

## Introduction

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The Glasgow School of Art's Experience Lab is a core activity in the Digital Health and Care Institute (DHI), a Scottish Innovation Centre funded for five years by the Scottish Funding Council. The GSA is a founding partner in the DHI Innovation Centre, along with the University of Edinburgh.

The Experience Lab seeks to bring together service users, researchers and businesses to collaborate on possible solutions to healthcare challenges. The Lab uses current and emerging design research methods to replicate real life practice. In doing this, they provide a creative and innovative environment where rapid cycles of experience can trial new technology, services, processes and behaviours.

The posters contained in this booklet represent the research interests of Lab designers and were presented at the Practical Aspects of Health Informatics workshop in Elgin in October 2015.

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# What is an Experience Lab?

Elizabeth Brooks, Sanne Ree Barthels,  
Jane Candlish & Emily Souter



The Digital Health and Care Institute (DHI) is an Innovation Centre funded for an initial period of five years by the Scottish Funding Council (SFC) in partnership with the NHS, Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE).

It aims to create an open community where industry can collaborate effectively with academia, health, care and social partners on innovation opportunities that will create societal and economic benefits in Scotland. The DHI will co-create sustainable economic growth through new products, services and systems. Our solutions will generate high value health and social care solutions to the benefit of the people of Scotland and further afield.

A central element in the implementation of DHI is the concept of the Experience Lab, which was developed by the Institute of Design Innovation at The Glasgow School of Art. The Experience Laboratories bring users (service users, carers, clinicians, practitioners and third sector), businesses and researchers together to tackle health and care challenges. Ideas gaining evidence of success will become candidates for further research, development and exploitation.

An Experience Lab provides an environment where users, businesses and researchers can collaborate to respond to health and care challenges in an agile and iterative manner. Labs use current and emerging design methods to replicate real life practice. In doing this, they provide a safe, creative and innovative environment where rapid cycles

of experience can trial new technology, services, processes and behaviours.

DHI is tasked to deliver multiple Experience Labs in a variety of medical and health and care settings. While each lab will be unique, they are by nature multidisciplinary, involving a selection of service users, carers, clinicians, practitioners, third sector, businesses and researchers collaborating in response to health and care challenges. Successful ideas from Experience Labs become candidates for further research, development and exploitation.

It is important to note that each Experience Lab is crafted by the lead designer to suit the subject and participants. While the labs share a common method, the execution and tools used will be different.

The research approach, while remaining firmly rooted in emerging design research methods, will also be tailored to each lab. A large proportion can be planned ahead but it is the skill of the lead designer to adapt the activities to the participants' reactions during the lab itself.

Through the Experience Lab approach, different areas will be researched, such as reflective practice, the benefits of participant experience and the role of archiving.

For the remainder of the funding period, some larger themed labs are planned, such as one looking at selfmanagement of diabetes.

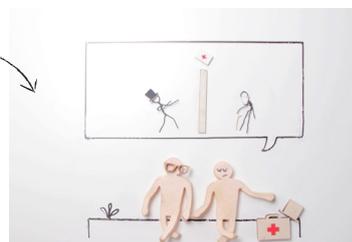
The three basic principles of the Digital Health and Care Institute are: Explore, Experience and Exploit

However, this is not solely a linear process. Projects and ideas can come in at any stage and even loop back to an earlier stage if necessary.



When a project is taken on by the Experience Lab, our designers spend time speaking to the partners in detail, exploring the issue.

In our example, the partner is creating a solution for medical application. However, the partner explains that there is a barrier between themselves and the person who will ultimately use it.



The partner describes the barrier, which makes it difficult to communicate with the end user.

After hearing all the details, the designer says:

"I have an idea."

A team of designers at the Experience Lab works directly with the end user to explore the problem, using design research methods. The designers create a platform where they can collaborate and co-create a tailored solution.



The Experience Lab creates an environment for people to understand and investigate the problem.

It is important that all participants feel comfortable to make suggestions but also make mistakes.

Labs can involve several participants from the academic, business and civic worlds.

They take part in a series of activities created by the Experience Lab designers.

People are encouraged to visualise the problem and possible solutions from a novel perspective, in order to challenge commonly held assumptions.



Storytelling is also important. Participants are interviewed and the work carried out during the lab is recorded and videoed at various points during the process to allow detailed qualitative analysis later.

The next stage is rapid prototyping. Working collaboratively, all participants use information gathered during the lab to build a possible solution.

Designers take the designed solution along with all the other information for thematic and qualitative analysis.

In our example, the outcome is a report and a video about the lab.



Finally, the report and video are given back to the original partner.

The report itself will suggest possible next steps but the project may progress to the factory stage for commercial exploitation, or the partner may continue development of the designed solution alone.

# Positive Participation:

## Unexpected positive outcomes in Experience Lab research

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Dr. Tara French

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### **Participatory Research Approaches**

Participatory research approaches differ from conventional research approaches primarily in terms of the ‘alignment of power’ within the process (Cornwall and Jewkes, 1995). Various modes of participation exist including contractual: where people are contracted to take part in experiments, consultative: where people are asked to give their opinions and views prior to the design or development of interventions, collaborative: where researchers and people collaborate together on projects which are controlled by the researchers and collegiate: where researchers and people are considered as colleagues, working together using their various skills through ‘mutual learning’ and control of the project lies with the people (Biggs, cited in Cornwall and Jewkes, 1995). Experience Labs are designed to operate primarily at the collaborative and collegiate modes, but can also cut across all modes of participation as the design process evolves. The Labs bring together participants from a range of backgrounds who are considered as ‘experts.’ The Lab aims to empower those involved to feel a level ownership over what evolves as a result of the Lab process. The findings of recently completed projects have revealed an emerging pattern of positive experiences of participants who have been involved in Experience Labs. However, these positive benefits reported by participants extend beyond the intended purpose of the research. These emergent properties are therefore considered as unexpected positive outcomes.

### **Experience Lab Case Studies**

A series of Experience Labs were designed to explore and develop a new concept system for assisted living to support and empower older adults to live independently at home for longer (French and Teal, 2015). Six older adults volunteered to take part in the project and were invited to bring a family member or friend to accompany them. The Lab involved visits to participant’s homes to understand their daily life and routines, a trip to John Lewis to explore buying decisions and

preferred products, and the creation of a home environment to test the mock system. Participants took part in all of the sessions, which allowed them to meet other people and feel an integral part of the research. Participants reported how much they enjoyed participating in the Labs and were keen to be involved in future projects.

Positive benefits from both a participant and organisation perspective were demonstrated through a series of Labs, which were designed in collaboration with the Scottish Ambulance Service. The first Lab explored challenges faced by ambulance clinicians in relation to their working practice and explored opportunities to overcome these. A later Lab involved the co-design of a digital directory of services to aid ambulance clinicians in their working practice to deliver the most appropriate care to the patient (French and Teal, 2015). Participants reported that taking part in the Lab had allowed them to meet with other clinicians across Scotland and realise that many of the challenges experienced were similar, therefore they felt that they were no longer working in a ‘silo.’ The ambulance service can use the Labs as a way to promote and demonstrate the changes and investments they are making for the service in the future. This results in user driven change, leading to a sense of empowerment among staff.

A final example demonstrates the positive effects on the wellbeing and social experience of participants. A recent Lab took place in Edinburgh and Lothians in partnership with Midlothian Council and University of the West of Scotland. The Lab aimed to co-design a game-based learning tool for online and social media safety together with young people with a learning disability. Four Labs took place over the period of one month and participation sustained across each session. Both the young people and their local area coordinators reported that taking part in the Labs had been a positive experience for the participants; the Labs provided the opportunity for participants to meet new people, get out of the house and learn new skills.



Cornwall, A. and Jewkes, R. (1995). What is participatory research? *Social Science Medicine*, 41(12), 1667-1676

French, T. and Teal, G. (2015). Transforming healthcare through design-led innovation. In Christer, K. *Proceedings of the Third European Conference on Design4health 2015*, Sheffield, 13-16 July 2015

French, T. and Teal, G. (2015). Co-designing a digital directory of services. *Procedia Computer Science*

# Can Experience Labs Enable Co-creation?

Sneha Raman

Experience Labs aim to enable creativity and collaboration by creating a safe space and the use of design tools and artefacts. In this poster I examine how successful we are in achieving this, based on examples from recent Labs.

Focus on the 'user' has significantly increased in the design of products, technology and services in recent years. But user-driven design exists on a spectrum. Sanders and Stappers (2012) map popular design research methods based on whether they adopt an expert or a participatory mindset, and whether the motivations are predominantly research-led or design-led. The Labs occupy the top-right area on this map. We use a user-driven and design-led methodology with a participatory mindset.

Co-creation - meaning collaborative creation - is a manifestation of the participatory mindset. The Labs bring together academic, business and civic stakeholders and relevant user groups, who assume the role of co-creators. We believe that while researchers, designers and stakeholders are experts in their domains, users are experts about their own experiences. Co-creation values collective knowledge and shared motivations, and presents outcomes representing the interests of everyone involved.

The Game Jam project aimed to design a game-based learning tool for young people with learning difficulties. We ran a series of Labs involving young people and trainers, with game developers and a local council as our academic and civic collaborators. The first three Labs focussed on creating and prioritising user requirements through storytelling and role-play. In traditional product development scenarios, this would inform the design brief for the game developers. But we took the approach of involving the participants in further Labs to co-design the game. We created wireframes and tested a prototype that resulted in the final story, characters, tasks, rewards and forms of interaction. Co-design helped to reduce the gap often created when user requirements are interpreted and translated by 'experts', and to shorten the time between making and testing.

Creating the right environment for co-creation is an important aspect of the Labs. In addition to the choice of space itself, objects, props and design tools are selected and arranged to foster collaboration and aid the creative process.

A group of older adults living in the Highlands was invited to a Lab developing a notification system for assisted living. Props and designed artefacts allowed participants to imagine a future home with a system monitoring and supporting their needs. Design of the space attempted to create a sense of familiarity to make participants comfortable by using characteristics of their own homes - observed by researchers during previous visits. The space also had new artefacts. It encouraged them to perceive everyday challenges with a view to create alternatives to the current situation. As Dunne & Raby (2013) explain, the set-up is an invitation to step into a new, unfamiliar and playful space. It made the future look plausible and encouraged critical discussion around what people liked and did not like about the system. The designed space enhances creativity, but not all Labs make use of a set to embody this. It can be achieved through mindful decisions that are simple yet effective, such as seating arrangements, the posture adopted by facilitators and tools that encourage equal participation and value all inputs.

Many participants come to a Lab with a feeling of apprehension, but the methods and tools ease them into the process. The use of physical things as thinking tools allows people to share by overcoming barriers of discipline, hierarchy and culture. It helps them communicate visually and directly with each other (Martin & Hanington, 2012).

The quotes and general impressions from the participants suggest that Labs encourage co-creation and that project partners see value in our approach. My research interest is in further studying the role of spaces and artefacts in co-creation, and to understand what makes some approaches more successful than others.

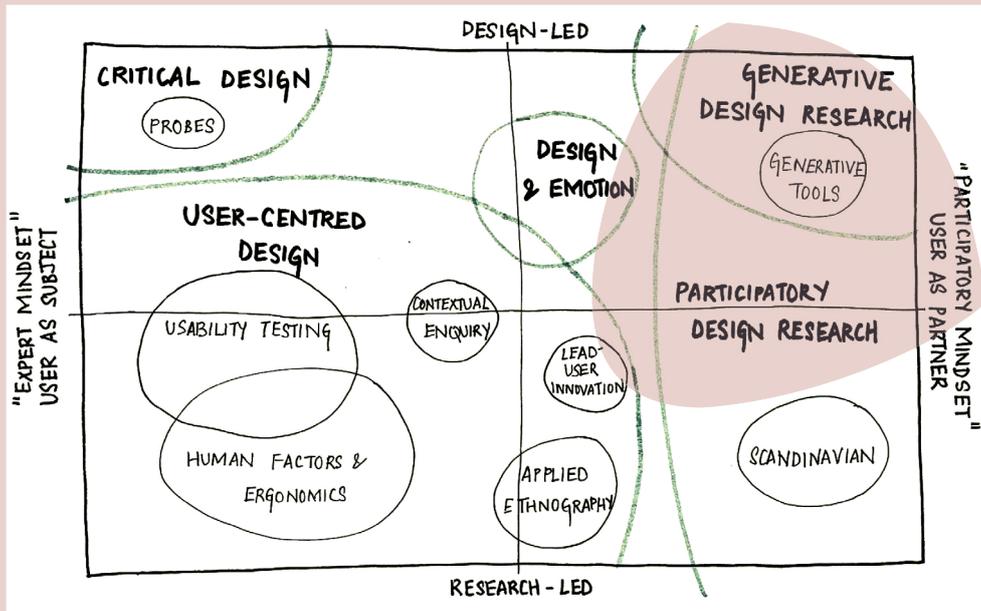


Figure 1.



3.



4.



2.



1.

Figure 1. Emerging landscape of design research approaches & methods (Sanders & Stappers, 2012) adapted to locate the Labs.

1. Game Jam: Young people presenting one of the game concepts for a learning tool.
2. Game Jam: A participant testing the game prototype
3. Boys & Toys: Men sharing their experiences in life before and after becoming a father.
4. Notification system: Older adult in the 'future home' setting.

# OFFICE HAWAII

Office Hawaii is a model that uses the metaphor of a surf spot as a way to reflect on energy management en workflow for organisations working (or wanting to work) in creative processes.

## Background

Many organisations work in a way that cost employers quite a lot of energy. Doing more projects at the same time or working in an unquiet surrounding are examples that can possibly result in productivity - and energy loss. Inspired by the emergence of waves, this 'work model' is aiming to provide the tools for experiencing a nicer workflow. This means that you will be less distracted and more productive, you are putting your energy in your work but also get energy out. It also means you simply enjoy your work, as you are not too focussed on the end result but enjoying the way to get there.

## Flow in creative processes

In creative organisations this workflow seems to be even more relevant as creativity is not something that can just 'be done'. How I experience it, valuable creative projects arise, they happen.

Their quality is strongly depending on their (work) flow and they can not be seen separate from each other. When this flow gets interrupted for a while by say, an admin issue, picking it up can cost a lot of energy and time, as this will have to be preceded by a relatively long period of 'getting back in there'. Also working on creative projects in where the maker can not seem to discover any preferable value can result in less workflow and is likely to going to cost this person a lot of energy. Because this workflow seems to be fragile as well as determinative in weather or not an organisation wins or loses energy, it can be helpful to further define and visualise this 'in flow' or 'not in flow' state of being. To do that I have used a metaphor, which makes the level of workflow in an organisation visual and understandable. This can help to reflect on the workflow as a group.

Through discussing interruptions or generators the organisation can build up a new, more suitable way of working.

## Surf spot as metaphor

The choice of a surf bay as a metaphor for workflow in an organisation comes from my experience of energy generation or -waste during a surf session, which has to do with the quality of the waves.

This quality depends firstly on the quality of the swell. The swell is created by the wind blowing on the sea's water surface for a long time. Circular movements arise underneath the surface. The water itself does not move in circles, the molecules are transporting the energy to each other. Only if the swell meets a beach with the right angle, the circular movements will come 'up' and collapse, and will create waves. If the soil is to steep the wave bumps into the soil and the swell just 'stops'. When the soil is to swallow the circular movements of the swell will fade and not be turned into waves either. Waves do not come in alone, they move in sets, generally around 6 waves per set.

In between these sets there is a little bit of time, which is nice for surfers as it gives them the possibility to paddle in without getting washed. Looking at how a wave arises, perhaps waves can learn us a little more about how to let arise healthy and productive projects. So if the wave was a project, what would have created it's swell, what is the wind of the project? Then the soil of a wave, which is the resistance experienced by the swell that makes it into a wave. For a project this would be the challenge. How much challenge is needed to be creative and productive?

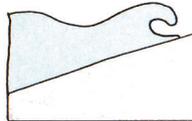
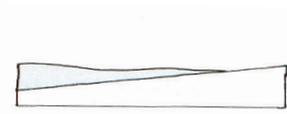
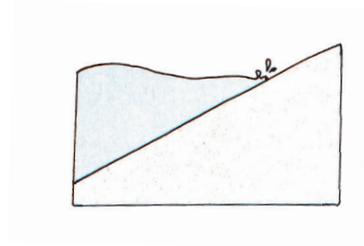
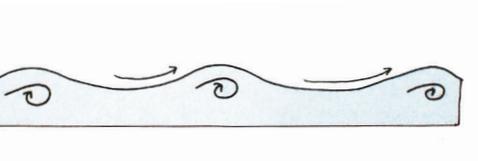
When we look at how a wave behaves, we might recognise the way it is building up energy, peaking, and then building down. In projects we mostly do the same: we gather information and build up a project, peak for a meeting or deadline, and then analyse and share what we have done, perhaps seeing a possible continuation.

## Office Hawaii

Because it is often hard to predict the exact outcome of creative projects, as the value of it is often traced back into the unpredictability of the process itself, this model is based on small circles of development.

The model explains how these circles turn into waves, how these waves come in sets and how working in a healthy organisation can feel like surfing on a Hawaiian worthy surf spot.

> By Sanne Ree Barthels, Innovation Designer  
Digital Health & Care Institute



# Interaction Space

## How can interaction spaces be described to help the design of Experience Labs?

Jeroen Blom

### Background

The health and care environment is subject to many new technology developments supporting patients and families, and health professionals. An interesting aspect of these developments is the role and position of new technologies within the interaction space between humans.

Current understanding of the interaction space is strongly influenced by the philosophy of phenomenology as first described by Edmund Husserl and Martin Heidegger in the early 20th century. According to French philosopher and phenomenologist Maurice Merleau-Ponty perception is inherently (inter-)active; it is a reciprocal interplay between perceiver and perceived [1]. Interaction in that sense can be interpreted as a conversation unfolding, where the live experience of being in the world is providing the means to interact. In design theory this phenomenological view is deeply embedded in *Designing for Quality in Interaction* [5]. Interaction design is shifting from designing for a cognitive model of goals to design for intuitive and engaging interaction [2,6].

### Project Case Studies

A number of projects which have been undertaken by the Experience Labs illustrate the potential role a 'technology' can have in interpreting and facilitating interaction between humans. The project case studies presented here are simplified to focus on the interactive element.

The graphics opposite, show a proposed solution-space or a combination of proposals within a project. Generally the problem-space in these projects exist without a form of technology. The Experience Labs are creating the environment for people to articulate experiences of the current interaction space as well as help them understand the effect of proposed new technologies. The Experience Labs help to unpick the 'conversation unfolding' with a goal to come to intuitive and engaging interaction spaces.

These examples show different relations between people and technology, or between people through technology. The examples can be categorized by the role the technology takes in the interaction space. The least complex interaction space can be found in projects that focus on an information source: project 1 and 2. This involves information support from technology towards the user, and there are few other streams of interaction involving other people or input to the system. However this does not mean the system to interact with will be easy or straightforward to design.

A second interaction space can be described by passive facilitation of human-to-human interaction as illustrated by projects 1 and 4. Both are essentially a platform where humans connect and engage with each other, and the technology only takes the role of passive facilitator.

The third space is described by the technology taking an active engaging role in the interaction space. The technology can be adaptive or responsive to the animate world. It can observe events or behaviour and pro-actively initiate interaction with the primary user or invite a secondary user in the conversation.

### Next Steps

Experience Lab projects encompass a range of potential interactions between primary and secondary users and technology. Analysis of a selection of projects lead to a proposed model to describe three types of interaction spaces (Figure 1). The next steps will focus on exploring the relation between the different potential interaction spaces, how proposed technologies move between spaces and how this understanding can help the design of future Experience Labs.

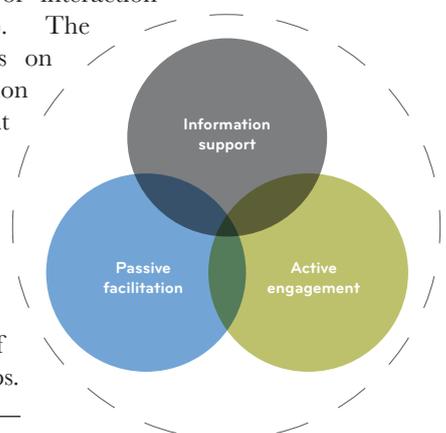
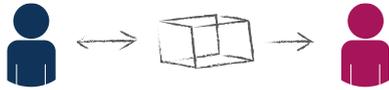


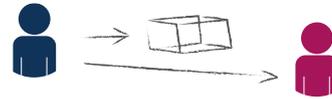
Figure.1 Proposed model of interaction spaces

**1 Game Jam**  
**Project goal:** co-design a game to raise awareness about online behaviour for young people with learning difficulties.



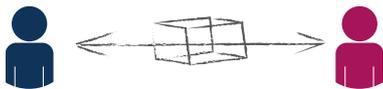
**Interaction:** Young person (blue icon) engages with fictive characters expressing human activities and/or consequences. Trainer (red icon) can observe answers.

**2 Directory App [3]**  
**Project goal:** explore the potential of a directory app for on the road use of ambulance personnel.



**Interaction:** ambulance personnel (blue icon) could access the directory when in need of support, potentially connecting them to despatch (red icon).

**3 Digital empathy**  
**Project goal:** to learn about the experience of empathy in video conferencing consultations, and how to enhance this experience.



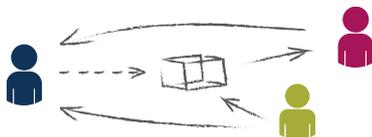
**Interaction:** patient (blue icon) and consultant (red icon) are connected via video conferencing and the system is merely in between facilitating the conversation.

**4 Digital brokering service**  
**Project goal:** to explore a system aimed at facilitating brokering of small services between residents of rural communities through a digital platform.



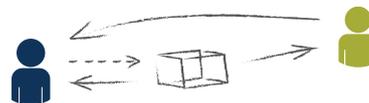
**Interaction:** multiple persons actively engage with a digital platform, to express ability of providing services (green icon) or request services (blue icon). Organization (red icon) monitors platform and provide training to service providers.

**5 Indoor tracking: people with dementia**  
**Project goal:** to explore the potential of a system, tracking people with dementia in an indoor environment and how this can support professional and personal carers.



**Interaction:** the system is tracking data on the behaviour of the person with dementia (blue icon). The system would potentially send data, continuous or in alerts, to professional (red icon). Personal carer (green icon) can observe registered behaviour.

**6 Assisted living for older adults [4]**  
**Project goal:** to explore how a sensor system could support older adults in their needs, to live independently at home for longer.



**Interaction:** sensors are observing the environment in the house and potentially sending an alert or reminder to the older adult in the house (blue icon), and to a loved one (green icon).

- [1] Abram, D. (1996) *The Spell of the Sensuous: Perception and Language in a More-than-Human World*. Vintage Books, New York  
 [2] Deckers, E. J. L., Levy, P. D., Wensveen, S. A. G., Ahn, R. M. C., & Overbeke, C. J. (2012) Designing for perceptual crossing: Applying and evaluating design notions. *International Journal of Design*, 6(3), 41-55.  
 [3] French, T. and Teal, G. (2015) Co-designing a digital directory of services. *Procedia Computer Science*, 63, 445-450  
 [4] French, T. and Teal, G. (2015) Transforming healthcare through design-led innovation. *Design 4 Health European Conference*  
 [5] Hummels, C.C.M. and Levy, P.D. (2013) Matter of transformation: Designing an alternative tomorrow inspired by phenomenology. *Interactions* 20, 6, 42-49  
 [6] Hummels, C.C.M. (2012) Matter of transformation: Sculpting a valuable tomorrow. Inaugural lecture, Eindhoven University of Technology

# Experiencing Uncertainty: Comfort through Design at the Fuzzy Front End

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Gemma Teal

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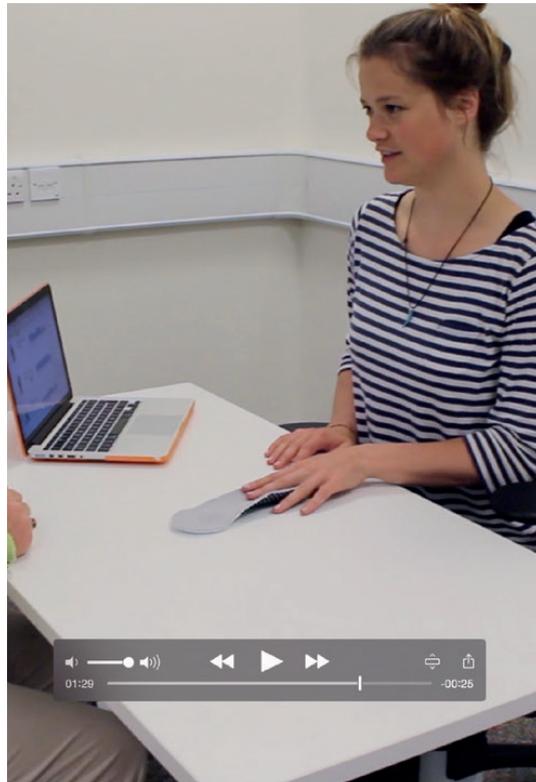
'Designers live and breathe uncertainty and ambiguity.' In his ethnographic study of designers, Michlewski (2015) highlights this as a distinctive design attitude, enabling designers to 'take a creative leap' and innovate. Within the context of Experience Labs, the design process is opened up to include end users, and a designer's task is to ensure non-designers feel safe outwith their 'comfort zone', enabling creative conversations to happen. At this early stage there are many unknowns, and the opportunity identified is likely to be difficult to articulate at the fuzzy front end (Sanders and Stappers, 2008) of the development process. All this uncertainty can be overwhelming to non-designers, and faced with the task of taking ideas forward, it can be tempting to revert to tried and tested approaches that offer little scope for real innovation (Bate, Robert and Bevan, 2004). Experience Labs use bespoke tools and activities designed to quickly make ideas tangible, whereupon non-designers can begin to discuss and explore how the concept could be embodied and implemented.

An effective way of bringing concepts to life is through storytelling. 'Scenario-based design' is widely used within software development teams to make concepts 'concrete' and allow understanding of the activities that need to be supported, then allowing these activities to drive the design (Carroll, 2000). We frequently use scenarios to design with end users: through role-play activities we gain understanding of current practices, design and make prototypes, and test ideas through Experience Prototyping (Buchenau and Fulton Suri, 2000). Storyboards and filmed scenarios (Blythe, 2014) allow us to gain feedback to develop proposed concepts.

Experience Labs use designers' capabilities and tools to detangle the fuzzy front end of the development process to enable non-designers to feel comfortable exploring intangible or ambiguous concepts for collaborative innovation. Further research is required to understand the essential attributes of successful tools, and to explore the role of facilitation techniques and physical environments.

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October 2015



Bate, P., Robert, G. and Bevan, H. (2004). The next phase of healthcare improvement: what can we learn from social movements? *Quality and Safety in Health Care*, 13(1), pp.62-66.

Blythe, M. (2014). Research Through Design Fiction: Narrative in Real and Imaginary Abstracts. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York: ACM, pp.703-712.

Buchanan, M. and Fulton Suri, J. (2000). Experience Prototyping. In: *The 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*. New York: ACM, pp.424-433.

Carroll, J. (2000). *Making Use*. Cambridge (Massachusetts): MIT Press.

Michlewski, K. (2015). *Design Attitude*. Farnham: Gower.

McAra-McWilliam, I. (2007). Impossible things? Negative Capability and the Creative Imagination. In: *Creativity or Conformity? Building Cultures of Creativity in Higher Education*. Cardiff: University of Wales Institute.

Sanders, E. and Stappers, P. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), pp.5-18.

# Knowledge Labs:

## capturing design knowledge in experience labs

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Michael Pierre Johnson

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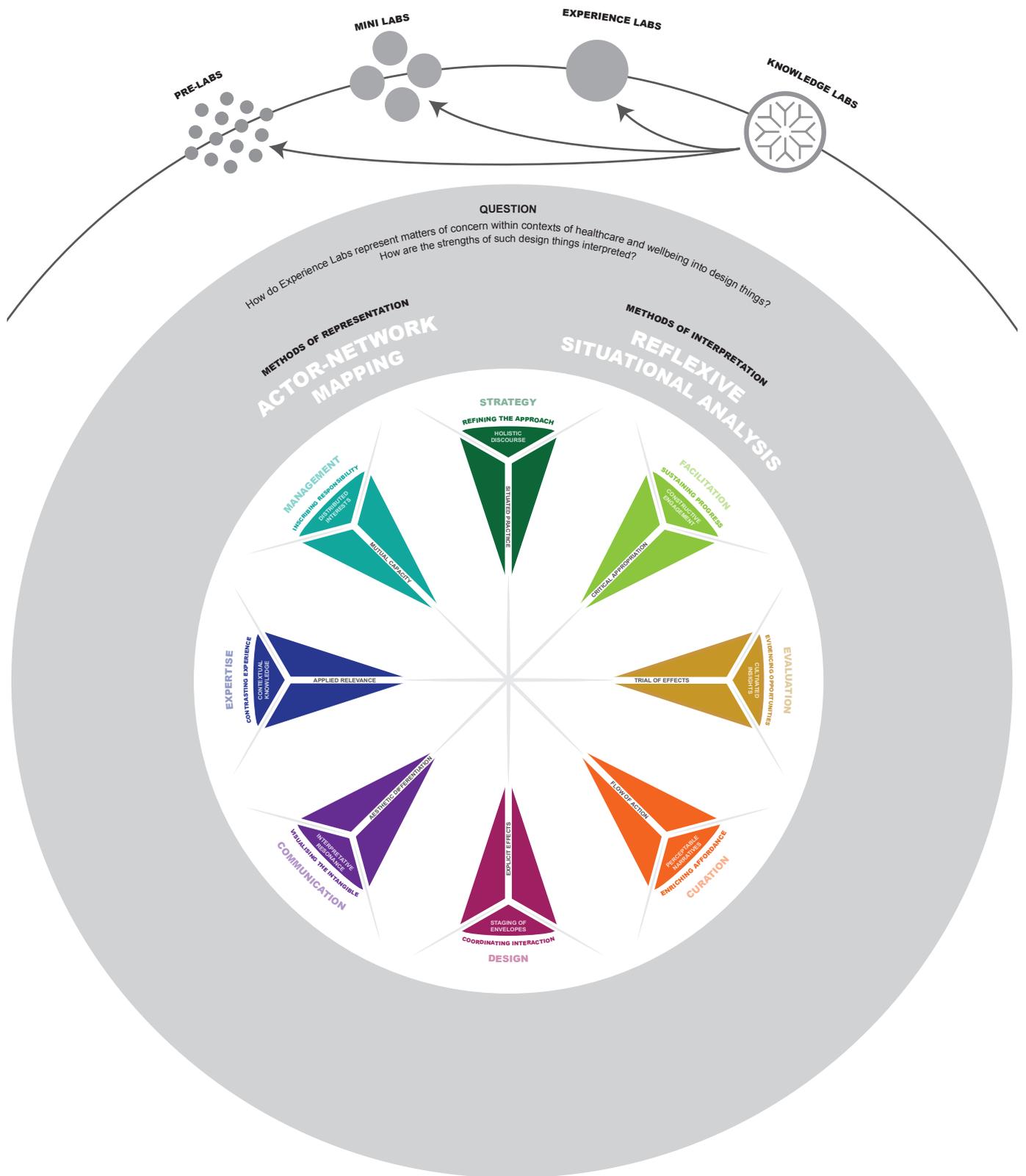
This poster is positioned as a proposal for continuing research with Experience Labs, which aims to capture the knowledge developed through design things (Binder et al., 2011) in the context of healthcare and wellbeing. The wide variety of projects, design approaches, procedural challenges and collaborative relationships encountered have led to an expanded categorisation of Experience Labs. This includes pre-labs, exploratory research activity preceding full Labs, and mini labs, Labs with shorter time-scales that can bypass wider procedures.

This poster proposes to also develop knowledge labs, which are research-focused, reflexive workshops capturing the relations between the multi-disciplinary assembly of people and

things constituting each Experience Lab. Based on a methodology developed within the PhD thesis, Mapping Design Things: Making design explicit in the discourse of change (Johnson, 2016), knowledge labs aim to apply methods of representation, 'actor-network mapping', and interpretation, 'reflexive situational analysis', with which to capture the matters of concern (Latour, 2005) engaged through design things. Such an approach aims to develop a reflexive framework categorising such matters of concern (such as the figure provided) to help define Experience Labs as an effective approach to innovating healthcare and wellbeing.

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October 2015



Binder, T., De Michelis, G., Ehn, P., Jacucci, G., Linde, P. and Wagner, I. (2011) Design Things, MIT Press  
 Johnson, M. P. (2016) Mapping design things: making design explicit in the discourse of change, Ph.D thesis, Glasgow School of Art.  
 Latour, B. (2005) Reassembling the Social: an introduction to actor-network theory, Oxford: Oxford University Press

# The Internet of Things and Healthcare Innovation

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Marjan Angoshtari

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The number of devices connected to the Internet exceeded the number of people on the Internet in 2008, and could reach an estimated 50 billion by 2020. An Internet of Things (IoT) ecosystem is emerging to support the process of connecting objects, including buildings, roads, household appliances, and humans, to the Internet via sensors and microprocessor chips that record and transmit data (Swan, 2012).

## **What is the Internet of Things?**

The Internet of Things represents the next evolution of the Internet, which is taking a huge leap in its ability to gather, analyse and distribute data that we can turn into information, knowledge and ultimately, wisdom (Evans, 2011).

## **Is there potential for the Internet of Things in Healthcare?**

As the population increases, it becomes even more important to make the most of Earth's resources. People deserve healthy, fulfilling, and comfortable lives. By combining the ability of the next evolution of the Internet to sense, collect, transmit, analyse and distribute data on a massive scale with the way people process information, humanity will have the knowledge and wisdom it needs not only to survive, but to thrive (Evans, 2011).

Healthcare is a promising arena for the IoT. There is potential for doctors and nurses to monitor patients remotely through Internet-connected devices, which could create a more efficient health system (The Guardian, 2015). The principles of IoT are already being applied to improve access to and the quality of care, but also reduce the cost (Niewolny, 2013). Healthcare professionals pioneering such technology say the key is to manage the data generated by patients (The Guardian, 2015).

## **Example of IoT application in Healthcare:**

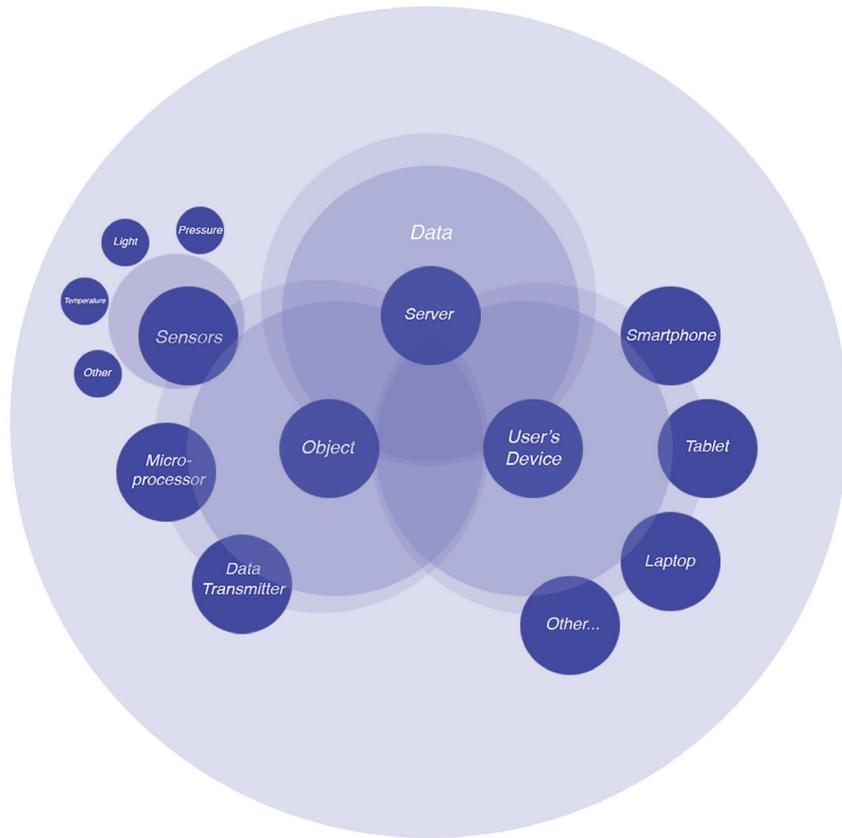
Approximately 1 billion people age 65 and over will be classified as having reached 'non-working age' by the middle of the century. The IoT could significantly improve quality of life for the surging number of elderly people, e.g. a small, wearable device could detect a person's vital signs and send an alert to a healthcare professional when a certain threshold has been reached, or sense when a person has fallen and cannot get up (Evans, 2011).

## **The IoT and the Experience Lab:**

The Experience Lab employs a user-centric approach in order to develop innovative solutions. Within the Labs, we aim to gain a deep understanding of how people interact with technology and how that can feed into our innovation design process to help address people's needs and desires.

## **Within the context of the IoT, we aim to:**

- Improve our understanding of how sensors can provide better access to information from the person or their environment;
- Create a greater understanding of the type of data required to address people's specific needs, rather than what is technologically possible;
- Better understand how a specific user group might experience their environment and develop an in-depth knowledge of their needs and desires in order to define characteristics for the sensors;
- Develop a deeper understanding of the type of sensors required for different applications and solutions based on the needs of user groups;
- Create a better understanding of the role of actuators in such systems and how the required data is transmitted and communicated to a specific user group;
- Explore the required interactions between devices and people and what needs to be communicated;
- To explore the wearable sensors in this context.



1. Evans, Dave; The Internet of things – How the Next Evolution of the Internet Is Changing Everything; white paper; Cisco Internet Business Solutions Group; 2011; pp. 2, 7, 9.
2. Mathieson, SA; NHS and Internet of Things: 'The future of care is about the patient taking control'; The Guardian; 8th June 2015.  
<http://www.theguardian.com/public-leaders-network/2015/jun/08/nhs-internet-of-things-future-care-patient-control>
3. Niewolny, David; How the Internet of Things is Revolutionizing Healthcare; white paper; Freescale Healthcare; 2013.
4. Sawm, Melanie; Sensor Mania! The Internet of Things, Wearable Computing, Objective Metrics, and the Quantified Self 2.0; Journal of Sensors and Actuator Networks; ISSN 2224-2708; 8th November 2012; pp. 217, 219.

# Stacking Worms: The Challenges of Planning in a Dynamic and Creative Environment

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Cate Green and Tine Thorup

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“Materials, methods and goals are always moving, making projects more akin to stacking worms than stacking bricks” Collyer, 2009

## **Theme 1:** Uncertainty ↔ Knowledge

(1) As the project progresses through the first iteration, our level of uncertainty decreases and our knowledge increases. Correspondingly our confidence in our planning increases, until the cycle begins again for the next iteration.

The Experience Lab begins in an uncertain space. The lab takes shape by a process of information gathering, observation and reflection. Although we can plan for that space, we cannot anticipate the findings. Major milestones in the project – such as ethics approval and contracting - are both reliant on the findings of this scoping exercise. Uncertainty also prevails throughout the project, which can change course as it develops. At the outset, uncertainty impacts on our ability to plan ahead (ethics, contracting, logistics, budget forecasting), the ability to communicate to partners (when, how), and the ability to provide accurate reporting (Key Performance Indicators).

Planning begins with estimates but becomes more accurate as the project progresses – this is known as “progressive elaboration” Project Management Institute, 2004

## **Theme 2:** Perfection ↔ Progression

The impact of innovation can be experienced very differently across an organisation as pictured in Afuah’s Hypercube of Innovation (2), and similarly the experience of when a task is completed to the level of satisfaction and how rapidly something needs to progress can differ across our organisation.

The Experience Lab team strives to create bespoke and unique experiences, applications and outcomes. This approach can present difficulties in defining the point of “completion”, and what one person perceives to be “good enough” may differ from another’s perception. Standardisation leads to greater efficiency, but hampers creativity. There is therefore a tension between creative solutions, which aspire to perfection, and standard practice, which favours progression. This tension is visible both within individual lab projects, and how we choose to articulate and visualise our work.

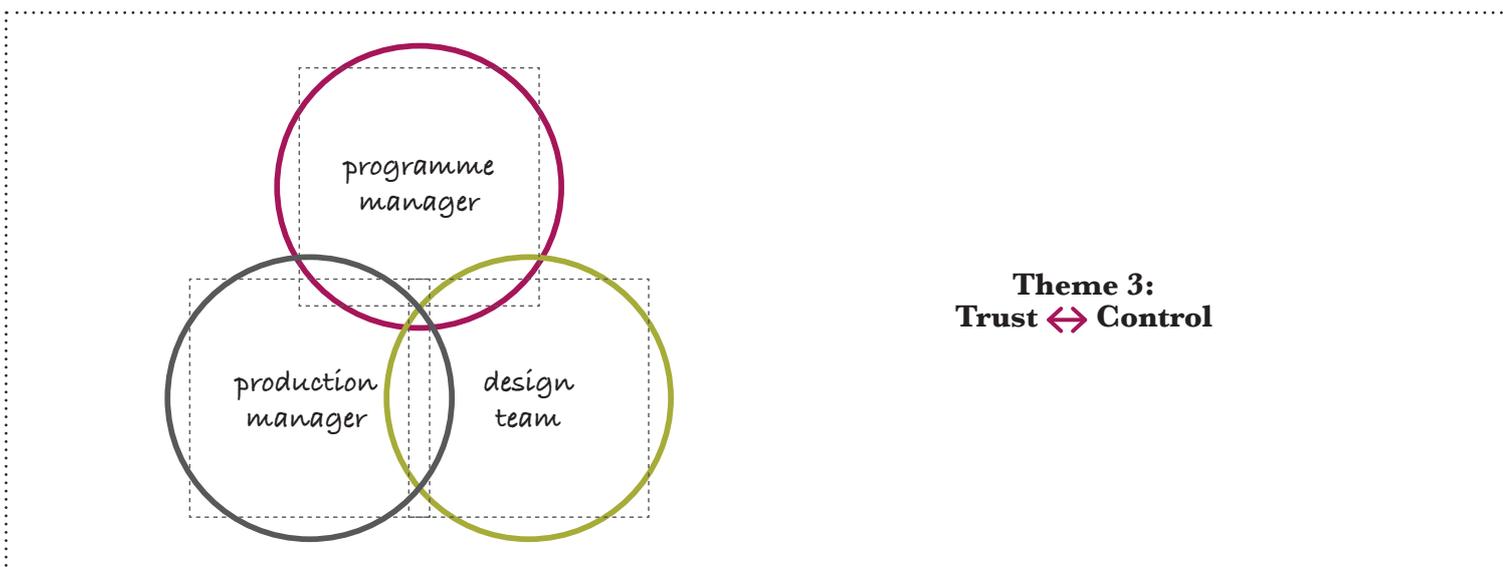
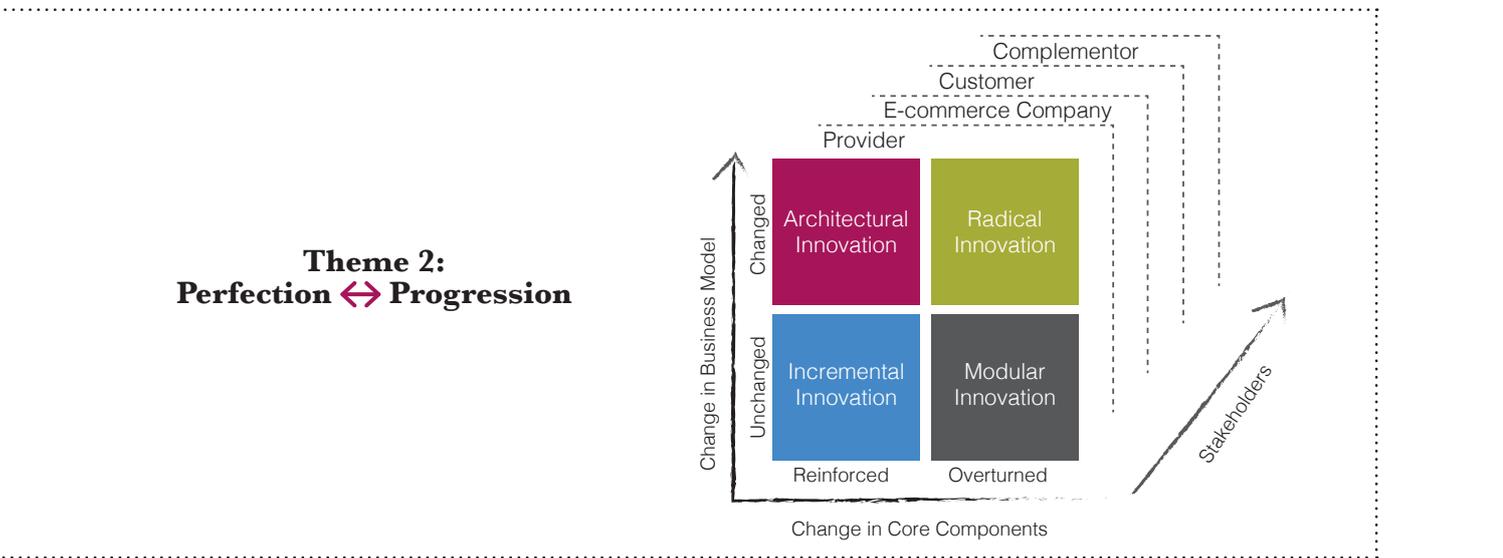
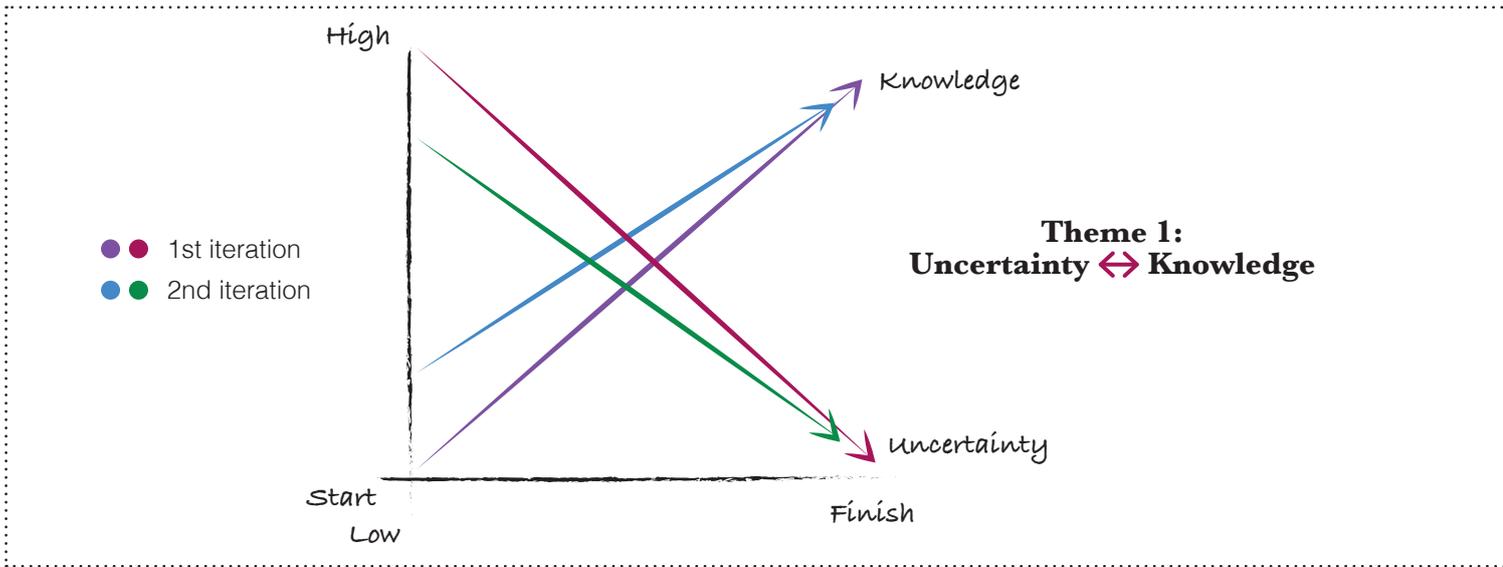
“A project that encounters unknown unknowns is best suited to a ‘learning’ strategy which involves scanning, problem solving and flexibility” Pich, Loch and De Meyer, 2002 .

## **Theme 3:** Trust ↔ Control

Each circle has to trust that the other will deliver, without micro managing the process. Each team is guided by agreed upon outputs (3).

We accept a level of uncertainty, and with that relinquish the same measure of control. It follows that trust then plays a significant role amongst our team. In turn, less restrictive control measures allow creativity to flourish within an outline set in order to achieve success in our projects. Rather than controlling details, targets are set, thereby providing direction and discretion for staff – this is termed “output or outcome control” – Snell, 1992.

“When you abandon the status quo and work collaboratively, you sacrifice control over your product, your team, and your business. But the creative gains can more than compensate”. Peopleware, DeMarco & Lister



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