Emergent NPD process and development risks for IoT: an exploratory case study in agri-tech

Ms. Boyeun Lee[1], Dr. David Hands[1], Prof. Rachel Cooper[1], and Prof. Paul Coulton[1]
[1] Lancaster Institute of Contemporary Art, Lancaster University, Lancaster, UK.
b.lee12@lancaster.ac.uk

Lee, Boyeun is a third-year PETRAS Ph.D. candidate as well as a Post-Doctoral Research Associate in Prosperity at Imagination, Lancaster University. With a wide range of public and commercial experience across sectors as a service design researcher, her core research interests focus on design strategies for industrial, social, and political innovation in which emerging technologies play a significant role as an enabler.

Dr. Hands, David is Associate Director of Teaching, Imagination, Lancaster University. David has also written and published extensively on design management and design as a strategic resource for both profit and non-profit organisations alike.

Professor. Cooper, Rachel OBE is a Distinguished Professor of Design Management and Policy at Lancaster University. Her research interests cover: design thinking; design management; design policy; and across all sectors of industry, a specific interest in design for wellbeing and socially responsible design.

Professor. Coulton, Paul is the Chair of Speculative and Game Design in the open and exploratory design-led research studio Imagination Lancaster. He uses research through design approach to create fictional representations of future worlds in which emerging technologies have become mundane.

Abstract: With the emergence of Internet of Things (IoT) as a new source of 'big' data, businesses face new opportunities as well as emergent challenges. Recent research claims digital technology can enable new kinds of development processes that are distinctive from their counterparts in 20th century. However, although academics and practitioners often critically debate the IoT, minimal attention has been focused on New Product Development (NPD) processes; arguably, one of the most critical marketing planning and implementation process activities undertaken within the organisation. Thus, this paper aims to contribute to a new understanding of IoT NPD processes. To achieve this aim, a comprehensive literature review was undertaken primarily focusing on traditional NPD design processes and reviewed against, a featured case study, IoT NPD processes. The relevance of IoT NPD against the characteristics of existing NPD processes, are subsequently reviewed and critically debated. Finally, NPD processes and the meaning of design within an IoT context is critically reframed. In essence, this paper summarises how NPD processes and the role of design could be improved and proposes a set of guidelines with an accompanying conceptual framework for IoT NPD processes.
Keywords: New Product Development Processes for IoT, Internet of Things, IoT development risks, Value creation for IoT, Design for IoT

Introduction

Over the last few decades, a compelling wave of innovation based on digital technology has emerged with the invention of World Wide Web (WWW). The internet, an open and distributed network through which people can communicate and share information, has become an essential platform. Recently, it has become realisable for almost any physical object that has been connected to the internet and transformed into an IoT device. As such, it is estimated that 30 billion devices around the world will be connected to the Internet by 2020 (IEEE Spectrum, 2016). The emergence of IoT as a new source of 'big' data, whereby people enter new relationships with objects, and businesses are increasingly reshaping business models and strategies. In industry, the IoT is regarded as a fertile field for commercial enterprises, it has been forecast that one in every six businesses would be engaged in the roll-out of an IoT-based product (Burkitt, 2014).

There are crucial opportunities for new innovation (Lasi *et al.*, 2014; Radziwon *et al.*, 2014; Xu, 2012; Yoo, 2013) by amalgamating sensors, actuators, and cloud computing with non-digital products and services (Yoo *et al.*, 2010). In this regard, it is estimated that the total global impact of IoT technologies could generate anywhere from $2.7 trillion to $ 14.4 trillion in value by 2025 (McKinsey, 2013). However, it has been revealed that most businesses are adopting the IoT only to a limited extent, at the proof-of-concept stage (Patel, Shangkuan & Thomas, 2017) and nearly three-quarters of IoT device implementations are failing (Cisco, 2017). Reichert (2017) argues that one of the significant reasons challenging the early IoT initiators is the lack of experience in IoT development. This is because digital technology radically changes traditional ways of business activities such as: how to operate supply chain (Gartner, 2014); how to develop products and services (Henfridsson, Mathiassen & Svahn, 2014; Yoo *et al.*, 2012); and how to create meaningful value (Hui, 2014).

The continuous development of new products and innovation is widely accepted as a requirement for companies' sustainable growth. Consequently, the subject of innovation, New Product Development (NPD), risk management and development risks have gained a considerable amount of attention from academics and practitioners over decades and has increased in the last ten years (Marcelo, 2013; Susterova, Lavin & Riives, 2012; Smith & Merritt, 2002; Thäuser, 2017; Teller, Kock & Gemünden, 2014). However, in the digital age, the integration of software in physical products is challenging the traditional way of NPD, market dynamics, organising logic, the creation of meaningful value, and supply chain operation that are evidently distinctive from the traditional product innovation (Xu, 2012; Johnson, Scholes & Whittington, 2008; Lucas Jr. & Goh, 2009; Lenfle & Midler, 2009; Henfridsson, Mathiassen & Svahn, 2014; Yoo *et al.*, 2012; Svahn & Henfridsson, 2012; Hui, 2014).

Despite the growing popularity and opportunities of developing IoT products and services, there has been little attention focused on NPD processes for IoT; arguably one of the most critical marketing planning and implementation process activities undertaken within the organisation in the future. As software is becoming increasingly embedded within a variety of design artefacts, it is imperative that emerging perspectives in order to both feed and draw insight from broader design discourse. Scholars from marketing and design (Ng & Wakenshaw, 2017; Speed & Maxwell, 2015) argue that it is time to reframe conventional NPD processes to satisfy current needs and potential commercial opportunities in the era of IoT.

Methodology

This study explores how IoT products and services, which aim to increase organisational value, should be developed, and as such to contribute to a comprehensive understanding of NPD for IoT. In order to achieve these aims, the following research questions were proposed for critical discussion: (1) How are conventional NPD processes and value creation different to its counterpart in IoT context? (2a) How are IoT products and services actually being developed and (2b) what are the risks inherent over the duration of the NPD process? (3) How should design be reframed as a critical enabler to mediate value over the IoT NPD process? This research study was conducted using a strong qualitative research methods approach, including an extensive examination of current literature and a single in-depth case study.

Books, articles, academic text, and white papers were selected for a comprehensive literature review through searching electronic databases such as ProQuest Business Premium, Springer Journals Archive, Wiley Online Library Journals, and Google Scholar. Search terms used, included 1) "NPD", "Innovation process", "software development", "design and development process", "linear value creation" and "role of design" 2) "IoT development", "digital innovation", "digital artefact", "value constellation" and "digital economy" 3) "development risks", "IoT development risks", and "IoT risks". These are then supported by a manual investigation of abstracts and articles published in select journals- Journal of Product Innovation Management, Journal of Information Technology, European Journal of Innovation Management, and Journal of Association for Information Systems. Each text was critically examined for their relevance to the primary question(s) of the main research study.

A case study was selected as it is argued as one of the best means of investigating a contemporary phenomenon within a bounded system (a single case) (Yin, 2009; Stake, 1995, 2005) or multiple bounded systems (cases) (Yin, 2009; Eisenhardt, 1989; Stake, 1995). Although this research only includes a single case study, as it is the early stage of current research, the overall research programme will contain multiple case studies to generalise and validate the findings (Eisenhardt & Graebner, 2007). Bounded system can be any special unit such as a program or an activity (Creswell, 1998). As the object of investigation was NPD process for IoT, the unit of analysis for the case studies bounded as the whole journey of IoT products and services development rather than a company which is common in business studies (Mills & Durepos, 2013).

The featured case study involved a semi-structured interview and document reviews, such as public marketing material and presentations. Multiple sources of evidence were used to ensure a thick description and contribute to the validity of the research (Eisenhardt, 1989; Mills, Durepos & Wiebe, 2010; Stake, 1994). The case for the research was selected relying on purposeful sampling (Merriam, 2009) rather than random sampling. Considering the overall research aims, accessibility, and resources, the case needed to satisfy the following criteria were considered: a) the geographical location of the case was limited to the UK; b) the project should aim at developing new IoT products and services. A small number of leading industry White papers on IoT case studies leading the industry were reviewed to develop the list of possible case studies and further internet searching was conducted to contact the company.

In order to recruit appropriate participants for the case study, job roles were considered rather the job titles, such as: 1) those who are in charge of managing the development process; 2) those who are involved strategic decision making over the process; 3) and/or those who hold the authority to drive IoT development project. The interview was conducted at the interviewee's office over 90 minutes in February 2019. The interview was recorded and professionally transcribed. Then it was analysed, categorised, and codified manually by the first author. A draft report was sent to the interviewee and feedbacks was reflected upon the final documents for final validation.

Qualitative content analysis method (Zhang & Wildemuth, 2009) and the inductive approach (Corley & Gioia, 2004) was applied to enable the researcher to focus not only on the explicit text itself, but the experts' intention or contextual meanings around the text. A series of iterations and comparisons enabled themes and overarching dimensions to be subsequently identified. The interview transcripts were interrogated iteratively with marking phrases and sentences related to the research questions. After identifying first-order categories of codes, the links and patterns were investigated which led to identifying the second-order themes. In accordance with validity claims in the literature, the analysis was further refined based on interviewees feedback, documentation reviews and insights into prior literature (Kumar, Stern & Anderson, 1993).

Conventional NPD processes and development risks

Conventional NPD processes

NPD is a complex business activity, which aims to transform customers' requirements into organizational value through products and/or services in the market. Over half a century, NPD processes have been described broadly and there is neither a satisfactory description nor a single design and development model (Bahrami & Dagli, 1993). Within manufacturing economies, a number of different NPD models for physical products have been developed, then in the late 20th century, the models started to be modified and developed specifically for service and software development. This research study investigated conventional NPD processes and it identified that whether developing physical products, software, or service, the process begins from identifying the latent needs for delivering the product(s). However, depending on the characteristics of the objects (physical, digital, or service), there are specific ways of designing and developing new products.

The majority of the development processes for traditional products take conventional sequential approaches, often referred to as 'waterfall models', 'over the wall process (Trott, 2011),' and 'parallel processing models (Takeuchi & Nonaka, 1986)' and 'a stage-gate system (Cooper, 1990)'. Only a few models have different representations of NPD, such as 'Unger and Eppinger's spiral model (2009)', 'a network model (Trott, 2011)', and 'a cyclical innovation model (Berkhout, Hartmann & Trott, 2010). As the economic paradigm has transformed from good-dominant logic to service-dominant logic, and emerging digital technologies disrupt existing NPD processes, new approaches toward service and software development appear and affect physical products development, such as 'service design process (Johnson *et al.*, 2000)', 'V-model (Forsberg & Mooz, 1991)', 'agile development method (Beck *et al.*, 2011)', 'double design process (Design council, 2007)', and 'open innovation (Chesbrough, 2004)'. Existing NPD models, service, and software development processes are continuously evolving, supported by emergent trends of increasing significance of NPD activities, such as: a) NPD process runs simultaneously b) a cross-functional approach; c) external network interactions; d) iterative and incremental approach. These factors not only serve to progress NPD processes, but they also to widen the designer's horizon and working methods in the design process (Jacobs & Cooper, 2018).

However, the majority of the processes are unrealistic and non-applicable to the projects (Forsberg & Mooz, 1991). More importantly today, they are regarded as obsolete in respect of generating value for emerging technologies such as IoT products and services. This is because digital components in physical artefacts introduce a novel innovation logic (Svahn, Henfridsson & Yoo, 2009). As product embed digital capabilities such as programmability and reproducibility (Benkler, 2006; Zittrain, 2006), agility and frequent updates of functionality are facilitated in NPD process for IoT (Svahn & Henfridsson, 2012; Yoo *et al.*, 2010), it becomes more important to imagine not just how the product is developed but how it will continuously evolve in use. Therefore, the attention of this discussion focuses on more development risks, value creation, and the NPD process for IoT products and services.

Development risks

Although there are a number of definitions of risk in product development in literature, the presented research adopts the one Smith and Merritt (2002) made which is that the risk is the possibility that an undesired outcome disrupts your project. Regarding the source of risk, previous researchers classified risks in the NPD process into different categories. Ricondo et al (2006) and Mansor et al (2016) identify that the main categories of risk are technical, market, commercial and organizational risks. Whereas Hillson (2002) contends that the development risks are mainly divided into internal and external risks. For example, internal risks are divided into four categories, such as Management, Financial (internal), Technical and Organizational risks, while external risks categories include Market, Regulatory, Financial (external), Partnership, Social, and Nature risks (Škec, Štorga & Marjanović, 2013).

Technological risk which of the source comes from inside or outside of an organisation (Mansor, Yahaya & Okazaki, 2016), stands for a company's inability to completely comprehend or predict some facets of technological environment related to new product development (Milliken, 1987). The higher the complexity and sophistication of the technological environment the higher the technology risk is (Mansor, Yahaya & Okazaki, 2016). Market risk implies uncertainty about the kinds and extent of customer needs that can be satisfied by a particular technology or new product (Moriarty & Konik, 1989). Higher market risk is expected when consumers are unfamiliar with a product due to little consumption experience, thus making user requirements difficult to define (Mansor, Yahaya & Okazaki, 2016). Unlike technology risk, the source of market risk is external to firms (Park, 2010) and it is regarded as the least controllable risk factor in NPD (Kim & Vonortas, 2014).

Organisational risks are regarded as the state of uncertainties in which companies deal with the internal and external environment which can directly affect NPD performance (Mansor, Yahaya & Okazaki, 2016). Financial risks more possibly than not are the issues of SMEs due to their relatively small size. In order to invest in new product development, companies need capital (Mansor, Yahaya & Okazaki, 2016). Keizer and Vos (2005) described that commercial risk is concerned with the extent to which a product or a product idea, is financially feasible for the company developing the product. Although the categories of the risks can vary per industry and setting of a business (Hartman & Ashrafi, 2004), in this paper four risk factors, (technical, market, commercial and organizational risks) will be used for analysis in the discussion that forms the conclusions section.

Emergent NPD processes for IoT- a case study in agri-tech

Although UK dairy exports are growing and the long-term outlook for the industry is positive, UK Farmers have faced financial challenges caused by low milk prices. An IoT system targeting the dairy industry has been developed in order to satisfy the increasing worldwide demand for good quality animal products in combination with responsible farming, such as reduction of environmental impact, diminishing resource use, and increasing animals' welfare. It combines real-time sensor data collected from neck collars with GPS, machine learning technologies and cloud-based services to create more value in the dairy chain. The neck mounted collar monitors animal's fertility and health by detecting its eating behaviour, heat expression, and rumination 24/7. Once real-time data is analysed, meaningful information is transmitted wirelessly to the farmers' devices to support decision-making and service provisioning.

The new development process for this IoT system is identified and illustrated by an interviewee who led the development as a co-founder, Directo,r and CTO of the start-up company. The NPD process has continued over a 13 year period and continues from initiating the IoT solution to a global company providing products and services to the dairy industry, comprising multiple cycles of design and development phases. Each discrete stage of activities within the NPD process was critically examined (Figure. 01).

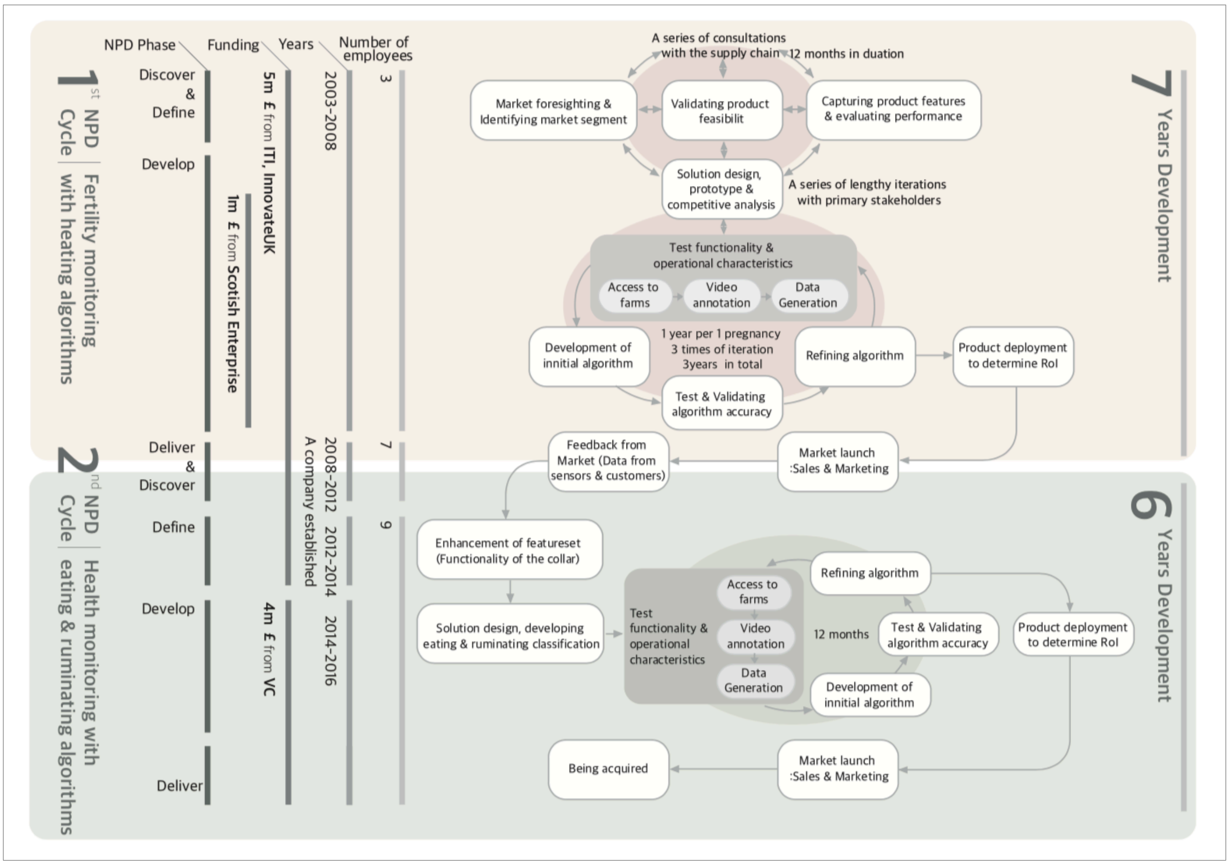

Figure 1: The emergence of value over a thirteen-year period.

1st Cycles of Discover and Define

The 'Discover and Define' phases encompass market fore-sighting and segmentation, validating product feasibility, capturing product features, and evaluating performance. This phase was 12 months in duration. The market needs were identified and validated within the market fore-sighting stage through a series of consultations with the sector supply chain, such as farmers, herdsman, main retailers, logistics, milk recorders, artificial inseminators, nutritionists, animal scientists, and technology providers. All the agriculture segments from crops to chickens were assessed and the appropriate market segment was identified. Identifying the most appropriate market segment is crucial as it drives nearly all of the strategic business decisions. Once the market was identified, the project team validated the viability of the product by specifying the features embedded within the final product/ service of the solution.

1st Cycle of Develop

The product features and performance requirements were then specified in detail at the solution design stage considering the competitive landscape. Designing and prototyping a solution was achieved through a series of lengthy iterations with primary stakeholders involved from the outset in the product definition. In the development of the solution and managing the input from industry stakeholders, critical decisions were reached such as; what is the minimum viable feature set of the product?; what is the form factor?; what are the products' lifetime requirements?; the definition of the deployment process?; and what is the overhead in terms of maintenance cost?. Subsequently, the initial product hardware prototype was developed and evaluated in partnership with dairy farmers who not only to test functionality and operational characteristics of the hardware but also to collect data in order to create and validate a software algorithm that identified accurately the onset of heat (to optimise pregnancies) automatically.

To increase the accuracy of the algorithm, the project team incorporated the understanding of the farmers' knowledge of the characteristic behaviour animals at or near the onset of ovulation and interpreting data into an actionable event through an alert. It is fundamental to *'listen to your customers'* during the entire IoT NPD process but specifically at the stage of understanding current on-farm practices, in turn informing on what and how data should be presented, core to all IoT systems.

The team enjoyed a good relationship with a small number of research and commercial farms from the outset of the project, as such; access to the farms was not a significant issue. However, the stages of developing the initial algorithm, testing and validating the accuracy of algorithms, and refining algorithms were time-intensive and resource consuming. Primarily this is due to the ovulation cycle of the animal (which is one year); thus, the robust validation of the impact of the solution relies on the collection and analysis of 12 months of data. For the initial product, the period was 36 months as the stages of development, test, and refining algorithms were iterated through a series of many iterations. Moreover, even though the team had the access to on-farm environments and were allowed to deploy the neck-mounted collar on appropriate commercial animals, the annotating of videos for a significant number of animals to gather truthing data against which the algorithms would be compared was both time-consuming and costly. During the stage of algorithm development, there were three internal researchers, but three or four operatives at each of five farms simultaneously became involved to annotate the video over a series of iterations.

Securing funding was also a significant issue to ensure that the team generates sufficient on-farm data to validate the algorithms. On top of the funding from InnovateUK, they succeeded in securing close to £1m from Scottish Enterprise. The phase of developing, testing, validating and refining algorithms was a long and challenging journey. Apart from time and financial issues, the team encountered a series of development risks such as: the performance of the IoT system; the risk of misunderstanding the appropriate market segment; the risk of not having algorithms(s) which are fit for purpose; and the risk of limited market traction. Thus, the development risks in an IoT NPD process could be more difficult and complex when compared to a traditional NPD process.

1st Cycle of Deliver and Discover

In order to commercialise the IoT product, the Return of Investment (RoI) of the system had to be accurately validated. As discussed earlier, the natural cycle is one pregnancy per year, which means that RoI takes a similar amount of time to capture. The pace of development was another associated risk since validating RoI and algorithm were challenging; whereas the actual feature set and algorithm development definition was quicker. At the stage of market launch, a commercial company that had a partnership with the team progressed the sales and marketing strategy. The start-up company focussed primarily on the IoT system development from analysing the market through to delivering the collars to the farm, the market attraction was a major challenge. The dairy farming sector has followed many years of standard practices, which are difficult to change quickly.

2nd Cycle of NPD process

While commercialising the IoT product, the project team received market feedback and collected data that enabled them to identify farmers' latent needs in monitoring animals' health. The team identified that monitoring health is achievable indirectly from the muscle movement of the animal to derive accurate measurements of the time spent rumination and eating with the same hardware. After understanding how the veterinary doctors and farmers judge when the animal is unwell, they accessed the farm environment to record the muscle movement and made efforts to develop and refine the algorithm for a further 12 months. The value of the IoT system is to provide an automatic indication of the animals' eating behaviour, heat expression, and rumination, which would then support their decision making on the optimum intervention. Finally, the company developed the IoT system that has subsequently been acquired by an established business in 2016.

Discussion

Reframing NPD process for IoT through reflecting challenges and opportunities

From the case study, it was identified that approaches towards the IoT NPD process seem to be similar to a generic NPD process. In addition, the fundamentals of IoT business success are not much different to its counterpart of traditional business success such as: listening to the customers to understand and articulate their requirements; capturing the understanding of users' behaviour and fusing it into the right solution within the right business purpose; having a good relationship with lead partners and stakeholders. However, several factors, the characteristics of digital technologies (Yoo *et al.*, 2012), the dimensions of big data (McAfee & Brynjolfsson, 2012), the properties of digital artefacts (Yoo *et al.*, 2010), and the dimensions of digital innovation (Yoo *et al.*, 2012) allow a distinctive approach to existing NPD activities and development risks.

The difference in approach towards NPD for IoT products and services proves that it is not a linear but continuous and emergent process (Jacobs & Cooper, 2018) which indicates that value propositions are able to keep evolving for enhanced customer experiences. Over the first and second cycles of the NPD process, the value of the IoT system was evolved from only proposing fertility monitoring to proposing animals' health monitoring. Flexibly adding new sets of value to the same IoT system is desirable but it also means that design of IoT products and services are unable to be fixed which increases the time and/or cost for project completion (Gil & Tether, 2011). The rapid pace of digital technology development (Yoo *et al.*, 2010) also results in keeping design fluid.

Further, real-time data on customers' experience enables the spatial and temporal division between discovering, defining, developing, delivering, and consuming offerings to coincide. Over the 1st cycle of the delivery stage, while farmers were using the fertility monitoring service, health monitoring service, the new offering, was being discovered and developed simultaneously. As while the importance of iteration of processes has long been regarded as significant factors in NPD process, the iteration within each phase of the process becomes even more of a design imperative. Thus, the business should cultivate the ability to manage the fluidity and uncertainty of their own NPD process.

Development risks over the IoT NPD process are more vulnerable compared to its counterpart in the conventional NPD process. There are higher market risks as IoT is a relatively new market with a few consumers having little consumption experience on IoT products and services which are challenges for companies to define product requirements (Mansor, Yahaya & Okazaki, 2016). Technological risks are found around all over the IoT development process. Unlike developing hardware or software products, developing digitised artifacts increases the risks and complexity of development activities due to their multifaceted architectural and abstraction layers. Hence, the multitude of stakeholders and the two different productions (hardware and software) process should be carefully curated in terms of creating value for IoT. Moreover, the fact that the evolution of IoT technologies, e.g., chips, sensors, wireless technologies, is in a hyper-accelerated innovation cycle which is much faster than the typical consumer product innovation cycle, challenges firms to completely comprehend or predict aspects of the technological environment (Milliken, 1987).

Data is another factor of increasing technological risk in IoT development. To test the feasibility of the IoT system takes longer as sufficient data is collected and the accuracy of algorithms is therefore validated. The long and fluid development process implies higher financial risk specifically over the first NPD process cycle. The founder of the start-up company had to keep searching for capital to continue designing the IoT system. A series of risks seem to be interrelated to both internal and external risk sources. For example, identifying customers' requirements would be not only internal management risks as it is challenging to define but also external market risks as the customers are unfamiliar with IoT systems. Moreover, it has been identified that the development risks in IoT are more difficult to manage compared to its counterpart in traditional product development due to the distributed innovation activities of IoT, the complexity of building smart products, and the diverse ways of creating value.

Design contribution to creating value in the context of IoT

Creating value for a new and yet to be explored technology, such as IoT, is a compelling challenge for businesses and designers who contribute to adding value to digitised artefacts. Due to their continuous connection to the internet, products are better considered to be services. Thus, the organisations and designers trying to create value with their own connected product should gradually transform the way of designing and business tactics from a goods-dominant logic to a service-dominant logic.

Over decades of a goods-dominant logic, designers have become skilled at mediating value (Speed & Maxwell, 2015). By this, they have frequently played a significant role in providing ways to further understand the customer's needs and solve problems from a user-centred perspective. However, through traditional NPD processes, more often than not, designers were excluded from the majority of discussions around the creation of a product's core value, and instead, were hired to add value through the use of type, colour, and form at an elementary level. Moreover, developing innovative products in the past, challenged designers as they were only able to access to limited information on existing needs in a reactive manner at a single point beyond its selling point (Speed & Maxwell, 2015). After launching a product, designers played a significant role in adding value to a product through marketing campaigns, making sure that a product's 'worth' was commensurate with its perceived value but not exceeding the costs of production. There was a peak moment of value which is the point of sale (see Figure 2A.) when consumers perceived value for a product or service was 'worth' the offer made by the company. The limitation of the designers' contribution to the object of design (a thing) and marketing campaign is illustrated with the yellow area in Figure 2A.

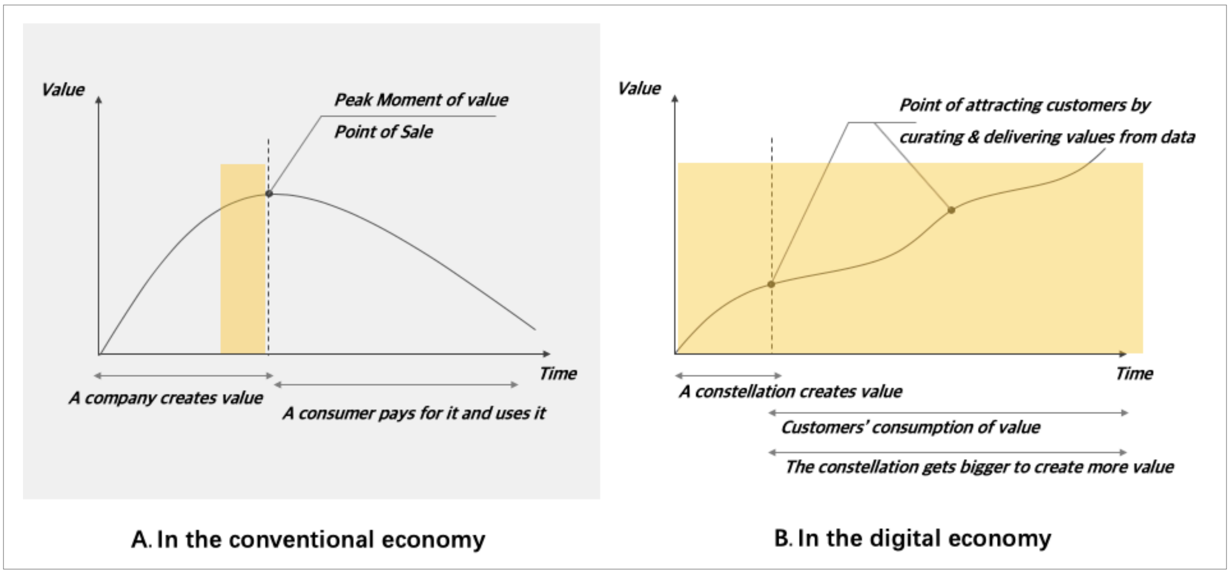

Figure 2: The emergence of Value in the Time Frame.

However, in the context of IoT, there is no critical peak moment of adding value due to the underlying connection to the internet. The value of connected objects, therefore, does not decrease while being used, instead, it increases depending on what value is provided through the networked objects. Moreover, the emergence of value has a rising curve as new services are added (Figure 2B.) based on a growing constellation of internet products. This is due to real-time data frequently being analysed to construct personal value propositions. Through the analysis of large, linked data sets, organisations are thus able to keep creating and refining value propositions across a broad spectrum of stakeholders. Real-time data, which is not a natural medium for designers to work with challenges designers, however, it enables more effective and faster feedback about the assumptions of where value lies, whilst further analytics are able to track the production of unforeseen value.
The acceleration of these cycles ultimately leads to the co-production of value through the push and pull between producers and consumers. This is one of the reasons why design is now at the core of many successful products and services in the digital economy. As such, designers should get involved in value creation more actively over IoT NPD processes, which is illustrated, with the yellow area in Figure 2B. Certainly, an important way to begin to create value with an IoT business model is to start with identifying latent human needs that are concealed beneath huge amounts of customer-generated data.

Conclusions

The authors examined established literature and a featured case study to provides attention to the core research questions at large: 1) How are the conventional NPD processes and value creation different to its counterpart in IoT context? 2a) How are IoT products and services actually being developed and 2b) what are the risks inherent over the duration of the NPD process? 3) How should design be reframed as a critical enabler to mediate value over IoT NPD process? Although this study has explored issues and value creation related to design and development processes for IoT, there are still a number of limitations. As a single case study is only explored within this study, risks and activities of each stage are not profoundly uncovered and limited in findings and generalizing. Notwithstanding these limitations, however, the authors argue that the research study also has some important contributions for wider adoption. For practitioners, this research will enable industry practitioners to understand how design contributes to value creation through a defined NPD process. For academics, this research project contributes to augmenting the body of literature regarding emergent innovation processes for IoT and serves as a starting point for future in-depth research on IoT NPD processes.

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