual and varied sensory engagement with the surroundings. It involves pleasure accompanied by, or possibly driven by exertion and labour. The labour, in both past and present, requires skill drawn out of experience, using straightforward tools. This account of nature experience would appear to support the idea of connectedness described by Borgmann.

It suggests that knowledge drawn from experience and engagement are key to connection.

Appendix B

The Scarecrow and the Garden Boy

The Scarecrow and the Garden Boy

{Sound}

If you stand very still in the orchard, without making a sound, you'll hear the trees remembering the secrets of the garden.

{Sound}

Once there was a garden boy whose job it was to keep the fires in the heated wall at just the right temperature all through the night. The Duchess required a perfect fresh carnation on her dressing table every day. If a fire went out, the carnations in the glasshouses would die. And if such a disaster were to strike, the Duchess would make things very painful for the boy.

Late one afternoon, the boy set to work in the vegetable patch, pulling up all the celery. He was so exhausted from his night-time duties he forgot to ask permission from the scarecrow who protected the celery trenches.

When the day's work was done, the boy had just enough time to eat a lump of bread before his night-time work began. A bat swooped over the garden wall, bringing down the dark. The scarecrow sneaked up behind the boy as he tended a fire in the wall. *Crickle, crickle, crickle, crack.* 'Are you a boy-shaped crow? Or a crow-shaped boy? Either way you don't pick from my patch without asking me first.'

The boy leaped from the scarecrow's grasp and ran for the glasshouses. The scarecrow chased him up the garden path, shouting, 'Crow-shaped boy, I'll plant you in the compost.' *Crickle, crickle, crack.*

The garden boy always treated his tools well and tools take care of those who do. By the glasshouse door the boy grabbed a rake. He threw it across the path behind him and a forest burst from its metal spikes. Trees towered high above the garden walls with sharp metal leaves.

The boy ran on, but he could hear the scarecrow crashing through the forest, shouting, 'Boy-shaped crow, I'll pod you with the peas.' *Crickle, crack.*

Under the arch, the boy found a watering can, filled to the brim. He tipped it up and water flooded down the sloping path making a lake at the bottom of the garden. The boy jumped onto a spade and sailed to the other side.

But the scarecrow followed close behind on a rhubarb leaf, shouting, 'Crow-shaped boy, I'll stick you in the hive.' The boy ran up through the rose garden and headed for the orchard. *Crack, crickle, crack.*

There were no tools on the path, but he found a thumb pot in the long grass. He picked it up and put it down again and nothing happened. The scarecrow was nearly upon him. He turned the pot upside down and it shot up into a mountain. The scarecrow was stuck at the very top bellowing down at him, 'I'll plant you yet, crow-shaped crow. I mean boy-shaped boy. Crow-shaped boy!'

The boy laughed and picked an apple from a tree. A much juicier apple than the one in your hand.

A fox walked along the garden wall, setting light to the sky with his tail. In the rosy dawn the mountain shrank until nothing was left of it but a stone plinth. The scarecrow was frozen like a statue on top.

The boy ran to check the fires in the wall, and to his relief none had gone out or even died down. *Crickle, crickle, crickle, crack, crickle, crickle, crickle, crack.* When the head gardener arrived, they pulled the scarecrow from the plinth and pushed him deeper than ever into the vegetable patch, so he couldn't go wandering again. In the glasshouse that day, the boy cut the largest, most beautiful, carnation anyone had ever seen.

{Sound}

Appendix C

The Weeder Woman

The Weeder Woman

{Sound}

There's only one night of the year when the birds talk and the trees walk. And if you listen carefully you'll know the secret of when it is.

{Sound}

There was once a young weeder woman who spent long days on her knees with the daisy grubber yanking out the weeds. She was good at her job, but the Duke ignored her curtseys, the head gardener ignored her hard work, and the journeymen ignored her all together. After a while she wondered if she'd become invisible.

Now, for years and years there'd been rumours of a great treasure hidden in the garden, but nobody knew where it was. Only on the one night of the year when the birds talk and the trees walk could the secret of the treasure's whereabouts be discovered. And every man on the estate was certain he would be the one to find it.

On Christmas Eve, all the workers were up with the icy dawn to gather produce for the next day's festivities. The Duke demanded the grandest of tables with peaches, plums, strawberries and grapes for his guests.

When the day's work was done, fires and lanterns brightened the dark winter night and there was feasting and song in the journeymen's bothy. The weeder woman was not invited to join in. But being invisible, she was able to take a small lump of bread and a mug of cider from the table without anyone noticing.

The weeder woman slipped into the garden, where the winter-thin birds had gathered in the trees. Feeling sorry for them, she gave them the bread instead of eating it herself. The grateful birds gathered round her chattering, and she soon heard them say exactly how the treasure could be found.

But before she could set about it, three journeymen crept into the garden. They banged into each other with their spades and said, "Shusssshhh!" 'Shusssssh!' 'Shuuuush!'

Next, the head gardener crept into the garden. With his bowler hat pulled down low, he sneaked through the shadows.

Then, the Duke himself crept into the garden and walked right into a tree, sending birds flying from its branches up to the walls.

The birds watched, but they kept their beaks shut and wouldn't say a word to help. The weeder woman was standing in the orchard, right where you are now. She held her breath and didn't dare move, wishing herself more invisible than ever.

The Duke, the head gardener and the journeymen tiptoed round and round the garden, searching for the treasure in vain.

When all the men had given up and gone, the weeder woman took her mug and poured a little cider onto each of the apple trees' roots and the trees began to walk. First they crossed the orchard to greet one another and then they bowed and curtsied and began to dance.

The apple tree ball was far more joyous than any that had ever taken place in the big house. Under the starry sky, the trees joined branches and leaped about. The Bess Pools jigged in rings. The Radford Beauty spun about with one Pippin after another. All the Lords and Ladies skipped away from the walls to join in. And the tree called Ulland, after a pony, galloped up and down the central path.

The weeder woman watched the ball in wonder, and when the trees had finally tired and the birds told her it was time, she curtseyed to the Sturmer Pippin. 'It's under this root here,' he said, and she just had time to pull up a chest filled with silver and gold before the trees all settled back to sleep.

For many years after that, on the one night in the year when the birds talk and the trees walk, the birds could be heard to say, 'They're looking for the treasure.'

'Looking for the treasure.'

'But it's already gone.'

'Long long gone.'

'Taken far away by the one they didn't see.'

{Sound}

Appendix D

Ethics forms for Boggarts workshop

**Faculty of Science and Technology Research Ethics Committee (FSTREC)
Lancaster University**

Application for Ethical Approval for Research

This form should be used for all projects by staff and research students, whether funded or not, which have not been reviewed by any external research ethics committee. If your project is or has been reviewed by another committee (e.g. from another University), please contact the FST research ethics officer for further guidance.

In addition to the completed form, you need to submit **research materials** such as:

- i. Participant information sheets
- ii. Consent forms
- iii. Debriefing sheets
- iv. Advertising materials (posters, e-mails)
- v. Letters/emails of invitation to participate
- vi. Questionnaires, surveys, demographic sheets that are non-standard
- vii. Interview schedules, interview question guides, focus group scripts

Please note that **you DO NOT need to submit pre-existing questionnaires or standardized tests** that support your work, but which cannot be amended following ethical review. These should simply be referred to in your application form.

Please submit this form and any relevant materials **by email as a SINGLE attachment** to fst-ethics@lancaster.ac.uk

Section One

Applicant and Project Information

Name of Researcher: Liz Edwards: Senior Research Associate – Digital Technology for Living with Environmental Change & HighWire CDT

Claire Dean: HighWire CDT

Andrew Darby: HighWire CDT

Project Title: *Digital Technology for Living with Environmental Change:* Digital Boggarts*: Understanding microclimates in a National Trust Garden

* Boggarts are a 'spirit' or folkloric creature associated with a place, like a goblin or brownie. The term is familiar within the National Trust as several properties run boggart-making workshops.

Level: *Masters, PhD, Staff* Staff

Supervisor (if applicable): Paul Coulton & Philip Ternouth

Researcher's Email address: liz.edwards@lancaster.ac.uk

Telephone: 10317

Address: C29 Infolab21

Names and appointments/position of all further members of the research team:

Is this research externally funded? If yes,

ACP ID number:

Funding source: EPSRC: Impact Acceleration Account

Grant code: Managed internally by Philip Ternouth

Does your research project involve any of the following?

- Human participants (including all types of interviews, questionnaires, focus groups, records relating to humans, use of internet or other secondary data, observation etc.)
- Animals - the term animals shall be taken to include any non-human vertebrates or cephalopods.
- Risk to members of the research team e.g. lone working, travel to areas where researchers may be at risk, risk of emotional distress
- Human cells or tissues other than those established in laboratory cultures
- Risk to the environment
- Conflict of interest
- Research or a funding source that could be considered controversial
- Social media and/or data from internet sources that could be considered private
- any other ethical considerations

Yes – complete the rest of this form

No – go to Section Five

Section Two

Type of study

Includes *direct* involvement by human subjects. **Complete all sections apart from Section 3.**

Involves *existing documents/data only*, or the evaluation of an existing project with no direct contact with human participants. **Complete all sections apart from Section 4.**

Project Details

1. Application is for an individual study for a programme of studies

2. Anticipated project dates (month and year)

Start date: 3rd July 2017 **End date:** 31st December 2017

3. Please briefly describe the background to the research (no more than 150 words, in lay-person's language):

Through my thesis I worked with National Trust gardeners at Clumber Park, Nottinghamshire, to develop digital-nature hybrid technologies for use in interpretation of gardens, to support connection to place. This has developed into a positive on-going relationship and together we made a successful application to the EPSRC Impact Acceleration Account. Through this work we plan to develop a workshop framework that can be transferred to other National Trust properties. In this iteration it brings together computing and digital making, storytelling, design and environmental education for children in year 5 of Primary School. We hope to support children's connection to a kitchen garden and see if the engagement activity has impact beyond the day of the visit.

4. Please state the aims and objectives of the project (no more than 150 words, in lay-person's language):

We aim to design a framework for a one and half day workshop that brings computing, environmental education and design. We intend to run a pilot workshop with a group of children in year 5, in the Walled Kitchen Garden at Clumber Park, (National Trust), and in a Primary School close to the property. We will reflect on the workshop with National Trust employees and volunteers to develop a transferrable framework that can be used with other schools at other National Trust properties.

The workshop will introduce the micro:bit and teach pupils how to programme them to read temperature, humidity and direction. Pupils will go on a tour of the Walled Kitchen Garden with a teacher and gardeners and learn about microclimates in the garden using their microbits. They will use storytelling and design to create digital (NFC-enabled) boggarts to tell and share stories about the garden.

5. Methodology and Analysis:

The first session will be in schools. It will begin with a base lining activity to gauge pupil's knowledge of microbits, digital building, microclimates and their experience of gardens, National Trust properties and Clumber Park. Pupils will answer baseline questions by placing stickers/counters and post it notes on a chart or dropping counters into boxes. We will not collect any personal or identifying information. Pupils' identities will be kept anonymous through the data collection process. Indicative questions will include whether the children have visited Clumber Park before, whether they have visited a National Trust garden or public park before and whether they have used a microbit before.

At the end of the workshop pupils will be asked about the experience of the workshop and content, again using stickers and post-it notes placed on a chart to record feedback and reflections. Indicative activities will include writing (on post-it notes) words or phrases to describe the day, the place, the activities, the best thing about the

day and the worst thing about the day. Photographs will be taken, with prior permission gained for photography of individuals, and these will be used as part of the reflective process. Parts of sessions will be audio recorded.

In addition to the pupils we will be working directly working with:
A Primary School Teacher (who is also a National Trust volunteer), a National Trust volunteer (formerly a teacher), who has responsibility for interpretation in the garden, the Senior Gardener, Head Gardener and probably a representative from the Education Team at the Clumber Park Discovery Centre. Other members of staff and volunteers may be indirectly involved. After the workshop we will conduct a semi-structured group interview/conversation to reflect on the work in school and in the garden. This will gather feedback on: the structure of the day; the individual activities; the relationship between activities as a whole, use of technologies, relevance of workshop to Primary curriculum, relevance for National Trust objectives, use of space, strengths and weaknesses and suggested future developments for the workshop. Some will be in the form of group conversations. There may logistical issues that prevent everyone gathering at the same time, so some conversations with individuals may be needed. Group conversations and semi-structured interviews will be recorded using audio recorders and/or note-taking. The recordings will be captured on an encrypted audio recording device. If this is not available/feasible in the setting audio will be transferred from recording device as quickly as possible onto encrypted storage and the original recording will be deleted immediately. The data will be transcribed and made anonymous. If a transcription service is used any external transcribe will be asked to sign a confidentiality agreement. Analysis will be undertaken by thematic coding of transcripts.

We will create a space for people indirectly connected to the event (for example volunteers who may be working in the garden at the time of the event) to share thoughts about the design of the event and its impact. This will be a sealed box left in the kitchen, the main communal area for staff and volunteers. The research team will reflection on the day as close to the end of the activity as possible. These reflections may take the form of field notes, sketches, photographs or diary style audio-video recordings.

We intent to follow up with the school, NT and pupils to get additional feedback on the experience and running of the event and to see what aspects of the event have remained in the memory of pupils. As before, this information will be collected anonymously, using the methods described above and stored on an encrypted data storage device.

Section Three

Secondary Data Analysis

Complete this section if your project involves *existing documents/data only*, or the evaluation of an existing project with no direct contact with human participants

1. Please describe briefly the data or records to be studied, or the evaluation to be undertaken.
2. How will any data or records be obtained?
3. Confidentiality and Anonymity: If your study involves re-analysis and potential publication of existing data but which was gathered as part of a previous project involving direct contact with human beings, how will you ensure that your re-analysis of this data maintains confidentiality and anonymity as guaranteed in the original study?

4. What plan is in place for the storage of data (electronic, digital, paper, etc)? Please ensure that your plans comply with the Data Protection Act 1998.

5. What are the plans for dissemination of findings from the research?

6a. Is the secondary data you will be using in the public domain? YES/NO

6b. If NO, please indicate the original purpose for which the data was collected, and comment on whether consent was gathered for additional later use of the data.

7. What other ethical considerations (if any), not previously noted on this application, do you think there are in the proposed study? How will these issues be addressed?

8a. Will you be gathering data from discussion forums, on-line 'chat-rooms' and similar online spaces where privacy and anonymity are contentious? YES/NO

If yes, your project requires full ethics review. Please complete all sections.

Section Four

Participant Information

Complete this section if your project includes *direct* involvement by human subjects.

1. Please describe briefly the **intended human participants** (including number, age, gender, and any other relevant characteristics):

The research will involve 12 children in year 5 of Primary school. It will involve staff and volunteers from National Trust and a member of staff from a Primary school local to the National Trust property.

2. How will participants be **recruited** and from where?

Participants will be recruited through connections with National Trust from previous research at the National Trust property. A volunteer at the National Trust property is a Primary School teacher and has obtained permission for year 5 students to take part in the pilot project. The teacher will recruit pupils for the project with parental permission.

3. Briefly describe your **data collection methods**, drawing particular attention to any potential ethical issues.

1) Semi-structured interviews with adults, which will be audio recorded and transcribed. Field notes and photos may be taken. Charts with stickers and post it notes used for data collection with children will be used to gauge experience and knowledge before and after the workshop.

A box for anonymous feedback from staff and volunteers will be left in a safe, accessible place.

4. Consent

4a. Will you take all necessary steps to **obtain the voluntary and informed consent** of the prospective participant(s) or, in the case of individual(s) not capable of giving informed consent, the permission of a legally authorised representative in accordance with applicable law? **YES**

If yes, please go to question 4b. If no, please go to question 4c.

4b. Please explain the procedure you will use for **obtaining consent**?. If applicable, please explain the procedures you intend to use to gain permission on behalf of participants who are unable to give informed consent.

Participant information sheet with opportunity to ask questions

Informed Consent Form

These will be given to adults directly involved in the project. They will also be sent to parents of children involved in the project.

A second participant information sheet and consent form, adapted for Year 5 students will be given to students. This will make it clear that students do not have to agree to taking part in the research in order to take part in the project. Researchers will monitor children and if any appear unhappy they will be given the option to withdraw from the process.

4c. If it will be necessary for participants to take part in the study **without their knowledge and consent at the time**, please explain why (for example covert observations may be necessary in some settings; some experiments require use of deception or partial deception – not telling participants everything about the experiment).

n/a

5. Could participation cause **discomfort** (physical and psychological eg distressing, sensitive or embarrassing topics), **inconvenience or danger beyond the risks encountered in normal life**? Please indicate plans to address these potential risks. State the timescales within which participants may withdraw from the study, noting your reasons.

There are no risks beyond risks encountered in normal life in the data collection phase.

The project activities involves spending time in a garden. A risk assessment for the activity will be submitted to the school. Gardens may present different risks to a classroom environment, such as stings, dehydration, sunburn or cold. Pupils will be given a list of things to bring to minimise risk in the environment. There will be water and sun-cream available. Parents will complete a health form informing staff of allergies and medical needs along with permission slip for the trip to Clumber Park.

Participants will be free to withdraw from the study at any time, up to 2 weeks after taking part in the study, with no notice.

6. How will you protect participants' **confidentiality and/or anonymity** in data collection (e.g. interviews), data storage, data analysis, presentation of findings and publications?

Data collection methods for children have been designed to keep feedback anonymous. Photographs will be anonymised in post processing. All data, including raw data and the un-anonymised photos, will be kept on encrypted storage devices.

7. Do you anticipate any ethical constraints relating to **power imbalances or dependent relationships**, either with participants or with or within the research team? If yes, please explain how you intend to address these?

None are expected within the research team. There are inherent power imbalances between staff and pupils and potentially culturally between adults and children. The research is designed to minimise imbalance.

8. What potential **risks may exist for the researcher** and/or research team? Please indicate plans to address such risks (for example, noting the support available to you/the researcher; counselling considerations arising from the sensitive or distressing nature of the research/topic; details of the lone worker plan you or any researchers will follow, in particular when working abroad.

Risks are low. Some work will take place outdoors so researchers will wear appropriate clothing for the environment.

9. Whilst there may not be any significant direct **benefits to participants** as a result of this research, please state here any that may result from participation in the study.

Pupils may learn new skills in several areas (eg computing, design, environmental science). Pupils will be able to keep the boggart they make, or leave it on display at Clumber. They may also keep the microbits and use them if they return to the National Trust property. Pupils will have the experience of visiting a National Trust property for free.

10. Please explain the **rationale for any incentives/payments** (including out-of-pocket expenses) made to participants:

No payments are planned. As stated above pupils will be able to keep the boggart they make. National Trust will be able to keep other materials purchased for the project.

11. What are your plans for the **storage of data** (electronic, digital, paper, etc.)? Please ensure that your plans comply with the Data Protection Act 1998.

Data will be stored on encrypted laptops, external drives and servers

Raw data will only be accessible to research staff (named above).

I (Elizabeth Edwards) will be the data steward during the period of the contract on the project (currently 2019).

Data retained for 10 years as suggested

12. Please answer the following question *only* if you have not completed a Data Management Plan for an external funder.

12.a How will you make your data available under open access requirements?

If required, anonymised supporting data will be provided in an electronic format on the journal website, with unrestricted access post-publication. If required, data will also be deposited in Lancaster University's institutional data repository and made freely available with an appropriate data license. Lancaster University uses Pure as the data repository which will hold, manage, preserve and provide access to datasets produced by Lancaster University research.

12b. Are there any restrictions on sharing your data for open access purposes?

N/A

13. Will **audio or video recording** take place? no audio video

13a. Please confirm that portable devices (laptop, USB drive etc) will be **encrypted** where they are used for identifiable data. If it is not possible to encrypt your portable devices, please comment on the steps you will take to protect the data.

We will use encrypted data storage wherever possible. Where this is not possible (e.g. when using some types of audio recording equipment and digital cameras) the data will be transferred as soon as possible, within 48hrs, to an encrypted storage system and the original unencrypted files will be deleted.

13b. What arrangements have been made for **audio/video data storage**? At what point in the research will tapes/digital recordings/files be destroyed?

Audio files will be deleted at the end of the project in 31st December 2017, but transcripts of audio and video will be kept for 10 years.

13c. If your study includes video recordings, what are the implications for participants' anonymity? Can anonymity be guaranteed and if so, how? If participants are identifiable on the recordings, how will you explain to them what you will do with the recordings? How will you seek consent from them?

N/A

14. What are the plans for dissemination of findings from the research? If you are a student, mention here your thesis. Please also include any impact activities and potential ethical issues these may raise.

Results of the research may be submitted for publication in an academic/professional journal. The results of the research may be presented to project partners and at conferences. Some research may be presented at public engagement and impact events. The research will be used in the design of a workshop framework to be shared with National Trust, and potentially other organisations.

15. What particular ethical considerations, not previously noted on this application, do you think there are in the proposed study? Are there any matters about which you wish to seek guidance from the FSTREC?

N/A

Section Five

Additional information required by the university insurers

If the research involves either the nuclear industry or an aircraft or the aircraft industry (other than for transport), please provide details below:

Section Six

Declaration and Signatures

I understand that as researcher I have overall responsibility for the ethical management of the project and confirm the following:

- I have read the Code of Practice, [Research Ethics at Lancaster: a code of practice](#) and I am willing to abide by it in relation to the current proposal.

- I will manage the project in an ethically appropriate manner according to: (a) the subject matter involved and (b) the Code of Practice and Procedures of the University.
- On behalf of the University I accept responsibility for the project in relation to promoting good research practice and the prevention of misconduct (including plagiarism and fabrication or misrepresentation of results).
- On behalf of the University I accept responsibility for the project in relation to the observance of the rules for the exploitation of intellectual property.
- If applicable, I will give all staff and students involved in the project guidance on the good practice and ethical standards expected in the project in accordance with the University Code of Practice. (Online Research Integrity training is available for staff and students [here](#).)
- If applicable, I will take steps to ensure that no students or staff involved in the project will be exposed to inappropriate situations.

Confirmed

Please note: If you are not able to confirm the statement above please contact the FST Research Ethics Committee and provide an explanation.

Student applicants:

Please tick to confirm that you have discussed this application with your supervisor, and that they agree to the application being submitted for ethical review

Students must submit this application from your Lancaster University email address, and copy your supervisor in to the email in which you submit this application

All Staff and Research Students must complete this declaration:

I confirm that I have sent a copy of this application to my Head of Department (or their delegated representative) . Tick here to confirm

Name of Head of Department (or their delegated representative) Professor Adrian Friday

Applicant electronic signature: Elizabeth Edwards Date 12-6-17

Participant Information Sheet: Teaching staff / National Trust Staff & Volunteers

Date: 12th June 2017

Digital Boggarts*: Understanding microclimates in a National Trust Garden

- Boggarts are folklore creatures connected to a place.

I am a researcher at Lancaster University and I would like to invite you to take part in a research study. The research investigates the use of digital technologies, storytelling, computing and design to communicate environmental science, particularly about gardens and microclimates.

Please take time to read the following information carefully before you decide whether or not you wish to take part.

What is the study about?

We aim to prototype a workshop that brings Year 5 Primary school pupils to a National Trust Walled Kitchen Garden to learn about microclimates in gardens. This will be used to create a framework for transferring the activity to other National Trust properties. We are researching the experience of the workshop and the use of a multidisciplinary, practical approach to environmental science in a garden setting.

What will I be asked to do if I take part?

If you decided to take part, this would involve semi-structured interview/conversations, in a group or individually. The workshop itself involves working with year 5 pupils in school (teachers) or in the Walled Kitchen Garden at Clumber Park (teachers/National Trust stall and volunteers).

What are the possible benefits from taking part?

You will contribute to the design of a workshop that may be useful/relevant for future work.

Do I have to take part?

No. It's completely up to you to decide whether or not you take part. Your participation is voluntary and you are free to withdraw at any time, without giving any reason.

What if I change my mind?

As explained above, you are free to withdraw and if you want to withdraw, I will extract any data you contributed to the study and destroy it. Data means the information, views, ideas, etc. that you and other participants will have shared with me. However, it is difficult and often impossible to take out data from one specific participant when this has already been anonymised or pooled together with other people's data. Therefore, you can only withdraw up to 2 weeks after taking part in the study. If you are involved in a workshop and then withdraw your data will remain part of the study.

Will my data be identifiable?

After the interview/focus group/observation (*change as applicable*), only the research team involved in the project will have access to the data you share. The only other person who may have access to the data is a professional transcriber who will listen to the recordings and produce a written record of what you and others have said. The transcriber (if used) will sign a confidentiality agreement.

I will keep all personal information about you (e.g. your name and other information about you that can identify you) confidential and secure, that is I will not share it with others. I will anonymise any audio recordings and hard copies of any data. This means that I remove any personal information.

How will my data be stored?

Your data will be stored in encrypted files (that is no-one other than, the researchers will be able to access them) and on password-protected computers.

I will store hard copies of any data securely in locked cabinets in my office.

I will keep data that can identify you separately from non-personal information (e.g. your views on a specific topic).

In accordance with University guidelines, I will keep the data securely for a minimum of ten years.

How will we use the information you have shared with us and what will happen to the results of the research study?

I will not use any personal data but I will use the data from the study in the following ways:

- I will use it for academic purposes, which may include publications and presentation at academic conferences and organisational meetings.
- When writing up the findings from this study, I would like to reproduce some of the views and ideas you shared with me. When doing so, I will only use anonymised quotes (e.g. from our interview with you), so that although I will use your exact words, you cannot be identified in our publications.
- The data will be used in the development of a workshop framework.

Who has reviewed the project?

This study has been reviewed and approved by the Faculty of Science and Technology Research Ethics Committee.

What if I have a question or concern?

If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact myself Liz Edwards, 01524510317 liz.edwards@lancaster.ac.uk

If you have any concerns or complaints that you wish to discuss with a person who is not directly involved in the research, you can also contact:

Prof. Paul Coulton, Professor of Speculative & Game Design, Lancaster Institute for Contemporary Arts, Lancaster University, p.coulton@lancaster.ac.uk

Prof. Adrian Friday, Head of Department, SCC, Lancaster University a.friday@lancaster.ac.uk

Thank you for considering your participation in this project.

CONSENT FORM Teaching staff / National Trust Staff & Volunteers

Project Title: Digital Boggarts*: Understanding microclimates in a National Trust Garden

- Boggarts are folklore creatures connected to a place.

Names of Researchers: Liz Edwards, Claire Dean, Andrew Darby

Email: liz.edwards@lancaster.ac.uk

Please tick each box:

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. If I withdraw within 2 weeks of commencement of the study my data will be removed. If I am involved in workshops and then withdraw my data will remain part of the study.
3. I understand that any information given by me may be used in future reports, academic articles, publications or presentations by the researcher/s, but my personal information will not be included and I will not be identifiable.
4. I understand that my name/my organisation's name will not appear in any reports, articles or presentation without my consent.
5. I understand that interviews/group conversations will be audio recorded and transcribed and that data will be protected on encrypted devices and kept secure.
7. I understand that data will be kept according to University guidelines for a minimum of 10 years after the end of the study.
8. I agree to take part in the above study.

Name of Participant Date Signature

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent

_____ Date _____ Day/month/year

One copy of this form will be given to the participant and the original kept in the files of the researcher at Lancaster University

Participant Information Sheet: Parent

Date: 12th June 2017

Project Title: Digital Boggarts*: Understanding microclimates in a National Trust Garden

- Boggarts are folklore creatures connected to a place.

I am a researcher at Lancaster University and I would like to invite your child to take part in a research study. The research investigates the use of digital technologies, storytelling, computing and design to communicate environmental science, particularly about gardens and microclimates.

Please take time to read the following information carefully before you decide whether or not you wish your child to take part.

What is the study about?

We aim to prototype a workshop that brings Year 5 Primary school pupils to a National Trust Walled Kitchen Garden to learn about microclimates in gardens. This will be used to create a framework for transferring the activity to other National Trust properties. We are researching the experience of the workshop and the use of a multidisciplinary, practical approach to environmental science in a garden setting.

What will my child be asked to do if they take part?

Your child will have the opportunity to take part in a one and half day workshop. The half day will be spent learning how to use programme and use micro:bit computers to read temperature, humidity and direction. The second day will be spent at Clumber Park, a National Trust Garden. Your child will have a tour of the garden as part of a group, with their teacher and a gardener, and will learn about microclimates in the garden. Your child will take part in storytelling, design and technology activities on themes to do with the garden. Before the activities your child will be asked questions about their previous experiences of computing and gardens. The answers will be given anonymously. We will not collect any personal information about your child.

After the workshop we will ask your child to answer questions about things they have learnt and the experience of the workshop. Again, this will be collected anonymously.

What are the possible benefits from taking part?

You child will have an experience of using a micro:bit and other digital technologies. Your child will visit a National Trust property, have a tour of the garden and learn different making skills. If your child wishes, they will have the chance to leave an audio story in the garden to tell visitors stories about the garden.

Does your child have to take part?

No. It's completely up to you to decide whether or not your child takes part. Your child's participation is voluntary and they are free to withdraw at any time, without giving any reason. Your child can take part in the activities without giving feedback or contributing to data collection.

What if I change my mind?

As explained above, your child is free to withdraw and if you want them to withdraw, or if they want to withdraw I will extract any data they contributed to the study and destroy it. Data means the information,

views, ideas, etc. that you and other participants will have shared with me. However, it is difficult and often impossible to take out data from one specific participant when this has already been anonymised or pooled together with other people's data. Therefore, your child can only withdraw or opt out of parts of the study as it is ongoing. At the end of the day it may be impossible to separate out individual contributions so data will remain part of the study.

Will my data be identifiable?

After the workshop only the research team involved in the project will have access to the data shared.

No personal information about you, or your child (e.g. name and other information that can identify you) will be collected.

How will my data be stored?

Your child's data will be stored in encrypted files (that is no-one other than, the researchers will be able to access them) and on password-protected computers.

I will store hard copies of any data securely in locked cabinets in my office.

No personal data will be kept that can be used to identify your child.

In accordance with University guidelines, I will keep the data securely for a minimum of ten years.

How will we use the information your child has shared with us and what will happen to the results of the research study?

I will use your child's data in the following ways:

- I will use it for academic purposes, which may include publications and presentation at academic conferences and organisational meetings.
- When writing up the findings from this study, I would like to reproduce some of the views and ideas shared with me by the children but will not reveal any identities of those leaving the remarks.
- The data will be used in the development of a workshop framework.

Who has reviewed the project?

This study has been reviewed and approved by the Faculty of Science and Technology Research Ethics Committee.

What if I have a question or concern?

If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact myself Liz Edwards, 01524510317 liz.edwards@lancaster.ac.uk

If you have any concerns or complaints that you wish to discuss with a person who is not directly involved in the research, you can also contact:

*Prof. Paul Coulton, Professor of Speculative & Game Design, Lancaster Institute for Contemporary Arts,
Lancaster University, p.coulton@lancaster.ac.uk*

Prof. Adrian Friday

Head of Department

Computing and Communications

InfoLab21

LA1 4WA

Lancaster

Lancaster University

a.friday@lancaster.ac.uk

Thank you for considering your participation in this project.

CONSENT FORM Parent

Project Title: Digital Boggarts*: Understanding microclimates in a National Trust Garden

- Boggarts are folklore creatures connected to a place.

Names of Researchers: Liz Edwards, Claire Dean, Andrew Darby

Email: liz.edwards@lancaster.ac.uk

Please tick each box:

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily
2. I understand that my child's participation is voluntary and that my child is free to withdraw at any time, without giving any reason, until the point where information is pooled and individual contributions cannot be identified. If anonymous data has been pooled together it will remain part of the research project.
3. I understand that any information given by my child may be used in future reports, academic articles, publications or presentations by the researcher/s, but personal information will not be included and my child will not be identifiable.
4. I understand that my child's name will not appear in any reports, articles or presentation without my consent.
5. I understand that data will be protected on encrypted devices and kept secure.
6. I understand that data will be kept according to University guidelines for a minimum of 10 years after the end of the study.
7. I agree for my child to take part in the above study.

Name of child:

Name of Participant

Date

Signature

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent

_____ Date _____ Day/month/year

One copy of this form will be given to the participant and the original kept in the files of the researcher at Lancaster University

School of Computing and Communications

CONSENT FORM Child

Project Title: Digital Boggarts*: Understanding microclimates in a National Trust Garden
* Boggarts are folklore creatures connected to a place.

Names of Researchers: Liz Edwards, Claire Dean, Andrew Darby

Email: liz.edwards@lancaster.ac.uk

I am a researcher at Lancaster University.

I would like to invite you to take part in a research study about digital making, coding, storytelling, designing and gardens.

Taking part in this study is your choice. You do not have to take part.

Please read the form to see if you would like to take part.

What is the study about?

This study is about digital making, coding, storytelling, designing and gardens. We are trying to find ways to connect the subjects you learn in school and teach you about gardens and the things that grow in them using digital devices. We would like to design a workshop to use with other schools in other National Trust gardens so we want to find out about the things that work well and the things that don't work as well.

What will I be asked to do if I take part?

If you are interested in taking part, we will ask you some questions and we will collect the answers. There are no right and wrong answers. It isn't a test. You do not have to answer these questions if you don't want to. We will ask to take part in activities including making things or giving feedback on your experience of an activity. Some activities will be in school. Others will be at Clumber Park, a National Trust garden, which is open to the public.

What are the possible benefits from taking part?

You will have a chance to learn to use a Micro:bit and other digital technologies. You will be given a tour of the Walled Kitchen Garden. You will make things and you will be able to keep some of the things you make and use them if you visit the garden again. If you wish, you will be have the chance to leave an audio story in the garden to tell visitors stories about the garden.

Do I have to take part?

No. Taking part in this study is your choice. You do not have to take part.

What if I change my mind?

If you agree to take part but change your mind that is okay. I will remove any information you have shared and destroy it, unless it has already been added to everyone else's information and cannot be identified as yours.

Will my data be identifiable?

The information will be anonymised. This means your name will not be included in anything written about the research.

If you choose to do an audio recording of your story it may be left in the garden but the feedback you leave will be collected anonymously so your name and personal information will not be collected.

How will my data be stored and protected?

All information collected will be kept on encrypted hard drives, on laptops and online stores. This means the information will be kept in a coded way so that it cannot be read by someone unless they have a password.

The information you give will be **anonymised data**. Anonymised data (where your name or other identifying information has not been collected) will be stored for at least 10 years. The anonymised data may be used by other researchers for their own research projects.

Anonymised data will be used in research papers.

Who has reviewed the project?

This study has been reviewed and approved by the Faculty of Science and Technology Research Ethics Committee.

What if I have a question or concern?

If you have any questions or if you are unhappy with anything about taking part in the study, please talk to your teacher at school.

Thank you for considering your participation in this project.

Project Title: Digital Boggarts*: Understanding microclimates in a National Trust Garden

* Boggarts are folklore creatures connected to a place.

Names of Researchers: Liz Edwards, Claire Dean, Andrew Darby

Email: liz.edwards@lancaster.ac.uk

Agreement to take part in research project (Child)

This study is about digital making, coding, storytelling, designing and gardens. We are trying to find ways to connect the subjects you learn in school and teach you about gardens and the things that grow in them using digital devices.

Please tick each box and sign at the bottom of the form if you agree that:

1. I have had a chance to ask the researcher about this study

2. I have had a chance to talk about this research with my parents.

3. If I do not want to take part, I understand that I do not have to.

4. I understand that any information I tell you may be used by researchers and included in documents.

5. I understand how the information will be used.

6. I understand how the information will be stored.

7. I agree to take part in the above study.

Name of Participant

Date

Signature

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Child

_____ Date _____ Day/month/year

Signature of Researcher /person taking the consent

_____ Date _____ Day/month/year

One copy of this form will be given to the participant and the original kept in the files of the researcher at Lancaster University

Appendix E

Segment from transcript of
conversation with Gardener

01/07/18

Researcher: And values, the philosophy that I talked about. Has that had an impact? Can you see that in evidence and things here? Or is other things more relevant to talk about in relation to that? I mean, that's a few things.

ANONYMISED 1: I want to talk about values first then, because that has had a huge impact. We have anyone, banging the drum [inaudible 00:04:11 for the values, I think is implied], or training anyone, or really talking directly. I think, people see that as part of spirit of place. People.. I now hear, people, that I never thought in a million years, I'd hear them spout any [unclear] talk about anything like this, say, reference your philosophy", and say things like, "we don't want our interpretation, however that manifests itself, whether it's an information board, or whether it's a piece of tech, we don't want it to act as a barrier between our visitors and the garden.

And I think that's the essence of that shared philosophy that we had at the very beginning and took us on that journey. And just your average volunteer believes that now.

Researcher: How do they know it?

ANONYMISED 1: That's what I mean, I don't know. I don't know. I must drone on about it. Or they've picked up some of the times that you've spoken to us about various things.

Researcher: What if I'd have done it, like, you see when I planned, when I came here ... The traditional way of doing design stuff is to kind of, run a workshop, and do stuff.

ANONYMISED 1: Yes, yes.

Researcher: But at the time that I came ... I thought that's what I would do, but at the time when I came, it felt ... I didn't really want to disrupt people, because volunteers had come to garden. So, I didn't really want to put people in a room and do other design stuff. So, we didn't do it that way.

ANONYMISED 1: Involving people 's had a big impact. Working alongside them, because you've done that to a degree. You've been in the garden with them, just talking quite informally about things, rather than ...cos I think my volunteers are fab. They are very, very able. Not just as gardens volunteers, but there really able people. Some of them are retired from really powerful positions and stuff. But a lot of them, if we sat them down in a room and talked to them about some of the more technical aspects of what we were trying to do, they'd have switched off.

I think part of the key is, you were in the garden, and that instantly made it non-threatening. I think that was part of how they got under its skin. So, there's that element, and then when we set up the little room with the recording booth, it was a really powerful signal to them, that we valued their memories and their thoughts and reminiscences about the garden.

That came to the fore I think, and pushed anything else about the method that we might be delivering those,.. that was really secondary. And as a result, I don't think they worried too much about how you made the rhubarb talk. I don't think they were bothered then. But if we'd done it the other way around, I think they might have got hung up on, "oh my God",.. they would have seen technology first, and then, not quite seen it really as just a vehicle for us to tell the garden stories.

You hear that phrase a lot more now. Certainly, from the team, but I'm hearing it now, from people beyond these four walls.

Researcher: What?

ANONYMISED 1: Telling the garden stories. I'm hearing that phrase a lot, which I like. Because, what it's done is, they've stopped talking about the listening orchard. The rubaphone. They are both fab and we love them, but they are just a means of telling the garden stories. So, I'm really pleased actually, that we as a team, have moved away from ... It's almost like, "Yeah, yeah, we know we can get the tech to do whatever we want."

But what is it we want? So, we now, I think, we are all about helping others to see the garden differently. But the tech has become secondary.

Researcher: It's kind of interesting, cos the way you tell it, is almost exactly the way I have been reflecting on it.

ANONYMISED 1: Is it?

Researcher: Yeah, so that's quite good. It's kind of good that we are actually seeing it the same way.

ANONYMISED 1: Isn't it?

Researcher: Because, I was writing and I was thinking, "I don't know if this is actually what SR thinks."

ANONYMISED 1: Yeah, it is. I think we've said before, that it wouldn't ...

Researcher: Do you want me to get the other watering can and do some as well?

[inaudible 00:09:39]

ANONYMISED 1: I'm only topping these up a little bit now. [BACK TO ANSWERING QUS] Either walk around or ... I don't think we could have got here any faster. And I don't think we'd have got here if we'd done differently. I don't think workshops and stuff would've worked because, where we've got to, is people thinking about the stories first and not worrying about the tech. It's almost like they think to themselves, "If you want to talk about the Land Girls, yeah, we can work with ANON on finding a way of doing this."

But the way doesn't matter, the story ...

Researcher: The story is the thing.

ANONYMISED 1: So, they started focusing on those stories, which is brilliant because, it's bringing all sorts of other things to the fore, so, has *** told you about the oral history project?

Researcher: No. I haven't really spoken to *** for a while, apart from, like, a few Twitter conversations.

ANONYMISED 1: When *** comes, I'm sure she'll talk to you about oral history project. I genuinely don't believe, that we would have gotten funding for that (*** went and talked to the British Library to be trained).

Researcher: Oh, fabulous. I had no idea about that.

ANONYMISED 1: Yeah. I really don't think we'd have gotten funding for a project like that, if we hadn't worked like this before, because, it's made the people who hold the purse strings, who are, naturally quite risk averse, it's made them see the value of the Rubaphone, the Listening Orchard, in terms of being vehicles for recording people's reminiscences, or stories, then suddenly waking up to the fact that, we could lose these if we don't capture them.

So that's the next big thing for us, I think. Once we've captured all of those, what we do with it. Cos it's great to archive it, and it would be great for me to be able to access that archive, in order to be able to make interpretation. But, it shouldn't live in an archive, should it?

Researcher: No.

ANONYMISED 1: The oral history project, I think, has to be something that's alive. It's a bit, you know Fi Glover?

Researcher: Yeah, the Listening Project. I saw their caravan once on the motorway, and I wanted to give it a big thumbs up.

ANONYMISED 1: Yeah, I love that program.

Researcher: Because I think it's so particular to those people that talk, that you would think that it could be distancing, but it isn't. It's the particular that makes it interesting.

ANONYMISED 1: Isn't it?

Researcher: I feel that's something I feel quite strongly about in relation to design.

(Aside about watering plants) Do we need to do that one?

ANONYMISED 1: No, they'll get that tomorrow morning.

Researcher: Yeah, I feel that particularity in design, can show you things that are valuable.

ANONYMISED 1: Yeah, absolutely. That's the other thing as well, that has become embedded, and I genuinely think that's the right word. What's become embedded in my team when they talk about any vehicle that we think about in terms of telling our stories. They are very particular about its making.

They've become very particular about, the Listening Orchard, for example (and it's the example that they always use), the apples were made by ANON. Not only were they made by ANON, but they were a piece of oak that fell in the park. They've really, really embraced that.

In a way that, has delighted me, to be honest. I also think, when we get the new hub, or if we do get the funding for it, it will be way, way better. You know, in that shed, people didn't always know the Rubaphone lived in there, did they?

Researcher: No.

ANONYMISED 1: The shed wasn't the right vehicle for the Rubaphone.

Researcher: I think it's the way things grow and change, and you go, "Okay, that doesn't work here, but maybe it works there." It was better there, I think, than you know, the first year... it was better in that building.

ANONYMISED 1: Yeah, right.

Researcher: I thought it was better to have it ...

ANONYMISED 1: Among the rhubarb was good, wasn't it?

Researcher: Yeah. So, okay, am I okay to keep talking?

ANONYMISED 1: Yeah, go ahead.

Researcher: The values, the philosophy I brought, can you talk about what you think that is? Can you give me your interpretation of things that you remember, things that stuck out from the things that we've talked about? You've talked about some things already, but, it's just interesting to hear it reflected back.

ANONYMISED 1: The philosophy has been about uncovering the garden for anybody who visits it in whatever capacity they visit it, in innovative ways that hasn't detracted from the garden, but that has been the spirit of place, which is a concept that, I think, people find difficult anyway and why should they think about it? But actually, the way we've created things and applied that philosophy it's all about spirit of place. It's all about ... Morning.

Speaker 2: Morning (to visitor).

Researcher: Hi.

ANONYMISED 1: I think for me it's about revelation. It's revealing the garden in a way that doesn't hide it simultaneously. So, you know my thing about ... I don't like, I wouldn't want our visitors to have to read their way around the garden. I think that the philosophy as well has been around if you want to interact with the story telling, you can choose to do that, but it's in embedded in the garden in such a way that you can ignore it. I think that's equally important. That if you just want to come here for grab a deck chair, sit in the orchard, and just be in probably one of the most gorgeous gardens I have ever known ... And I know I run it, you can. Without even knowing the that Rubaphone or the Listening Orchard or any of our other innovations exist. You can walk past it.

And the other thing as I was stepping off the path, as well wasn't it? Getting people beyond the do not walk on the grass mentality. Get them to experience the change in atmosphere when you step into an orchard. That's worked really well as well. And the comments that we get from visitors about that have been really overwhelmingly positive because until you do it you never know how different it can be. So, there are those things really about the revealing without hiding is what I call it.

Researcher: Yeah.

ANONYMISED 1: No, revealing without obscuring, I think is probably a better way of describing it.

Researcher: Yeah.

ANONYMISED 1: And you know what, that's a tall order isn't it?

Researcher: Yeah.

ANONYMISED 1: That's a real tall order, but I think we have succeeded. And what's great now is that-

Researcher: Is that fox?

ANONYMISED 1: Yes. Still stealing the peaches.

Researcher: Oh my god, yes.

ANONYMISED 1: We've also got rabbits living in the garden now, which is a pain. Which is why we have the mesh over the...

So all the impetus for the new space, you call it, the interpretation hub that we are trying to get money for, none of that came from me. And I think that's a result in itself.

Researcher: So, is that ANON?

ANONYMISED 1: No, it was ANON, ANON, ANON, ANON? ANON. The day the shed went offsite, Beth was up doing something and her first reaction to that is where's the Rubaphone

going to live? What a shocker. So yeah, I think that's how I would encapsulate the philosophy.

Researcher: OK, that's great.

ANONYMISED 1: Ask me questions [inaudible 00:04:47] that's fine.

Researcher: I might come back to that in a bit, but the length of relationship. So quite a lot has changed. From your perspective ... See I don't want to put words into your mouth. I'm trying to think about how to. I mean you talked about the pace that we've worked at being right for the garden?

ANONYMISED 1: Yes.

Researcher: Or right for the team or whatever.

ANONYMISED 1: Yep.

Researcher: Other things that you've got from the fact that ... Okay, I haven't been here very much this year, but before that I was here relatively frequently. How do you the time plays into the work? I don't want to impose more closed than that.

ANONYMISED 1: So, I'm not sure I know what you're asking me, but I think the first three years together, I wasn't senior gardener. And so although I could have a bit of influence I didn't have a lot of influence. So I think the pace of the change and implementation in those first few was a lot slower than in the last two years.

So in the last two years, it can be as fast as we like, but it can't be too fast. It couldn't have accelerated in the way it has in the last two years without it having gone at the pace it did in the first three years.

Researcher: Yeah.

ANONYMISED 1: So I think it's probably a good thing that I wasn't senior gardener in the first three years because the pace was the very thing that allowed it to embed quite deeply. I think if we'd started when I was senior gardener, I might have tried to accelerate the pace and the degree to which philosophies and methodologies were embedded, I think would be a lot more shallow. You know we would have been at soil level. Whereas now, I think we're at root level.

Researcher: Yep.

ANONYMISED 1: So we, kind of.

Researcher: Yeah, no, it is. But it's also so ... Okay I've learned to ...

ANONYMISED 1: [inaudible 00:07:41]

Appendix F

Transcript of conversation with visitor

Participant asked about background. Start of recording I'm talking about my background while we prepare for interview.

Interview starts timecode: 00.24

L: Have you been to Clumber before?

M: Yes, yes

L: To the Walled Kitchen Garden?

M: This is the first time I have been in here because I've always arrived too late when we've been before, so.

L: OK. So was it specifically the apple festival that brought you into the garden? Or is it just the timing, that the timing worked out?

M: It's the timing, cos yeah, my mother-in-law lives in Doncaster so we've come down for the day and we fancied going to Clumber and we just thought we'll try for the Walled garden again while we can do.

L: Yes, yes. Are you gardeners?

M: No, no I'm not (laughs). I love open spaces but I don't.

L: Lets stand to the side (to move away from people coming to use apples). So you love open spaces but you don't.

M: Yeah

L: What have you seen in the garden today? Are there any particular highlights for you?

M: Well I've not really started yet. I've come in the wrong way cos my bother-in-law and everything has gone into the, gone into the kind of greenhouse area, so we thought it would be too hot for the dogs, so I was going to have a wander round cos I love seeing all the different types of apple that are grown. Another National Trust place that we are familiar with called Acorn Banks up near, quite near Lancaster, near Penrith...

L: Oh yeah, oh yeah, yeah

M: They've got a special orchard with unique Cumbrian apples and I had never realised the range of apples there were so I was keen to explore

L: Yeah, yeah

M: and seeing your chair and seeing the varieties there I thought, "Oh, that's interesting."

++chat about the apple collection++02.20

L: So, the apple. You've just listened to the wooden apple. Can you give me a bit of feedback on it? Positive, negative anything.

M: Yeah. Well I really like the idea of it, cos I didn't know what you were giving me at first, which is one of the great things cos its eye-catching so it immediately does command you attention but in a very sensitive way, 'cos to tell you the truth I didn't realise at first what it was that you were giving me. Um, and so I'd no expectations of what to expect, um, but er, so I quite enjoyed listening to it. It's a really good idea and contraption, but what I probably really liked, just in view of what I had come to the orchard for, was just finding out if I'd picked an (unclear) and just told me about that tree and how long it had been growing for and what the apples would taste like, and that kind of side was what I was really kind of looking for.

L: Yes, we are going to do those kind of recordings. The sound recordist who works with me hasn't been able to come over yet. I'd been hoping to do that for today.

M: Right, right.

L: But that's the plan.

M: Right

L: We've done a similar thing with rhubarb. When you hold the rhubarb it tells you about the the different varieties and how they taste.

M: Yeah

L: Yeah, So I'm glad you'd be interested in that.

M; Right. No, I'd be fascinated in it. Also, sorry this is probably going to ruin the recording but then, I work away around the country and one time I was working in London and we were in this pub, a great pub called the Bree Louise and the London Apple Growing Society came in (they had some special name) and they wanted to do a poll with us cos they'd come up with a new hybrid apple tree. Its like who would like to volunteer names to name this apple and I'd never even really realised that this sort of thing went on until that night.

L: Yeah

M: And I had this tree proudly sort of..., it was kind of, it was like it was round about October, November time they had this tree displayed proudly with them.

L: Great, that sounds good. OK. I'm just checking that's still going. So, the negative..., so maybe the content, you'd prefer content that was specific to the trees.

M: Yeah

L: But what about the experience of the thing, using the thing. How was it to use?

M: It was very easy. The only slight problem I had with it was just the sound cos I'm going, not very deaf..

L: Needs to be..

M: I'm not quite as ...as I used to be, so I'd like to have been able to **control the volume**, to put the volume up a notch.

L: OK, great. What about the appropriateness of this kind of thing in this kind of place?

M: Well that's **the thing that most impresses me with it because it doesn't look out of place. It kind of draws you in but not in a garish sort of way. It looks, it fits in with its landscape really well, surroundings..**

L: OK, thanks. And if there more of these kind of things would that be ok or is there a point where there is too much of it?

M: **I think if every tree had them and there was no differences then that would be too much but no I really, I think cos its so, so unobtrusive that I think its absolutely fine, I think it's a really good idea.**

L: Great, good. Anything else, any other kind of content you would like or any other things that you would like, interpretation, are there things that you're particularly interested in.

M: Well if we were just looking at orchards in particular, for a start off, one of the things that would be really good is again about, er, if there was something that could be at **different stages within the apple tree**, so there could be a little display of something..

L: Yeah

M: ...where you'd have something similar just to say this is how the apple develops

L: Yep,

M: **and because again with blossom on apple trees in kind of like May time and everything I've often wanted to understand the cycle, often wondered as well about the, the sweetness within an apple, how it develops and so at what time is the prime time to pick.** Um, so I'd like it if you could kind of use the concept, I know you couldn't use it with an apple...

L: Well I mean you could...

M: but use the concept as such.

L: Yeah. You could probably, you could you know have different kinds of content at different times of the year. You could do that but there are also other ways you do it.

M: Yeah, so you know. I'd like to know that cos I'm pig ignorant and that kind of learning appeals me.

L: I'll introduce to, I'll point you in the direction of ANONYMISED because she can answer those questions. I'm not a gardener myself.

M: Right, right.

L: I can't answer those. But, um, and there's one other question to do with, so that's the content, I know, when you go to other places, what kind, when you get interpretation, do you have a preference? Do you prefer to read things, listen to things, look at things or interact with things?

M: I've a mixture really but I'm quite a pragmatist so I try to take on information in the quickest way.

L: OK

M: With my eyesight not being as sharp as it used to be sometimes reading now, it, er, I drive my wife mad feeling round for my glasses., different glasses that I need. So I just like, I like pragmatic and relevant stuff so um..

L: OK

M: **So anything that helps build my knowledge and understanding about places is what I'm looking for.**

L: Brilliant, that's really helpful. Thank you very much.

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