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DOCTOR OF PHILOSOPHY

Local And Global Explorations Through Design Research

Birnie, Steven James

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Local And Global Explorations Through
Design Research

Steven James Birnie

2014

University of Dundee

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LOCAL AND GLOBAL EXPLORATIONS THROUGH DESIGN RESEARCH

Volume 1

Steven James Birnie, BSc (Hons)

Submitted in fulfilment of the
requirements for the degree of
DOCTOR OF PHILOSOPHY

**THE UNIVERSITY OF DUNDEE
DUNCAN OF JORDANSTONE COLLEGE OF ART & DESIGN**

In collaboration with the
NCR Corporation
Duluth, Georgia, USA

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Abstract

This doctoral thesis is a practice-led and corporate-grounded enquiry into the role of design research methods in a global technology company. The work aims to understand and communicate through a series of case studies how locally conducted participatory action research can be integrated into the processes of an in-house design team at the global NCR Corporation. It questions the current approaches taken in the design and development of consumer transaction technologies in the context of a global organisation and new markets.

The thesis starts by introducing the reader to the global corporation in which the study is focused and author employed, the NCR Corporation. The contextual grounding of the corporate environment, its heritage, history and continued evolution will illustrate the dynamic yet traditional role design has played within the corporation. As a senior member of the Consumer Experience Design (Cx Design) team in the corporation the author is well placed to evaluate the role of design and how it can evolve. The immediate contextualisation is then followed by a broad examination of the literature in the field of design in a corporate culture, research methods and socially-led innovation. This will define the boundaries of interest and influence in the thesis.

A participatory action research approach was taken to address the research questions. Informed by a series of hyperlocal and global community engagements framed and directed from within the corporate culture, the author defines an understanding of the levels of community engagement through design research. The resulting outputs are then applied within the context of the NCR Corporation where the impact and influence on such engagements can be understood. The author concludes that his contribution to new knowledge, the development of a Participatory Action Based Strategic Design Process, can be applied within a global technology company. The process adapts McNiff's and Whitehead's (2011) seven phases of action research reporting and Ravi Chhatpar's strategic decision-making process. The thesis demonstrates the value and influence of design research methods in the design of consumer transaction technologies. The thesis provides an understanding of how design research methods have been applied in a corporate environment, how the insights are applied, and demonstrates how the research has influenced the author's practice and therefore the wider Cx Design group.

Glossary of Terms

Word/ Phrase / Acronym	Explanation
Consumer transaction technologies	Encapsulates the wider self-service business. Automation is a key part of it, ATMs, Point-of-Service devices but also electronic and digital interactions via mobile devices or online.
Community	The focus for this thesis is on place-based communities as opposed to communities based on groups of people with similar interests or online communities.
CCI	Corporate Community Involvement. This involves corporations engaging with the communities they impact and/or where they are located. CCI goes beyond corporate sponsorship and corporate giving, as it is a process of partnership where both work together for a positive societal impact.
CSR	Corporate Social Responsibility. For more on this subject please refer to Section 5.3 Corporate Social Responsibility and Community Involvement.
Hyperlocal	In the context of this thesis it means local community. The term hyperlocal is commonly used in marketing, in terms of targeting a specific area; and in journalism, in terms of locally specific news.
NCR	When NCR was founded in 1884 the acronym stood for National Cash Register. When the company was acquired by AT&T in 1991 and then subsequently re-established in 1997 the company was renamed the NCR Corporation.
NID	National Institute of Design, Ahmedabad, India.
Socially-Led Innovation	Is where the communities or end users of the solution, as opposed to the manufacturers of the product or service, drive the process of innovation.

Design Research Activities

Journal Articles

Summerskill, S, J., Marshall, R., Case, K., Gyi, D, E., Sims, R, E., Davis, P., Day, P. N., Rohan, C. & Birnie, S., (2010). 'Validation of the HADRIAN system using an ATM evaluation case study.' *International Journal of Human Factors Modelling and Simulation* 1 (4). pp. 420-432.

Conference Papers

Manohar, A., Birnie, S. & Rogers, J., (2013). 'Connected communities and story cultures'. In *Proceedings of the 2013 RGS-IBG Annual International Conference*.

Birnie, S., Rogers, J. & Rohan, C., (2011). 'The Pillar ATM: NCR and community centered innovation.' In *Proceedings of the 2011 Conference on Designing Pleasurable Products and Interfaces*, pp. 373-376.

Rogers, J., Birnie, S. & Pengelly, J., (2007). 'Self Service Revisited.' In *Proceedings of the 9th International Conference on Engineering and Product Design Education EPDE07*, pp. 105-110.

Rogers, J., Birnie, S., Pengelly, J. & Adams, R., (2006). 'This is self service design.' In *Proceedings of the Engineering and Product Design Education Conference, Salzburg*. pp. 201-206.

Conference Presentation

Birnie, S., (2010). "What is a community anyway?" *XVII World Congress of Sociology Conference*. 11-17 July, Gothenburg, Sweden.

Design Research Workshops

Birnie, S., Chalkley, J., Sanchez, D., Hair, D., Peng, F., Cox, J., Crossley, J. & Qu, J., (2012). "Mobile Insights Ideas Jam". National Institute of Design. Ahmedabad. India. 25/01/12.

Birnie, S., Chalkley, J., Sanchez, D., Hair, D., Peng, F., Cox, J., Crossley, J., Qu, J., (2012). 'Mobile Insights Exhibition'. *National Institute of Design*. Ahmedabad. India. 27/01/12.

Birnie, S., (2011). 'Community Insights Workshop', *The Small Society Lab.*, Dundee Contemporary Arts, Dundee, Scotland. 25/06/11

Birnie, S., (2011). 'NCR|RNIB Insights workshop', *The Small Society Lab.*, Dundee Contemporary Arts, Dundee, Scotland. 17/06/11

Birnie, S., (2011). 'Business Insights Workshop', *The Small Society Lab.*, Dundee Contemporary Arts, Dundee, Scotland. 10/06/11

Birnie, S., (2011). 'Charity Insights Workshop', *The Small Society Lab.*, Dundee Contemporary Arts, Dundee, Scotland. 07/06/11

Birnie, S., (2008). 'Video Insights Workshop', *Dance Base.*, Edinburgh, Scotland. 15/12/08

Author's Declaration

This thesis is the work of Steven James Birnie and the author is solely responsible for the contents. The contents of this thesis have not been submitted for any other higher degree.

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Steven James Birnie BSc (Hons)

.....

Professor Jon Rogers. Supervisor

Acknowledgements

The PhD journey, for me, has been one of discovery: the discovery of new methods and practices, the discovery of new relationships and the discovery of what I can achieve. The journey has been the most challenging undertaking of my life, the majority of which has been exciting and rewarding. Over the course of this part-time research activity there have been many challenges that life has thrown up and if it was not for those mentioned below I would not have managed to complete it.

I would like to acknowledge all those that have contributed. My initial thanks are extended to my Supervisory Team, Professor Jon Rogers, Dr Graham Pullin and Dr Chris Lim, who have supported, listened and guided me through my postgraduate research. Part-time study is challenging and can only be achieved by having the right support network in place. I appreciate the patience and perseverance they have demonstrated that got me through the most challenging times.

The research activity would not have been at all possible if it was not for the strong support I received from my management team at NCR, in particular Charlie Rohan, Steve Swaine and Lyle Sandler. The support shown through the organisation's investment in the research over such a prolonged time demonstrates real investment in its employees. My colleagues within the Cx Design group have supported my research activity throughout as well as shown patience.

To my family and friends, I would like to thank you for the patience, love and support you have shown me through this lengthy process. I apologise for being so absent and, at times, distracted. To my mother, I would like to say how much of an inspiration you have been through your illness; your drive and positivity has not only kept you but the whole family going.

Finally, to Ashley, Alex and Finlay, you have been amazingly patient with me over the prolonged write-up stages of the thesis and shown nothing but love and support. I now look forward to being able to enjoy our life together to its fullest.

Preface



Figure A: James A. Gordon & Sons, 1953

James A. Gordon¹ was a true entrepreneur and my great-grandfather. As with most people, my family have had a great influence on me. In 1923 my great-grandfather started trading in the rural town of Alford, Scotland, over the hill from where he grew up in Inch. In the beginning, it was a general store. It would later expand to three shops in the town and one in Gairloch, trading in everything from clothing, specialist honey,

¹ This picture was taken outside my great-grandfather's shop, Alford, Scotland in 1953. Right to left: George Gordon (author's grandfather), James A. Gordon (great-grandfather), Robbie Gordon (great-uncle), and James Gordon (great-uncle).

furniture removals, upholstery, antiques, watch making, groceries, kilt making and lots more.

While the size of the business has decreased, it is still successfully trading and has recently celebrated its 90th year. A business can only survive for that long, through turbulent times in world history, by being resourceful and by understanding the needs of customers and employees. While a businessman, my great-grandfather was acutely aware of his social responsibility to his employees. He bought a large house in the town that was converted into apartments for the employees. In the 1940s, he needed to find work for employees returning from war so *'anything and a' thing*² was packed into vans and transported and sold around the highlands and islands of Scotland³.

My uncle recalled in his Master's thesis:

'Today the private trader is assaulted on every side by fierce competition of chain stores and supermarkets with their glittering displays and cut prices. Yet I feel sure there is still a place for the dedicated trader whose best asset is his personal knowledge and interest in the customers.' (Gordon, 1971)

It was that business drive and social consideration that has stayed with me today. While times have changed core human values have not.

I originally studied as an industrial designer at Gray's School of Art⁴, Aberdeen, graduating in June 2000. It was through my undergraduate training that I would apply social values to designed objects. My final honours project was an interactive toy for children with visual and hearing difficulties. It was through conversations, meetings and engagements with occupational therapists, the RNIB (Royal National Institute for the Blind) and children with various physical and cognitive disabilities that I understood the power of design. The project illustrated how design can be used in a participatory way to communicate with people, understand communities, and overcome challenges.

² Described by my grandfather in his native Doric dialect. Doric refers to the dialect of Scots spoken primarily in the North East of Scotland, the area in which I grew up.

³ A short video converted from family cine film tells some of the history of Alford and The Gordons of Alford has been uploaded to YouTube: http://www.youtube.com/watch?v=FtUTAT_ghB0 Accessed: 17 October, 2013

⁴ Gray's School of Art - Robert Gordon University, Aberdeen, UK.

After graduating I was fortunate to gain an internship within the Advanced Development team at NCR, Dundee. This was my first real experience of design outside the university, the corporate environment and of the self-service industry. For me it was interesting to observe the internal politics and influences from within a multinational corporation. At the time, the Dundee plant had a large manufacturing facility so as a recent graduate it was an exciting introduction into the impact designs conceived in my sketch pad would eventually have on so many people and in so many different parts of an organisation.

At the end of my internship I moved to Edinburgh and began working as an industrial design consultant in what was Scotland's largest design consultancy, Forth Product Design. Working within a dynamic design consultancy at this stage of my career, in what I describe as the best learning environment, was very exciting. The drive, dedication, passion and expertise of my colleagues were inspiring while the range of projects and the timescales involved made the work very challenging. My three-year experience within the consultancy showed me that the realities of industrial design were perhaps not as idealistic as I was lead to believe in university. The universal design principals, engaging with communities and people, and conducting research into understanding people was not there. The consultancy is a hard-nosed business within which the resources, time, budgets or client drive did not exist to pursue such areas.

Moving from the consultancy, I went on to lecture part-time back at Gray's School of Art, on the same course I had graduated from in 2000. Having a short but concentrated amount of industry experience while also understanding the various issues and challenges of undergraduate study allowed me to connect well with the students I supervised. I was able to address gaps in the course that I had recognised since graduating and experiencing design in the field.

As the lecturing position was part-time, it allowed me to establish my own design consultancy, B Product Design. Working in partnership with other consultants and manufacturers in the area I was able to work on small design projects. The lessons I learned through being director of my own consultancy were hard ones. It showed me just how hard it was to sustain a business on your own, how connecting with the right people is critical and that at that particular stage of my life I did not have enough knowledge of the relationship between design and business.

I moved from academia and consultancy into an in-house design team back at NCR in 2005. The role within the in-house design team has been a constant learning exercise that employs all my experience gained in my previous roles within design. As a senior designer within the Cx Design team I have worked on projects for household names such as Tesco, Walmart and Barclays as well as being part of the development team for globally-released self-service devices. In an attempt to bridge the link between industry and undergraduate design education I created the NCR Student Design Competition in 2005. Initially, it was a competition between Gray's School of Art and Duncan of Jordanstone College of Art and Design; it later grew to include Edinburgh College of Art and Glasgow School of Art and ran for eight years. The focus for all of the projects created was on people. I wanted the students to research and understand people, then employ that knowledge into new self-service concepts.

Being a global technology company, much of the innovation and development research has quite rightly been focused on technology. Through the process of this thesis I encourage a shift towards understanding people, then understanding how technology can facilitate their needs better. This PhD journey has built on personal and professional experiences where I am now the *'dedicated trader'* in my field *'whose best asset is his personal knowledge and interest in the customers'*.

Section I

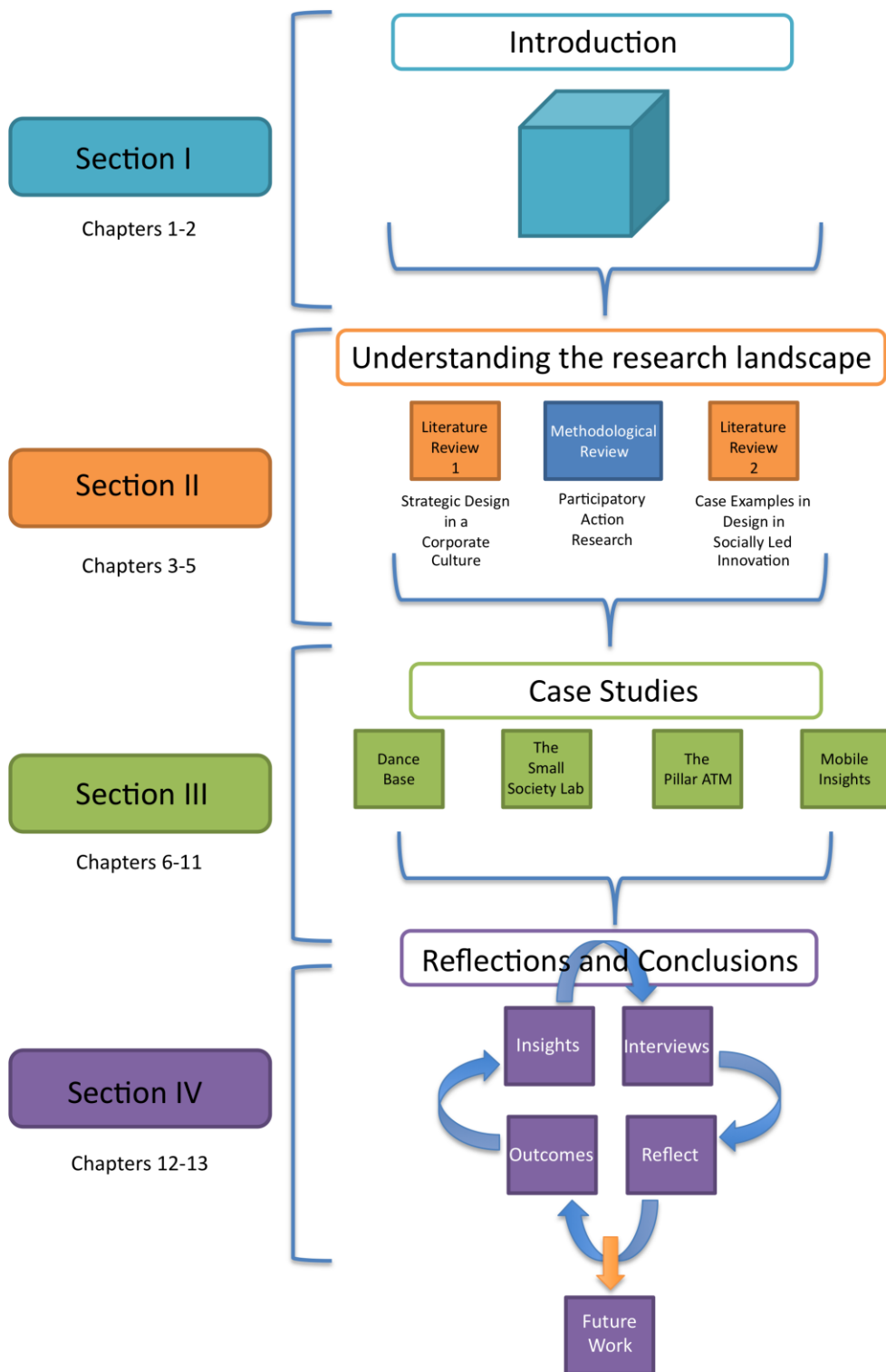


Figure 1.0: Thesis Process

Chapter 1: Introduction

This thesis is an exploration of a series of research questions that are tested within the context and practice of the NCR Corporation. The thesis uses a series of case studies conducted with hyperlocal communities both in the United Kingdom and India to understand how design research can play a role in the activity of a global technology company. The case studies apply a participatory action research methodology to gather local insights that are then applied in a global corporate context. Through the close engagement and participation with people the thesis demonstrates how community engagement can act as a catalyst for innovation. The thesis will also reflect on the impact the doctoral journey has had on the activity of the in-house design team with an understanding that this can be more broadly applied to other organisations. It is of relevance and interest to the design research community how such research activities can influence and impact corporate design practice. Table 1 below identifies the specific research questions the thesis will answer.

Research Questions	
Primary Question:	<i>How can design research play a role in the activity of a global technology company?</i>
Related Questions: 1	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>
2	<i>How can insights that have been generated through hyperlocal research be applied globally?</i>
3	<i>How can design research methods support socially-led innovation in NCR?</i>
4	<i>How has the research conducted throughout the doctoral journey impacted the activity of the in-house design team in Dundee?</i>

Table 1: Thesis Research Questions

The research contained within the thesis is a practice-led enquiry into the role of design research methods within an organisation where technology, not people, is the primary driver behind innovation. While the role of user-focused research as a catalyst for innovation has been questioned (Norman, 2010)⁵, the author will demonstrate how Participatory Action Research (PAR) has been applied in a global technology company,

⁵ In the article Donald Norman states that '*Design research is great when it comes to improving existing product categories, but essentially useless when it comes to breakthroughs*'.

demonstrating how the results of which provided innovative solutions and have impacted the design outcomes at the global corporation. *Participatory*: by engaging with people and communities who are integral to the design process. *Action*: by being actively engaged and as a result influencing the process and outcomes. *Research*: by following a methodological approach in the pursuit of new knowledge that can be applied within the organisation. The research bridges the methods and theories fostered in academia with the strategic business realities of a corporate culture.

Section I of the thesis is concerned with understanding the context of the study. The thesis is contextualised in *Chapter 2: The Role of Design in NCR: PAST, PRESENT and FUTURE*. The chapter details the past, present and potential future role of design within the corporation. The research has been driven by the recognition by the author that there was an opportunity for increased consumer dialogue and engagement in the design process of consumer transaction technologies at NCR. The chapter maps the role of design in the corporation, acknowledging the emerging strategic role design can play while also highlighting the challenges in overcoming a non-design led corporate culture.

Section II focuses on the broader landscape in relation to the research questions. The literature review focuses on three areas: design in a corporate environment, design research methodologies and design in socially-led innovation.

Chapter 3: Strategic Design in a Corporate Culture discusses the evolving role of design, which is now focused on the experience a product or service delivers, and not just the tangible aspects of the design. The chapter illustrates how there is a real business need for products that have been designed through an understanding of consumer needs.

Chapter 4: Participatory Action Research discusses the methods investigated, applied and adapted in the case studies. The research was not focused on the development of new methods but the application of participatory action research in the context of a global technology company, NCR. The thesis should be associated with action research in the form of Participatory Action Research. The process used throughout the case studies applies the methodological approach taken in Living Theory. This theory places the practitioner at the heart of their own enquiry, allowing them to improve their practice and generate insights and explanations as an ongoing cyclic process. While more associated with action research in relation to education and reflective practice, the principles and definitions it applies are relevant to an iterative design approach. This

methodology has been applied to all of the case studies contained in the thesis as it allows for suitable reflection and modification of practice where required.

Chapter 5: Case Examples in Design in Socially-Led Innovation, discusses how the application of participatory design methods and consumer engagement can lead to products and services that strive for a positive social impact on the communities in which they operate. It highlights several case studies from the UK, USA and India that put the needs of the community at the centre of their business or research strategy. An understanding of these examples led to a practical case study orientated approach being taken.

The contextual review in chapters three and five illustrate that engagement, through mutual understanding and needs, can lead to the development of products and services that benefit the community, consumers and business.

Section III applies the understanding described in the previous section. The focus for the case studies has been on consumers within place-based communities⁶. Communities are important; much of the devices NCR produce could be described as community objects, placed there for 24-hour access. It is through the understanding of consumers in a community context that relevant insights can be gained.

The case studies examined through this thesis investigate the role of participatory design methods embedded in a corporate environment with hyperlocal communities. With all of the case studies there is a drive to understand people and how a multinational corporation such as NCR can, through participation and social awareness, address the self-service needs of the community.

Sir Patrick Geddes⁷ is often attributed to the phrase “think global, act local”. This approach has been taken in the selection of a series of case studies that are focused hyperlocally both in the United Kingdom and India. Locally conducted studies engaged

⁶ The focus is not on virtual communities such as Second Life (<http://secondlife.com>) as there was a need to constrain the scope of the research. While virtual communities are interesting and will perhaps play a greater role in the consumer’s experience of consumer transaction technologies in the future, the author did not feel it was suited to his current practice or research interest.

⁷ Sir Patrick Geddes was a Scottish biologist, sociologist, geographer, philanthropist and town planner. He has links to the University of Dundee as he held the Chair of Botany between 1888 and 1919. The exact phrase does not appear in Geddes’ 1915 book “Cities in Evolution” though is implied.

with various communities of people; the process helped the author understand the appropriateness of the design research methods and how they could be applied.

Communities in India were targeted as this country was and will continue to be strategically relevant for NCR. India is a market in which the corporation has been active for over 10 years with sales, software and manufacturing hubs situated throughout the country⁸. Case studies, specifically in chapters nine and ten, demonstrate how a global organisation can use participatory design methods to understand consumers in this market.

Reflections on the outcomes of the case studies form the conclusions of Section III. The key reflections established from all of the case studies are framed around the research questions; these are then developed further and form the basis for the overall reflections and conclusions in the proceeding section.

Section IV, *Reflections and Conclusions*, summarises and reflects upon the whole process and outcomes of the thesis. This is facilitated by a series of interviews with a range of stakeholders who have impacted the research.

It establishes that design in the NCR Corporation is moving positively up the Design Ladder (see page 36) (Denmark. National Agency for Enterprise and Housing, 2003)⁹. While it may be argued that design's role in NCR is perceived as styling, stage two in the Design Ladder, there are definite moves to use design as a process, stage three, and ultimately as a source of innovation, stage four. Indeed, the sponsorship of this PhD research activity illustrates one of the building blocks towards the strategic use of design in the corporation.

The author's intention in this research was not to develop new methods but to demonstrate that there is an alternative method of product ideation that is through consumer engagement. The contextual review in chapters three to five illustrate that engagement, or corporate community involvement, through mutual understanding and needs, can lead to the development of products and services that benefit the community, consumers and business.

⁸ NCR's sales organisation in India is based in Mumbai, software is based in Hyderabad, and the manufacturing facility is situated in Pondicherry.

⁹ See Section 3.2 Design in a Corporate Culture.

The contribution to new knowledge communicated within this thesis is the adaption of McNiff’s and Whitehead’s action-reflection methodology overlaid with the development of Ravi Chhatpar’s strategic decision-making process into a Participatory Action Based Strategic Design Process (see Figure 1.1). The process contributes to the design research community in that it demonstrates the application and modification of participatory design techniques, methods and methodologies in a multinational corporate environment. It also contributes to the role of design in the NCR Corporation whereby a process and strategy for design research is built into the core of the design group’s focus and functionality.

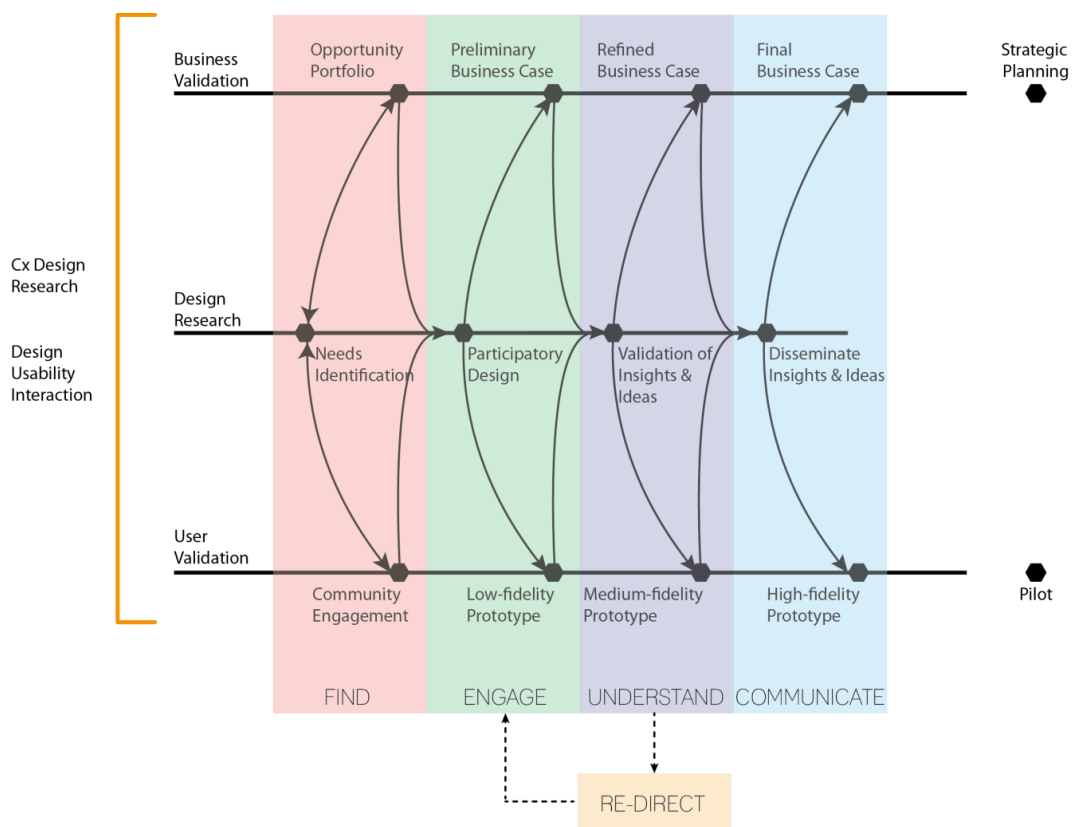


Figure 1.1: Proposal for Participatory Action Based Design Strategy

The author demonstrates that action based participatory research methods can and will continue to play a role in the design process of Cx Design. The use of participatory design methods allows for a refocus from new solutions being driven purely by technology innovation to research and community engagements being the catalyst for innovation. The final closing chapters state the limitations of the research and outline two possible areas for future development of the work.

The next chapter will give the reader a contextual awareness of where the research is based. It provides an overview of the NCR Corporation and the developing role of design within the global technology company.

Chapter 2: The Role of Design in NCR: PAST, PRESENT and FUTURE

2.0 Introduction

An organisation as old and established as NCR comes with an incredible amount of history, heritage, legacy and evolution. This section will give an overview of NCR, the key historical points, its lines of business, and the evolution of the role of design over its history and beyond.

The NCR Corporation is a global technology company; their assisted and self-service solutions function in various lines of business sectors from retail, financial, travel, healthcare, hospitality and public sector organisations. NCR currently operates in more than 190 countries and is headquartered in Duluth, Georgia, USA. As of 2012 there are approximately 26,000 employees of NCR, with revenue of around \$5 billion and it enables approximately 300 million transactions per day (“NCR,” 2013).

In an internal publication celebrating the 100th anniversary of NCR it described that there have been many ages of NCR through the decades: 1884 – 1922 is considered ‘*The Cash Register era*’; 1923 - 1951 ‘*The Accounting Machine era*’; 1952 - 1984 ‘*The Computer era*’; 1985 and beyond ‘*The Information era*’ (*Celebrating the Future: 1884-1984*, 1984). With the advances in technology, the Internet and consumer values changing since 1985 the information era has developed significantly. The author proposes¹⁰ that the relevant eras in NCR beyond 1985 could be broken up into two main eras, ‘*The Consumer era*’ (2001-2010) and the ‘*Experience era*’ (2010 to present).

The various eras of NCR show that it has not stood still. That is not to say that it is necessarily fast moving; the financial industry in particular is traditionally very conservative when it comes to technology adoption. Brett King¹¹ states that banks are still organised in traditional silos where the Internet, ATMs and mobile payments are often relegated to ‘alternative channels’. He declares that if banks are to survive in today’s environment then they will have to understand the total customer experience. (King, 2010. p16). As NCR moved from the mechanical eras into the computer era it

¹⁰ The newly defined eras have come from the author’s experience of working in the company for almost a decade and through discussions with the senior design management team.

¹¹ Brett King is a technology futurist and expert in the retail-banking sector. His book, *Bank 2.0*, uses a series of industry case studies and interviews to demonstrate the need for banks to think beyond their traditional branch-based mentality and focus on the complete customer service.

found itself at the cutting edge of technology with design playing an important role. Today, NCR is world leader in the ATM industry, self-checkout and airline check-in; still evolving and adapting to customer and consumer needs.

2.1 The Eras of NCR

John H. Patterson founded the National Cash Register Company in 1884 in Dayton, Ohio, USA. For almost 130 years NCR have '*helped companies around the world better connect, interact and transact with their customers*' ("NCR," 2013)¹². As the name would suggest, the origins of the company were in the manufacture and sales of cash registers. Patterson did not invent the cash register; an already established coalmine and grocery store owner, he recognised its potential after seeing the benefits in his own store. Patterson and his brother bought the National Manufacturing Company which made the first cash registers and its patents in 1884. They renamed the company the National Cash Register Company; Patterson was then able to begin the monopolisation of the market with this new accounting device. The cash register changed the way business and accounts was done forever. Up until mechanical cash registers, store owners kept their takings in their pocket or a simple cash drawer. There was often leakage of profits, whether through theft, loss or poor accounting. The cash register finally allowed businesses to keep track of their cash flow and for businesses to be run in a professional manner.

Patterson's drive and focus on targeted sales ensured that the company soon became a global organisation. Patterson introduced sales territories, quotas, sales conventions and dress codes. Publications for sales agents, customers and employees that are common today were also introduced by Patterson to educate and advertise. They were to become a truly global organisation by the end of the 1880s, with sales agents across the globe. NCR dominated the global cash machine market at the turn of the 20th century with a 95% share by 1917(*Celebrating the Future: 1884-1984*, 1984).

NCR's reputation in the business equipment market allowed it to create new markets and evolve its product offering. In the 1920s the production of the more complex 'accounting machine' era began. These machines allowed for more complex transaction processing. This technological development into NCR's second era saw the corporation grow significantly in sales and scale. As NCR moved towards its third age it had

¹² Please see appendix A for a historical timeline of key points in NCR's history.

continued to evolve through two world wars and a Great Depression. Notably, NCR played a role in the Second World War and produced the American version of the Bombe. It was a top-secret machine that was designed to break the German 'Enigma' and the Japanese 'Purple' codes. NCR was able to use the knowledge gained through this research in its post-war development.

It was in 1945 that NCR arrived in Dundee through the support of the United States and the 'Marshall Plan' (Long and Eichengreen, 1991). The arrival signalled a post-war boost to Dundee and Scotland. In 1947 work officially began at the plant on the manufacture of mechanical cash registers. At the time, NCR were keen to provide superior employee facilities; this was reflected in a balanced plan that included welfare departments, high-quality catering facilities and wide-ranging social events.

The third era of NCR was a significant one; it was the decision for NCR to move into the computing industry. Through acquisitions, NCR was able to enter the market and by 1957 had released the first fully transistorised business computer, the NCR 304 data processing system. At this time, computers were the size of a room and not widely available. The first buyers of the NCR 304 were the US Marine Corps at Camp Pendleton, California, in 1959. NCR continued to evolve the computer systems, making them faster, more reliable and commercially available with the release of products such as the NCR 315 (a general purpose business computer), the NCR 390 (the first low-cost, mass-marketed computer) and the NCR 615 Century Series (the first computer to store its data and software on a hard disk) (Robat et al., 2000). At the time, the computer industry market was never expected to amount to the billion-dollar industry it is today.

In the 1960s the manufacturing facility in Dundee was still focused on the design and development of mechanical cash registers. With the advent of decimalisation it was believed that NCR's newly decimalised mechanical cash registers would be in great demand. However, new economies such as Japan were developing lower cost electronic cash registers that quickly eroded NCR's market share. The future was looking uncertain for the Dundee facility and it required a quick refocus.

The rapid development of computer technology and the computer market moved NCR into its fourth era. By the time NCR had reached the 'Information era' it had entered a new line of business, the Automated Teller Machine and self-service. In 1978 NCR launched its first ATM, the NCR 770, designed in Dayton. It was the move into this

industry that saved the NCR Dundee manufacturing facility and allowed it to rationalise its manufacturing stream and focus its core skills. The ATM's combination of mechanics and electronics meant it was suited to the skills of the Dundee facility. The transition was by no means easy: the first Dundee designed and manufactured ATM was the 1780 ATM. The product suffered from significant reliability problems that damaged the reputation of NCR and the Dundee manufacturing facility, yet, it did form the basis for self-service banking globally.

The lessons were learned for the development of the Third Generation ATM the '5070', which became NCR's most successful product at the time. Much of the success of the product is down to how the team actively engaged with customers and consumers to understand what their real needs were (*Celebrating the Future: 1884-1984*, 1984). Together with manufacturing efficiencies, it allowed the 5070 to become a true world-beater.



Figure 2.0: NCR's 5070 class ATM. Copyright NCR

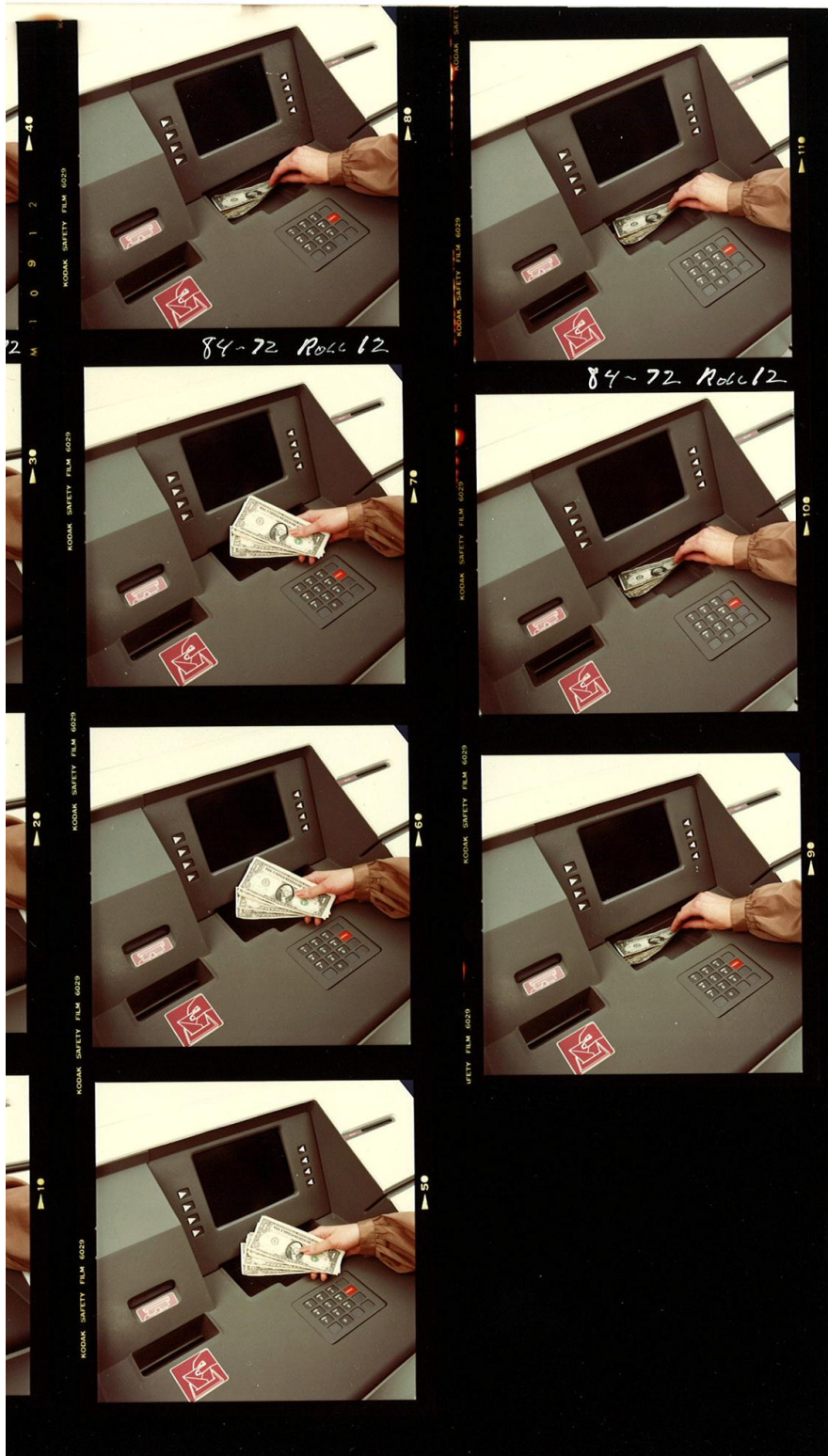


Figure 2.1: 5070 Marketing contact sheet. Copyright NCR

The 'Consumer era' of NCR followed the rise of awareness and legislation around usability and accessibility, in particular, in the self-service market. This is a key point in the role of design in NCR's evolution, it signals a move from technology to people. NCR has been a proactive member of the California Building Code since 1984 and the American National Standards Institute since 1991. They have provided guidance in the creation and development of accessibility legislation and best practice in various countries. This formed the basis for Acts such as the American Disabilities Act (ADA), Canadian Standards Association (CSA) and the European Accessibility Act (EAA).

The numerous, different and complex legislation and guidelines that NCR adheres to in its production of global self-service solutions make the design of the devices very challenging. Figure 2.2 illustrates the challenge of designing a through-the-wall ATM interface to suit a global market. The blue box illustrates the consumer's ideal viewing area and the green line illustrates the maximum operational height of 1200mm as specified by ADA. NCR has often been ahead of the curve in terms of usability, being the first to introduce Media Entry and Exit Indicators (MEEIs), private audio capability, sunlight viewable displays and tactile markers on PIN pads for the visually impaired. They have also been active in the development of software that allows better assessment and awareness in the early concepts of ergonomic and accessibility issues (Summerskill et al., 2010). As new markets open up and their accessibility awareness increases and legislation tightens then it will be an even more important issue.

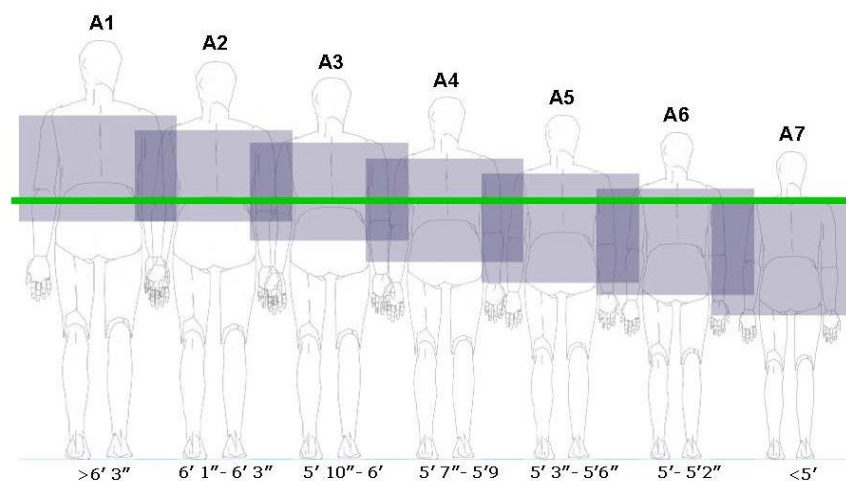


Figure 2.2: Anthropometric Data and ADA. Copyright NCR

As a company it could be said that NCR is moving towards an 'Experience era'. There is now a great understanding and awareness of the various global accessibility legislation

acts that the corporation must adhere to. Technology has developed and consumers' expectations of service delivery have shifted; as a result, the consumer can now control how, when and where they interact with banks and retailers. With the devices becoming increasingly commoditised then differentiation has to be found in different ways. NCR needed to understand the less tangible aspects of self-service.

As an organisation there is still a long way to go before there is an understanding and appreciation of how the consumers' experience is delivered and influenced through the products and services NCR supply. That said, the building blocks are beginning to be put in place for that learning and experience to be realised. Design has played a significant role through the eras of the NCR Corporation, and through this '*Experience era*' its significance will only grow. The next section will define what the role of design has been and how that has evolved through time.

2.2 Role of Design in NCR

Design as a discipline has evolved in NCR through the peaks and troughs of global business. Little is known about the strategic role of design and its perceived value in the early days of NCR's history. It is known that NCR used to employ jewellers to design the early cash registers because of their ability to work with fine mechanical components.

Before a dedicated design group was established in NCR the industrial design was outsourced to third party industrial design consultancies, primarily based in the United States. One notable designer who worked with NCR was Walter Dorwin Teague who designed the National Cash Register Building at the 1939-40 New York World's Fair. The exhibition hall featured the new National Cash Register 100 Model but was six storeys high (*Celebrating the Future: 1884-1984*, 1984).

Design in NCR was traditionally governed and controlled from a central location. In the 1980s this was in the then NCR headquarters in Dayton, by the Corporate Industrial Design group (CID) (see Figure 2.3 that illustrates the development and evolution of the in-house design group in NCR since the 1980s). The CID group focused on high-level design values and design detailing that could be incorporated across the various product platforms. As small scale design groups emerged to support the various engineering and manufacturing hubs, the CID group delivered industrial design guidelines for them to follow. The plant-based design groups would then interpret the guidelines for their

product line and this would have to be approved by CID before going up to the Chief Executive Officer (CEO). The CEO of the organisation would have to sign off all product developments before release, illustrating the high value placed on the design and quality of the products.

It was in 1992 that the CID group commissioned Metaphase Design Group to conduct research into the fundamental principles of design excellence and understand its characteristics with regards to commercial industry products. The comprehensive investigation was conducted over a 12-month period and was comprised of interviews about design with buyers and customers in the US, Europe and the Far East. Both quantitative and qualitative research was done on products and corporations in an effort to understand and profile the concept of design excellence (*NCR: The Search for Design Excellence*, 1992).

The report found that there were six specific factors that comprise the formula for a reputation for design excellence. It states them in order of importance:

1. *Usability (human factors)*
2. *Aesthetics*
3. *Reliability*
4. *Functionality*
5. *Innovation*
6. *Appropriateness (NCR: The Search for Design Excellence, 1992. p1)*

The report calls out human factors as being vitally important in the delivery of design excellence. Human factors are the use of anthropometric data and ergonomics to understand how human beings interfaced with machines.

'More than any other factor, this research has illustrated the importance of human factors: designing products that are easy to use and understand, safe, and in proper scale to the human form. Most importantly designing products that complement the way people think and act is the keystone to constructing design excellence.' (*NCR: The Search for Design Excellence*, 1992. p1)

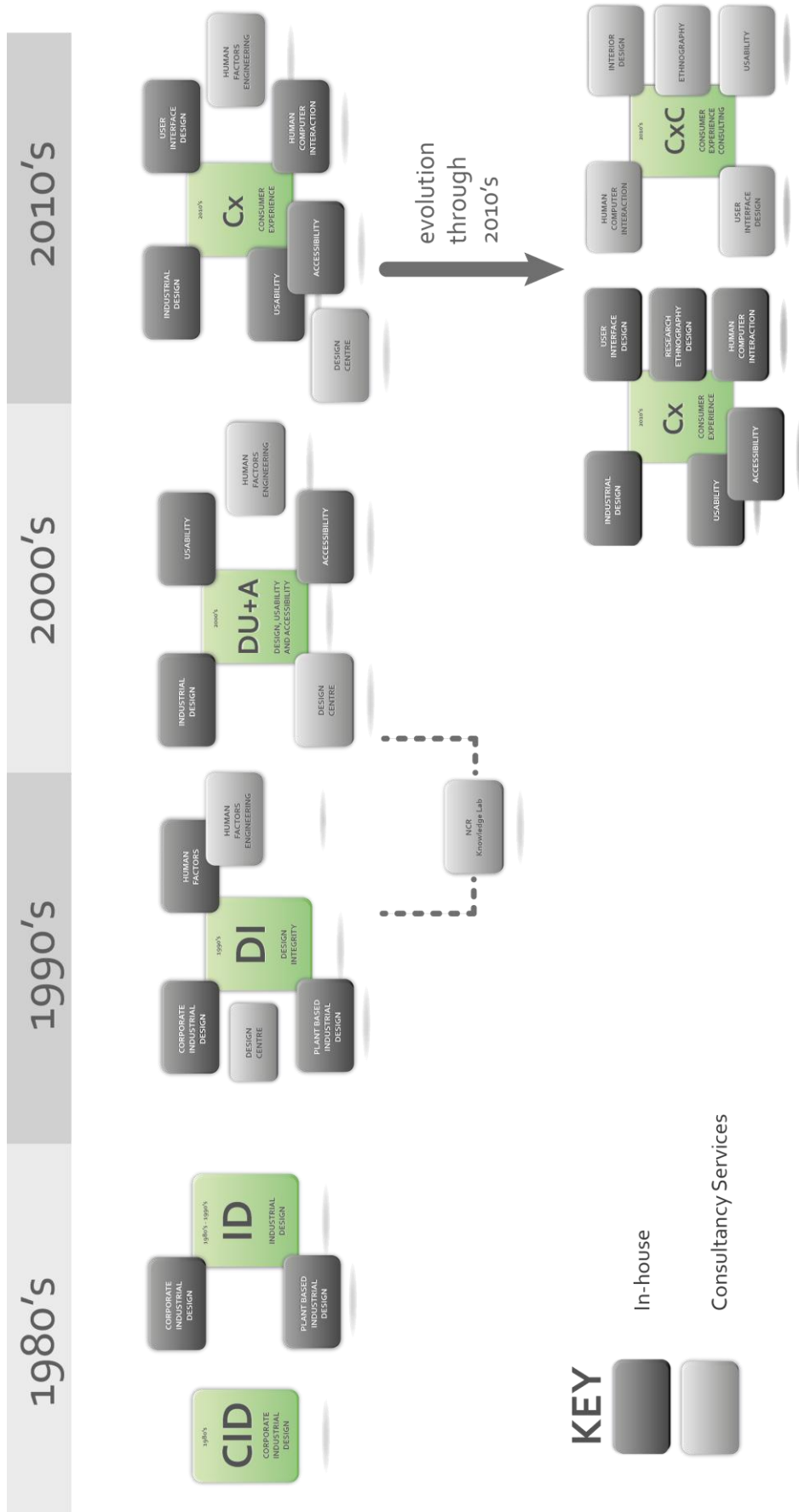


Figure 2.3: The Development of the Roles of Design in NCR

Another key factor that the report calls out was that for design excellence to succeed in an organisation then there had to be strong support shown from top management. The report states that:

'Design excellence cannot be achieved through the implementation of a six month program or spawned through some type of employee incentive program, but must become company commitment.' (NCR: *The Search for Design Excellence*, 1992. p1)

In response to the results found in the report, the Design Integrity group (DI) was formulated in 1995 that encompassed CID, Corporate Human Factors, Corporate Mechanical Engineering, plant-based Industrial Design and plant-based usability. Following the demise of CID, the role of design became less controlled, consistent and valued within the organisation as other organisational groups retained a more dominant position (Rohan, 2013)¹³. Over the following five to ten years, the DI group was consolidated further to evolve into the Design, Usability and Accessibility group (DU+A) in 2000.

The DU+A group was based in Dundee and primarily focused on the financial line of business. At the time there was a clear disconnect within the company between design based in Dundee and focused on the financial lines of business and design based in Atlanta (under the control of engineering) focused on the retail lines of business. The resurgence of awareness of the value of design to the corporation, initially within the financial line of business, was through the creation of the DU+A group. This is evidenced by a consolidation of previously distributed resources with design and usability expertise into a focused team. The research and development based DU+A was linked at a management level with professional services consulting on design. Customer meetings and consulting exposure increased significantly. The strength, value and contribution of the whole group far exceeded the sum of the parts. The group worked closely with engineering, marketing and professional services in product development and pre- and post-sales support. The number of employees grew within the group slowly over a 10-year period and the group's visibility and awareness in the organisation increased but

¹³ The NCR Knowledge Lab was created in 1996 and aimed to conduct leading-edge research into the relationships between consumers and technology over the preceding 1-10 years. In the interests of clarity I have focused on the development of corporate industrial design in NCR. The London based Lab was disbanded in 2001.

design was still not strategically placed¹⁴. The various groups still viewed design as something that was done at the end of the development process, and often reluctantly engaged with design and often too late for any real impact to be made.

The creation of the Consumer Experience (Cx) group in 2010 built on the findings from the 1992 Design Excellence report and recognised the technological and cultural shift in consumers' engagement with, and understanding of, technology. *'Most importantly designing products that complement the way people think and act is the keystone to constructing design excellence.'* (NCR: *The Search for Design Excellence*, 1992. p1)

The overarching Cx group incorporated Cx Design (which included interaction design, industrial design and usability), Cx Labs and Cx Research. The group brought design groups based in Dundee, Atlanta and Orlando into one organisation overseen by a Vice President of Design, Lyle Sandler. The group's focus is to ensure there is a consistent and market leading experience delivery across NCR's entire product range and engage with all of NCR's Lines of Business (LOBs¹⁵) (Day et al., 2010). In parallel, NCR focused on achieving seamless, multi-channel access for consumers, whether through their mobile platform, the Internet or kiosk (Bruno, 2009a)¹⁶. Until this point NCR had always been a business-to-business (B2B) service provider. The solutions NCR provided were delivered to a retailer or financial institution as a touch-point for an interaction with consumers. The aim of the organisation was to enable consumers to dictate how and when they interacted with business. If NCR is to be able to work in a consumer-to-business (C2B) model then it must deliver suitably rich and appropriately engaging interactions that consumers have become more expectant of through personal mobile devices. Figure 2.4 illustrates the B2B and C2B model.

¹⁴ The size of the group fluctuated between 8 to 10 employees. This is a very small proportion of the 24,000 employees in the whole organisation.

¹⁵ NCR's Lines of Business include Financial, Hospitality, Public Sector, Telecom and Technology, Retail and Travel sectors.

¹⁶ A transcription of the interview with John Bruno, Executive Vice President and Chief Technology Officer at NCR, can be found in Appendix B. A digital video of the interview can be found on the accompanying CD. Indexed CD-1.

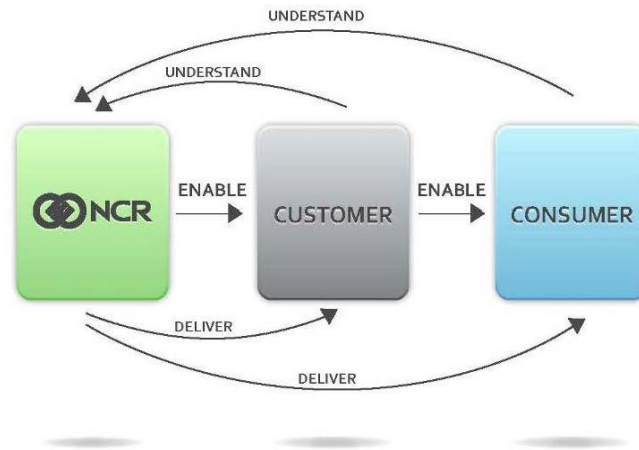


Figure 2.4: NCR's B2B-C2B model. Copyright NCR

A survey was conducted by the author in 2008 with the aim of understanding the value placed on the various aspects of the consumer experience by senior management. It showed that the respondents believed that a best in class consumer experience is a very important factor to NCR's business. It is valued, can be sold and would give us a competitive advantage¹⁷. What was recognised was that NCR had an in-depth knowledge of its customers and the markets in which they operate; what has now to be strengthened is its knowledge of consumers and their real needs.

In January 2013 the Research Ethnography Design (RED) consulting group was established. It is based in Singapore and operates under the wider Cx group. Working alongside the other Cx disciplines, the core focus of the six-member group is to provide a deep understanding of the consumer to NCR's customers. This illustrates how NCR is still evolving to adapt to and understand new markets and consumer behaviours.

While the building blocks are being set in place for the Cx Design¹⁸ group to be used strategically within NCR the reality is that it is still in its infancy. As of February 2014, design is not formally positioned within the NCR development process (Product Lifecycle Management (PLM) process)¹⁹. This means that there is no obligation for design input or sign-off, which creates the situation where budget, resource and time are not allocated at the planning stage of the project. There is also very limited engagement with 'consumers' or investigation into their desired experience.

¹⁷ See Appendix C for a report on the survey results.

¹⁸ There are currently 14 members within Cx Design, which include interaction design, industrial design and usability, based in both Dundee and Atlanta.

¹⁹ See Figure 2.6 for NCR's 2007 PLM process diagram. This process has been illustrated as it gives the breakdown of the relevant groups and their roles within the development cycle.

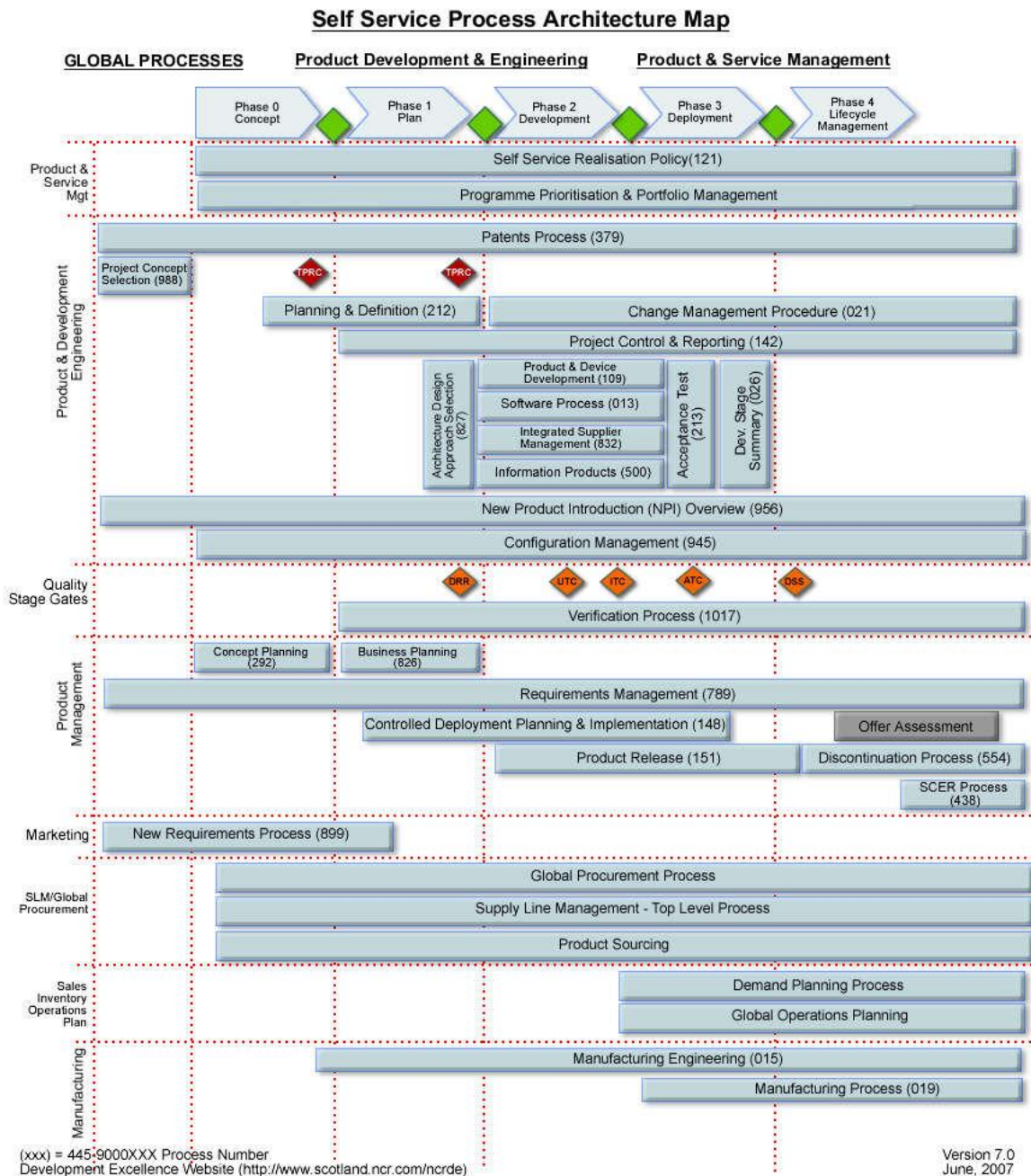


Figure 2.5: NCR's 2007 PLM Process Map. Copyright NCR

The process illustrated above has since been superseded by a much more simplistic process (Figure 2.6) but one that still does not integrate design, design research or the consumer experience into the development cycle.

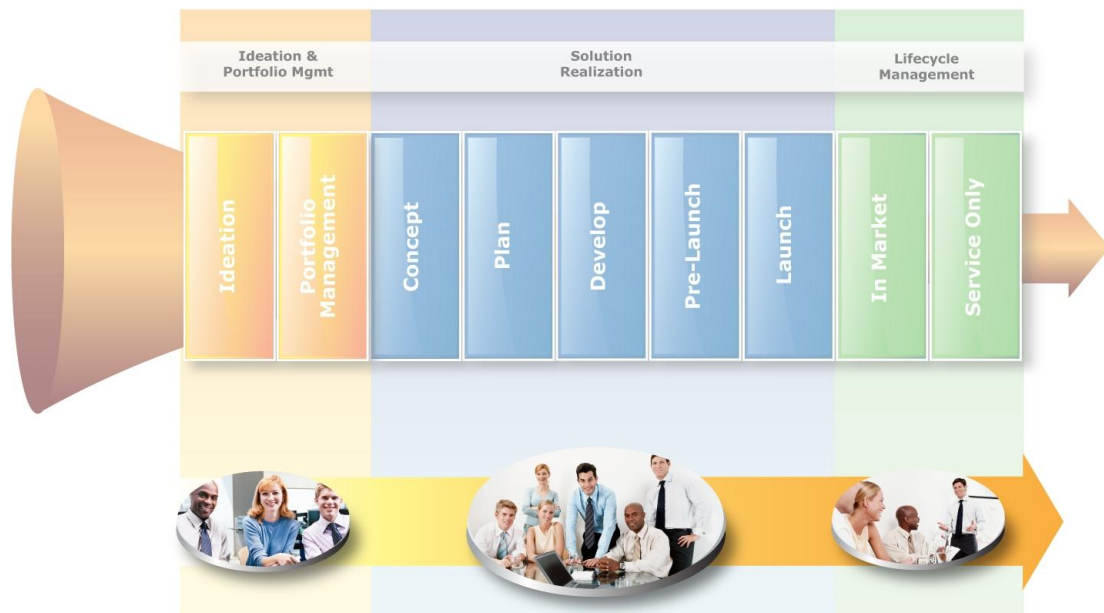


Figure 2.6: NCR's Current PLM Process. Copyright NCR. 2014

The reality is that the Cx Design is informally integrated throughout the process. As a group there is involvement from ideation and throughout the lifecycle of the product. Critically, though, this informal integration and ad hoc development support means the role of the team can be overshadowed or underappreciated by the rest of the organisation. The under appreciation of the design team is not uncommon and is highlighted in *Section 3.2 Design in a Corporate Culture* and again in interviews with Charlie Rohan and the Cx Design team in *Chapter 12: Reflections with stakeholders*. Figure 2.7 illustrates the extensive role Cx Design has throughout the whole development process and beyond.

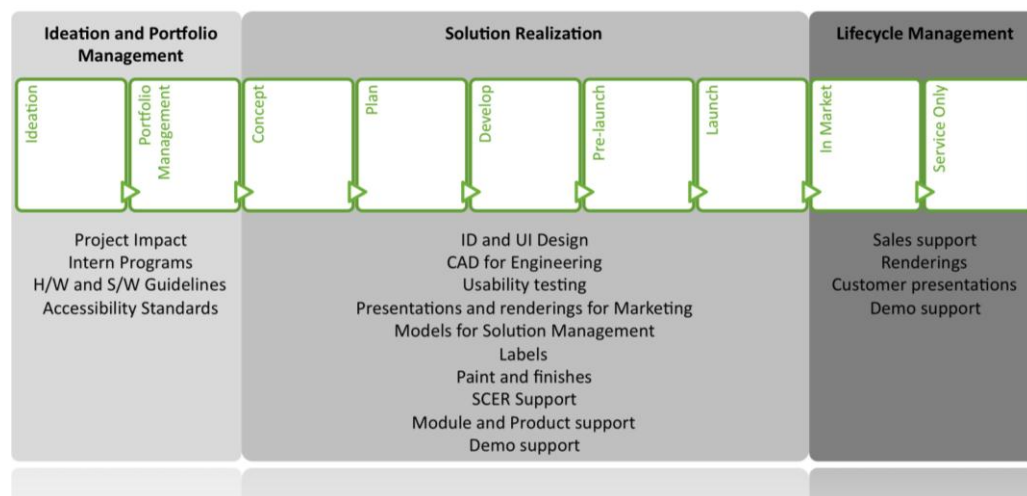


Figure 2.7: Cx Design Involvement Throughout Development Process. Copyright NCR

The sponsorship of this PhD research activity illustrates one of the building blocks towards the strategic use of design. Building the knowledge and experience base from within the existing design team, as opposed to buying it in from a consultancy, was a strategic decision. The knowledge gained through the activity will feed back into the Cx group and be used to formulate and inform future design strategy in NCR.

The aim of this chapter has been to give the reader an understanding of the evolution of design through its various eras within NCR. Before moving on to the next chapter that focuses on design in a broader corporate context, it would be worth understanding how the role of design is perceived to grow in NCR's immediate future. The following section is a communication from the VP of Cx, Lyle Sandler. It communicates the 'One' future for design in NCR and gives the context in which the research is conducted.

2.3 'One' Design Future for NCR

'ONE Group – *The definition of good design varies across groups and individuals. Good design requires creativity, debate, analysis and collaboration. Good design does not happen in a vacuum. CX/D [Consumer Experience Design group] will act as the single design filter for NCR, fostering innovation and a human centricity. All designs wearing the NCR brand will be filtered through CX/D before release, our designs are the NCR story, and we are the storytellers!*

'ONE Design Language – *We will speak with a single design vocabulary, a schemata that represents form and function, a schemata that provides evidence that WE ARE NCR. We DESIGN the everyday mechanisms that make life easier for consumers, there will be no ambiguity that our design language represents our uniqueness, approachability, usability, brand essence and our dedication to the consumers our customers serve.*

'ONE Design Message – *Design is a corporate asset that differentiates NCR. Designers will deliver a common message, internally and externally. Designers will enable and evangelize design to internal and external constituents. We will promote action, we will influence, we will educate. There can and will be no ambiguity regarding our value, our skill set and our deliverables. We are a "design" company. We are passionate about design. Spread the word.'* (Sandler, 2013)

2.4 Conclusions

The NCR Corporation is a long-established global organisation that leads the market in consumer transaction technologies. Through the history of the organisation innovation has been key, innovation on how and where it sells its devices and innovation on how those devices operate. NCR and, in particular, the design and usability group within the organisation have for decades been a thought leader in the consideration of the human interaction of consumer transaction technologies.

The role of the design group in the organisation is evolving beyond the design of hardware but it is now considering the interaction, service delivery and the overall consumers' experience. This is in the early stages but the formation of the RED group and Lyle Sandler's 'One' design future message signals a shift towards the need to develop understandings of consumers and communities that go beyond traditional methods such as user testing.

Yet, the Cx Design group within the development organisation is not formally identified in NCR's PLM processes. This means it lacks authority and strategic influence within the organisation even though design has been recognised as a core strategic asset. The role of the design team is often overshadowed by sales, marketing and other groups within the organisation that have a stronger voice or a more dominant position. A core capability of the design group is its ability to apply appropriate design research methods to engage with and understand people and convert this understanding into a catalyst for innovation. The resulting innovation and understanding can then be applied strategically within the organisation.

The following contextual review examines the role of design in a broader corporate context. It examines the evolution of the role of design in a corporate culture and how consumer understanding and business drivers can come together through an integrated design research strategy.

Section II

Introduction

The aim of this chapter is to demonstrate an understanding of and critically analyse the background research area and demonstrate how the research conducted throughout the thesis relates and contributes to this landscape. The literature review topics focus on strategic design in a corporate culture and case studies in design in socially-led innovation. These are separated by a study of the methodological approach taken during the practical elements of the research. The chapter focuses on the broader landscape in relation to the research questions highlighted below.

Research Questions	
Primary Question:	<i>How can design research play a role in the activity of a global technology company?</i>
Sub-Questions:	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>
1	
2	<i>How can insights that have been generated through hyperlocal research be applied globally?</i>
3	<i>How can design research methods support socially-led innovation in NCR?</i>
4	<i>How has the research conducted throughout the doctoral journey impacted the activity of the in-house design team in Dundee?</i>

Table 2: Thesis Research Questions

Chapter 3: Strategic Design in a Corporate Culture is relevant to the thesis as it contextualises the research which has been conducted in a multinational global corporation. The chapter discusses the evolving role of design, which is now focused on the experience a product or service delivers, and not just the tangible aspects of the design. The chapter illustrates how there is a real business need for products that have been designed through an understanding of consumer needs and how this can be built into a corporate design strategy.

Chapter 4: Participatory Action Research is relevant as it is the core methodological approach taken through the case studies described in Section III. The chapter discusses the methods investigated, applied and adapted in the case studies. The practice-led participatory and reflective nature of the research leads to the discussion of design praxis and the appropriate approaches taken in community engagements.

Chapter 5: Case Examples in Design in Socially-Led Innovation is relevant as it contextualises the nature of the research which is focused around community engagement. The chapter discusses how the application of participatory design methods and consumer engagement can lead to products and services that strive for a positive social impact on the communities in which they operate. It highlights several case studies from the UK, USA and India that put the needs of the community at the centre of their business or research strategy. An understanding of these examples led to a practical case study orientated approach being taken.

Chapter 3: Strategic Design in a Corporate Culture

3.0 Introduction

In this chapter the author will explore corporate culture and the strategic role of design in a corporate culture. The reader will be taken through perspectives of the corporate culture and how that influences design. The role of design and how it can be used within corporations to engage with consumers in a mutually beneficial way is explored in this chapter. It describes how design as a discipline is often undervalued within corporations as other groups such as research and development (R&D) or marketing can overshadow it. Relating to the research question on the role design research can play in global organisations, corporations engage with design on various levels whether being used merely as a group to provide styling expertise or on a higher strategic level, integrating design with business processes and driving innovation.

The section will also discuss the role of design moving beyond the stylisation of products towards a consideration of the total consumer experience and service delivery. This mirrors the trend highlighted earlier in Section 2.0 by King (2010) in relation to the financial sector and its need for an awareness of how the customer wants to interact and transact.

Within the context of this thesis it is necessary to understand the corporate landscape in which this research has been conducted and influenced; understanding the dynamics of corporate culture helps to frame the research. For design to have a positive influence in a company it must be embedded within the culture and ethos of that company. The following chapter discusses corporate culture in relation to a global organisation.

3.1 Corporate Culture

A corporate culture can be described as the way things are done in an organisation, the rituals, values and dynamics of a company. Yet it is more accurate to recognise a corporate culture as existing on several levels within the organisation. Edgar H. Schein²⁰ believes the biggest danger in trying to understand culture is oversimplify it (Schein, 2009. p21). The culture is demonstrated through the tangible products it produces as well as the invisible elements of thoughts and feelings within the company. Schein

²⁰ Edgar H. Schein is a recognised expert in the field of corporate culture and organisational psychology and is the Sloan Fellows Professor of Management Emeritus at the MIT Sloan School of Management.

describes these levels as 'Artefacts' (visible organisational structures and process), 'Espoused Values' (strategies, goals and philosophies) and 'Underlying Assumptions' (Unconscious, taken for granted beliefs, perceptions, thoughts and? feelings). (2009. p21)

In relation to corporate culture Schein states that:

'Culture is a pattern of shared tacit assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.' (2009. p27)

There are other supporting definitions of corporate culture which help to illustrate its complex and dynamic nature. These definitions include 'a cognitive framework consisting of attitudes, values, behavioural norms, and expectations' (Greenberg and Baron, 2003), 'the collective thoughts, habits, attitudes, feelings, and patterns of behaviour' (Clemente and Greenspan, 1999) and 'the pattern of arrangement, material or behaviour which has been adopted by a society (corporation, group, or team) as the accepted way of solving problems'. (Ahmed et al., 1999)

What is acknowledged is that for a positive²¹ corporate culture to be adopted there has to be widespread employee support (Sadri and Lees, 2001). This support is generated firstly through a clear corporate vision that comes from the strong leadership at the top of the organisation and filters through the company (Irani et al., 2004; Sadri and Lees, 2001). The employees play a critical role in creating a positive culture. As a company adapts and grows, moves into new markets, and there are mergers and acquisitions, then the culture has to adapt with it.

The adaption and adoption of corporate culture is particularly relevant in a global organisation where an employee's cultural background has to be moulded to suit the corporate ethos, and vice versa. The culture has to be suitable for the company's environment and fields it operates in. For example, Goffee and Jones (1996) talk of how a global technology and manufacturing organisation would need to create a culture of innovation, communication, awareness to detail and high quality. This is where

²¹ A positive corporate culture is where the values of the corporation are aligned with those of the employees and consistent with the environment in which the corporation operates.

manufacturing quality standards have to be met and where R&D groups need the sharing of ideas to foster innovation. This becomes challenging when regional perspectives of quality change and competition between regional groups hinders communication and collaboration. Another challenging factor is that the culture of the organisation is often difficult to change as it comes from the wide range of learning from the large group of people within the company. It is often the intangible elements such as ways of thinking and feeling that are invisible and difficult to measure that make up the core of the corporate culture, relating to Schein's definition of underlying assumptions mentioned previously.

These challenges are amplified in a global organisation that goes through mergers, acquisitions and joint ventures. In a merger, the two cultures have to try and blend together in a balanced way in order for the people to work together. In a merger there will be sub-cultures within the larger organisation. In a joint venture, the team, group or organisation must bring the cultures from the two groups together and create a new culture (Schein, 2009). It is up to the management team to ensure that the bringing together of different corporate cultures is done in a way that is appropriate to the larger organisation. It is also important that the whole organisation recognises the value that the other culture, although potentially different, can bring.

John Hooker²² highlights that in Western culture it is recognised that there is a tendency to try and encourage and expect other cultures to adopt Western ideals, philosophies and traits; but this often has negative consequences (Hooker, 2007). One only needs to look back at colonial British states to see evidence of that. Global orders are now being built on regions' own indigenous cultural traits, using the cultural differences as a business advantage. Hooker identifies examples and how they have used their inherent culture to their own advantage:

'Japanese social discipline brought about a revolution in efficient and high-quality manufacturing. Indian intellectual rigor is the basis for its world-class information technology. Korean loyalty to superiors helped create an economic success story that rivals any in the world. Cantonese entrepreneurship is one of the engines driving Chinese economic growth.' (Hooker, 2007)

²² John Hooker is a Professor of Business Ethics and Social Responsibility and Professor of Operations Research at Carnegie Mellon University and has published extensively on optimisation methods for business.

Global business is embracing the inherent cultural advantages of different nations; this has been facilitated through our global digital culture. Chris Horton, a Content Creator and Digital Strategist for Minneapolis-based Integrated Marketing Agency SyneCore Tech, describes digital culture as:

'It transcends geographical proximity; it knows no physical boundaries; it recognizes no socio-economic, racial or ethnic hierarchies or divisions. Rather, the digital culture is a virtual culture open to anyone with access to a computer device and an internet connection.' (Horton, 2013).

The digital culture allows for the sharing of ideas and increased communication between different regional groups within an organisation through email, video conferencing, telecommunications and digital file transfer.

Western organisations still have a dominance of design houses in the West developing solutions for the rest of the world. There are some organisations that have set up hubs in other countries, NCR included. The hubs often utilise the inherent cultural advantages of that country, for example, India as a hub for software development. Design groups have to be flexible and innovative to develop solutions that work on a local level and globally, understand the core cultural differences, understand what makes a product or service successful in a particular region and understand what the real needs of the people of that region are.

The next section *Design in a Corporate Culture* will describe the role of design within a corporate culture and its evolution from a superficial application of industrial design to its strategic use within an organisation to provide sensitive, considered solutions that satisfy consumers' and market needs. The chapter discusses that if design is to be used as a strategic tool that can be a differentiator in the market then it has to be fostered and communicated strongly from the top of the organisation. Some organisations are reluctant to embed design at the core of their business, for various reasons.

3.2 Design in a Corporate Culture

Good corporate design provides a cohesive message and philosophy through the products, software interactions and marketing collateral and sales material. As

Bernhard E. Bürdek²³ states it ‘includes all measures aimed at shaping a company’s image at the material level’ (Bürdek, 2005. p349). Corporate design is significantly more than the logo design; the image of the corporation is embodied through the tone of voice it creates via the hardware and software solutions it releases. This is a very difficult exercise as there are many influencing factors, especially in a global organisation. These challenges include global resource and supply chains. For example, the paint applied to one product element in one part of the world has to match the paint applied in another, as when the parts are assembled in a different location then there can be no discrepancies. Another issue is when development teams work on a single project from different cultures and time zones with different priorities and aesthetic styles. The product or interface must look harmonious in its style and follow the same corporate design strategy (Forty, 1986. p223).

Understanding how design is and can be used within a corporation can be difficult to articulate, as there are many definitions of design; this leads to ambiguity in how it has been used and is recognised within an organisation. There are many descriptions of design as it is approached from different angles, whether from an academic, corporate, artistic or technical viewpoint (Bürdek, 2005. p15; Jones, 1980; Thompson, 1996). What is generally acknowledged in the variety of descriptions is that design refers to the process and the outcomes as well as to the tangible and the intangible. The outcomes of design are often a tangible product or intangible idea or concept.

The ambiguity of the definition of design amongst academic and industry professionals does lead design to often be unrecognised or overshadowed by other departments or activities. Design often goes unreported in an organisation, as there is no clear definition of what it is, and is done by untrained ‘designers’ within the organisation. Design developments may be conducted by or have strong engagement with marketing, project management or production teams; Gorb and Dumas (1987) call this ‘*silent design*’. What this illustrates is that the lack of structure around design recording and reporting means that the value of the role can be lost and underestimated (see Figure 3.0).

Although Gorb’s and Dumas’s research took place almost 30 years ago, it is relevant to highlight that the issue of silent design is still being seen today, as illustrated in *Section 2.2 Role of Design in NCR* through Cx Design’s exclusion from the PLM process. Since

²³ Bernhard E. Bürdek is a Professor at the Academy of Art and Design in Offenbach am Main (Germany) and an author. He heads the design office Vision & Gestalt.

Gorb's and Dunas's research there has been a greater drive and awareness to integrate a design-led culture into business in many sectors (Brown, 2009; Verganti, 2009). Yet this has been with limited success, integrating design at a strategic level in an organisation.

'Despite efforts to exemplify successful cases of businesses employing design, research has identified that design in business still struggles to be integrated within organisational processes: predominantly, design plays a role at operational level in developing artefacts such as product development, packaging, advertising and communications.' (Lee and Evans, 2012. p655)

It is recognised that organisations in the manufacturing industries regard design as an integral part of their business while those in the more service-orientated industries (discussed in Section 3.3) believe design plays, or at least is perceived to play, a less significant role (Tether, 2005. p3). As Professor Bruce Tether²⁴ and the Design Council have identified, this is most likely because design tends to be associated with the production of goods, which the service industries generally do not do. Manufacturing industries are focused on the production of goods and engage in a global market. The strength of low-cost regions, China and India, for example, means that many Western manufacturers have to compete on quality and innovation rather than price. This leads them to use design to their competitive advantage.

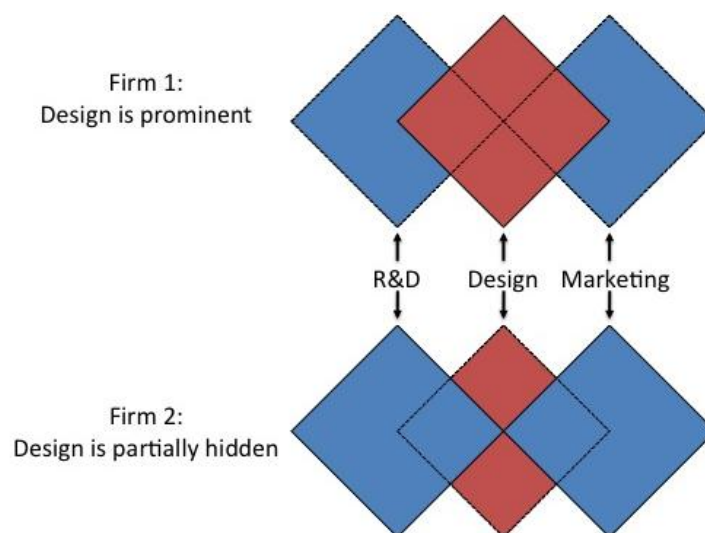


Figure 3.0: The Importance of Design - A Matter of Perspective (Tether, 2005)

²⁴ Bruce Tether is Professor of Innovation Management and Strategy at the University of Manchester. He was also a Research Director with Design London. Design London offers teaching, research, a business incubation unit, an Innovation Technology Centre and a program of industry services and executive education called 'Design Connection'.

When design is recognised and harnessed correctly within an organisation it can have a powerful positive effect. The Danish Design Centre (Denmark. National Agency for Enterprise and Housing, 2003) has identified different levels in which an organisation adopts design. They have identified four levels in what they call the Design Ladder, beginning at the top of the Design Ladder and working down:

'Step No. 4: Design as innovation. *The designer collaborates with the owner/management in adopting an innovative approach to all – or substantial parts – of the business foundation. The design process combined with the company vision and future role in the value chain are important elements.'*

'Step No. 3: Design as process. *Design is not a finite part of a process but a work method adopted very early in product development. The design solution is adapted to the task and focused on the end user and requires a multidisciplinary approach, e.g. involving process technicians, material technologists, marketing and organisational people.'*

'Step No. 2: Design as styling. *Design is perceived as a final aesthetic finish of a product. In some cases, professional designers may perform the task, but generally other professions are involved.'*

'Step No. 1: Design is an inconspicuous part of, for instance, product development and performed by members of staff, who are not design professionals. Design solutions are based on the perception of functionality and aesthetics shared by the people involved. The points of view of end users play very little or no part at all.'

The studies conducted by the Danish Design Centre identify design as having an influence over increased turnover, job creation and greater exports; they have identified that *'The higher a company is placed on the Design Ladder, the better its gross performance'* (Ramlau, 2004. p50). The authors of the study conclude that investment and engagement in design whether through internal design groups or external consultancies correlates to the economic success of the company which, they argue, benefits society as a whole. The authors state that the higher an organisation is placed on the Design Ladder the greater the economic benefits.

The conclusions of the survey do not explain any other influencing factors in the success of the organisations, therefore, they may seem rather sweeping statements. The general point, however, is that the more an organisation invests in new products, innovations, and services, if correctly invested, they would see a return on that investment and, therefore, increased revenue.

How the role of design within business has evolved is discussed further in the following section. As consumers' expectations of service delivery increase it has meant that design has to be used to understand the holistic experience of every aspect of the consumer interaction, from the interaction on a mobile device to customer support. For a service or product to be successful every aspect of the ecosystem²⁵ has to be understood and considered carefully.

3.3 Service Design and the Consumer Experience

Design within organisations has evolved to go beyond the production of a tangible product. Design is now considered to be the tool to understand, encapsulate and evolve the consumer's experience of the intangible and tangible offerings from an organisation. There is a growing trend towards service design and the focus on the consumer's experience as the consumer plays a more dominant role in the location, time and way a service is delivered.

As with the general definition of design, the definition of service design is still under debate (Goldstein et al., 2002; Holmlid, 2009; Stickdorn and Schneider, 2010). The general consensus is that service design is a multidisciplinary approach that combines methods and tools from various design disciplines with a focus on the overall experience of a service or design solution, which is no different to good product development. The main aspect of service design is to investigate and understand customer needs and motivations, which is perhaps where service design practitioners are taking a lead. It is perhaps the role of the graphic communication element of service design that differentiates it from other forms of design using common transferable tools. As Stickdorn and Schneider state '*It is a new way of thinking as opposed to a new stand-alone academic discipline*' (2010. p29).

²⁵ Parts of a service or product that make up the ecosystem are the point-of-sale interaction, the out-of-the-box-experience, consideration of the context of use and the consumer touch-points in a service. Relating back to NCR's 'One Design', it is the consideration of the holistic experience.

The insights drawn from the investigation and understanding of consumers' needs can then be used to facilitate change in an existing service, or generate new services the purpose being that the solutions are relevant, efficient, useful and desirable; ultimately, what people want. Stickdorn and Schneider (2010) recognise that service designers come from a variety of backgrounds and utilise the variety of tools available. It is perhaps the all-inclusive nature of service design that makes it so difficult to determine a common language and description.

This is particularly relevant today as such a large amount of the UK economy is dominated by service-related industries. According to a recent Office of National Statistics report, service industries account for around 78% of UK Gross Domestic Product (GDP) (Great Britain. Office for National Statistics, 2013). While the service industries are generally more locally influenced and focused, in comparison to manufacturing sectors, they still have to be able to compete in the global market²⁶. Consumers' expectations of service is growing as they become more educated in service potential (increased Internet use and consumer travel), influenced by immersive consumer product interactions (touch screen technologies, mobile phones and tablet computers) and look for increased value for money due to the global down turn.

Many of the methods used within the service design sector are part of the designer's tool kit; these are: *observation* and recording, through digital ethnographic techniques; *co-design with consumers*, design workshops, brainstorming, idea jams; *prototyping*, service blueprinting, story boarding, model making; *testing*, experience prototyping, usability testing; *implementation*, story boarding, service specifications, service blueprint. (Stickdorn and Schneider, 2010)

The tools mentioned above are being applied across various industries to try and ensure that the service industries can compete locally and internationally and that they fulfil consumers' expectations of service. The ubiquitousness of mobile technologies and the Internet has changed the way consumers can interact with organisations. Previously, it was the organisation that dictated to the consumer when, where and how any service interactions would take place. This power shift has now transferred to the consumer

²⁶ An example of the globalisation of services is online shopping sites such as Amazon or iTunes where consumers can view and compare prices and service delivery with other retailers offering the same digital or physical content. Another example is air travel, the price structure and level of service is competed for on a global scale.

(Bruno, 2009; King, 2010). With the consumer now having greater control of the mode of service delivery and with an increased expectation on the quality of that service it means that organisations have to ensure that service offerings are multi-channel and seamlessly connected.

With the control of the service delivery now in the hands of the consumer, companies have to compete at the experience level. Organisations use service design methods to understand and co-create services and touch points that engage with the consumer on some level, whether that is physical or emotional. As products become more and more commoditised, companies are looking holistically at their whole service offering to understand how the experience of the whole interaction can be one that the consumer will want to return to. A good example of this is Apple's iPod and iTunes service (Apple Inc, 2013; Buxton, 2007; Moggridge, 2007) where the whole ecosystem has been systematically and holistically considered.

Designing for an individual's experience is a complex and iterative process. Every individual interacting with a service will experience it in a way personal to them. An individual carries with them personal feelings, experiences, memories and emotions that they take into the service (McCarthy and Wright, 2004; 2010). It is through service design principles of user-centred focus and co-design that the experience can be tailored to the individual and personal needs of the target customer. This applies to the customisation of the service by the consumer as well as adapting to niche markets or different market segments.

Understanding and then communicating the value of the experience of a service has become an important part of business (King, 2010. p16; Kumar, 2011. p3). Retailers have begun to create stores that are often focused more on the experiences they create over the amount of products they sell. They use the specialist stores to reinforce the brand image they wish to create which in turn drives sales through other outlets.

Niketown is a good example of the role of the experience in a retail environment. The experiences they create within the stores are designed to create an experience that draws on celebrity culture from dance, TV, music and sport, performance, style and recreation. This is done through the visual spectacle, architectural layout of the retail space and a collective participation in the environment created. As Peñaloza (1998) points out, this multi-sensory approach to retail experiences creates '*Spectacular*

consumption behavior' (p337). Brands such as the Hard Rock Café and, famously, Disney sell an experience. Disney pioneered the staged retail experience through their theme parks where customers are considered as guests within a performance.

Pine and Gilmore (1998) see the experience as a distinct economic offering. They state that companies have recognised that consumers desire experiences and are responding to this. They see this response as a distinct next step in '*the progression of economic value*' (1998. p97) as they believe that products and services have become commoditised and the new area of differentiation is through the experience offering. Figure 3.1 illustrates the Pine and Gilmore model of economic value and how companies can add monetary value through differentiated experiences.

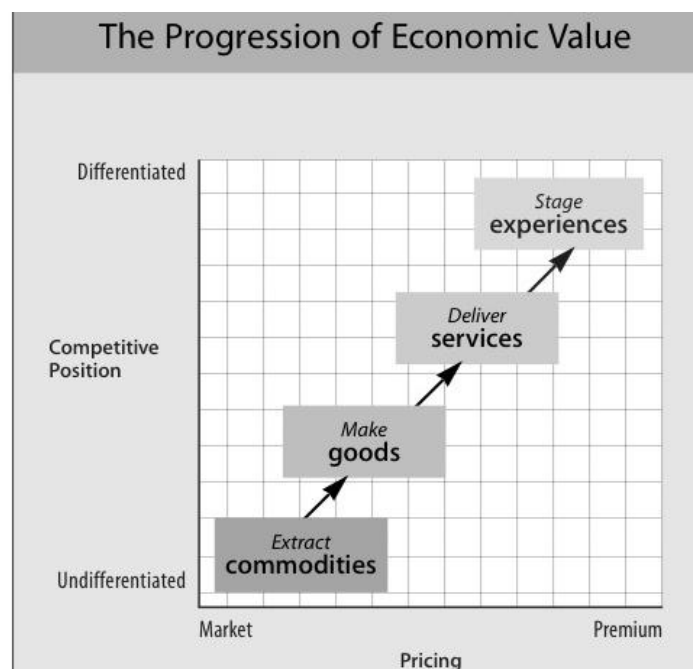


Figure 3.1: The Progression of Economic Value as described by: (Pine and Gilmore, 1998)

Counter to Pine’s and Gilmore’s claims and perhaps over simplified description of staged experiences²⁷ being a distinct next step, Holbrook states that he has:

‘laboured mightily to convince the world that all products involve goods that perform services to provide consumption experiences.....I believe that every type of consumption event provides some form of experience(s)’. (Holbrook, 2000. p180)

²⁷ Considering a service delivery as a set of ‘staged experiences’ it is understood that one point of a service delivery experience is part of a larger experience. An example is self-service airline check-in: that particular touch-point in the service, or staged experience, is just part of the whole experience of air travel.

The author would agree with Holbrook in that consumers associate an experience with all goods and services, whether good or bad and that the experience cannot be separated from the interaction. Ensuring that staged experiences command higher value relates back to good holistic design of the whole service delivery through a user-centred design approach.

Goods and service suppliers have long understood the need to understand the experience delivery (Holbrook, 2000; Watson, 1963). Also, as Holbrook states, the consumer has not drastically changed; they have always valued '*consumption experiences*' (2000. p181). It is, fundamentally, companies' understanding of the consumer that has developed. Marketing and management organisations are widening their focus from the brand to an understanding of the experience of the brand.

The level of consumer immersion has to be designed appropriate to the consumers' expectations, the task and the context. Morrison and Fukasawa (2007) suggest products can aim to be '*super normal*'. They believe they can be designed '*to undercut all the excesses and bold, brash statements recognised as design*' (2007. p20). The author suggests that consumer transaction technologies sit close to this space, attempting to find the balance between immersion and the ordinary, stimulating and nothing special - never bad. Yet, in order to do this the interaction must adapt to what consumers now understand as 'normal'.

In order to understand consumers and enable them to become a valued part of the design process and business strategy some organisations are going to a co-creation model. The next section investigates this approach of consumer integration and argues that it can lead to increased customer loyalty. The approach is being led and adopted by business and marketing groups.

3.4 Co-creation and Corporate Culture

There has been the recognition in some business sectors and by some corporations that co-creation reduces financial risk and allows for a greater chance that the product or service will be successful and the experience is more considered. C.K. Prahalad²⁸ (2010)

²⁸ C.K. Prahalad was a distinguished author and academic, having been elected as the most influential living management thinker in 2007 and 2009 by Thinkers 50, compiled by *The Times of London* and Suntop Media. He sat on the board of the NCR Corporation until his death in 2010. NCR now has an annual award named in honour of its former board member, given for the design of technology solutions that promise quantum improvements in customer value.

argues that for businesses that adopt a co-creation model it would reduce the investment needed because more share the investment, believing that it reduces risk as more key players develop and invest in a solution. He goes on to state that *'It also requires a new respect for consumers as co-creators of solutions and not just passive recipients of a product or service.'* (Prahalad, 2010. p15)

This *'new respect'* often requires a change of mind-set within the organisation and an analysis of the current systems and tools in place for consumer engagement and implementation.

Frank T Piller²⁹, who has written extensively on mass customisation, sees co-creation as *'a company–customer interaction (social exchange) and adaptation for the purpose of attaining added value for both the supplier and the customer'*. (Piller et al., 2004. p437)

Piller writes about co-creation from a business perspective, investigating companies that apply this approach and use modern technologies, such as the Internet, to allow it to happen efficiently. He recognises that for co-creation to work effectively the correct background systems need to be put in place to keep operational costs to a minimum. Piller categorises the cost-saving potentials as *'decoupling and postponement'*, *'access to sticky information and generation of customer knowledge'* and *'efficient utilization of the customer base'*.

These points are expanded upon:

'(1) By decoupling the value chain into an order-specific and a customer-neutral part, cost-savings arise from the postponement of activities until an order is placed. By doing so, a firm wins certainty and prevents costs of misplacement of activities due to imprecise planning information.'

C.K. Prahalad's book *'The fortune at the bottom of the pyramid: eradicating poverty through profits'* has been of particular relevance to this thesis. The *'pyramid'* refers to an economic pyramid where the distribution of wealth and the capacity to generate income is illustrated with the wealthy (small percentage) at the top and poor at the bottom (large percentage). He states that more than 4 billion people live at the bottom of the pyramid on less than \$2 per day.

²⁹ Frank T Piller has headed the Technology and Innovation Management Group at RWTH Aachen University since 2007. Earlier, he worked at the MIT Sloan School of Management and was an Assistant Professor of Management at the TUM Business School (1999-2004). He is of relevance to this thesis as he has studied and advised a range of Fortune 500 companies and bridges academic research with corporate practice.

'(2) By integrating the customer into value creation, a firm gets access to so-called 'sticky information' (Hippel, 1994). The aggregation of this customer information to more precise market knowledge increases the efficiency of market research and product development activities.

'(3) By using the course of customization to increase switching costs for the customer, a firm builds stable relationships with its clients, allowing a better utilization of its customer base ('re-use' of existing customers for additional sales). Thus, costs for marketing activities and customer acquisition can decrease.' (Piller et al., 2004. p439-440)

The points outlined above illustrate the belief that integrating the consumer into the design and manufacturing process through co-creation can lead to increased customer loyalty. Co-creation is applied in all market sectors from the bottom of the pyramid to the top (Prahalad, 2012, 2010). The Indian prosthetic limb manufacturer Jaipur Foot is an example of a company engaging in co-creation and development with its customers at the bottom of the pyramid. They work closely, both in terms of communication and geographically, with patients to understand their needs and produce a solution that is most suitable and cost effective for them³⁰. At the top of the pyramid, Nike, through its co-brand NikeiD, are allowing consumers to influence the design of trainers by introducing the ability to colour customise.

As illustrated throughout the chapter, the role of design in a corporate culture has and will continue to evolve. The evolution of design mirrors that of the relationship between business and consumers. As the role of design evolves it is necessary to understand how design can be used strategically within an organisation. The strategic use of design has the potential to inform and direct corporate product and service strategy; the following section will discuss this in more detail.

3.5 Value of Design in Organisations and the Role of Design Strategy

This section will explore the value of design in business and how it can be applied within the strategic development of an organisation. The section illustrates the potential for design groups and design thinking to be integrated with and impact on business strategy. This approach is one that iteratively integrates design in the strategy building process through design research that involves consumer engagement at various levels.

³⁰ Jaipur Foot is discussed in greater detail in *Chapter 5: Case Examples in Design in Socially Led Innovation*

Design strategy in the context of this thesis is concerned with the interplay between design and business strategy. Using design in this way allows the corporation to understand the most appropriate direction in terms of innovation and how this can be achieved.

Designers have often struggled to communicate the value of the intangible aspects of their work, much of which can be overshadowed by other departments, as highlighted previously in *Section 3.2 Design in a Corporate Culture* (Gorb and Dumas, 1987; Tether, 2005). During an economic downturn and subsequent recovery it is increasingly important for designers and internal design groups to be able to state their worth. Organisations such as the Design Council state that designers need to be able to state their worth to the organisation, which in turn will increase their credibility as a service. Yet, according to research conducted by the Design Council, as much as 69% of companies surveyed did not measure their return on investment (Design Council, 2008a).

With design being an industry that often underestimates its value and is commonly overshadowed by other departments then it is perhaps unsurprising that the return on investment (ROI) goes unmeasured. One of the critical factors in its oversight is that it is difficult to do. Putting a value on the intangible aspects of the success of a product or service is not an exact science as there are so many influencing factors and departments that contribute to the success. In order to effectively measure the ROI of design the Design Council advises that there are clear definitions of 'return' and 'investment' at the onset of the design process (Design Council, 2009). Karen Donoghue, founder and principal of HumanLogic, a strategic user-experience firm states '*The measure of success depends on the intended goal.*' (2002. pxii)

This can be challenging when different groups within a corporation have different measures for success. Donoghue associates the usability of a product, service or website to profitability, noting the disconnection between business success measures and end users' measures (Donoghue, 2002. p39). The measures for business success are typically revenue and retention while for end users these are ease of use in completing transactions and satisfying goals, and a solution to their frustrations (in an online context). Donoghue calls for alignment in what constitutes success for consumers to be the same as what constitutes success for business.

Integrated with understanding the ROI of design is the development of a robust design strategy. Design strategy as a discipline aims to establish the overall direction a company should take and how it should get there. As part of that process design strategy determines how and where a company should innovate in the short, medium and long terms. Tim Brown, CEO and President of IDEO, refers to design strategy as ‘*design thinking as a systemic approach to innovation*’ (2009. p157). Brown believes that the ‘*human-centered, desirability-based approach*’ (2009. p159) is well suited to strategic innovation derived from a design thinking strategy, as opposed to a strategic innovation focused purely on technology.

There are those like Verganti (2009. p48) and Norman (2010. p38) who believe that strategic innovation does not come through user engagement but instead is driven by technological developments and the vision of the CEO. While this may be true in some cases, Verganti sites Apple and Alessi as examples, there remains a strong belief by many that consumers should be engaged and integrated as part of an organisation’s strategic design process (Brown, 2009; Chhatpar, 2008; Cruickshank and Evans, 2011; Koskinen et al., 2011; Kumar, 2011; Marzano, 2005).

There are an ever-increasing number of strategies being employed by companies to allow them to use design and innovation to understand their long-term goals and direction. Each of the strategies has their own strengths and weaknesses; summarised in Table 3, two of the strategies will then be discussed in greater detail.

Reference	Title	Description	Strengths	Weaknesses
(Johnson et al., 2008)	Reinventing Your Business Model	Understand the Customer Value Proposition and how key resources and process will allow the company to satisfy that in a profitable way.	Systematically identifies the constituent parts of their proposed strategy	Consumer engagement is not highlighted in identifying the Customer Value Proposition.
(Chhatpar, 2008)	Analytic Enhancements To Strategic Decision Making	The business case is seen as an iterative process, with design research and user validation feeding into it.	Design research at the heart of the decision making process of the corporation.	A broader range of design research methods could be used over the few highlighted in the model
(Kumar, 2013)	Design Innovation	A cyclic and iterative building innovation around	Engages a range of methods to be	The elements of the model cannot be

	Process	experiences, thinking in systems, cultivating an innovation culture and adopting an innovation process.	used within the process.	conducted in parallel this would be more suitable in a corporate environment.
(Weiss, 2002)	Developing Tangible Strategies	A framework that combines expertise in human, technical and business factors.	Using design as an enabler as a result of integrated capabilities.	Focused on the high level consultants perspective so therefore does not illustrate how it would integrate into a global corporation.
(Jacoby and Rodriguez, 2007)	Innovation, Growth, and Getting To Where you want to Go	A 'ways to grow' model that helps managers understand their current position and evaluate the next steps.	Puts an understanding of the human need at the beginning of the process.	A high level model that does not go into the details of the practicalities of integrating it into a corporation.

Table 3: Strategic Decision Making Strategies

Vijay Kumar³¹ (2013. p1) states that despite the fact there is so much attention on innovation it is surprising that companies are not better at it. The lack of a suitable process means that it is difficult for organisations to know how to make innovation a practice integral to the company that is reliable and repeatable. Kumar proposes a structured model for innovation, The Design Innovation Process (Kumar, 2013. p8). The model proposes a cyclic and iterative process that builds on what Kumar believes are the core principles of successful innovation – building innovations around experiences, thinking in systems, cultivating an innovation culture and adopting an innovation process.

³¹ Vijay Kumar is the author of 101 Design Methods: A structured Approach for Driving Innovation in Your Organisation. He is a Professor at the IIT Institute of Design and leads the Strategic Design Planning and the Design Methods programs. He is also a consultant, coach and advisor to global corporations and organisations.



Figure 3.2: Kumar's Design Innovation Process (Kumar, 2013. p8).

Kumar's Design Innovation Process engages in a range of methods throughout the innovation process yet it does not propose these elements are done in parallel. Conducting some of the phases in parallel by different elements of the organisation would help to make the design research and innovation process more efficient in terms of time and cost. A more efficient process would be more appealing in the context of a global organisation where different teams or stakeholders can be engaged throughout. Supporting this, Hargadon³² states in relation to linking learning with innovation in organisations, *"For new ventures to succeed, entrepreneurs must also attend to building new ties that link others to these ventures for a discussion of the differential advantages of bridging and building network ties"*. (Hargadon, 2002. p45)

The next section will discuss a process that proposes such an approach.

3.6 Review of Chhatpar's Strategic Design Approach

Ravi Chhatpar illustrates two models of the role played by strategic decision making in business (Chhatpar, 2008)(see Figure 3.3). The first shows what is called a 'traditional

³² Andrew B. Hargadon is a Professor at the University of California, Davis. His research focuses on the effective management of innovation and entrepreneurship, particularly in the development and commercialisation of sustainable technologies.

approach' taken by many organisations, which is a sequential track where the business case is the core tool used to quantify the impact of the strategic decisions made. Chhatpar argues that this approach is too slow, particularly in today's dynamic consumer technology market. Chhatpar states that by the time a business case has been decided upon, the development of products and services will be based on decisions and assumptions that are months old. For a company to compete it has to be more dynamic and allow design to influence the business case.

The 'new approach', a strategy that Chhatpar says '*enhances the business case*' (p.17), illustrates this. The business case is seen as an iterative process, with design research and user validation feeding into it. This approach moves design beyond being used as a tool placed at the end of the strategic development process to make it reality. The core to the new approach is that through the integration of design research methods into the strategic development process it allows for a real-world understanding.

Through early basic prototyping, the designer can identify usability issues, missing features and user preferences. This can be built upon through participatory design where the user becomes an integral part of the design process. From a design team's perspective it allows them to understand the product usage in context. The purpose of this process is to feed into the business case development and continually evaluate its assumptions in the real world. The involvement of design within the strategic development of an organisation should allow for a more accurate business case as the assumptions made are more timely and relate to identified and tested user requirements and expectations.

Advocates of this approach agree that design as a discipline has evolved; it has evolved beyond creating objects for consumption. The belief is that design and a strategic design thinking approach can, and should, be used to create products, services and interfaces of value (Brown, 2009, 2008; Norman, 2010, 2007; Papanek, 1984; Thackara, 2005), value in terms of a real-world understanding of consumer needs, wants and expectations. Incorporating this approach into an organisation can be achieved by integration and collaboration throughout the organisation, through design leadership and design champions at the strategic and project level (Lee and Evans, 2012. p659).

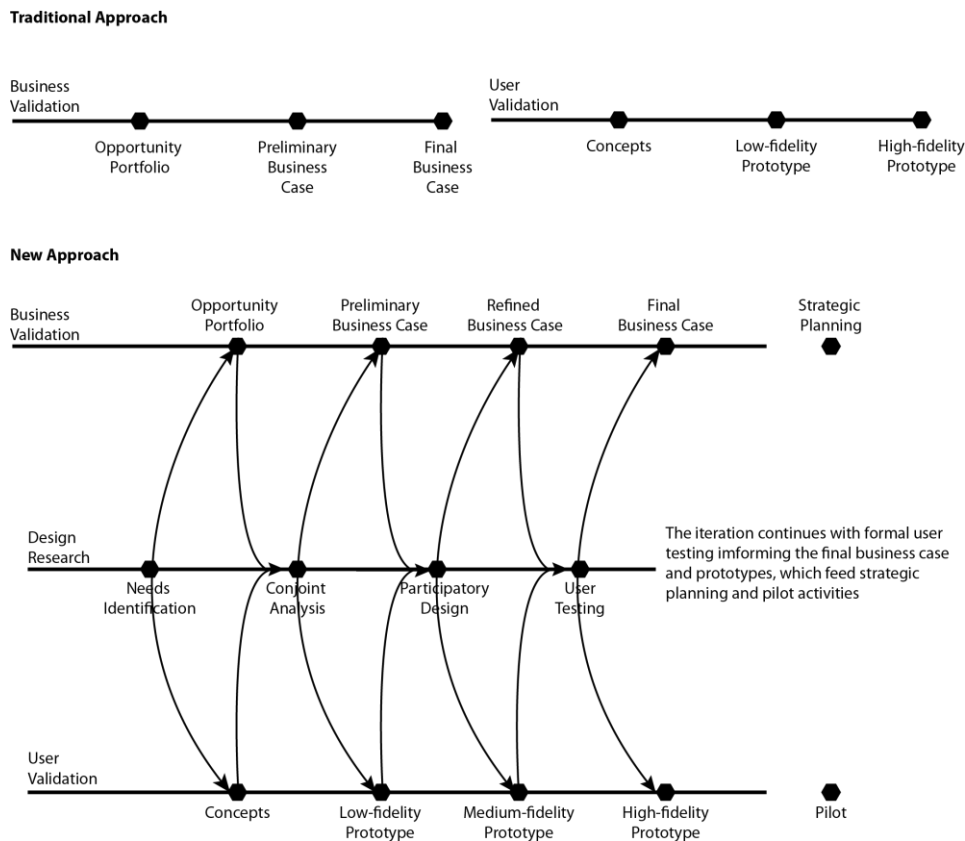


Figure 3.3: Chhatpar's Strategic Decision-Making Process: A Traditional And New Approach (Chhatpar, 2008. p19)

While Chhatpar's strategic decision-making process is valuable in terms of the integration of strategic business vision with user validation, there are opportunities for refinement. The forthcoming two chapters on Participatory Action Research and Case Studies in Socially-Led Innovation highlight the value of participant integration in the strategic design process. Chhatpar's process illustrated above does include participatory design but this could be introduced earlier in the process to ensure validation and cooperation is included in the early stages.

Chhatpar has called out conjoint analysis as a distinct area of design research activity. Conjoint analysis is popular in marketing and social sciences as it is an exercise where participants attribute preferences or values to a set of selected choices (Ramírez-Hurtado, 2010). This part of the process could form part of a broader validation, as it is only one of the methods that could be employed. The specific areas of the process will be investigated further in *Section 13.2 Modifying Chhatpar's approach to strategic decision making*. This process is of interest as it strategically integrates design research in parallel with user validation and business validation. Working the three areas in parallel with close integration should make the process more efficient and effective.

3.7 Conclusions

The chapter has demonstrated how the corporate environment and its culture are influenced by many factors such as, location, acquisitions and strong leadership. The corporate ethos of an organisation is difficult to change without the employees buying into its ideals but this can only be delivered through a leadership team that can communicate them effectively. The globalisation of business has meant that it is increasingly difficult for an organisation to instil the same corporate ethos across multiple regions. The author argues, in *Section 3.1 Corporate Culture*, that multinational corporations need to have a deep understanding of cultural differences, strengths and weaknesses, similarities and diversities, if they are to be successful in that region, from an employee and consumer perspective. In the context of NCR, the global scale of the organisation means that if it is to create a positive corporate culture then it has to have an awareness of cultural nuances between regions, groups and employees.

The demands and continued rise in expectations of the consumer on the product and service delivery of the goods they consume means that design as a role within an organisation is continuing to evolve. Design has to function beyond the usability; the fact a product works well, feels comfortable and is easy to use has rightly become expected by consumers. Designers now need to consider the holistic experience that is delivered to the consumer through a multitude of delivery channels.

This understanding of consumers' expectations can be done at various levels of the design process through co-creation. As Prahalad (2010) suggests, involving the consumer in the design process and allowing them an element of control of the outcome can generate customer loyalty. This approach is being adopted by businesses catering to consumers at the top and bottom of what Prahalad has identified as the economic pyramid.

The evolution of design within a corporate culture has seen the role of design attempt to move into a more strategic position, supporting business strategy development through closer integration and collaboration. This is illustrated through Chhatpar's Strategic Decision-Making process. Table 4 highlights the core reflections of the chapter and their associated subject area and reference.

How a process of designer engagement with consumers through design research and participatory design is followed is explored and discussed in the following chapter, Participatory Action Research.

Subject Area	Core Reflections	Related Research Question	Core Reference
Role of design in a corporate culture.	Other more dominant groups within an organisation, where design is not at core of the company's strategic vision, often overshadow the role of design.	<i>How can design research play a role in the activity of a global technology company?</i>	(Denmark. National Agency for Enterprise and Housing, 2003; Lee and Evans, 2012; Ramlau, 2004; Tether, 2005)
Co-creation in business for mutual benefit.	Corporations can find a new respect for consumers as co-creators of solutions if there is proper engagement. This new respect will bring mutual benefits.	<i>How can design research methods support socially-led innovation in NCR?</i>	(Pralhad, 2012, 2010)
Design research strategy.	Bring different elements of an organisation together through user understanding with design research at its core.	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	(Chhatpar, 2008)
Design-led strategic innovation.	Design-led innovation requires integration and collaboration throughout the organisation through design leadership and design champions at the strategic and project level.	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	(Lee and Evans, 2012)

Table 4: Chapter Reflections

Chapter 4: Participatory Action Research

4.0 Introduction

This chapter reviews established approaches to participatory action based design research, its methodologies and techniques. A definition of the scope and context of this thesis in such a broad area of design research will be provided. The chapter aims to communicate how design research can bridge academic methodological design thinking and the need for multinational corporations to engage with communities of consumers. This in turn shapes the understanding of the potential role of design research in a global organisation.

The core methodology used in the application areas of the thesis can be defined as action research. An understanding of the application of action research and its limitations is undertaken in this chapter. Through action research the author was able to research their immediate context and practice which is described in Section III, Case Studies. This will be used to build an understanding of how participatory design through an action research methodology can be integrated into the design process within a global corporation

The chapter concludes by highlighting the opportunity for participatory action research to be used in the corporate environment for design teams to engage with communities. It is proposed that participatory action research engagements can lead to a better understanding of the needs and requirements of the community in which the organisation's service and product solutions are placed.

4.1 Scope of Thesis

The scope of the thesis is one that aims to demonstrate the application of participatory design and participatory action research in the facilitation of engagement with people, communities and business (see Figure 4.0). Design areas outside the core area identified have been left outside the scope of the thesis in order not to distract or dilute from the main narrative – how corporations can use participatory action research to engage with people and communities in the context of a global technology company. The topics shown 'in' scope support that. This is a similar approach taken by Koskienen (2011. p7) where he maps out the large area currently understood to be under the design research umbrella.

As design and design research is a broad subject area it is important to define the boundaries of this thesis. The research will focus on participatory action based research methodology. With this as its grounding it will bring in the application of practice-based research and participatory design processes and how they apply within a multinational corporation. This will be discussed in greater detail in *Chapter 5: Case Examples in Design in Socially-Led Innovation* through a series of examples. Much of the qualitative methods applied have originated from tools applied in the social sciences such as ethnographic observational techniques. The range of techniques and how they can be applied will be considered.

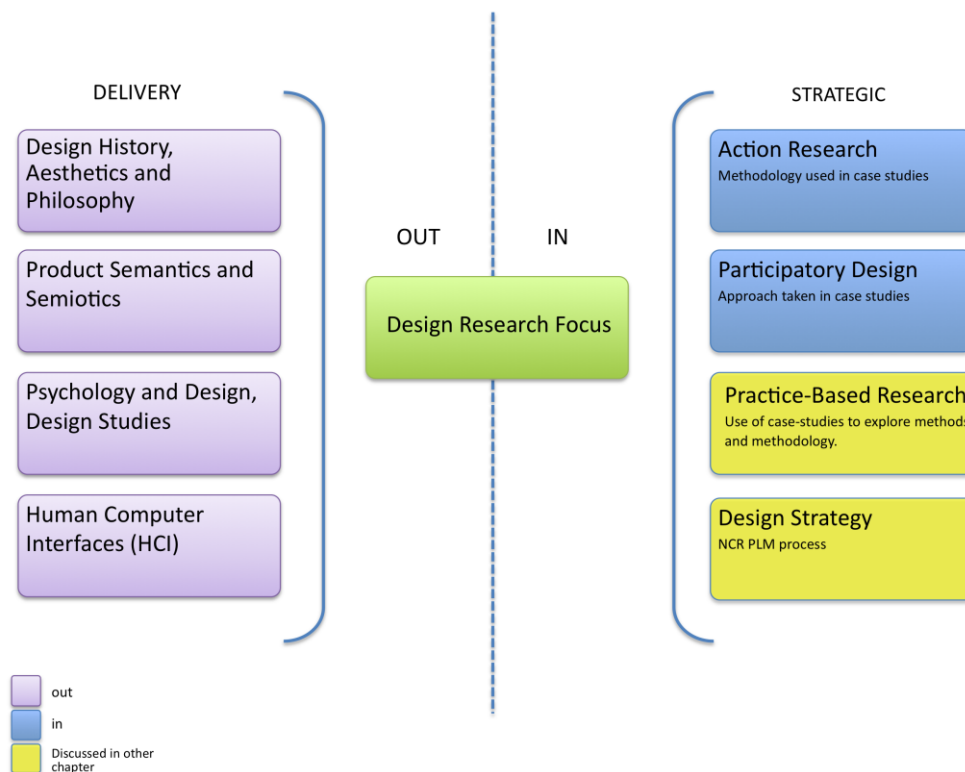


Figure 4.0: Design Research Focus Diagram

Within NCR there can be a tension between what needs to be delivered and strategic decision-making, delivery often becomes the most critical element. The research contained within the thesis is concerned with a refocusing onto the strategic side of the business. The delivery elements illustrated in figure 4.0 show topics that to varying degrees influence the delivery of solutions in the authors day to day practice. This could be through the delivery of a multi-function ATM platform to the design of an interface

moulding on a point-of-sale device. The topics deemed outside the scope of the main thesis, while influencing different aspects of design, are not strongly enough related to participation, communities and industry to be a core focus. Discussions on design are a well-trodden path, some of the topics are touched upon, such as philosophy and psychology, when discussing the fundamentals of action based research. While Bill Gaver's aesthetic, social and cultural interventions (Gaver and Dunne, 1999; Gaver, 2011; Gaver et al., 2010, 2003) and Jodi Forlizzi's research on research through design (Bardzell et al., 2012; Forlizzi et al., 2009) have been of interest and influence they are active in the area of computer science or more specifically Human Computer Interface (HCI). While the themes of HCI are relevant, the thesis does not go into the field as it covers a broad area that would distract from the main focus of participation and action.

4.2 Action Research Methodology

There are different branches of action research, some of which are not directly related to design research. The thesis is concerned with action research where the knowledge acquired is applied in the real world, through participatory engagements. Hilary Bradbury Huang³³ (2010) identifies five major forms of action research.

Action Science: The application of action science is in the professional environment where the intention is to cultivate long-term effectiveness and communication. Chris Argyris defines the approach as a strategy of inward reflection that will allow an organisation to adapt and grow to changing environments and considers the approach as a set of tools (Argyris, 1995). This reflective approach Schön (1983) calls the thoughtful and insightful process of 'reflection-in-action'.

Cooperative Inquiry: The foundations of the methodology are '*based on people examining their own experience and action carefully collaborating with people who share similar concerns and interests*' (Reason, 1996. p226). Heron and Reason describe this as '*research with rather than on people*' (Heron and Reason, 2006) and is a cyclic process of knowledge acquisition, feedback and practice.

Participatory Action Research (PAR): Action research, by its very nature, is participatory. PAR is heavily informed by participatory design movements of the 1960s and 1970s (Atkinson and Hammersley, 1994; McNiff and Whitehead, 2011; Minkler, 2005;

³³ Hilary Bradbury-Huang, PhD., is an Adjunct Professor in the Division of Management at Oregon Health & Science University. She is also editor-in-chief of the Action Research Journal.

Spinuzzi, 2005) as it has a focus on empowering the various stakeholders and making the design process more democratic (Crouch and Pearce, 2012). It is a methodology suited for intervention within communities or groups (IDEO, 2012).

Developmental Action Inquiry: The approach is associated with William Torbert; he links action inquiry with stages of ego development:

'The three questions concern the first-person dynamics of one's own awareness, the second-person dynamics of the immediate group with whom one is interacting, and the third-person dynamics of the larger institutions within which one's action is situated.' (Torbert, 1999. p189)

Living Theory: McNiff and Whitehead (2011. p15) describe this approach as relating to the understanding that theories evolve and develop over time as people's personal perspectives change. It is a process of practise, observing that practise and then reflecting on it (Whitehead and McNiff, 2006. p32). Practitioners who wish to study, evaluate, modify and improve their working practice through reflection can then apply living theory.

The work conducted throughout this research should be associated with action research. The case studies described in Section III adopt a PAR approach while following McNiff's and Whitehead's action-reflection methodology (Figure 4.1). As described above, the key to PAR is where there is collaboration with other participants, individuals or communities and a levelling of traditional hierarchies. Also, the researcher is embedded in the context of the research, an active participating part. This is in contrast to social science researchers and even some active in action research that would take a more distanced observational approach.

While there are different forms of action research, many of the principles are similar and interlinked. McNiff and Whitehead are more associated with action research in relation to education and reflective practice. The principles and definitions, explained below, that McNiff and Whitehead apply are relevant to the author's own iterative and reflective design approach: (McNiff and Whitehead, 2011. p15)

'Improve your understanding' – How can design research methods be applied in the development process of a global technology company?

'Develop your learning' – What participatory design methods are appropriate to be applied in the context of a global corporation?

'Influence others learning' – How could participatory action research activities influence in-house design teams?

The process of action research is cyclic, much like the iterative design process (see Figure 4.1). The process outlined below mirrors the approach taken by the author during the case studies that are described in Section III. The points on the process can be positioned against stages contained in the case studies.

Observation: Identifying the issue or concern. In the case of this particular thesis it was the need for increased consumer engagement by the Cx Design team at the NCR Corporation.

Reflection: Why is this an issue and what can I do about it? In order to design and develop solutions that are truly relevant to communities and consumers the author believes there should be proper engagement and understanding of their needs. Appropriate design methods can be employed and demonstrated to the Cx Design team.

Act: Try it out. The author will demonstrate through case studies the application of design research methods in live situations.

Evaluation: Evaluate progress and make judgments about what is happening. The author will show a critical evaluation of the case studies, their outcomes and impact.

Modify: Modification of ideas and practice. Developing and adapting methods and approaches for consumer engagement and understanding how that can be applied in the corporate context.

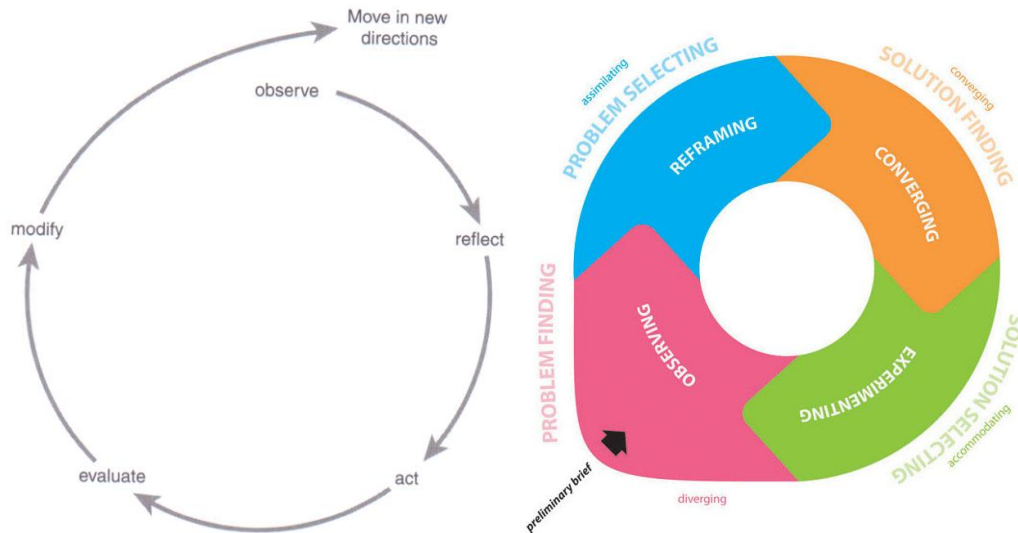


Figure 4.1: Action Research Methodology (McNiff and Whitehead, 2001, p9) and Iterative Design Process Cycle (Beaumont, 2009)

In contrast to scientific methodologies, the researcher may be embedded in the practice and research being undertaken. Action research will inevitably be tainted by personal experience, values and logics and how the research is practiced. Values refers to what a person believes is good and logics refers to how a person thinks. As McNiff and Whitehead state:

'Values, logics and practice are mutually influencing: what we believe in and value influences what we think; what we think influences what we believe in; and values and logics influence, and are influenced by, our practices.' (McNiff and Whitehead, 2009, p8)

McCarthy and Wright emphasise this point by understanding the influences of individual experiences on products and situations:

'...lived, felt experiences as prosaic, open, and unfinalizable, situated in the creativity of action and the dialogicality of meaning making, engaged in the potential of each moment as being responsive to the personal stories of self and others, sensual, emergent, and answerable.' (McCarthy and Wright, 2004, p184)

Therefore, it is critical when conducting action-based research that those influencing factors are made clear in the writing and dissemination of the work.

As with any professional field there is specific terminology used; how it is understood and the questions it raises are important in understanding the context of this thesis. The key terminology is based in philosophical foundations: ontology, epistemology, methodology and social intent (McNiff and Whitehead, 2009; Grix, 2002). Below is an explanation of the terminology and how it relates to this thesis.

Ontology: This is the starting point of research; it refers to the theory of being, and how individuals see themselves. People see themselves in different ways, which will influence the lens in which the research should be viewed. The author's perspective is grounded in 'constructivism' that assumes reality is an output of the human cognitive process and that the social interpretations are produced through social interaction and are in a continual state of evolution (Cassell and Johnson, 2006; Grix, 2002). People understand the world around them through their interactions with people and cultures but this understanding will change as new relationships are formed. This approach is more common with a qualitative research approach (Bryman, 2001).

Epistemology: This refers to the theory of knowledge and how that knowledge has come to be obtained. The author believes that learning can be done through participation and action. This approach is called 'interpretivism' where the researcher must understand the subjective meaning of social action (Bryman, 2001; Grix, 2002).

Methodology: This refers to the theory of how things are done. The author views research as a creative process, one that accepts trial and error and perhaps a certain amount of ambiguity in the results as opposed to a definite solution derived through a fixed set of methods. The author believes that the methods can be adapted to suit the particular context as opposed to rigidly conforming to a predetermined set of methods.

Social Intent: This refers to the research in the broader context within which it will have influence. Action research is inevitably political as it is undertaken within the context of a social situation. The context of this doctoral research has been conducted within the context of a multinational corporation and academia. One of the catalysts for beginning the research was to demonstrate to the Cx Design group the application and value of participatory action research in the design process within the organisation. The research demonstrates to the design research community how the methods can be applied within the context of a global corporation. The thesis also illustrates how such methods can provide solutions that can engage with communities and consumers in a

more socially responsible way, shifting the product development focus from technological solutions to human needs.

Action research methodology is well suited to industry applications as it is a cyclic process of proactive engagement, learning and reflection. While action research as a general methodology has been employed in diverse fields such as nursing, teaching and organisational development, it is the application through participation with communities on which the thesis is focused. Participatory action research will be examined, illustrating how closely it relates to design praxis. Praxis is particularly relevant to this research as the case studies in Section III bridge industry and academia with live industry projects and theoretical reflection.

4.3 Participatory Action Research and Design Praxis

Participatory Action Research (PAR), like all branches of action research, aims to understand, reflect upon and change the world around it. Participation in action research can be implemented on different dimensions at different stages of the process (McNiff and Whitehead, 2009). Where participatory research may differ from other types of action research is in the collaborative form of inquiry with the communities who act as co-researchers/designers in a democratic way. It is a philosophical approach closely related to participatory design principles.

Participatory design originated in Scandinavia in the 1970s and 1980s and was motivated by Socialist movements for the democracy and the empowerment of workers (Spinuzzi, 2005). The UTOPIA project is cited as the first project that produced design approaches and techniques for participatory design (Spinuzzi, 2002). The activity was concerned with the creation of technologies that would allow workers to retain control within the workplace. They had been forced to adopt computer-based systems that were introduced by the management and forced many workers out of work. Since its conception, participatory design has undergone changes, largely in moving away from its Marxist origins, but the principles have remained constant. Spinuzzi states the core principle attempts to:

'...examine the tacit, invisible aspects of human activity; assumes that these aspects can be productively and ethically examined through design partnerships with participants, partnerships in which researcher-designers and participants cooperatively design artifacts, workflow, and work environments; and argues that this partnership must be

conducted iteratively so that researcher-designers and participants can develop and refine their understanding of the activity. The result of the research typically consists of designed artifacts, work arrangements, or work environments'. (Spinuzzi, 2005. p164)

When engaging in participatory design, the designer draws on various research methods such as ethnographic observation, shadowing, interviews, analysis of artefacts and interviews. The iterative use of the methods forms research results that can be co-interpreted and co-designed by the designer and the participants who will ultimately use the designed solution.

Researching through design allows for reflection of one's practice and has become popular with practitioners (Birnie et al., 2011; Hannah and Wingfield, 2010; IDEO, 2012, 2002) and researchers in the field (Gaver et al., 2010; Hoven et al., 2007; Shorter et al., 2013; Zimmerman et al., 2007). PAR is closely associated with praxis, '*the dynamic relationship between thinking and acting, between theory and practice*' (Crouch and Pearce, 2012. p14).

The position of this thesis is that research and design is not an isolated activity, it is done in society, embedded and influenced by the people, communities and by the culture they create. Praxis is relevant to and related to PAR as it exposes the researcher to the interdependencies of the practical, theoretical and ethical issues of research practice (Crouch and Pearce, 2012. p43). These same issues are prevalent when conducting PAR, which focuses on giving the 'powerless' (Coghlan and Brannick, 2009) a voice in the design/research process. It is a process of empowerment that allows them to create their own theories and knowledge.

4.4 Challenges of PAR

There is debate around the academic rigour of the approach as well as what constitutes participation, action and research (Holmlid, 2009; McNiff and Whitehead, 2011, 2009; Melrose, 2001; Spinuzzi, 2005). Debates around the methodological approaches to PAR are welcomed in the field due to its democratic nature.

There are different schools of thought around the role of the researcher and action. McNiff and Whitehead believe that practitioners are able to contribute to the understanding of what they are doing; this is called living theory action research or first-person action research. Others, such as John Elliot (2006, 2004), believe that the

researcher should play an observational role, examining, theorising and reporting on what the practitioners are doing. While the author is working in a different field to McNiff and Whitehead and has approached action research in a participatory manner, the author has applied their methodology in Stage III of the thesis. This methodology was taken as embedding the practitioner in the research subject and reflecting on the impact of that research on the practitioner, and the wider research area was relevant to the author and NCR.

The application of PAR on a local level and the results of which are then applied on a global scale have been questioned (Gustavsen, 2008). The researcher has to be conscious of what methods, insights and theories are applicable on a local and global scale. The author has applied methods in hyperlocal case studies that can be applied across different regions, but the learning from each case study is communicated to be site specific or generally applicable.

Ethical considerations of PAR are similar to any other research activity but can, in some cases, be more complex. PAR understands the 'subjects' are in fact 'participants' in the research activity, key partners in the activity that may be taking place within their familiar environment.

'The synergy that partners seek to achieve through collaboration is more than the mere exchange of resources. By combining the individual perspectives, resources, and skills of the partners, the group creates something new and valuable together – a whole that is greater than the sum of its individual parts.' (Lasker et al., 2001. p184)

Ethical guidelines have been written in some countries to ensure that the rights of the participants are not breached and allow for open dialogue between researcher and participants (Government of Canada, 2007; Minkler, 2005; Stuart, 1998). As PAR is a collaborative process it is necessary for all the stakeholders to understand the project goals and objectives of each party.

The stance of the thesis is that while complete participation in all aspects of the design process would be difficult for a multinational corporation to manage, awareness of the methodology, methods and ethical considerations will only help to benefit the consumers, communities and corporations in the long term.

4.5 Exploring the Fine Line between Co-design, Participatory Design and Co-creation

The author sees little distinction between co-design and participatory design; Sanders supports this view when she states that participatory design ‘was the terminology used until the recent obsession with what is now called co-creation/co-design’ (Sanders and Stappers, 2008. p7).

As stated previously, participatory design has been practiced in Europe for approximately 40 years and had high socialist ideals that over time have been relaxed and the terminology evolved. This has coincided with a shift in how some marketing, design and academic groups view people with regards to the design process. In Figure 4.3 Sanders’ (2005) illustrates this evolution from the 1970s and early 1980s where people were considered to be ‘consumers’. This evolved as the user-centred design approach became more prominent and people came to be referred to as ‘users’. As people began to be considered a valuable part of the design process and it became recognised that they could contribute to the actual designing of solutions, they then began to be seen as ‘participants’ or ‘co-creators’. This comes with an understanding that people (non-designers) have relevant expertise and that a designer’s role is to interpret their needs by working alongside them, as Sanders states, ‘in equal stature’ (2005, p4).

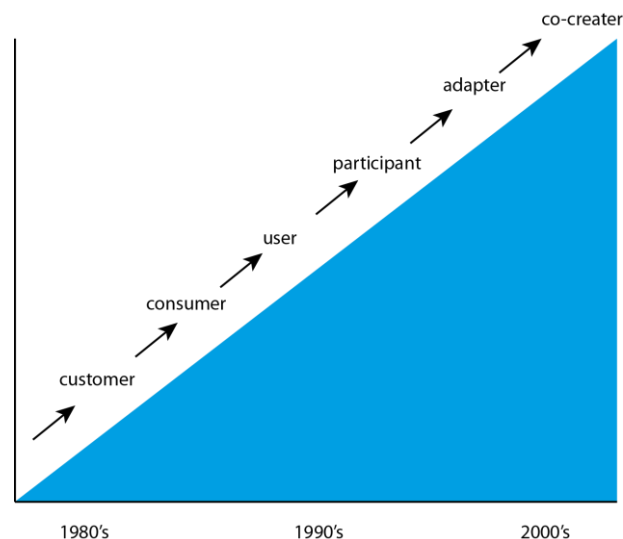


Figure 4.2: Changes In The Way We Think About People (Sanders, 2005)

Sanders goes on to state that the shift in perception from ‘consumers’ to ‘co-creators’ is needed when businesses are becoming more focused on experiences over artefacts. It is

business and marketing that is leading the application of co-creation³⁴. Co-creation is being used at various stages of the design process by businesses keen to engage and understand their target market. These businesses recognise that allowing their 'consumers' to become 'co-creators' can allow them to offer a unique selling point over their competitors.

While there is no real distinction to be made between participatory design and co-design, it is perhaps worth highlighting the difference between user-centred design and co-design. It is the difference between designing something *for* users and designing something *with* users (Robertson and Simonsen, 2012).

The user-centred design approach was prominent in the US from the 1980s (Sanders, 2002) and is still prominent worldwide today in companies concerned with the design of products and services, from software to hardware. The user-centred design approach takes an 'expert' understanding of the user's needs and applies that understanding to the design solution; the user is never an active part of the design team. The process is used in the initial stages to help define the design criteria, through focus groups, questionnaires and iterative design process. It will also be employed at the latter stages to give the designers a better understanding of how the designed solution would work in real-world environments.

Gulliksen et al (2003) state 12 core principles in relation to user-centred system design (UCSD):

- *'User focus – the goals of the activity, the work domain or context of use, the users' goals, tasks and needs should early guide the development.*
- *Active user involvement – representative users should actively participate, early and continuously throughout the entire development process and throughout the system lifecycle.*
- *Evolutionary systems development – the systems development should be both iterative and incremental.*

³⁴ The use of co-creation and experience design in business has been discussed in more detail in *Chapter 3: Strategic Design in a Corporate Culture*.

- *Simple design representations – the design must be represented in such ways that it can be easily understood by users and all other stakeholders.*
- *Prototyping – early and continuously, prototypes should be used to visualize and evaluate ideas and design solutions in cooperation with the end users.*
- *Evaluate use in context – base lined usability goals and design criteria should control the development.*
- *Explicit and conscious design activities – the development process should contain dedicated design activities.*
- *A professional attitude – the development process should be performed by effective multidisciplinary teams.*
- *Usability champion – usability experts should be involved early and continuously throughout the development lifecycle.*
- *Holistic design – all aspects that influence the future use situation should be developed in parallel.*
- *Processes customization – the UCSD process must be specified, adapted and/or implemented locally in each organization.*
- *A user-centered attitude should always be established.'*

While Gulliksen et al state user involvement and active participation throughout the design and lifecycle process this does not go as far as to co-design. They go on to state that participation is through domain experts and with '*actual end-users*' through interviews, observations and evaluation of results. The user relationship with the researcher and/or designer is distanced and observational.

Co-design works '*with*' the participant as a co-creator in the process, using design skills to facilitate conceptual thinking and debate. The participant group is engaged in all steps of the process from ideation to production. The shift from user-centred to co-designed has been through the evolution of design practice from the focus on a product to the

focus on designing for purpose, which requires a more participatory approach to design. Sanders states that *'the roles of the designer and the researcher blur and the user becomes a critical component of the process'* (Sanders, 2002. p2). Interestingly, she sees the shift as due to the fact that there is a growing cynicism about the methods and goals of consumerism, it could be assumed that this cynicism has only increased since the global downturn of 2008. As discussed in previous chapters, users now have greater control and influence over what, how, where and when they get the goods and services they desire. The co-design process is one that embraces this breakdown of the traditional hierarchy's between users and designers.

The Design Council gives a definition of co-design:

- *'A set of tools used by designers to engage non-designers by asking, listening, learning, communicating and creating solutions collaboratively.'*
- *A community centred methodology that designers use to enable people who will be served by a designed outcome to participate in designing solutions to their problems.*
- *A way to design a solution for a community with that community.*
- *The process of designing with people that will use or deliver a product or service.*
- *A partnership between designer, client and the wider community on a design project.*
- *Collaboration on a design project between client, end user, deliverer and designer.*
- *The shift of design power from the client, via the designer, to the end user.*
- *Collective thinking and designing that addresses a community's issues.*
- *Products or services that have been developed by the people who will use them in partnership with a designer.*
- *Democratic design: A designer facilitating outcomes instigated by a community.*

- *Research based design: A designer taking decisions and delivering solutions based on ideas / feedback from a community.'* (Design Council, 2008b).

The core difference between the UCSD points and the co-design points illustrated above is the clear demonstration of the need for communication and integration of the participant community into the design process when engaged in co-design and not being used as a test subject.

The author has communicated design when designing 'for' individuals through the user-centred design process to designing 'with' individuals or participant groups through co-design. The next stage in the evolution is to design 'with' communities. There is an increasing focus on the 'Big Society' and how governments, local councils, business and academics engage with and deliver to communities (Jones et al., 2010). The need to engage and share opinions about policies and projects with communities is often said (Great Britain. Department for Communities and Local Government 2010), but how this participation is done in a meaningful way is not.

There are several large-scale initiatives active in this area such as BESPOKE (Blum-Ross et al., 2011), Design of the Times (DOTT) ("Design Council," 2007) and the Design Council's RED (Design Council, 2004) projects. The specific activities of these groups will be discussed in greater detail in *Chapter 5: Case Examples in Design in Socially-Led Innovation*. Their activity has come about through the recognition that communities are fluid entities, comprising of people with different needs, interests and wants, and have voices that want to and should be heard (Egglestone and Rogers, 2010). Each of the initiatives moves beyond user-centred design to involve the community in each stage of the process, a symbiotic working relationship through communication and engagement.

The BESPOKE project wanted to see how journalism, created and controlled by the community, could be used within a community innovation process. The two-year Digital Economy programme, a funded project, was a partnership between five academic institutions, two local communities and various researchers from journalism, design, computing, craft and social science.

BESPOKE defines a blueprint for community engagement (Blum-Ross et al., 2011), breaking down the process into activities and outcomes :

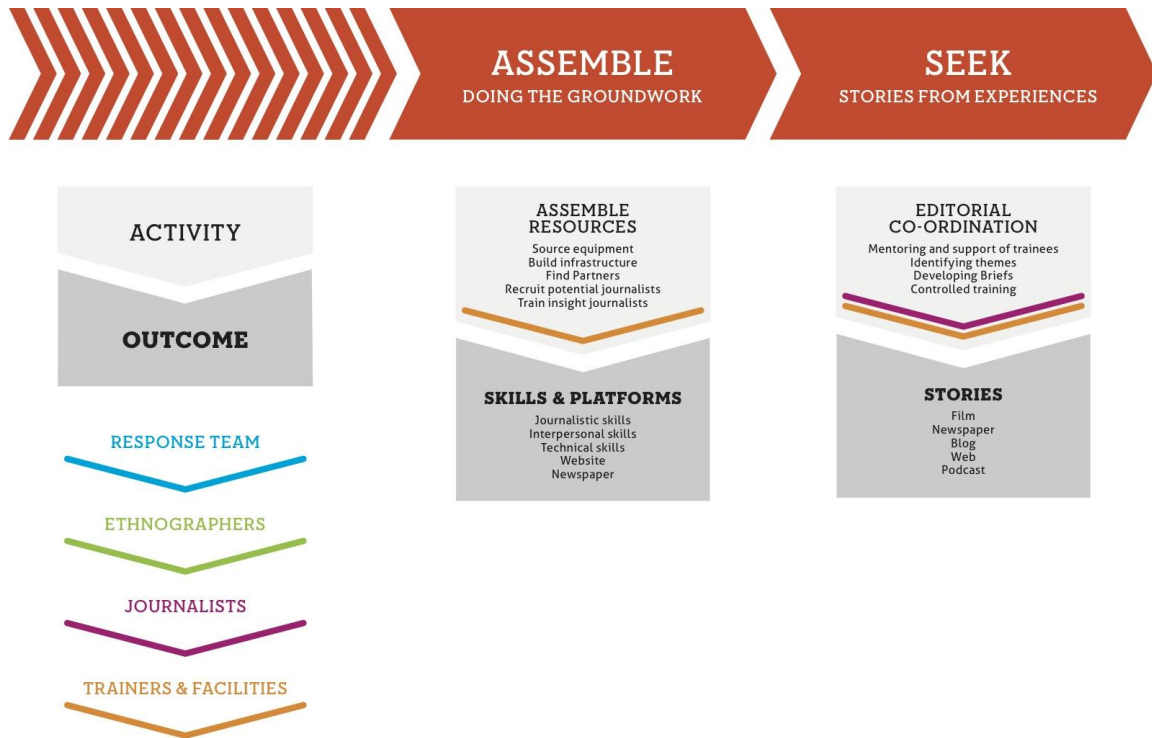
'Assemble – Doing the groundwork

Seek – Stories from experiences

Identify – Insights from stories

Respond – to insights and ideas

Hatch – Responses to community innovation'



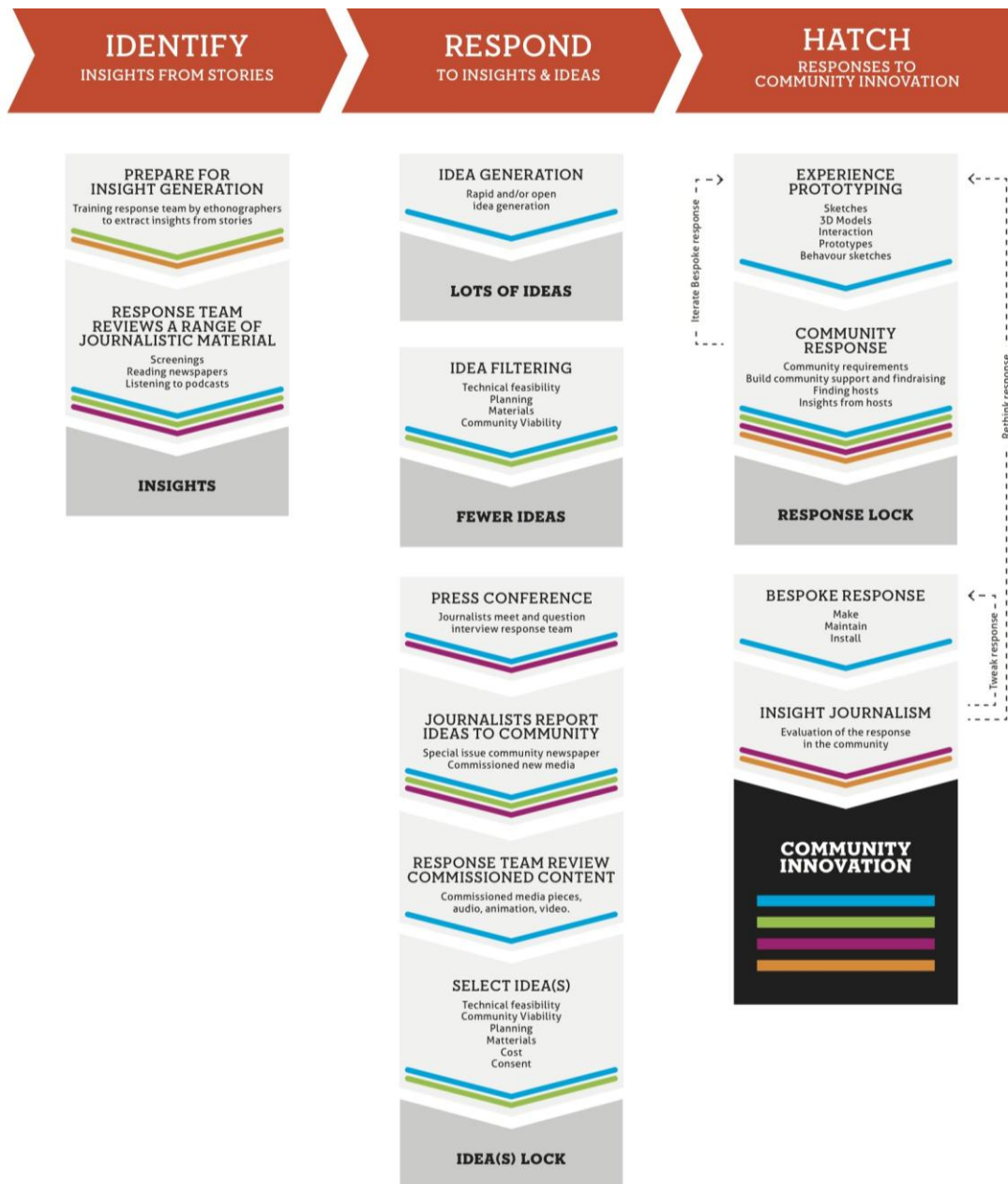


Figure 4.3: The BESPOKE Community Engagement Blueprint (Blum-Ross et al., 2011. pp. 28-29)

The blueprint illustrated above shows how Insight Journalism and such community-focused engagements involve the community throughout the design process, far beyond a user-centred approach. The community is actively involved in the insight gathering process, idea evaluation and development of responses. The next section describes specific methods for engagement with communities that support the notion of 'responses' to community needs, over 'interventions' (Blum-Ross et al., 2011. p60).

4.6 Design Methods for Community Engagement

Robert Curedale's book (2012), *Design Methods 1*, illustrates 200 hundred different design methods and ways to apply design thinking, demonstrating the range of methods available. The methods enable the designer to understand, empathise and communicate with the target consumer. Curedale cites four global trends that are influencing the approaches designers must take now. These are:

'The growing focus on people, systems and experiences beyond objects'

'The growing complexity of the design problems being faced'

'The trend towards working in cross disciplinary teams'

'The growing need to design for distant unfamiliar cultures' (Curedale, 2012. p i)

The trends cited above are particularly relevant when discussing design within a global technology company. The consumer's relationship with technology is developing as the ways in which they interact with it become richer and more sophisticated. Applying design methods should ultimately ensure that the needs of the consumer are understood and addressed.

Design methods range from qualitative methods originating in anthropology and ethnography, to quantitative methods originating in scientific methodology³⁵. The methods can be described as being appropriate in three categories: insights, ideas and evaluation. The segmentation corresponds to stages within the iterative design process, as previously illustrated in Figure 4.1.

The author defines the area of the process as:

Insights

The author defines insights as the act of harnessing a deep understanding of someone, something or somewhere to [re]direct activity.

Ideas

The creation of concepts that relate to the design context and community.

³⁵ For fuller explanations of the methods please refer to Appendices E, F, G and H. Appendices F and G are planning documents for consumer engagement created by the author for the NCR Corporation.

Evaluation

Community-focused evaluation that gains an understanding of design processes responses that lead to further insights.

The methods described below were selected from the range available as they were deemed the most appropriate to be applied at specific stages of the case studies described in Section III. Each method applied was selected due to their appropriateness in the context of the project and how they had the potential to provide a good return on investment in terms of the time and resource constraints. The part time nature of the study meant that the design research engagements had to be conducted in an efficient and timely manner, therefore the methods in each of the case studies was selected on this basis.

Digital Ethnography (Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004) – The method involves using digital tools to gather and analyse ethnographic data. The use of digital tools often means less investment in time and money in the data collection, which makes it more attractive to businesses.

Shadowing (Curedale, 2012; Kuniavsky, 2003; McDonald, 2005) – The method involves the participant and the researcher having shared experiences. The researcher observes the participant in context to gain an understanding of what the participant actually does, which may contrast with what they say they do.

Video Insights (Buur et al., 2000; Gaver et al., 2004, 2003; Raijmakers et al., 2006; Suri, 2003; Ylirisku and Buur, 2007) – There are different methods relating to Video Insights. The author's interpretation of the method is a time-framed video response to a question. The participants are asked to use a digital film camera to communicate their perceptions of a certain topic or environment. The film can be post edited if the participants feel it is necessary. The method helps the researcher to understand the context of the design challenge and gain insights into the participant's life, environment or community. The insights can be used directly to cooperatively generate ideas. The Video Insights used in the case studies in Section III were adapted from the technique described by Ylirisku and Buur, 2007.

Experience Prototyping (Buchenau and Suri, 2000; Buxton, 2007; Moggridge, 2007; Suri, 2003)– Creating experience prototypes allows the researcher to communicate, understand and test the proposed experience with participants. This allows the participants to get a better understanding of the design solution and be better informed to respond and input to further iterations.

Community Workshop (Bjelland and Wood, 2008; Egglestone and Rogers, 2010; Gaver, 2011; Press et al., 2011) – A community workshop was used to evaluate concepts, develop further ideas, and to let the community understand the design process.

Focus Groups (Dean, 1994; Holtzblatt et al., 2005; Kuniavsky, 2003) – Focus groups are targeted discussions around a particular subject. The group usually consists of between six to twelve participants and is coordinated by a moderator. The discussion may be recorded through audio or video recorders so it can be viewed at a later date.

Co-Design Workshop (Bjelland and Wood, 2008; Egglestone and Rogers, 2010; Gaver, 2011; Press et al., 2011) – This involves bringing the design team and various stakeholders together to explore, discuss and conceptualise the research context. The key aspect of the method is the co-creation of design concepts between researcher and participant. This activity can help to build trust and mutual understanding.

Questionnaires (Curedale, 2012; Holtzblatt et al., 2005; Kuniavsky, 2003; Lehtinen et al., 2009; Trochim, 2006) – Questionnaires can be used at various stages of the design process, to gather insights or for evaluation. A benefit of using the method is the quantifiable nature of the results that can be used for statistical analysis.

Service Safaris (Curedale, 2012; Moggridge, 2007; Stickdorn and Schneider, 2010; Suri, 2003) – Service Safaris allow the researcher to study and understand the various aspects of a service. Through the deeper understanding and appreciation of the service delivery then the researcher can gain insights into strengths, weaknesses, opportunities and threats.

Semi-structured Interviews (Curedale, 2012; Holtzblatt et al., 2005; Kuniavsky, 2003) – There are many forms of interview, one-on-one; telephone; email and structured. Semi-structured interviews allow the researcher to modify the questions as the interview

develops. The method can help with the flow of the conversation and can help the participant to be open with their responses.

Situated Designed Objects (Dunne and Raby, 2001; Dunne, 2005; Gaver and Dunne, 1999b; Gaver, 2007; Gaver et al., 2003) – Objects used by participants in their natural environment allow the researcher to gain deeper insights and evaluations of the designed solution. The researcher can understand how the solution is really used and how it can potentially be adapted to suit the needs of the participants.

Below is an illustration of the methods applied through the case studies in Section III of the thesis and how they are associated to the different stages of the design process.

Shadowing: (Curedale, 2012; Kuniavsky, 2003; McDonald, 2005)

Digital Ethnography: (Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004)

Video Insights: (Buur et al., 2000; Gaver et al., 2003; Raijmakers et al., 2006; Suri, 2004; Ylirisku and Buur, 2007)

Focus Groups: (Dean, 1994; Holtzblatt et al., 2005b; Kuniavsky, 2003)

Questionnaires: (Curedale, 2012b; Holtzblatt et al., 2005; Kuniavsky, 2003b; Lehtinen et al., 2009; Trochim, 2006b)

Semi-structured Interviews: (Curedale, 2012; Holtzblatt et al., 2005; Kuniavsky, 2003)

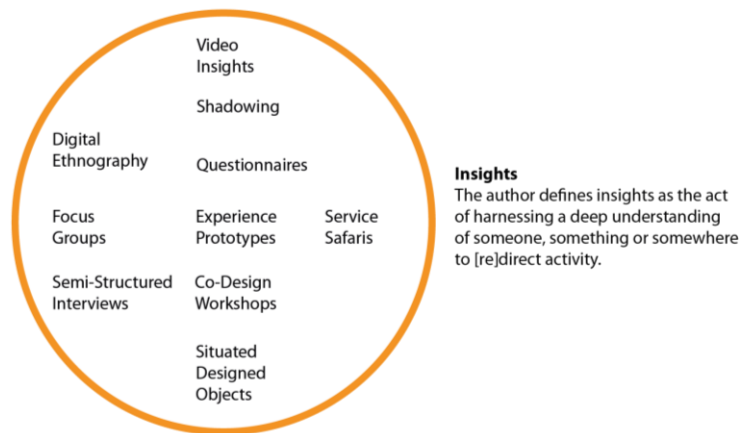


Figure 4.4: Insights Methods and References

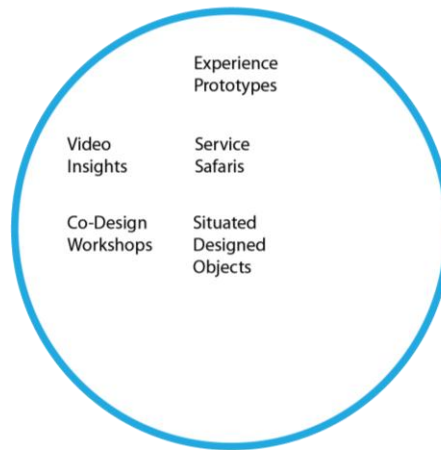
Co-Design Workshops:

(Bjelland and Wood, 2008;
Egglestone and Rogers, 2010;
Gaver, 2011; Press et al., 2011)

Experience Prototypes:

(Buchenau and Suri, 2000b;
Buxton, 2007; Moggridge, 2007;
Suri, 2003)

Service Safaris: (Curedale, 2012;
Moggridge, 2007;
Stickdorn and Schneider, 2010;
Suri, 2003).

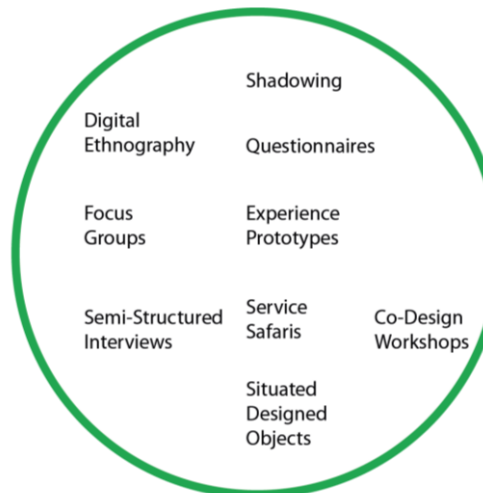


Ideas
The creation of concepts that relate to the design context and community.

Figure 4.5: Ideas Methods and References

Situated Designed Objects:

(Dunne and Raby, 2001;
Dunne, 2005;
Gaver and Dunne, 1999;
Gaver, 2007;
Gaver et al., 2003)



Evaluation
Community focused evaluation that gains an understanding of design processes responses that leads to further insights.

Figure 4.6: Evaluation Methods and References

4.7 The Case for Case Studies

PAR in the context of design research often uses case studies as an approach to capturing the whole experience of people and design responses, examples of which are discussed in the next chapter. The case study can sometimes be regarded as a weak approach that lacks objectivity, quantification and rigour and has been considered the soft option (Robson, 2011; Yin, 1989). Critics of case studies (Miles, 1979) believe that the process of preparing case studies takes too long, that the resulting documentation is unreadable and draws biased conclusions. The potential to include biased views that influence the direction of the findings and conclusions is a common criticism of the approach. Yet bias can also come into other strategies such as the creation of surveys. Another concern is that you cannot generalise from a single case study. This is true to a degree but is applicable to other approaches, as Yin³⁶ highlights:

'...scientific facts are rarely based on single experiments; they are usually based on a multiple set of experiments, which have replicated the same phenomenon under different conditions... case studies, like the experiment, are generalizable to theoretical propositions and not to populations or universes'. (Yin, 1989. p21).

The case study as a research tool is the preferred strategy when 'how' and 'why' questions are applicable. Its real strength is in how it is conducted in real-life contexts. Yet, as highlighted above, it is important to understand that the 'case' is site specific and the studies cannot be conducted devoid of the context (Robson, 2011).

'...the case study allows an investigation to retain the holistic and characteristics of real-life events'. (Yin, 1989. p14)

'...the case study's unique strength is its ability to deal with a variety of evidence – documents, artifacts, interviews, and observations'. (Yin, 1989. p20)

Before deciding to conduct a case study it is necessary to define the research questions: this is to ensure that the questions can be answered through a case study. As stated above, 'how' and 'why' type questions are most suitable as other approaches can be more appropriately used for 'what' type questions (for example, surveys). Yin states that

³⁶ Robert K. Yin is President of COSMOS Corporation, an applied research and social science firm. Prolific in the field of case study research he has authored nearly 100 journal articles and books. His book *Case Study Research: Design and Methods* cited above is now in its fifth edition.

there are five components necessary in the design of a case study: '(1) a study's questions; (2) its propositions, if any; (3) its unit(s) of analysis; (4) the logic linking the data to the propositions; and (5) the criteria for interpreting the findings' (Yin, 1989. p29).

Yet '*case study design tends to be a flexible design, especially if the research is exploratory*' (Walliman, 2006. p46), therefore, the researcher needs to be able to adapt as the case study develops.

A series of case studies are used to describe and discuss the role of PAR in the context of a global technology company in Section III. The case studies apply McNiff's and Whitehead's methodology using the range of methods as described in *Section 4.6 Design Methods for Community Engagement*, where appropriate.

4.8 Chapter Conclusions

This section on research methodologies has given an account of the various areas of design research and the application of an action research methodology. The iterative nature of action research makes it well suited to research applied in the field of design due to its similarities with the iterative design process. The core principles, as defined by McNiff and Whitehead, which are to 'improve your understanding', 'develop your learning' and 'influence others' learning, relates to the core research questions of the thesis and to the application of participatory action research within a multinational corporation.

PAR is the methodology applied throughout the case studies conducted within the NCR Corporation. PAR, if applied within a multinational corporation, becomes more complex, with considerations around cost, time and resource. Within PAR there are various interconnections between self-awareness, unconscious thought and life in society that influence the direction of the study. The application of PAR on a local level, the author would argue, allows for an understanding of how it can be applied on a global scale across different regions but the learning needs to be applied appropriately.

Grounding the thesis in PAR allowed the author to engage with communities and understand how the in-house design team could innovate by understanding community needs. The case studies, in Section III, demonstrate how design research methods were applied. The thesis establishes how using design research methods as a way of engaging

with people and communities allows for innovation to begin with the user as opposed to technology.

Chapter 5: Case Examples in Design in Socially-Led Innovation, illustrates how community engagement and participatory design are already being done through an action research methodology. The chapter discusses approaches taken here in the UK and the US and examines examples in India where engagements with people are at the heart of the business plan or research engagement.

Table 5 highlights the core reflections of the chapter and their associated subject area and reference.

Subject Area	Core Reflections	Related Research Question	Core Reference
Research area association.	The work conducted throughout this study should be associated with action research in the form of Participatory Action Research. It is a methodology suited for intervention within communities or groups.	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	(Crouch and Pearce, 2012; IDEO, 2012)
Application of action research in the thesis.	McNiff and Whitehead are more associated with action research in relation to education and reflective practice. The principles and definitions that they apply are relevant to the author's own iterative and reflective design approach.	<i>How can design research play a role in the activity of a global technology company?</i> <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	(McNiff and Whitehead, 2011. p15)
Social Intent.	The context of this doctoral research has been conducted within the context of a multinational corporation and academia. One of the principal overall intentions of the thesis is to demonstrate to the Cx Design group the application and value of participatory action research in the design process within the organisation. Secondly, the research demonstrates to the design research community how the methods can be applied within the context of a global corporation.	<i>How can design research methods support socially-led innovation in NCR?</i> <i>How has the research conducted throughout the doctoral journey impacted the activity of the in-house design team in Dundee?</i>	(McNiff and Whitehead, 2009)
Need for design research in a global technology company.	The consumers' relationship with technology is developing, as the ways in which they interact with it become richer and more sophisticated. Applying design methods should ultimately ensure that the needs of the consumer are understood and addressed.	<i>How can design research methods support socially-led innovation in NCR?</i>	(Curedale, 2012)

Table 5: Chapter Reflections

Chapter 5: Case Examples in Design in Socially-Led Innovation

5.0 Introduction

The focus of the chapter is to contextualise the nature of the research, which is focused around community engagement. The chapter will present an overview of initiatives from various organisations that engage in social innovation to create products and services that strive for a positive social impact on the community in which they are working. Through the lens of socially-led innovation will emerge a better understanding of the role design research can play in a global organisation.

A series of case examples demonstrates how design research methods can support socially-led innovation, designing for a community as opposed to the individual. They are to be treated as case examples rather than case studies as “*it did not involve an in-depth, longitudinal study of each case to explore causation*” (Yee, 2010).

A community focus and understanding has been a part of many corporations for a number of years, in some elements as a legal requirement and as part of a Corporate Social Responsibility (CSR) statement, which will be explained in *Section 5.3 Corporate Social Responsibility and Community Involvement*.

The NCR Corporation has established manufacturing, software and sales bases across India. They continue to investigate and invest in new opportunities in regions around the world. Ensuring there is a global aspect to this research, the chapter will draw insights from the community engagements in India. The aim is to understand how global corporations have engaged with communities in India and how social innovation is shaping design in the region. This knowledge can be transferred into other emerging markets appropriate for NCR through an understanding of how insights that have been generated through hyperlocal research be applied globally. The case study examples in this chapter also illustrate how design research methods support socially-led innovation.

5.1 Design in the Community

Design Thinking saw a move from designers designing for individuals towards designing for communities (Brown, 2008; Burns et al., 2006; Design Council, 2004; Kumar, 2011; Prahalad, 2012). This process of *Transformational Design* (Burns, 2006) uses design as a front-line tool in solving deep-rooted social problems associated with crime, healthcare

and education in the UK. How designers can respond to communities is furthered through the BESPOKE project (Taylor et al., 2012) where designers join forces with community journalists to take a responsive rather than interventional design approach on a hyperlocal scale; while Emily Pilloton (2009) takes a global perspective on community-centred design that is used to empower developing communities that often face extreme poverty³⁷. Pilloton has built a foundation for change, Project H, which shares many approaches to IDEO's Human Centred Design Toolkit (IDEO, 2012)³⁸. This design-led action is supported by design thinking in India (Ranjan, 2010) and the US (Brown, 2009), but countered to some degree by John Thackara's³⁹ service- rather than object-led approach to global problems (Thackara, 2005).

Having a more considered approach to design and how it affects people, communities and our planet is the chief concern of Thackara (2005). He questions the world we have created of objects and things and our pursuit for more of them. He questions why designers are not focusing more on the consumer, on people and are simply creating more plastic objects for the landfill that consumes greater amounts of the earth's natural resources.

In Thackara's book *In The Bubble: Designing in a complex world* (2005) he states that he would prefer a world more focused on services, not objects.

'The book is about a world in which well-being is based less on stuff and more on people. It describes an approach to innovation in which people are designed back into situations. In these situations, we will no longer be persuaded that to be better off, we must consume more trashy products and devices.' (Thackara, 2005. p4)

³⁷ Emily Pilloton's work will be discussed in greater detail in section 5.2.1. In 2010 she was chosen for 'The Nifty 50' in *The New York Times' T Magazine* (Alix, 2010), a list of America's up-and-coming. Described as a humanitarian, author, designer, architect, builder and teacher, her work focuses on using design to solve problems regarding community social welfare.

³⁸ IDEO is an international design consultancy located in Palo Alto, San Francisco, Chicago, New York, Boston, London, Munich, Shanghai, Singapore, Mumbai, Seoul and Tokyo. The company is involved in a diverse range of projects from products, services, environments, digital experiences and design management. They produced the IDEO Method Cards that helped communicate the application and range of design methods (IDEO, 2002). NCR have worked closely with IDEO and BBVA (Banco Bilbao Vizcaya Argentaria, are a multinational Spanish banking group) in the development of a multi-function ATM (IDEO, 2010).

³⁹ John Thackara is the Founder and Director of The Doors of Perception, a company that organises festivals that bring together designers, design thinkers, academics and students to discuss and realise how design and technology can be sustainably used for communities and people's basic needs. In 2005-2007 Thackara was Programme Director of Dott '07, discussed in section 5.2.2.

He argues that the focus should not be to try and eliminate the production of objects but to create objects that are sensitively considered with consideration of the experience of the object and not just the purchase. Thackara strongly believes services and technology should not eliminate the human or face-to-face interactions. It is these interactions that make us happiest, most satisfied and ultimately human. This highlights the real need for product designers and large corporations to be actively engaging in community-based design research; understand people and how they want to interact with technology around them. Thackara wants designers to look beyond creating just another product but to try and really understand how people's lives can be improved and, indeed, whether another product is the answer.

He uses the example of the self-service ticketing machines for purchasing train tickets, stating that '*People will always be smarter*' (Thackara, 2005. p206). He cites various examples where people have been substituted by self-service devices and how by their very nature they limit face-to-face contact between people, making the service more complex or unobtainable for those not willing or able to embrace the technology.

The following case examples describe the approaches taken in community-led initiatives. They have been selected as they demonstrate community-led engagements in different geographies, contexts and desired outcomes. This is relevant to the thesis as it demonstrates not only case studies' broad application but also the application of participatory-led activities in real-world contexts. The examples below state the challenge the projects aimed to overcome, the solutions that derived from the community engagement and the results.

5.2 Case Study Example 1: Project H

The Background

Addressing the social and community aspect of design, Project H engages with communities to understand and create effective design solutions that address real social needs (Pilloton, 2009; Pilloton, 2010b). The non-profit organisation claims to be '*one part design firm – one part advocacy group*'⁴⁰ whose global chapters have been involved in projects from educational devices to water filtration devices. Pilloton aims to encourage, empower and inspire designers and non-designers to think ethically while acting locally through design.

Project H follows six design directives in their work while working on projects with communities that do not have access to creative capital⁴¹ (Pilloton, 2010a.). The directives act as a guide and a mission statement that clearly state the organisations design philosophy:

1. *'Design through action.*
2. *Design with, not for.*
3. *Design systems, not stuff.*
4. *Document, share, and measure.*
5. *Start locally, and scale globally.*
6. *Build.'*

(Pilloton, 2010a)⁴²

Pilloton advocates bringing design as a tool and philosophy together with social entrepreneurship. The social impacts of the activities Project H is engaged in are intertwined with social entrepreneurship. In order for a product or service to have a greater, and sustained, social impact and relevance to a community it will often need to be economically viable. Pilloton argues that there needs to be a refocus of how a product or service is measured and deemed a success, arguing that the human benefit has been

⁴⁰ This approach is similar to other NGOs such as The Appropriate Technology Collaborative (ATC) who have been heavily involved with rural communities in Guatemala and Nicaragua. ("The Appropriate Technology Collaborative," 2013)

⁴¹ Creative capital can be defined '*as the combined assets of society that enable and stimulate its people and organisations to be innovative and creative*'. (Steenhoven et al., 2005)

⁴² Emily Pilloton's TED talk focuses on the creation of Studio H, a design-led community-teaching project. The points illustrated can be seen 4 minutes 37 seconds into the video.

overshadowed by profit. *'If designers can redefine the success of a product by including its social impact rather than only its profitability, the design process becomes more human centered and user focused.'* (Pilloton, 2009. p17)

Pilloton believes that designers need to be truly invested in a community to make any lasting social impact. She believes that this lasting impact requires three things, *proximity, empathic investment and pervasiveness* (Pilloton, 2010b. p48).

The Challenge

For Pilloton this is not rhetoric; embedding within the economically and socially deprived area of rural Bertie County, North Carolina, USA, in 2010 she set up Studio H. The question was 'how' could Project H bring a design perspective to repair the public education system and the rural community in Bertie County? Bertie County is a sparsely-populated farmland-focused county that lacks opportunities for its youth, who generally move away from the region as they grow up. It is the poorest county in the state where a high percentage live below the poverty line.

The Solution

The solution was to use design within the education system and more broadly within the community. Studio H evolved to become a high school design-build curriculum for rural community benefit. The core to the curriculum is learning through action and creative thinking by creating projects that provide appropriate skills to the students and relevant outputs for the community.

This was achieved by moving her operation to Bertie County and becoming completely integrated with the community. One of the outputs was a 2000-square-foot farmers market pavilion for the people of Bertie (Pilloton, 2013). The creation of the farmers markets has resulted in two new businesses and 15 new jobs being created, much needed in the local area.

The Result

Studio H developed strategies that connect the classroom and the home ensuring there was a closer connection between the school and the community. It had successfully developed a new and improved school design program that focuses on the design process and the production of solutions that benefit the local community.

However, political tensions and the removal of a key member of the school board meant that Studio H was not supported by the school administrative system and had to be self-funded. This created a situation that was ultimately unsustainable (Pilloton, 2012). After three years, the studio was forced to relocate to REALM Charter School in Berkeley, California. This has meant the deprived area of Bertie County, its youth and education system has lost a great asset. It shines a spotlight on the political, financial and cultural challenges in creating social reform.

Studio H has now successfully transitioned to Berkeley with the full support of the school's administration and students. The current project is to design and build the school library.

Conclusion

Pilloton and Project H unapologetically *'give a damn'* about how designers approach design, advocating its orientation towards activism and humanitarian values (Pilloton, 2009. p22). This is not necessarily new, having been similar to the approach communicated by Papanek (1984) since the 1970s and is now even taught at universities such as MIT [<http://codesign.mit.edu/>].

The approach taken by Project H and the message communicated by Pilloton make designers as well as business and community leaders stop and think: to think about what it actually means to be sustainable in a community context and to think about people and communities in the design of products and services that can promote social good.

5.2.1 Case Study Example 2: Design Council: DOTT '07

The Background

Design of the Times (DOTT) '07 was a yearlong programme of activities based in the North-East of England. The various case studies, exhibitions, events and community projects aimed to show how the design process could be used to better services within communities.

DOTT formalised some of the approaches taken by RED. RED (2004-2006) was set up by the Design Council to tackle social and economic issues through design-led innovation. Their projects were socially driven and use design innovation to investigate solutions

for new and improved services for the community. They were not about creating objects or products but rather about improving communication between various stakeholders. *'RED consider themselves as a 'do tank' that develops innovative thinking and practice on social and economic problems through design innovation.'* (Burns et al., 2006. p2)

Community engagements were key to RED's activities. The projects they were engaged with were very socially aware and usually tackled real problems within the community such as health, ageing and energy. RED proposed a design approach called *'Transformation Design'* (Burns et al., 2006). They describe Transformation Design as being about gathering the correct people together to work on a particular problem and hold the end user in the centre of the solution. The three core principals are *looking, making things visible* and *prototyping* (Burns et al., 2006. p18-19).

The participatory design initiatives undertaken through DOTT '07 tackled large social issues such as infrastructure, healthcare and education. The projects engaged with over 20,000 members of the public which included 15,000 school children ("Design Council," 2007). The range of projects included *'Low Carb Lane'* which focused on the production of a blueprint for an energy saving investment service for low-income families; and *'Move me'*, the development of a lift exchange programme for small rural communities. Another project to derive through DOTT '07 was called *'Alzheimer 100'*.

The Challenge

The *'Alzheimer 100'* project focus was to find innovative ways to improve the lives of people with dementia and their carers (Tan and Szebeko, 2009). At the time of the project it was recognised that in the UK over 700,000 people have dementia, a number which is set to increase to over a million by 2025 (Tan, 2012. p102). When the sufferers' carers are taken into consideration then the amount of people affected greatly increases. It was recognised that there needed to be significant improvements and innovations to dementia awareness, diagnosis, care, support and living with dementia.

The Solution

The initiative partnered with existing support networks and charities as well as academics, carers and those with dementia. Together they researched, designed and developed strategies to develop the project and engage with the public.

One such event was a Co-Design day where over 100 participants attended an event to imagine scenarios and develop solutions for dementia sufferers (Tan, 2012. p105). This approach was a key element of the whole project, which was engagement and conversation with people with dementia. This was innovative, as it was the first time that the real sufferers had been engaged at this level.

Through the Co-Design day and various design clinics, a series of design proposals was created. The first was a **Signposting Service**; this was a service that aimed to help people navigate through and access the various yet unconnected support networks. There was a proposal for a **Safe Wandering Garden** that aimed to give sufferers and their carers the opportunity for outdoor activity. Another proposal was for a **Volunteer Mentoring Service** for carers that would help the carers through their challenges. **Dementia Cafes** were proposed that would offer help, support and information for people affected by dementia. Finally, a **15-minute film** was created that captured the daily lives of dementia sufferers and their carers (Tan, 2012. p106).

The Result

The reality was that none of the proposals from the project (with the exception of the film) were brought into fruition during the lifetime of the activity due to time and budget restrictions. The same constraints are recognised in several of the case studies discussed in Section III; cost, time and resource are all major influencing factors in the participatory design process.

Filming that aimed to capture and communicate the day-to-day lives of dementia sufferers, for which consent had previously been granted, was later revoked. This meant that trust was compromised between a restructured Alzheimer's Society and the design team. It also lessened the impact of the video that was going to be a key part of the Co-design day. The consent was again given much later but meant that the video was more of a communication aid than an active element in the design process.

The greatest impact from the project came two years after its conception. In February 2009 the National Dementia Strategy published recommendations that directly sighted the Signposting Service from the Alzheimer 100 project. This was rolled out nationally between 2009 and 2010 under the banner of the Dementia Advisory Service (Tan, 2012. p109).

Conclusions

Following on from the perceived success of DOTT '07, the Design Council helped create DOTT Cornwall alongside University College Falmouth and the Technology Strategy Board. Following the same ethos as DOTT'07, of participatory design with communities at the heart of the design process, the projects demonstrate the changing role of the designer. The role of the designer has evolved from its beginnings as craftsman to a strategic partner. Lauren Tan, who studied the various projects and outcomes, uses the DOTT initiative to demonstrate the various roles a design can have. Her thesis shows that the role of the designer is far reaching, a designer is a co-creator, a researcher, a facilitator, a capability builder, a social entrepreneur, a provocateur and strategist (Tan, 2012). In a corporate environment, for design to play these roles effectively it requires design to be positioned high up the Design Ladder (Ramlau, 2004).

While DOTT '07 and DOTT Cornwall have been successful in engaging with communities on a local level through design, it could be questioned whether the timescales for the activities were long enough to make a true and lasting impact. This was demonstrated in all the proposals for the Alzheimer 100 project not being realised within the project lifetime.

Research activities taking place at Lancaster University's design research lab 'ImaginationLancaster' and the previously mentioned BESPOKE project are developing our understanding of community engagement. They have both demonstrated the use of participatory design research methods to respond to a clear understanding of a community's needs.

5.2.2 Beyond the Castle

The Background

PROUD (People Researchers and Organisations Using Design for Co-Creation and Innovation) is a €4.8 million, three-year project funded by the EU INTERREG program based at ImaginationLancaster. The group is focused on using and developing co-design processes to allow city councils, commercial organisations, academic institutions and communities to communicate effectively with one another. The methods used aim to foster long-term communication and collaboration on regional issues, an example being an on-going collaborative project between Lancaster City Council and the local community called Beyond the Castle.

The Challenge

Initiated in 2012, the Beyond the Castle project has brought 700 people together to understand how the local community want to enhance the area around a historic castle in the city. It had been identified previously that the local community did not utilise the area to its full potential and had little understanding of what already happened on the 14-hectare site.

The collaborative activities were on a variety of scales, deemed appropriate to the stage of the project. Initial consultations between PROUD and Lancaster City Council defined the core objectives and key themes for collaborative ideas to be generated. Key to the whole engagement was the city council's openness to go beyond public consultation meetings and engage in a co-design process. The initial consultation identified the core areas for investigation with the wider public.

The Solution

These key areas of focus identified at the initial consultation were brought into a wider co-design workshop with 15 city councillors. Using word clouds they were able to build connections with the core themes and understand what was most important. From that workshop core themes emerged that would form the basis of future co-design activities:

- Culture & Leisure
- Heritage and History
- Environment
- Accessibility and Way-finding

The core themes formed the basis for the proceeding workshops that would include wider members of the city council from the various departments that would have to instigate and support any eventual outcomes. Due to the scale of the project volunteers were needed to facilitate the various community workshops and capture and collate all the material and output generated. Once that structure was in place then members of the general public could be introduced into the process.

Through various co-design activities, from storytelling, market day stalls and prototyping and model making workshops the PROUD design team engaged with a wide demographic of the local community to understand what they wanted, invited new ideas and gave the community a voice in the process. A final public event was staged through

a co-design exhibition that showcased the previous workshops and events as well as actively seeking further public input that drew on the previous events.

PROUD are keen to point out that the co-design process should not be considered a burden, believing that all members of a community can actively contribute to society. It is a process that harnesses knowledge, experience, creativity and passion from all people affected by a particular challenge. Regarding the co-design process PROUD state that *'This is not about design by committee, or an average solution but rather challenging all citizens to examine and reassess their assumptions and perspectives.'* ("Beyond the castle: Imagining the future," 2013. p21)

The Result

The Beyond the Castle project highlighted the difficulties and tensions that are inherent in a publically engaged co-design process where the traditional hierarchical structures are not in place. The PROUD team are unapologetic about this as, for them, it was a key element in their research and in the development of their understanding of co-design. They also recognised that moving people, the councillors, designs and participants, out of their comfort zone was an essential component of the project. *'We were aware that this would not be an easy project for any of the participants, partly because we were looking to stretch our collective understanding of co-design.'* (Cruickshank et al., 2013. p50)

Through the process of the engagement the PROUD team were as much concerned with the development of understanding of the co-design process as the outcomes of the project. They put forth eight fundamental guidelines for design in co-design projects: 1) Agree how the success of the project will be recognised. 2) Move in and beyond your normal design practice. 3) Involve and respect lots of people in the ideas generating parts of the process. 4) Use the expertise of all participants in the process. 5) Let everyone be creative in their own way. 6) Explore and challenge assumptions. 7) Expect to go beyond the average. 8) Bring the process to the best possible conclusion with the best possible design outcome.

The guidelines put forth are not revolutionary as they very closely follow the guidelines mapped out previously in Section 4.5 (Blum-Ross et al., 2011; Design Council, 2008; Gulliksen et al., 2003).

Conclusions

Using Beyond the Castle as a case study, PROUD members are keen to:

'...promote active reflection by designers on their processes and assumptions and how these relate to the assumptions and creative processes of others. It is through this type of reflection (and responding to these reflections) that new types of co-design processes and co-designers will develop, ensuring all co-design participants have the opportunity to make their best possible contribution in co-design processes'. (Cruickshank et al., 2013. p57)

This relates to and justifies the reason behind using McNiff's and Whitehead's Living Theory (2009) methodology through the processes followed in the case studies described in Section III.

The case study highlights the core reason behind the use of co-design in the project; the understanding that the process allowed the organisers to access knowledge, experience and input from a wide range of people who were actively engaged in the process and outcomes. The public's engagement was much deeper than if they had been asked to complete a questionnaire or attend a council meeting. It did, therefore, produce results that were rich, considered and contextually appropriate.

5.2.3 BESPOKE

The Background

This was mirrored in the overall outcomes and approach taken with BESPOKE. The focus of the project was to investigate how digital technologies can contribute to an innovative, healthy economy and inclusive society.

The Challenge

The aim of BESPOKE was to create '*bespoke*' design responses to local issues and people in an engaging and playful way. They used Insight Journalism (Blum-Ross et al., 2011; Egglestone and Rogers, 2010) as a way to engage with the community who generate insights. Insight Journalism uses the local community to become journalists, reporting on issues that concern them; their immediate local community. They are not professional reporters but they are knowledgeable about the area and its people. Using this asset allows the research team to gain a unique understanding of how they can respond to the real needs of the community. This ethnographic approach was supported

by a series of community engagements that raised awareness of the project and encouraged community support.

The Solution

One of the first activities the project team conducted was participation in a community fête. Getting on the ground in the community environment was vitally important for the success of the project. This success could only be achieved through the understanding and active participation of the community residents.



Figure 5.0: Community Fête, BESPOKE 2009

A key component to the BESPOKE project was the recognition that communities respond to positive engagement and can connect with tangible responses to hyperlocal issues (Blum-Ross et al., 2011. p38). Insights gained via Insight Journalism allowed for tangible digital responses to be situated within the research environment, they could then be used and interacted with by the community. These responses included a digital busker, bringing the music created in the community to the community; a Wayfinder, allowing community organisations to direct and inform residents of local activities and events; a CCTV controller that captures and uploads selected clips to the Internet; and Viewpoint which gives the community a voice on hyperlocal issues that may affect them.

The Result

The BESPOKE team state that the *'journey to create the journalism and the outputs produced cannot and should not be untangled from one another'* (Blum-Ross et al., 2011.

p32). The process of engagement was as valuable to the research team as the production of artefacts and the resulting study of their impact. The project team engaged in community-centred design, not user-centred design. This distinction is important as they were grounded in '*difference rather than sameness*' (Blum-Ross et al., 2011. p60) and recognise the specific challenges of designing within a community.

In contrast to mass manufacturing and commercialism that strives to create homogenised products and services, BESPOKE strove to create responses that were personal and individual to that community. They did this often by focusing on individual viewpoints of members of the community, giving the designers a degree of empathy and ensuring a personal responsibility to deliver the solution in the correct way.

Conclusions

The BESPOKE project is a good example of how design in its various forms (see previous DOTT '07 case study (Tan, 2012) can and should be used in community engagement. Appropriate methods need to be applied that are the most suitable to the context, situation and stage of project. The case study demonstrates how designers have to be open to bringing the community in and listening to what they have to say and allowing them to become an integral part of the design process. It establishes how design research methods can potentially be applied within the context of a global corporation (McNiff and Whitehead, 2009). While design-led innovation requires integration and collaboration throughout an organisation the same can be said on a community level (Lee and Evans, 2012). BESPOKE showed that through design workshops and Insight Journalism that the community supported and championed the project at a strategic, project and community level.

Corporations can learn from BESPOKE in that a new respect for consumers can be found as co-creators of solutions if there is proper engagement (Prahalad, 2012, 2010).

5.2.4 Example case study conclusions

The case studies demonstrate the shift from designing for an individual to designing for communities (Brown, 2009; Burns et al., 2006; Egglestone and Rogers, 2010; Frohlich et al., 2011). They use a range of design research methods to engage with groups of people; the results are products, services and/or responses that are sensitive to the communities engaged (Stickdorn and Schneider, 2010).

The case studies show that when the project team engage with consumers and communities as co-creators a newfound respect is formed. This new respect brings mutual benefits for all the parties involved in the process (Pralhad, 2012, 2010). Studio H brought the school and the community together, creating infrastructure projects, new jobs and new meaning to a rural community's education. In the case of DOTT '07 and the Alzheimer 100 project, some of the outcomes have filtered through to government policy. Beyond the Castle is an on-going community project that would not have been possible without the community design initiatives held at the start of the project. Now the community is engaged and has channels of communication that can direct the council on the city planning of the historic site. BESPOKE made journalists out of a community, it got the community engaged in technology and communication in ways that could never have happened without the mutual trust and respect that was formed through design-led activities.

Timescales are an important consideration when considering social innovation and community engagement. What Beyond the Castle, BESPOKE and Project H all demonstrate is that in order to be able to truly understand a community of people and enable the vital community support then projects need to be considered for the long term. The project team should strive to be as embedded as possible, as Pilloton states, *proximity, empathic investment* and *pervasiveness* are key to a lasting positive social impact (Pilloton, 2010).

For the majority of corporations social impact would come under the remit of Corporate Social Responsibility (CSR) . The subject area is vast and perhaps more appropriate for a business-focused thesis. For this reason the author has recognised that it will not form a large part of this section. However, due to its relevance to industry it is still worth giving a brief overview of the topic and how it has developed over time.

5.3 Corporate Social Responsibility and Community Involvement

Archie B. Carroll (Carroll, 1999) describes CSR as being historically developed in three major phases: the initial rise from philanthropy into the modern era of CSR (1950s), into a deeper understanding, development and appreciation during the 1970s, and maturity of themes and models in the 1990s that are common today. Most, if not all, major corporations have a CSR statement (Bielak et al., 2007), though some are more positively engaged than others (Wagner et al., 2009). While the adoption of a CSR

statement and manifesto has gathered momentum there has been decades of debate on what CSR actually means (Aupperle et al., 1985; Dahlsrud, 2008; Geva, 2008; Griesse, 2013; Lee, 2007; Matten and Moon, 2008; Swanson, 1995; Waddock, 2004a, 2004b). What the majority recognise is that businesses have different kinds of corporate responsibility in society and different ways to measure their effectiveness. The statement that CSR *'means something, but not always the same thing to everybody'* (Votaw, 1972) is still as true today as it ever was. The table below illustrates the various stakeholder expectations of corporations.

<p>Communities</p> <ul style="list-style-type: none"> •Be a good neighbour •Contribute credibly •Make a long-term commitment 	<p>Consumers</p> <ul style="list-style-type: none"> •Offer fair prices and good product quality •Treat employees fairly •Show the brand's ethical dimension •Be a good citizen •Support local society 	<p>Governments</p> <ul style="list-style-type: none"> •Do more for society •Help address pressing social needs •Be a good corporate citizen 	<p>Investors</p> <ul style="list-style-type: none"> •Maintain licence to operate •Practice Socially Responsible Investment (SRI)
<p>Employees</p> <ul style="list-style-type: none"> •Encourage their pride in the company's investments •Make Employee Volunteering opportunities available •Offer Match Time/ Matched Funding 	<p>NGOs</p> <ul style="list-style-type: none"> •Ensure they are not exploited for marketing •Offer real support, real partnership, sharing of experience 	<p>Media</p> <ul style="list-style-type: none"> •Offer credibility •Adopt a unique approach •Create tie-in with broader theme 	<p>Opinion Leaders</p> <ul style="list-style-type: none"> •Be willing to support their causes as needed

Figure 5.1: Example of Stakeholder Expectations of Corporations (Lakin and Scheubel, 2010. p17)

Beyond communities, CSR is often applied to brand image on a global scale and as Rachel Cooper states *"CSR is bound to fail where it is adopted for reasons of public relations"* (2005. p17). The challenge for global industry is one of how to engage with and embed their activity within geographically located communities. For design thinking this presents an opportunity where designers can add value to the way in which industry engages with Corporate Community Involvement (CCI) as defined by Lakin and Scheubel (2010).

Many industries and organisations are active in the area of CCI. This goes beyond corporate giving, which is the simple act of an organisation giving money to a particular charity or event; there is no deeper commitment than that. CCI can be seen as a partnership with community projects, non-governmental organisations (NGOs) or governments. The results are geared towards societal impact and, importantly, the

company can leverage the results, whether that is sales, marketing collateral or overall brand image. The important factor is that there is openness and clarity in the process from the beginning.

India is a region where there are several world-leading examples of socially-led innovation and CCI taking place. Charles and Ray Eames identified, through the publication of the India Report in the mid-twentieth century, the immediate problems concerning India that unfortunately are still relevant today. The issues of food, shelter, distribution and population are issues that India still faces but, as the India Report highlights, the advantage is that they are clearly defined problems (Eames and Eames, 1958. p7). Time, resources and money do not need to be wasted on identification of the problems; the focus can be on the quality of the solutions. Eames and Eames reinforce this by stating that '*in the face of the immediate need for the nation to feed and shelter itself – a drive for quality takes on a real meaning*' (Eames and Eames, 1958. p9).

The India Report was a significant development in the role and recognition of design in India at the time of publishing that is still recognised today (Ranjan, 2013). The National Institute of Design, Ahmedabad, was set up in 1961 with strong Government support after recommendations made in the report. Through the publication of the India Report and its adoption by India it could be argued that India adopted Western approaches to design and design education. Yet the report was specific to India, focusing on their needs as a country and this served to focus the Government on strengthening India's rich design heritage (Ranjan and Ranjan, 2005).

5.4 A Lens on India

India, over the last decade, has seen vibrant economic growth that until recently seemed relatively undeterred by the West's current economic downturn. The core challenge for India is to try and meet its objective to make its '*growth inclusive*' for its people (Malayendu, 2012. p9).

India is the second most populous country in the world with a population of 1.21 billion (Government of India, 2011). Such a densely-populated country has with it inherent social and welfare issues. There is a high degree of illiteracy, having the highest rate of illiteracy in the world (Government of India, 2011). In addition, there are various healthcare issues, infrastructure problems and poverty. There are clearly issues that need to be addressed in Indian society and there are various initiatives led by the Indian

Government, NGOs⁴³ and corporations that seek to address them (Prahalad, 2010). In 2009 there were an estimated 3.3 million NGOs in India which equates to one NGO for every 400 Indians (Ramakrishna, 2013).

The challenges for corporations to provide products and services for the Bottom of the Pyramid market while also making a viable business are high but not insurmountable. Some have started to recognise that *'if we stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value conscious consumers, a whole new world of opportunity will open up'* (Prahalad, 2010, p1).

5.5 Design in India

India has a craft-based design culture with deep-rooted human values (Ranjan and Ranjan, 2005). For thousands of years, next to agriculture, the traditional craftsman has had an important role in commerce for rural Indians. Nowhere is design and craft more engrained, diverse or economically important as India (Ranjan and Ranjan, 2005). With such diverse industries as wood carving, metal engraving and basketry to name but a few in every region from Kashmir in the north, Kamataka in the south, Bihar in the east and Gujarat in the west. These micro-industries form the bedrock of Indian design, and design philosophy. Human existence, interactions, community rituals as well as the everyday are embedded in the craft-based culture of India.

As important and rich as these crafts and designs are to Indian culture, they have for years struggled to turn that into a profitable enterprise for the craftsmen themselves. The key purpose of the India Report was to understand how India could adapt to an industrialised world while still retaining the qualities of the country's handicrafts. Craft traditions in India continue to reflect diverse regional and socio-cultural profiles of the country. However, globalisation demands innovative products, materials and processes with new standards of quality and creativity. Design plays a major role in empowering the crafts and craftsmen, adding value and acting as a social enabler. Only knowledge empowerment and efficient multidisciplinary networking can lead to cutting edge advantage for Indian crafts. Attributes of Indian handicrafts have a great potential to contribute in this direction if well managed.

⁴³ 'A non-governmental organization (NGO) is a legally constituted organisation created by natural or legal persons that operates independently from any form of government. The term originated from the United Nations (UN), and is normally used to refer to organisations that are not a part of the government and are not conventional for-profit business.' (Ramakrishna, 2013. p45)

Indian design is more than craft. Indian design and innovation is being driven by the context of India, being so densely populated, the harsh environmental conditions and the speed and momentum of change that is ever increasing (Goel, 2012). These conditions are driving innovations from within India and also mean that multinational corporations (MNCs) have to innovate to work in that market. Innovation is increasingly being seen as a possible answer to the countries socioeconomic problems, as stated on the online India Innovation Portal:

'Innovation is increasingly being seen as the currency of 21st century. The future prosperity of India in the new knowledge economy will increasingly depend on its ability to generate new ideas, processes and solutions, and through the process of innovation convert knowledge into social good and economic wealth.' (Government of India, 2010)

According to Aradhana Goel, Director of IDEO India, *'Indian style innovation'* is essentially where *'copying is not only accepted but when done properly very creative'*, *'good enough works'* and *'knowing when to stop'* (Goel, 2012). She states that designers need to balance the tension found between what is minimal, what is viable and what is good. If this balance can be found, then something powerful can be created. This concept of innovation is in stark contrast to what we know of innovation in the West. There is a much more open idea of innovation in India and acceptance to learn, borrow or indeed copy ideas from others if another opportunity can be found.

An open innovation approach to innovation is gathering momentum with a wide variety of organisations in the West from SMEs, multinationals and government ("Open Government Partnership," 2012). Companies such as IDEO, a multinational design consultancy; IBM, a multinational technology and consulting corporation; and EMI, a multinational music company are examples of where open innovation is applied.

5.6 Socially-Led Innovation in India

There are many socially-driven initiatives underway in India, some charitable, some for profit, some government funded, some purely driven by business. What is often a core driver for a business to get involved in social-driven initiatives in the first place is the passion from the top levels of the company, what could be called *"passion driven projects"* (Nahar, 2012). The CEO of a company sees an opportunity and then aligns their own particular passions with the skill set of the company they run. The key factor with

many of the successful corporate-driven initiatives is the understanding of the core competences of the organisation and using them in a socially-driven way.

Not every company can, or indeed would want to, engage in socially-driven initiatives if they cannot profit from it in some way. The upsurge in social entrepreneurship provides livelihoods for people, in turn, providing wages. A socially-driven initiative that also makes profit is the model that is being widely accepted and adopted by many corporations (Prahalad, 2010; United Nations, 2011). The key driver is socially driven but in a commercial world where there is often a balance that needs to be found. What follows is a selection of relevant examples that explore social innovation in India. The three example organisations illustrated below have been selected as they epitomise the approach of viewing Bottom Of the Pyramid consumers as partners in creative entrepreneurship (Brown, 2009) through an empathetic understanding (Pilloton, 2010). This may be an approach that Western organisations could learn from to refocus their values and approaches to community engagement.

5.6.1 Jaipur Foot

Jaipur Foot is an interesting example and relevant to the thesis as it demonstrates how close community understanding can lead to innovative design solutions. This example is similar to the approach taken by Project H where proximity, empathic investment and pervasiveness led to solutions that communities need and have lasting impact (Pilloton, 2010).

Indian inventiveness and social entrepreneurial spirit are at the heart of Jaipur Foot. They offer an affordable and reliable prosthetic for people in developing nations who through disease, accident or landmine need a new limb. The service makes and fits a custom prosthetic limb all in one day, all for \$35, a fraction of what it would cost in the West (Prahalad, 2010. p58-60). The concept of Jaipur Foot was developed by craftsman Ram Chandra and trained physician Dr P.K. Sethi and is supplied by the NGO Bhagwan Mahaveer Viklang Sahayata Samiti (BMVSS).

The design follows the craft-based approach identified in the India Report (Eames and Eames, 1958) and the Indian design innovation principle of '*good enough works*' as identified by Goel. The service and the physical design are uniquely appropriate for the Bottom Of the Pyramid sector. The prosthetic is made on-site within hours of the patient attending one of the 'camps' set up in areas of need; the poor cannot afford to travel long

distances and stay overnight. The manufacture of the limb utilises small batch craft processes ideally suited for the areas in which Jaipur Foot operates (India, Cambodia, Pakistan, Afghanistan, Vietnam and Congo). The limb has been designed to suit the consumer needs for the market; for example, walking in wet paddy fields, kneeling at prayer and walking long distances. Also, the fitting of the prosthetic has been deskilled, as there is a shortage of trained physicians available.

There have been more than 1.3 million patients who have benefited from the range of artificial limbs now available from BMVSS ("Jaipur Foot," 2013). The range has extended beyond the Jaipur Foot to the Stanford-Jaipur knee, and above and below knee prosthetics. By accepting and understanding the needs of the market, BMVSS have created a prosthetic that has arguably tougher design considerations than prosthetics designed in the West but is manufactured at a fraction of the cost.

5.6.2 Aravind Eye Hospital

Aravind Eye Hospital supports Pilloton's (2010) empathic approach. Through their close understanding of the communities in which they operate, in a similar way to Jaipur Foot, they can challenge assumptions on how healthcare is delivered. It is an example of how different parts of an organisation can come together, integrate and collaborate to provide and innovate design-led approach (Lee and Evans, 2012).

Understanding the culture of the poor while addressing their healthcare needs is the approach of Aravind Eye Hospital. The company, founded by Dr Venkataswamy (Dr V), services the market in such a way that it provides skilled medical eye care at a fraction of the cost to similar treatments in the West. One of the key factors for the success of the service is how it has strategically standardised as much of the experience as possible. The standardisation has allowed Aravind to control parts of the procedure, deskill elements of the pre and post care and ultimately reduce the overall costs. Tim Brown states that Dr V:

'...realised that giving his patients something consistent with what they were accustomed to in their villages but still good enough to meet acceptable medical standards, allowed him to serve the poor in an economically viable way'. (Brown, 2009. p209)

Patients are first seen at one of Aravind's eye camps that are located within the targeted area, often employing local women to conduct the preliminary tests. Patients are then

taken by bus to the hospitals where the operations will take place. The hospitals use rapid prototyping machines to create low-cost lenses and sutures for cataract patients. The doctors and the procedures they conduct take an unashamedly production line approach, allowing the doctors to carry out more operations (Brown, 2009; Prahalad, 2010).

Aravind Eye Hospital is an example of world-leading social innovation. The production and service models it has created are being copied across the world and adopted by the West. Dr V approached the issue of healthcare in poor regions through empathy and experimentation that allowed Aravind to '*reach McDonald's-like efficiency in an organic, sustainable way*'. (Brown, 2009. p210)

5.6.3 Amul

The cooperative, Amul, established in 1946, is the largest and best-known dairy in India; supplied by 15 million milk producers ("Amul," 2011). They have decentralised milk collection, allowing farmers to take their cows, goats and buffalo milk to a Village Dairy Cooperative collection point near their farms. Amul collect the milk from over 50,000 villages across India (Prahalad, 2010. p63) from which the farmers are paid based on the quantity and quality of the product. The milk is then taken to larger processing plants where it goes on to produce a range of dairy products such as cheese, butter and ice cream.

The self-supporting Amul system gives the farmers control of procurement, processing and marketing of their product. The money raised allows the cooperative to pay a dividend to their members; it also supports the farmers in purchasing cattle feed and veterinary bills.

The success of the system has meant that the cooperative model created by Amul has been copied by the Indian Government. In 1965 the National Dairy Development Board was initiated to replicate the system across the whole of India.

Amul is an example of how socially-led service innovation can be both profitable for a business and the suppliers. The model adopted by Amul has allowed a better life for millions of people across India.

All of the examples illustrated above show how companies are innovating with the people and communities in which they are situated. They are viewing the community as an integral part of the organisation and through close contact and communication they can address the real needs of that community in a mutually beneficial way (Brown, 2009; Pilloton, 2009, 2010; Prahalad, 2010). The communities are supplied with a service that they need and one that in many cases fosters new jobs and, therefore, incomes to families that need it. As the community is invested, financially and socially, in the organisation then it acts as a barrier for competitors to get into the market; this has obvious benefits for the company.

5.7 Chapter Conclusions

This chapter has demonstrated how participatory design techniques have been used to understand, respond and react to communities. The ranges of initiatives illustrated have been based in academia, regional councils, NGOs and government organisations. The outcomes from the examples have all focused hyperlocally on community-specific challenges yet the outcomes or methods used can be applied on a wider scale.

The different examples of socially-led innovation in India all have key elements in common. At the core has been the development of a process that works in India for the Indian community. They have re-evaluated how they are organised and the services are delivered. The innovations have come from communication and engagement with the community that they service. This allows the people within the community to become ambassadors for that organisation. Through positive engagements and word of mouth they build momentum behind the company, supporting the product or service and ultimately protecting it against competitors gaining a foothold into the market.

This approach is being employed by organisations in the West. They now understand that they can build strong alliances and partnerships with other companies and communities. These alliances are being used to understand their markets better and foster innovation. The Open Innovation approach has been partly driven by necessity due to the economic downturn since 2008. Companies are less willing to invest large amounts of capital into new projects; they need partners. As C.K. Prahalad states, *'There is growing recognition that marrying the local knowledge of the nongovernmental organization with global reach of the multinational firm can create unique and sustainable solutions'* (Prahalad, 2010. p5)

Table 6 highlights the core reflections of the chapter and their associated subject area and reference.

Subject Area	Core Reflections	Related Research Question	Core Reference
Community focus	There is a shift from designing for individuals towards designing for communities.	<i>How can design research play a role in the activity of a global technology company?</i> <i>How can design research methods support socially-led innovation in NCR?</i>	(Brown, 2009; Burns et al., 2006; Tan, 2012)
Community engagement	Proximity, empathic investment and pervasiveness are key elements required for lasting impact.	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	(Pilloton, 2009, 2010b, 2013)
Mutual benefit	The core skills of an organisation are aligned to the needs of the community.	<i>How can design research methods support socially-led innovation in NCR?</i>	(Prahalad, 2010)

Table 6: Chapter Reflections

Chapter 6: Literature and Methodological Review Reflections

This section has covered three broad areas that all relate to the area of study. The subject areas approach the understanding of the design research in a global organisation from different angles. This chapter will review the literature review section and reflect on the core texts referenced within each section and how they will influence the future study.

The first subject area focused on the role of design in a corporate culture. A global corporation by its nature has to understand the effects and influences culture can have within the organisation. John Hooker supports this. *'If we want to understand what is going on around us, and if we want to succeed in the new world order, we must learn how differently other cultures think.'* (Hooker, 2007)

Global corporate culture has many influences. Edgar H. Schein points out that these are on three levels: *'Artifacts'*, *'Espoused Values'* and *'Underlying Assumptions'*. The influence of these separate elements also relates to how design is used and perceived within an organisation. The role of design has continued to evolve from packaging to a core strategic asset.

Still, within many organisations, particularly those where design is not at the core of the company's strategic vision, the role of design is often overshadowed by other more dominant groups (Tether, 2005). The Danish Design Centre identified four levels in which an organisation adopts design (Denmark. National Agency for Enterprise and Housing, 2003; Ramlau, 2004). They have recognised that the higher a company is placed on this ladder then the better its gross performance. This placement of the design group and its perceived value is relevant to the current and future role of the Cx Design group in NCR.

The development of the group has been to move slowly towards an understanding of the consumers' experience. In order to understand consumers and enable them to become a valued part of the design process, some organisations are moving to a co-creation model. C.K. Prahalad was a keen supporter of the co-creation approach believing that it gave companies a *'new respect for consumers as co-creators of solutions'* (Prahalad, 2010. p15).

Supporting the co-creation model, Ravi Chhatpar defines a '*new approach*' to strategic decision-making (Chhatpar, 2008). This approach is of particular relevance to the thesis as it attempts to bring together different elements of an organisation together with user understanding; this is all done with design research at its core.

The methodological review focused on Participatory Action Research. The chapter was particularly interested in people and methodologies that bridged research with design practice in real-world situations. The case studies in Section III utilise methods associated with applied research and apply them to specific design challenges within a multinational corporate context.

Core to the methodological approach taken was action research. This has many branches; the main focus is participatory action research as it can be applied in real-world situations with communities of people. McNiff's and Whitehead's (2011) methodological action-reflection approach is also of interest as it was suitably evaluative and reflective and also contains similar attributes to an iterative design approach.

The case studies conducted within this thesis are practice led. The case studies use design activities to understand the role that design research can play in the larger organisation, similar to the approach taken by the global design consultancy IDEO (2012, 2002).

There are many methods that can be appropriately applied to design activities. Elizabeth Sanders states that seeing consumers as co-creators puts them '*in equal stature*' (2005. p4) with designers which lends itself to methods where the design works with the participants. Three approaches were discussed: user-centred, co-design and community engagement. The user-centred approach focuses on designing *for* users (Gulliksen et al., 2003), the co-design approach is concerned with designing *with* users (Design Council, 2008) and the community engagement approach is about *responding* to community needs (Blum-Ross et al., 2011). The methods that are applied have to be selected by understanding what is most appropriate for the context and stage of the project. Robert Curedale's book illustrates the breadth of methods available driven by the global need to understand people and experiences (Curedale, 2012).

The third subject area was design in socially-led innovation. This chapter is particularly focused on design in a community context. John Thackara believes designers should look beyond creating another product but be more concerned with how people's lives can be improved through sensitive consideration of the experience (Thackara, 2005).

There is a shift from designing for individuals towards designing for communities (Brown, 2009, 2008; Burns et al., 2006; Egglestone and Rogers, 2010; Frohlich et al., 2011). The chapter discusses the approaches taken in a series of community-led initiatives. Emily Pilloton, the founder of Project H, believes *proximity*, *empathic investment* and *pervasiveness* are key elements required for lasting impact (2010b. p48).

Community engagement and understanding can be seen as part of a corporation's social responsibility. Engaging with communities where partnerships are formed for mutual benefit is what Lakin and Scheubel call Corporate Community Involvement (CCI) (2010). Yet this has to be done in a considered and appropriate way or it will negatively impact the image of the company.

Socially-led innovation is a particular focus in India where corporations and communities face real challenges with poverty, illiteracy, health and infrastructure. Prahalad called this the Bottom of the Pyramid (BoP) yet he believed that there were great opportunities to alleviate their situation stating '*...if we stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value conscious consumers, a whole new world of opportunity will open up*'. (Prahalad, 2010. p1)

Prahalad advocates a more open approach to innovation, for business and communities to work together, using the collaboration as a catalyst for innovation and investment. This approach builds on the methodologies and methods discussed in the previous chapter.

Table 7 highlights the core reflections and their associated subject area.

Subject Area	Core Reflections	Related Research Question	Core Reference
Role of design in a corporate culture.	Other more dominant groups within an organisation, where design is not at core of the company's strategic vision, often overshadow the role of design.	<i>How can design research play a role in the activity of a global technology company?</i>	(Denmark. National Agency for Enterprise and Housing, 2003; Ramlau, 2004; Tether, 2005)
Co-creation in business for mutual benefit.	Corporations can find a new respect for consumers as co-creators of solutions if there is proper engagement. This new respect will bring mutual benefits.	<i>How can design research play a role in the activity of a global technology company?</i> <i>How can design research methods support socially-led innovation in NCR?</i>	(Pralhad, 2012, 2010)
Design research strategy.	Bring different elements of an organisation together with user understanding with design research at its core.	<i>How can design research play a role in the activity of a global technology company?</i>	(Chhatpar, 2008)
Thesis bridges areas of design research.	The case studies utilise methods associated with applied research and apply them to specific design challenges within a multinational corporate environment.	<i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	(Kumar, 2011; Yin, 1989)
Methodological focus.	The main focus is participatory action research as it can be applied in real world situations with communities of people. McNiff's and Whitehead's methodological action-reflection approach is also of interest as it was suitably evaluative and reflective and also contains similar attributes to an iterative design approach.	<i>How can design research methods support socially-led innovation in NCR?</i> <i>How can participatory design through an action research methodology be integrated into the design process within</i>	(McNiff and Whitehead, 2011, 2009)

		<i>a global corporation?</i>	
Method application.	Range of methods available and appropriate in co-design, community-focused approach.	<p><i>How can design research play a role in the activity of a global technology company?</i></p> <p><i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i></p>	(Blum-Ross et al., 2011; Curedale, 2012; Design Council, 2008; Sanders, 2002)
Community focus.	There is a shift from designing for individuals towards designing for communities.	<p><i>How can design research play a role in the activity of a global technology company?</i></p> <p><i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i></p>	(Brown, 2009, 2008; Burns et al., 2006; Egglestone and Rogers, 2010; Frohlich et al., 2011)
Community engagement.	Proximity, empathic investment and pervasiveness are key elements required for lasting impact.	<p><i>How can design research play a role in the activity of a global technology company?</i></p> <p><i>How can insights that have been generated through hyperlocal research be applied globally?</i></p> <p><i>How can design research methods support socially-led innovation in NCR?</i></p>	(Pilloton, 2010)
Open innovation.	A more open approach to innovation, for business and communities to work together,	<i>How can design research methods support socially-led</i>	(Prahalad, 2010. p5)

	using the collaboration as a catalyst for innovation and investment.	<i>innovation in NCR?</i>	
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Table 7: Core Reflections and References

The following chapters demonstrate through a series of case studies how a multinational corporation has engaged in participatory action research, employing participatory design methods to understand, respond and react to community engagements. The case studies have taken place locally and internationally in markets in which the NCR Corporation is engaged. The case studies build on the previous chapters; with an understanding of the corporate context in which the author is based they have grounding in participatory action research methodology with socially-led values.

Section III

Case Studies

Introduction

The definition of a case study is '**1** an attempt to understand a person, institution, etc., from collected information. **2** a record of such an attempt. **3** The use of a particular instance as an exemplar of general principles'. (Thompson, 1996. p202).

In this section, four case studies will be examined that attempt to understand different people, communities and environments on a local level in relation to specific research questions and apply the insights gained to a larger global corporate context.

Case studies as an approach have inherent strengths and weakness, it is necessary to understand these and ensure that the method is applied appropriately and any weaknesses are recognised and limited. Case studies are the approach in which I have applied specific design methods, such as shadowing, focus groups and Video Insights. Case studies involve the analysis of small user groups or data sets, the use of case studies becomes difficult when the resulting output does not meet requirements to make it statistically relevant, if this is indeed required (Gillham, 2000).

The multi-method approach and the encompassing approach of case studies allow the researcher to apply a range of methods appropriate for the context of the investigation (Yin, 1989). The research is collected over a period of time and is contextual, appropriate for the researcher to get a real world understanding. The use of case studies also allows for stories, anecdotes and insights to be gathered and understood that could not be obtained through quantitative methods.

The process of applying case studies to understand people, communities and environments has been discussed in *Chapter 5: Case Examples in Design in Socially-Led Innovation* and is the basis for this approach being taken. It demonstrates that case studies are a familiar approach in design research with communities. DOTT '07 used a series of case studies to examine current failings in elderly dementia care services. The case study of how participatory design in the community had created services to support carers was a powerful method for communicating the role of design and engagement in the local community ("Design Council," 2007).

The BESPOKE project used a series of different design activities based around how journalism, entrenched within the community, could be used within a community

innovation process (Blum-Ross et al., 2011). The project used Insight Journalism to generate insights, which would provide the basis for tangible and often interactive objects. The responses to the objects or services from the local community could then be studied further. Each of the case studies built up a picture of the role of community engagement through Insight Journalism. This locally-specific picture could then be broadened to understand how it could be applied to a wider field or global context, such as India (Egglestone, 2013).

The innovation and co-creation organisation PROUD used the case study of '*Beyond the Castle*' to describe how they had applied a series of co-design methods within a community context to re-imagine how a specific community environment could be developed for future enjoyment. The process of the case study allowed the team to apply a series of methods that created a dialogue with the community that would have been virtually impossible through quantitative methods alone.

The following case studies demonstrate the embedding of local participatory design activity within the global thinking of a multinational organisation. They illustrate how participatory action research as a methodology has been used to engage with people and communities on a local level and the outcomes used to reflect on the design practice within a global corporation. They have been selected for this thesis over other smaller activities that took place as they best describe the journey of the research activity, demonstrate a broad range of method application, and engage with communities both locally and internationally.

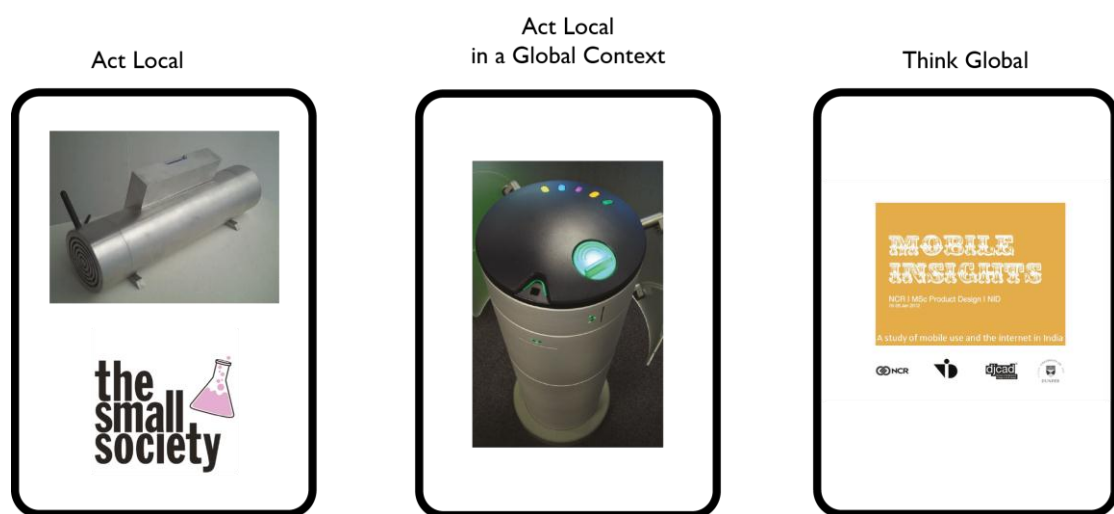


Figure 7i: Case Study Categories

The case studies have been categorised into three categories Act Local, Act Local in a Global Context and, finally, Think Global (see Figure 7). There are two case studies within the Act Local category. The first was an introductory study into the methods and approaches appropriate for participatory action research, and the second takes a more focused approach to explore concepts relevant for multinational corporations while also strategically relevant for NCR. These two case studies were conceived, driven and directed by the author. This allowed the author to have overall control of the activity and its output.

The Act Local in a Global Context category applies the approaches learned in the previous case studies and applies them in a community within the slums of Mumbai, India. An NCR-driven initiative, it demonstrates how methods learned locally can be applied globally and also how insights gathered globally can be applied locally. Positioning case studies in India was strategically relevant for NCR as it is a market of continued and increasing interest. NCR is heavily invested in the region with research, development, sales and manufacturing facilities positioned there. As stated in Chapter 5, Prahalad recognised that the people at the bottom of the pyramid could provide a huge untapped resource of innovation, inspiration and opportunity.

Progressing beyond the local level, the category Think Global builds on the previous case studies by describing a series of participatory design research activities in India conducted by a team from the UK. The insights gathered and ideas generated are appropriate not only to the specific understanding of the local market but also to the wider global arena. This activity was conceived and directed by the author but importantly had research deliverables for NCR and wide visibility within the organisation. All of the case studies had outcomes that either directly or indirectly fed back into NCR or specifically the Cx Design group. An activity timeline can be seen in Figure 7ii, which breaks down the activities and the methods applied.

Throughout the case studies all interactions with communities and the resulting output followed NCR's and Duncan of Jordanstone College of Art and Design's policy on ethical compliance. Where necessary, consent forms were given to the participants, an example of which can be found on the accompanying CD, indexed CD-7. The consent form ensured all parties were fully aware of the purpose of the research, what information was to be collected, how it was to be used and that any information would be stored anonymously. In the case of the interviews conducted as part of *Chapter 12: Reflections*

with Stakeholders, with their consent it was necessary to identify the participants, however, members of the Cx Design team remain anonymised.

The structure of the reporting of the case studies follows the process as mapped out by McNiff and Whitehead (2011. p8-9) that follows an action research report structure. The reader should note that the case study sections of the thesis have been written in the first person, as is common with action research reporting. The report is broken down into seven phases, each phase relates to a different stage of the design process. Following this structure allows the reader to clearly see how the projects have evolved and allows for future participatory design projects conducted within the Cx Design group to follow the same process.

Phase 1: Observe, take stock and identify concern.

Phase 2: Reflect on possible ways forward and begin to plan a solution.

Phase 3: Take action to try out the solution.

Phase 4: Monitor and observe the outcomes.

Phase 5: Evaluate and reflect on what has happened.

Phase 6: Modify practice.

Phase 7: Move in new directions or return to observe/reflect/act cycle.

Throughout the various case studies presented there were always a number of stakeholders engaged formally and informally. The constants were:

- *Myself*: I had to ensure that I stayed true to my own values and ultimately controlled the direction of the research.
- *The University of Dundee*: Ensuring there was academic rigour to the research throughout the PhD programme.
- *The NCR Corporation*: My employer and sponsor of the research and as such wanted to ensure the activities I was engaged in were relevant to the wider NCR community and business.

The individual case studies attempt to answer specific questions relating to the particular area of that study. These questions all feed into the main testable proposition of '*How can design research play a role in the activity of a global technology company?*'

A series of sub-questions to help answer the overarching question will be answered throughout the case studies and in the *Analysis and Reflections* chapter. These questions are:

1. *How can participatory design through an action research methodology be integrated into the design process within a global corporation?*
2. *How can insights that have been generated through hyperlocal research be applied globally?*
3. *How can design research methods support socially-led innovation in NCR?*
4. *How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?*

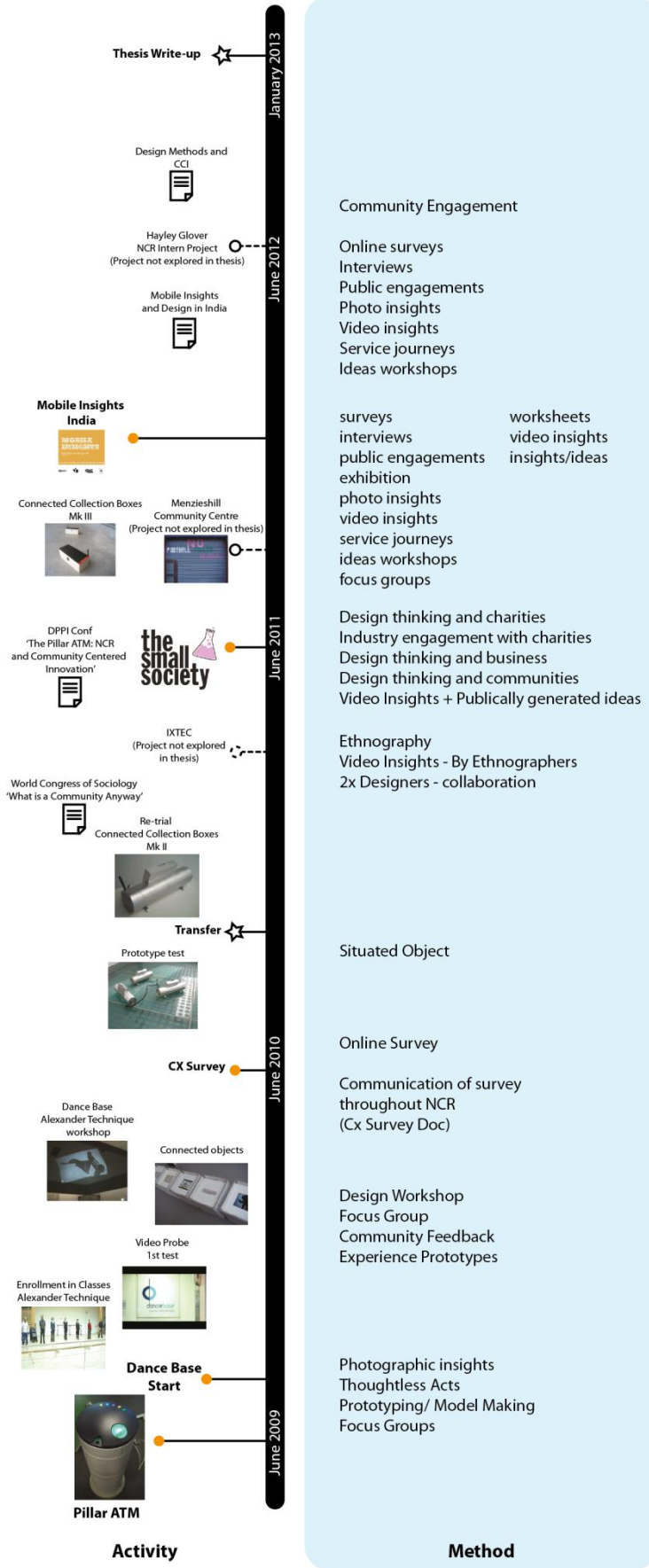


Figure 7ii: Project Activity Timeline

Chapter 7: Case Study I

Act Local | *Dance Base*

7.0 Introduction

The first case study will describe how design research techniques were explored to engage with a local community of people held together through their love of dance and the space in which this is fostered. The case study functioned on various levels; the primary function was to introduce me to design research, the methods and practices. Coming from industry it was necessary for me to understand how I could apply the methods and articulate the theories I was beginning to appreciate from academia. The process was to explore the new methods, gaining insights into how to apply them and how to build community relationships. It was important to conduct this relatively contained study outside the usual NCR context as it was exploring more unconventional practices. Secondly, I was to satisfy the client's brief. They had come with a specific need that had to be addressed. Thirdly, I was keen that the process and/or output would directly or indirectly feed back into NCR's working practice.

A series of research questions specific to the case study would be explored through the project activity that aimed to satisfy the various stakeholders engaged formally and informally with the project.

- *How can the charity connect with its customers locally?*
- *Do connected objects stimulate connectivity and communication within a community?*
- *How can a self-service device influence communication within hyperlocal communities?*

Although a hyperlocal study creating a bespoke design for one client is situated well outside of NCR's typical operating space, it did not mean that the process and results could not relate to how design is evolving in NCR. The case study ties directly to the statement in *Section 2.3 'One' Design Future for NCR*, by NCR's Vice President of Design, Lyle Sandler, where he states that '*good design requires creativity, debate, analysis, and collaboration*' (2013). The study is an attempt to take that ethos and apply it initially on a local level. As design within NCR moves into its '*Experience Era*' the study focuses around attempting to understand appropriate methods that can be applied to

understand what consumers want in terms of an experience and how that can be delivered in a self-service device.

While it was never the intention for the output of the case study to produce commercial strategically relevant results, the iterative design process did follow a similar model illustrated by Ravi Chhatpar (Chhatpar, 2008) and discussed in *Section 3.6 Review of Chhatpar's Strategic Design Approach*. The design research ran in parallel with the user validation and prototype creation, following a co-creation philosophy discussed by C.K. Prahalad (2010) and Piller et al (2004). Although there was no strategic business validation it could be argued that the Dance Base team's role was to ensure that the output satisfied their strategic plan for charitable donations and brand awareness.

The experience of the interaction was a key element of the final design created. As McCarthy and Wright (2004, 2010) highlight, any experience is individual. Everybody comes with their own personal feelings, memories and emotions that all act to influence the experience delivered. The final output of the study was sympathetic to this and allowed an element of customisation, even allowing different experiences to be created through the different objects created. An element of what Pine and Gilmore (1998) call the 'Stage Experience' was created through the final pieces when they were placed in the foyer of the studios.

The reporting of the case studies follows McNiff's and Whitehead's iterative process discussed in *Section 4.2 Action Research Methodology*. This methodology allowed for the application of a range of methods at various stages of the process from gaining insights, generating ideas and evaluating the outcomes. The process of researching through design is an approach taken by Bill Gaver (Gaver, 2007; Gaver et al., 2004, 2003). He uses designed objects to illicit insights and debate into users' interaction with objects. His work usually has a playful, often ambiguous, element. This ambiguity and playful interaction inspired the final output from the study.

The community of people who use and interact with Dance Base were the focus of the study, the methods applied throughout and the output was community driven. This approach builds on the examples highlighted in *Chapter 5: Case Examples in Design in Socially-Led Innovation*. Engagements with the community are used to create innovative responses to their needs, in a similar way to approaches taken by BESPOKE, PROUD,

DOTT and Project H. All of the examples highlighted engage closely on a community level, tailoring the insights and output to the specific needs of the community.

The core research team consisted of myself, Jon Rogers and, later in the project, Michael Shorter, Michail Vanis and William Henderson would conduct electronic and fabrication work. Jon, my first supervisor, made the initial contact with Dance Base and attended most of the project meetings with the Dance Base team. He oversaw the project to ensure there was the appropriate academic rigour being applied. It was my responsibility to direct the project and apply the appropriate methods to engage with the community that would allow me to design an appropriate solution. The next section describes the first phase of seven of the case study. The purpose of the initial phases are to observe and identify the issues and understand what approaches should be taken (see Figure 7.1).

7.1 Phase 1

Observe, take stock and identify concern

Why Dance Base? In August 2008 the research team were approached by Dance Base to create a collection box for their studio building situated on the historical Grassmarket in Edinburgh. The project was perfectly suited to begin an introduction to participatory design research as the Dance Base team were keen for a long-term commitment and the community of people that accessed the charity were diverse in ages, genders and social backgrounds.

Dance Base is a charity [<http://www.dancebase.co.uk>] and relies heavily on government funding and lottery grants. They are dependent on the money to function day to day and manage a range of outreach programmes for children from disadvantaged backgrounds. The challenge the centre has is that they are in such a modern looking space that nobody recognises they are a charity and grants and funding are becoming harder and harder to come by. Dance Base wanted a way to, firstly, generate some income and, secondly, give the users of Dance Base a gentle reminder that donations are needed to keep the place alive.

The project started with an initial consultation with a core team at Dance Base. This initial meeting consisted of an informal tour around the building and discussion on the challenge and next steps. There was an understanding at this stage that while a solution was to be delivered that the process could become part of a wider PhD research activity.

The building consists of three dance studios, a foyer, office space, changing facilities, an informal meeting area and a linking corridor that connected the old part of the building to the new. The internal walls and structure of the building are constructed with wood, concrete and steel, all shown in their raw form throughout. There was a demonstration from some of the attending professional dancers that are based at the site as well as introductions to the wider Dance Base team that organise events, outreach programmes and generally manage the site.

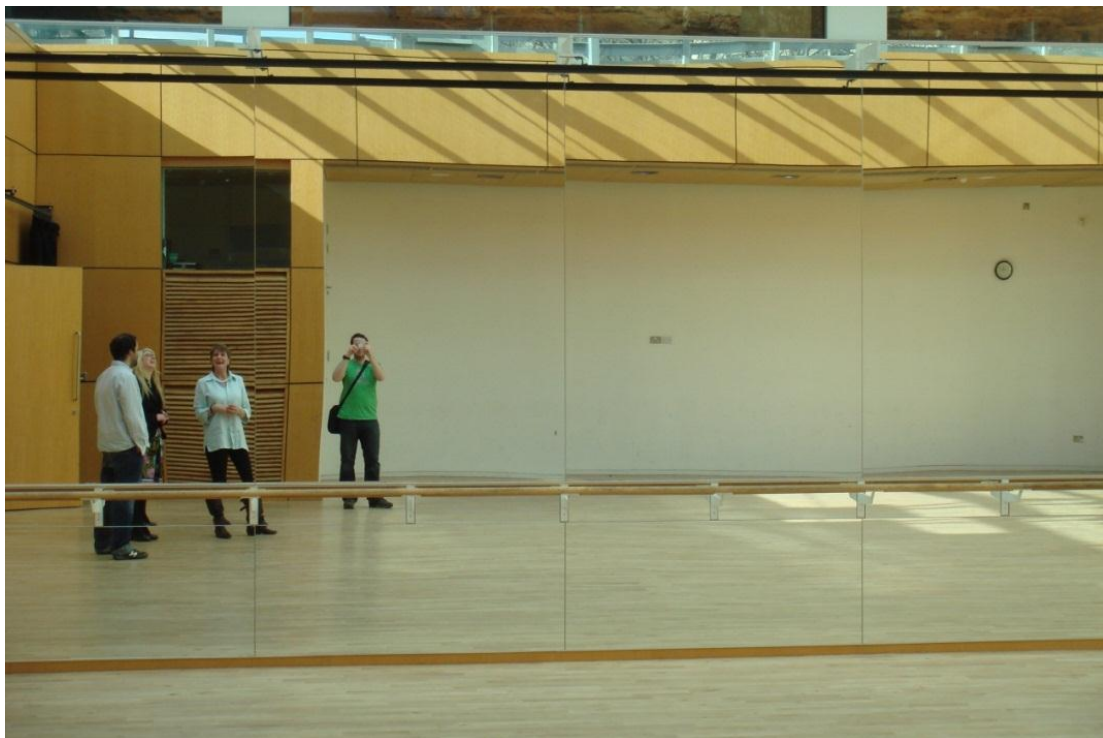


Figure 7.0: Studio One, Dance Base. August 2008. Steven Birnie

What became clear during the tour was just how important the space was to the Dance Base employees and customers. As well as the obvious use for a collection box, which is to collect donations, the Dance Base team wanted to raise the awareness to their customers of the fact that they were actually a charity. The Dance Base team also welcomed the proposal to explore wider opportunities, beyond a collection box, that could raise awareness of the charity and raise money. This began a programme of activities and design exercises to help the design team understand the environment, the people and the design challenges.

7.2 Phase 2

Reflect on possible ways forward and begin to plan a solution

All of the parties involved recognised that to simply place a large collection box in the middle of the front foyer would be insensitive, unrewarding and simply not work. There needed to be close collaboration with the community of Dance Base, they needed to get behind the project for it to become successful.

The next step was to understand ways in which this could be done. The purpose was to gain community support and to allow for a greater understanding of the people, place and context in which the solution would sit. The core reasons for the methods were identified which helped to select the most appropriate methods for the project and community. The reasons were:

- *Empathy* – Who are the people of Dance Base? Why do they go there?
- *Understanding* – It was as much about the community understanding the research, as it was the researcher understanding the community.
- *Engagement* – This type of project could not be done from afar, it was about communicating and interacting with the people that use Dance Base.

The following methods were identified as being relevant going into the initial stages of the project and would eventually inform the development of the activity going forward. They were selected as they involve a high level of community engagement and are particularly suited for a researcher that needs to understand both the people and the context of the research subject.

Digital Ethnography (Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004) – Digital cameras and digital video cameras were used to capture images of the people in context, using the space, interacting with the building and each other. The output helped to gather visual and audio information about the space in a quick, efficient and nonintrusive way. The output could be printed, discussed, analysed and used repeatedly.

Shadowing (Curedale, 2012; Kuniavsky, 2003; McDonald, 2005) – To get a deeper understanding of the people and place, employees of Dance Base were shadowed for short periods of time. This allowed for an understanding of the different interactions that take place and also to see how the space is used.

Video Insights (Buur et al., 2000; Gaver et al., 2004, 2003; Raijmakers et al., 2006; Suri, 2003; Ylirisku and Buur, 2007) – This method required community involvement. The purpose of using this technique was for gaining insights and design inspiration. The multi-sensory, audio and visual output that video provided was suited to the environment of study and the design process. The output became most useful during the ideation stages. The Video Insights used were adapted from the technique described by Ylirisku and Buur, 2007.

Experience Prototyping (Buchenau and Suri, 2000; Buxton, 2007; Moggridge, 2007; Suri, 2003) – Tangible models of the concepts were created that could mimic the desired interactions proposed. The experience prototypes allowed the Dance Base community and me to better understand the proposals through an appreciation of the scale, form and interaction.

Community Workshop (Bjelland and Wood, 2008; Egglestone and Rogers, 2010; Gaver, 2011; Press et al., 2011) – A community workshop was used to evaluate concepts, develop further ideas, and to let the community understand the design process. This proved to be most useful in getting all members of the Dance Base community, from board members to customers, engaged in the project and the proposed direction.

A timetable for the various activities has been split over two pages and can be seen in Figure 7.1.

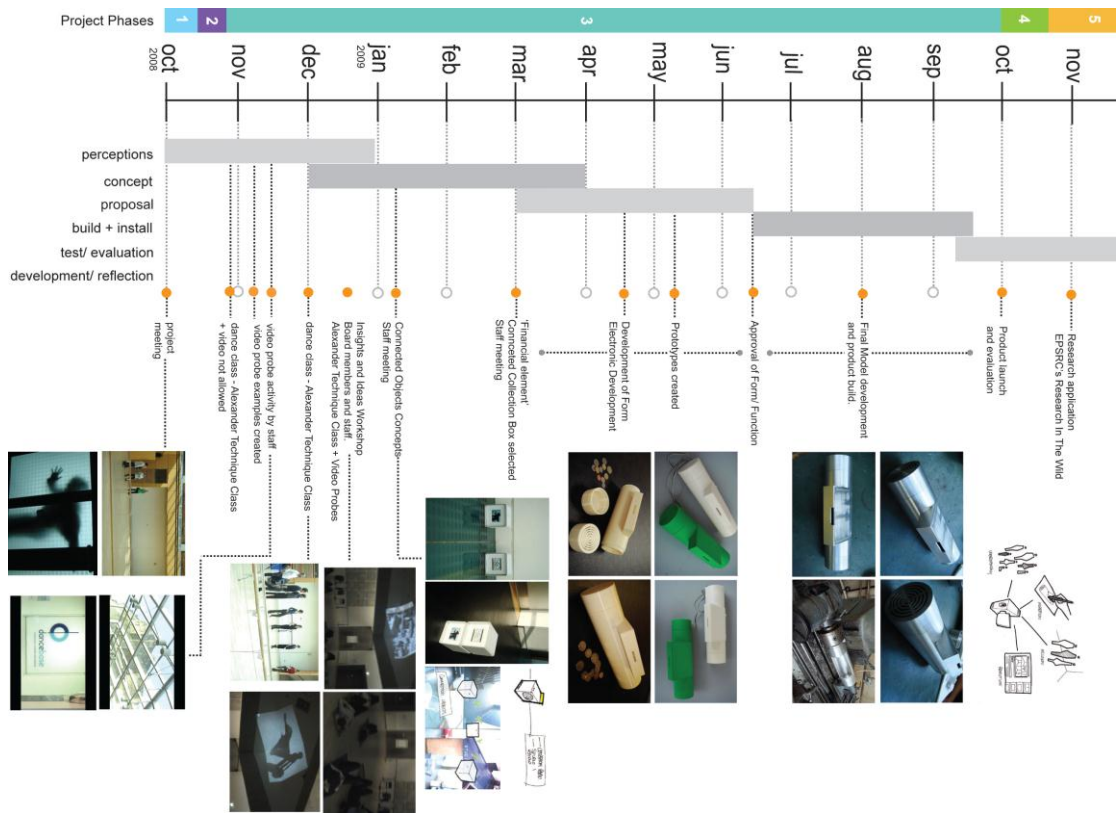
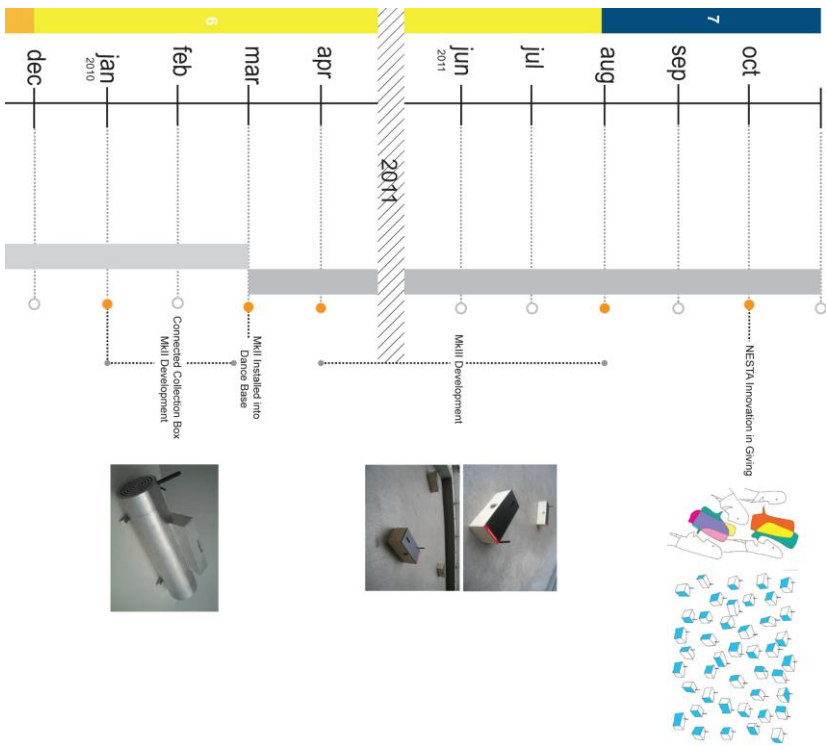


Figure 7.1: Dance Base Project Timeline



7.3 Phase 3

Take action to try out the solution

Action 1: Community Engagement

The core of the project was to design a product to be used by people of all ages and backgrounds brought together in one place by dance. Shadowing and engaging with the community allowed for a better understanding of the people, the tutors, the infrastructure and the environment. The enrolment of a dance class was essential; the class was called an Alexander Technique (AT) class.

Described as a movement-based way of thinking the class allowed for an introduction into this new environment. Being part of this class not only showed the variety of people who attended the one class but also allowed the participants and tutors to get used to the project team, who were newcomers into their environment. This helped to break down barriers and allowed for effective communication.



Figure 7.2: Alexander Technique Class, December 2008. Steven Birnie

Action 2: Video Insights

In parallel to the AT class, several of the employees were asked if they would each create a three-minute film showing their '*perceptions of Dance Base*'. A digital video recorder

was left with the group with little more direction other than that they had complete control of the content.

The results were very useful in that they provided unique insights into the community and space that I could never have accessed as an outsider⁴⁴. The primary use of the videos was to gather insights that could then be used to generate a range of ideas. Yet, after using the videos successfully with the community I became aware that they could be used on various levels, perhaps beyond a research tool. They could be used for:

Inspiration – Analysing the videos to generate a range of different ideas specific to a particular design challenge. The videos help the researcher to pick out details that may otherwise have been missed.

Understanding of participant – As a designer I am engaging with people, places and communities I know nothing about. The three-minute videos allow me to very quickly get a better understanding of the various stakeholders, the environment and challenges.

Understanding of community – As part of the research, I was studying self-service products in a community environment; using video for this was a better method for capturing the wider community as opposed to a photograph as it shows the participants interaction in real time. The videos can be viewed through the eyes of the participant, as opposed to a researcher viewing the participant using a machine or interacting in an environment.

Promotion – A surprising outcome of the method has been how it has also been useful for the participants. The quality of the videos created by the Dance Base team was such that they have been able to use them as promotional material for their charity.

Use within industry – This method is appropriate to my research as it allows me to quickly gain an understanding of the people, place and product. This method can be used within a large multinational corporation to help us try and better understand various elements of a user's experience, a user's day-to-day activity or environment in which our product will be situated. It is a method that does not require a huge

⁴⁴ The full videos can be viewed on the CD that accompanies this thesis. Indexed CD-2.

investment. The researcher's time is not taken up actually recording as the video camera is left with the participant.

Some of the strengths of this activity are:

Involvement – Bringing the participant into the design process ensures a closer relationship with the researcher and, therefore, a better understanding and appreciation of the final solution. This is in line with current thinking on co-design (Stickdorn and Schneider, 2010), the activity of bringing the participant in the design process.

Useful output – Valid not just for one particular project. They allow for design teams to build up an audio and visual record of a community of people within an environment that can be referred back to at different times.

Ease of use – Allowing the participants to simply play with the video camera can be a fun and enlightening process. There is no pressure on the participant to suddenly become the next Steven Spielberg... a three-minute limit was generally set to so they do not become overwhelmed by the thought of creating a movie.

Action 3: Insights and ideas

The digital video content was used to generate a wide range of ideas. The visual and audio feedback from the videos created by the members of the Dance Base community can be directly related to the concepts generated. The Video Insights were used to inspire as well as inform. The ambiguity of some of the imagery was welcomed as it provided a rich source to be interpreted in different ways.

The process involved watching the videos, sometimes many times, and noting down points of interest. These points of interest may be sounds, images or feelings that the videos have inspired. These initial notes were then developed into a range of loose sketches, the 'ideas'.

Insight



Idea

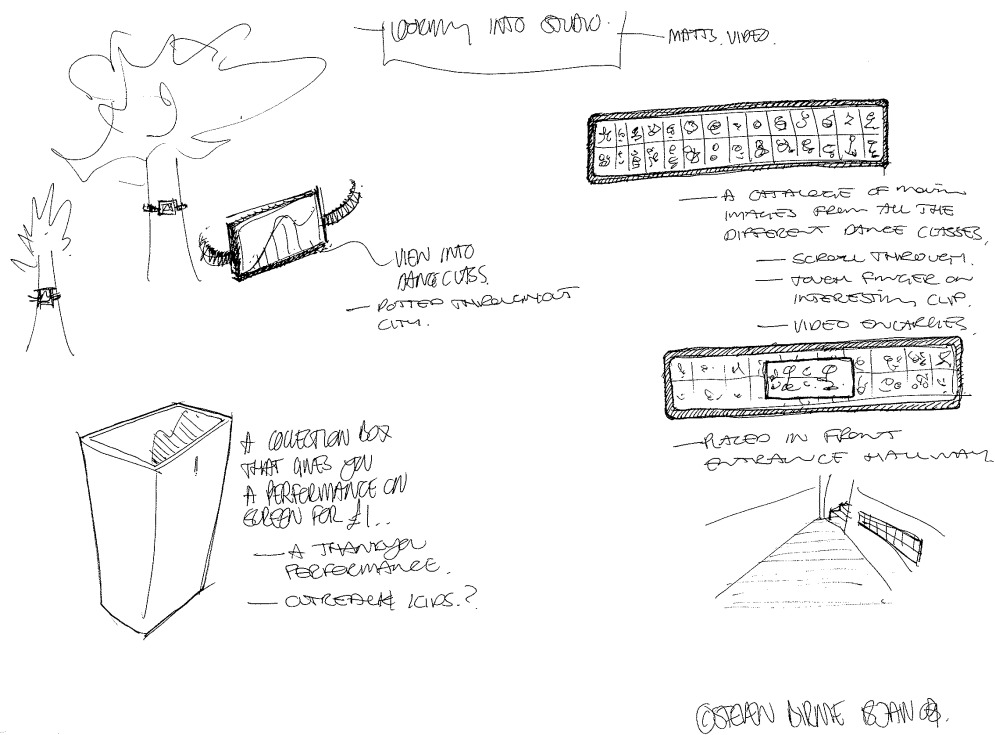
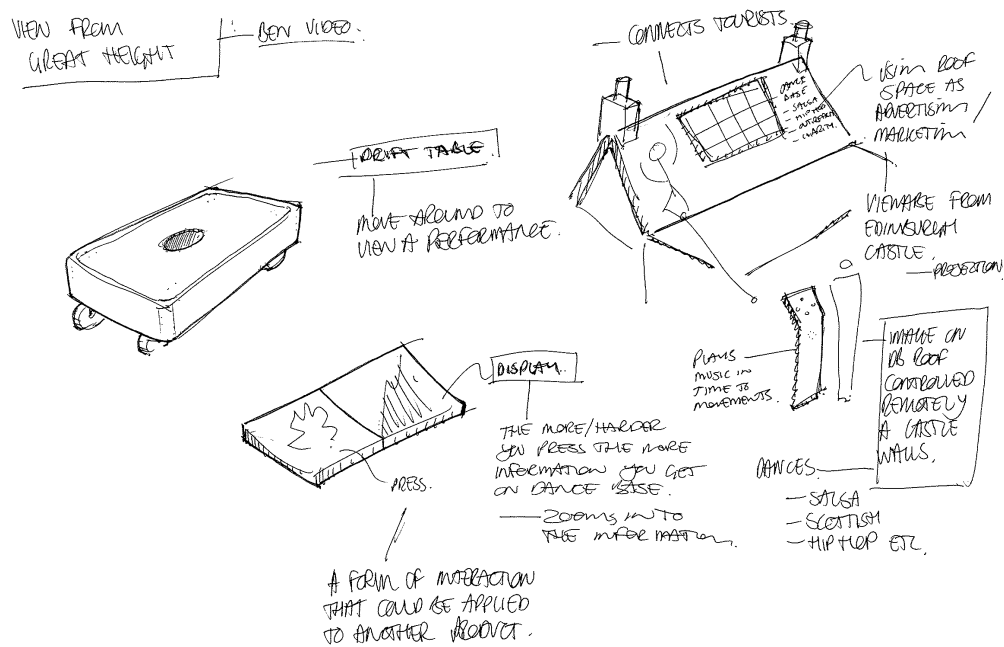


Figure 7.3: Insight and Ideas. Dance Base. Steven Birnie. 2009

Insight



Idea



GESTURE DRIVEN BEHAVIOUR.

Figure 7.4: Insight and Ideas. Dance Base. Steven Birnie. 2009

Insight

Action 4: Community Workshop

The lessons learned in the AT class and the Video Insights were applied to a workshop held with board members, staff and customers of Dance Base. The intent was to approach the workshop from their level, to incorporate things familiar to them and to be an introduction to the initial design concepts.

I instructed the AT tutor at Dance Base to ask the participants to lie on their backs, looking up at the roof of the dance studio the workshop was being held in. This was a standard part of the relaxation exercise conducted in AT classes; but this time the videos created by the Dance Base team were projected onto the roof. While the participants were getting into a relaxed state the tutor asked them to think about various questions relating to the experience of Dance Base. Examples of these questions were:

- *'Why should anyone give money to Dance Base?'*
- *'Dance Base is unique, why?'*
- *'You've come away from Dance Base with the biggest smile on your face, why?'*
- *'Pretend you're anonymous, what do you really think Dance Base is?'*
- *'You have a spare £1 in your pocket, what would make you put that into a Dance Base collection box?'*



Figure 7.6: AT Workshop with Video Insight Projections. Steven Birnie. 2009

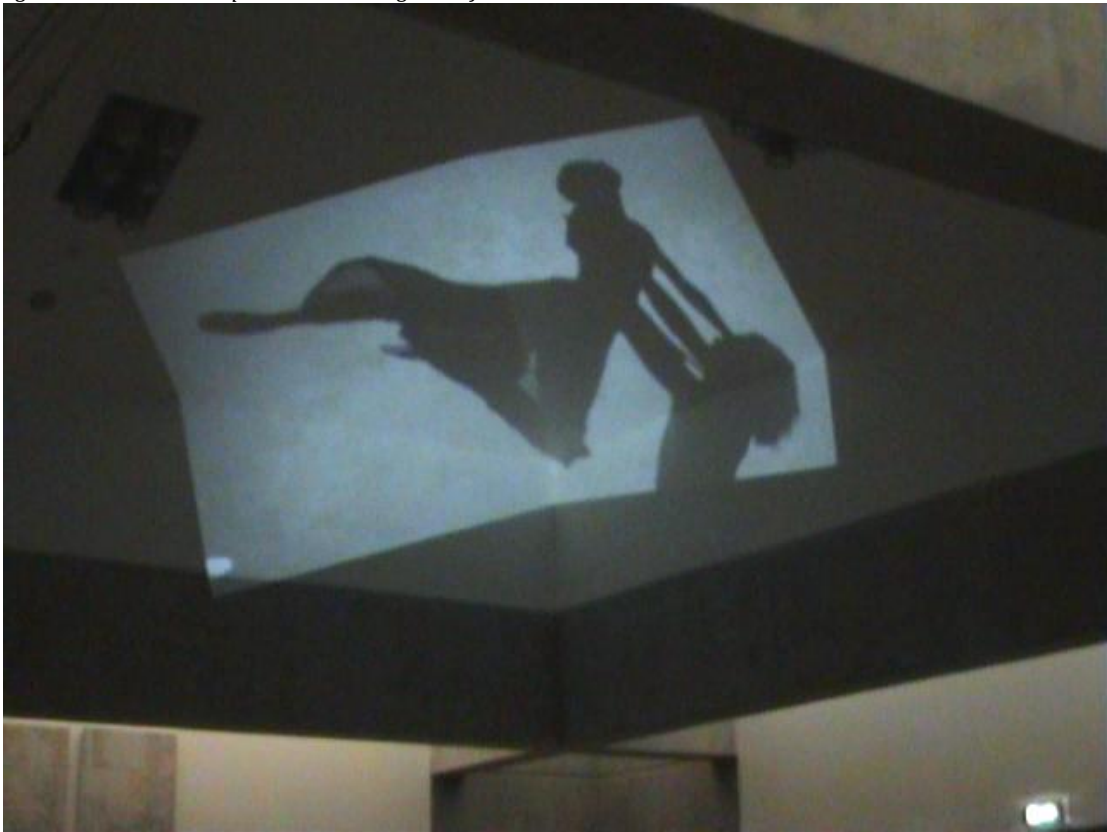


Figure 7.7: AT Workshop with Video Projections. Steven Birnie. 2009

These questions were posed to the participants at the beginning of the workshop to help set the scene and get them in the right frame of mind. The aim was to get all the individuals to participate and think creatively, the approach taken let them all know that this was not going to be the usual board meeting.

The walls of the studio had concept images illustrating various insights and ideas. All the participants gathered around the concept boards as the rationale and different design directions were explained. Having both the insight and idea helped them understand the approach much better than just the idea alone. The approach generated more discussion around development opportunities, new ideas and the project as a whole.

One of the elements recognised was the use of the space by various user groups: professional dancers; drop in classes; children interested in street dance; children interested in ballet; ballroom dancers; administration staff and the board of directors. The intent was to create an object that connected the space with the various interconnecting people. This began an exploration of 'connected objects'.

Action 5: Connected Objects

The objects investigated connecting the people through a dance studio radio, Twitter, Flickr and YouTube. Through meetings with the Dance Base members it was clear that they had a lot of content, from videos and photos of performances, that could be better shared with the community that use the space. Card prototypes were created and evaluated by members of Dance Base. The prototypes were placed around the environment and in some cases connected to illustrate their design intent. These experience prototypes were quick and inexpensive ways to understand whether the design should be pursued further.

Although interesting objects in their own right, upon review they were not suitable for this particular project. There was still a strong desire to ensure a financial element to the final design.



Figure 7.8: Connected Objects Concept Models. (left to right) Skype Radio, YouTube Box, Twitter Box and The Flickr Box. Steven Birnie. 2009



Figure 7.9: Connected Object Concept Model. Skype Radio Box. Steven Birnie. 2009

Action 6: Connected Collection Box

Although the initial intention for the project was to create a collection box it was through the community involvement and various engagements that the concept for a series of connected collection boxes had evolved. Through the participatory design process the community of Dance Base now had a stronger stake in the project.

A series of sketches and models were created of potential collection box ideas and discussed closely with the Dance Base team before a final form was decided.

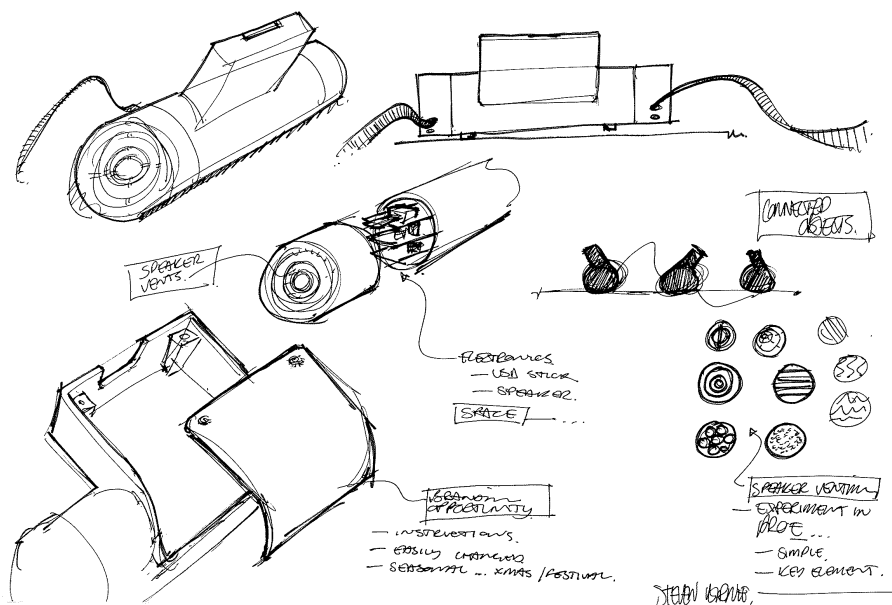
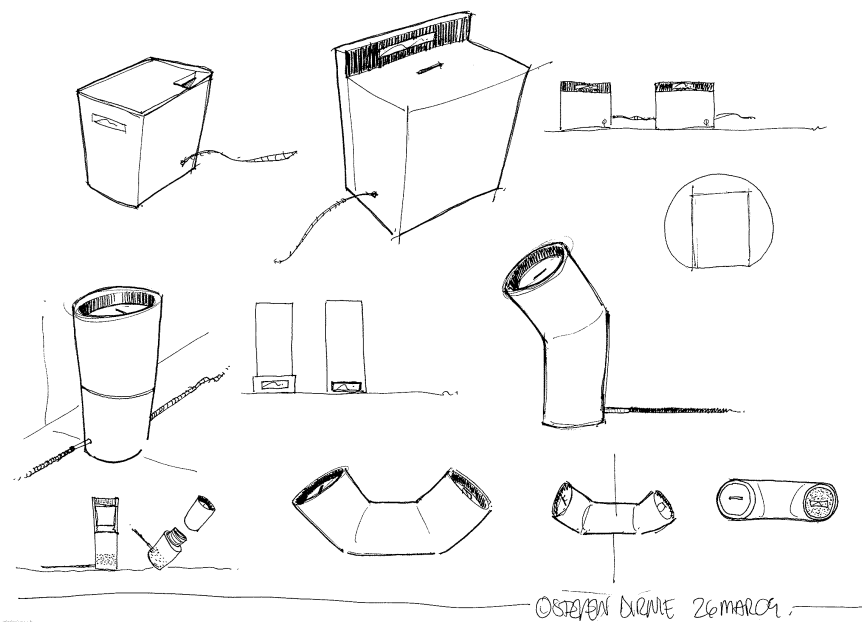


Figure 7.10: Concept and Development Sketches of the Connected Collection Boxes. Steven Birnie. 2009

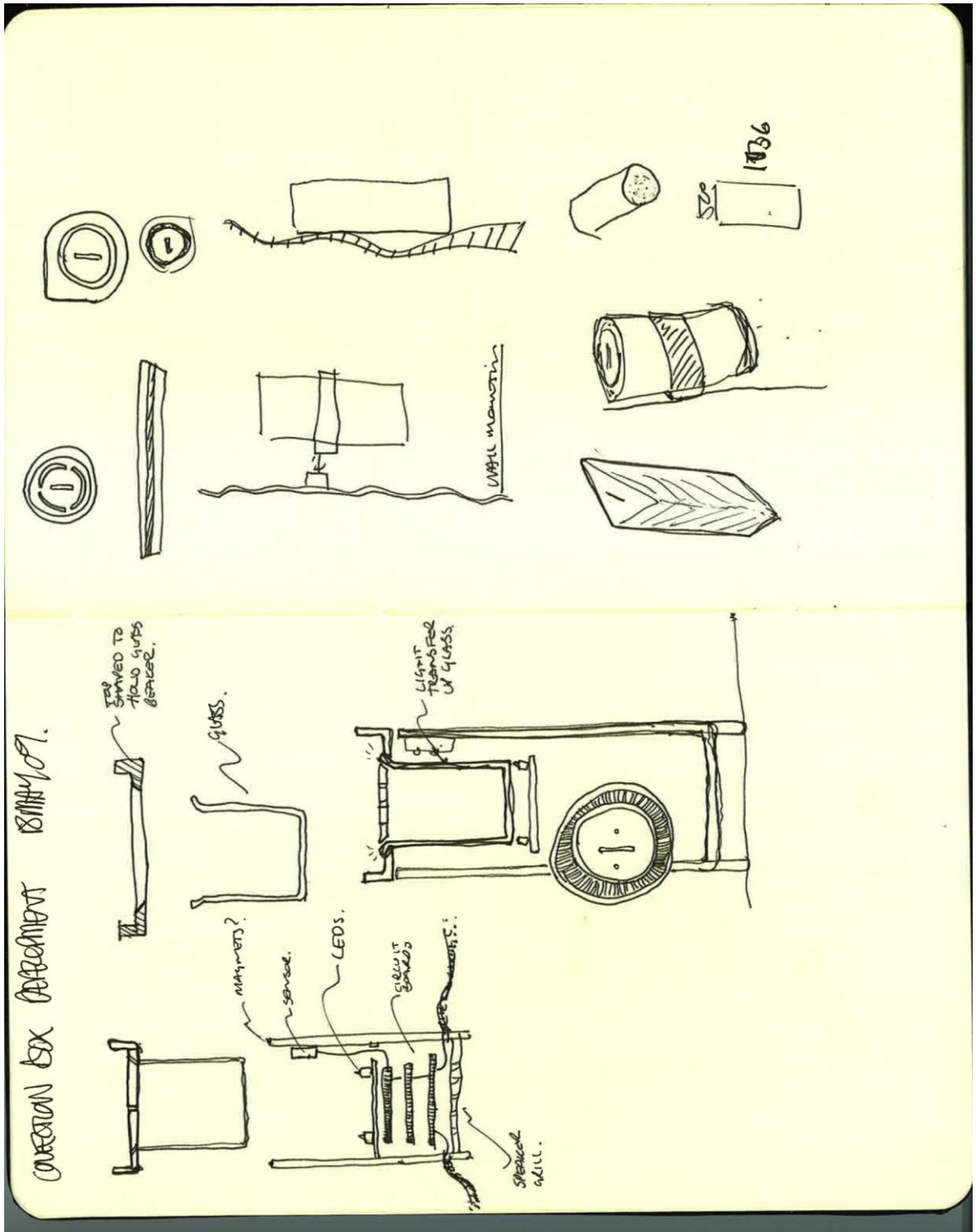


Figure 7.11: Concept Sketches of the Connected Collection Boxes from Author's Notebook. Steven Birnie. 2009

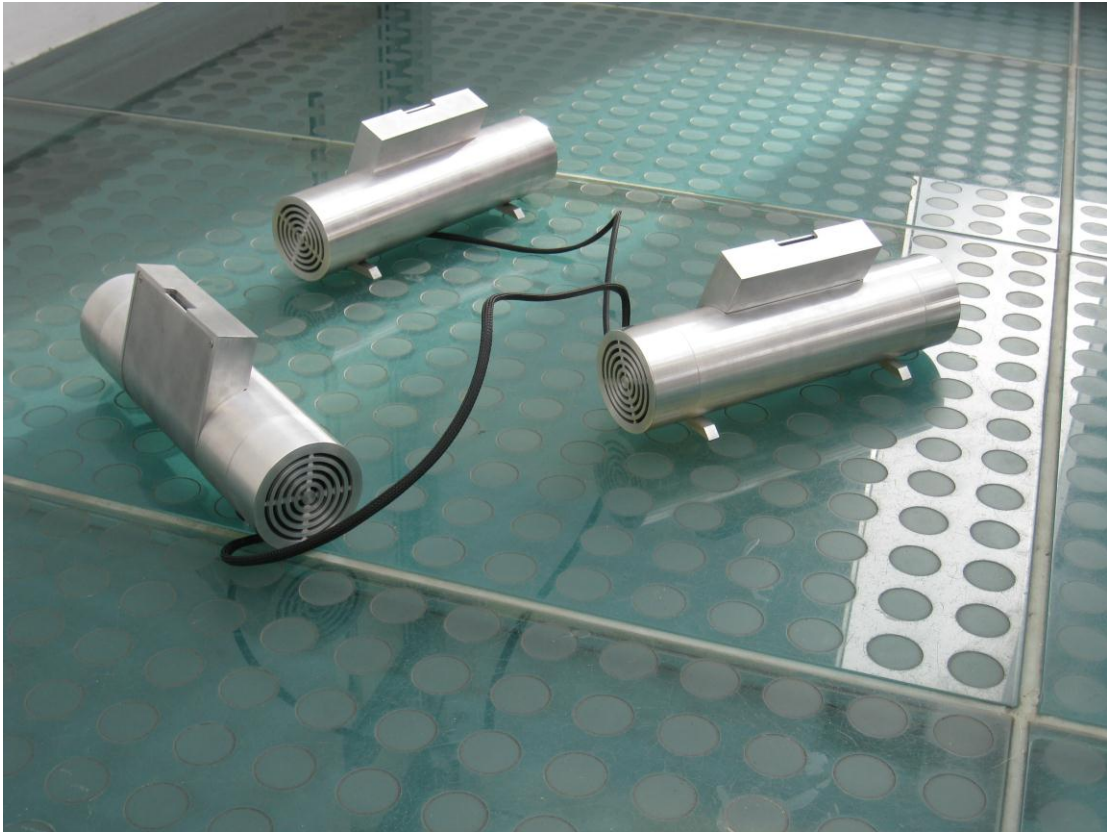


Figure 7.12: The Mkl Connected Collection Boxes. Steven Birnie. 2009

The Connection Boxes are essentially self-service communication terminals. They provide feedback through sound to the consumer directly, giving an instant reward for the donation. Importantly they also communicate to a wider audience as inserting money in one triggers a reaction from the rest that are placed throughout the building.

This audio reaction can be modified to suit a particular environment, event or marketing strategy. One of the key reasons for the whole project was to raise the awareness to customers of the fact that Dance Base was a charity. This had to be done in a sensitive and considered way.

The objects have been designed to be distinctly different from any other collection boxes that are routinely ignored on counter tops around the country. There is a certain ambiguity about the form; this is deliberate (Gaver et al., 2003). The aim is to create an initial interest in the object that will attract potential donators. Once the initial interest has been captured then there should be no confusion over how to use the device. There is a large area on the top of the device for instruction and branding. The money slot is prominent, protruding towards the user; this clearly indicates where money should be inserted.

The sounds selected are important as they provide an instant reward to the user, which in turn encourages re-use of the product. The greater the reward, the more frequent use, the more frequent use, the more money collected.

The initial approach was for the objects to have three distinct 'personalities'. The sounds projected from the devices can be, for example, informative, cheeky or gratifying in content and female, male or computerised in delivery. By giving the devices a personality the aim is to promote the feeling of trust, encourage repeat use and ensure an unexpected but rewarding experience for donating money.

The Development Manager, the main point of contact, offered his comments and suggested a script for the computerised voice:⁴⁵

'I really liked your slightly cheeky messages from the prototype, and I think it would be good to test these first. If they don't work, I'd like to test a more traditional 'Thanks very much for your donation' thing...'

'Mmmm tasty! Thank you very much.

Yum yum. Thank you.

Thanks very much. Got any more?

Very tasty. Thank you.

That's delicious. Thanks.' (Fletcher-Watson, 2009)

7.4 Phase 4

Monitor and observe the outcomes

After an initial review of the devices and their sounds the Dance Base team decided they really liked the cheeky approach; they felt this was more in keeping with the environment and the character of Dance Base. They were also keen to use the computerised delivery that had been discussed with them at a previous meeting. The reason for this was that they thought that it suited the metal casing used on the objects and was something quite different to what they had heard before.

⁴⁵ The full email can be found in Appendix H

After a two-week installation trial in Dance Base they felt that the computerised voices where too cold and harsh, even though the sentences themselves were quite friendly. The devices would respond after money had been inserted by saying a range of short sentences like *'Thank you very much'*, *'Go on put a bit more in'*, *'If you put a bit more in I might sing a song'*, *'You've been very generous, thank you'*. The Dance Base community did not favour the tone of the feedback. Reception desk staff preferred to hear human voices, particularly 'real' female voices, as opposed to the computer-generated text-to-speech test that was trialled. *'Voices – the FOH staff were a bit weirded out by the robot voice, so we had a go at recording the same scripts with staff.'* (Fletcher-Watson, 2009)⁴⁶

Informal verbal feedback from the Dance Base team showed that the form of the boxes worked as intended, see table 8. One member of the Dance Base teams stated that *'They have a form that draws people towards them to find out more'*⁴⁷. It created the correct amount of intrigue to be noticed and investigated but there was no misunderstanding of what it was. The Dance Base team had created labels for the boxes. I was personally not in favour of the branding style as I felt it was too stale and corporate, going against the essence of the devices. I had created the labelling part to be customisable by the client; therefore, I had to accept what they wanted to do with it.

⁴⁶ The full email can be found in Appendix J

⁴⁷ Notes from a feedback session taken at the time with the members of Dance Base. 12th March 2010. Attendees: Jon Rogers, Steven Birnie, Dance Base team – 2x male 2x female. All members worked for the charity at various levels. Male 1: Funding coordinator, Male 2: Marketing Manager, Female 1: Administrator, Female 2: Event coordinator.

	Form	Output	Location	Developments	General
Male 1	Thought the form worked well. Created interest. <i>'They have a form that draws people towards them to find out more.'</i>	Glad we moved away from the electronic voices. Prefer real voices. Too hard sounding. Not Dance Base personality.	Sometimes a bit loud for the foyer but it is an ideal location.	Broader reach. Promote the collaboration between Dance Base and Uni.	There has been an increase in the amount of donations taken from last year although he did not have an exact figure.
Male 2	Liked the overall shape. Wasn't sure if it was clear what it was at first.	Thought the sounds were fun and appropriate for Dance Base.	Would be good if one could be placed outside. Even further range.	Range of marketing opportunities was considered. Using the label area to communicate different themes.	<i>'They made the act of giving become an experience.'</i>
Female 1	Thought it looked different, which was positive. Wondered if the coin insert area could be improved.	Lots of fun though a bit loud. Sound quality could be better.	Liked how they could be distributed.	Play around with different outputs.	Would love to have more and to have them linked with site in Leith. Funding competitions
Female 2	Thought they looked really different from any normal collection box. It was a great conversation starter and created interest.	Loved the music coming out of it. Their choice. Abba a particular fav.	Need to experiment with different locations around the building. Sometimes Wi-Fi doesn't work too well.		<i>'We get the project as we have been involved all the way though.'</i>

Table 8: Notes From Feedback Session with the Members of Dance Base. 2009

7.5 Phase 5

Evaluate and reflect on what has happened

The first stages of this activity allowed for the opportunity to understand current methods such as experience prototyping, develop insights and ideas and engage in workshops with customers, employees and the board of Dance Base. It has also allowed for the introduction of Video Insights that brought the community of Dance Base into the design process. The use of video in capturing insights, observing participants and gaining an appreciation of people, communities and environments has been a prominent method used by the author in the case studies. As Ylirisku and Buur (2007) state, using video in design research can be a collaborative learning experience. Video is a rich medium; sounds and imagery combine to create a fuller picture of a particular event, environment, person or place. The richness allows for a greater collection of insights to be gathered that can be used to generate ideas.

'Insightful use of video in user studies turns the enquiry into a constructive dialogue about what is seen and how people see it. Video studies foster the collaborative construction of a design-focused understanding of the users' reality.' (Ylirisku and Buur, 2007. p40)

Having been introduced to how video can be used and how useful it was in the early stages of the design process I was keen to employ the technique with the design team at NCR. Video has been used in various ways in other case studies; also, it provided a platform for the designers to engage with one another and senior management at an NCR design workshop⁴⁸.

There have been significant challenges to overcome through the development cycle of the project. The manufacture, electronic development and smoothing out of glitches was particularly time consuming. It was through the efforts of William Henderson and Mike Shorter that these were overcome. My lack of electronic and Arduino knowledge meant I could not connect and program the devices myself and had to rely on others and fit into their timescales. The reliance on third parties, although welcomed, increased the duration of the project. I later went on an Arduino course to understand the basics.

As illustrated in Figure 7.12 an umbilical cord connected all the boxes to each other. On reflection, once the boxes had been installed for the initial trial, it was clear that the cord restricted the placement of the boxes and was rather impractical. The next phase was an electronic upgrade to make them wirelessly connected. This allowed for greater flexibility for installation and overcame some technical issues⁴⁹.

7.6 Phase 6

Modify practice

The next stage was to modify the devices to enable wireless connectivity. This was quite a challenge as the metal body of the device, insulating the signal, surrounded the Wi-Fi circuitry. The devices were modified to house a small aerial that added to the ambiguous intriguing form. The MkII devices could now be placed throughout the building, which was the original design intent⁵⁰.

⁴⁸ Based on the Dance Base activity, the team of designers and usability specialists were asked to create a three-minute video entitled *'What can NCR be?'* The activity was used as an icebreaker and bit of fun but did create a good discussion on the techniques used and perceptions shown. The brief for the project can be found in Appendix K. The videos can be found on the accompanying CD, indexed CD-3

⁴⁹ The power required to push the signal through the length of umbilical cable was an issue.



Figure 7.13: MkII Connected Collection Box with Wi-Fi Connectivity. Steven Birnie. 2010

Informal feedback from Dance Base was that the boxes were very successful in increasing their collection amounts; unfortunately, they could not disclose any figures. One member of the team, a funding coordinator, states that the devices '*made the act of giving become an experience*'⁵¹. The devices remain with Dance Base but have sparked interest from other parties. This has led to the development of MkIII devices.

One of the core lessons learned from the Dance Base experience in terms of the design was simplicity. While the form of the MkI design was perfect for the Dance Base environment it would not be suitable for general release. The construction and materials used in the MkI design were problematic and time consuming. If the design was to be taken forward and used in other environments then it had to be simplified.

The Connected Collection Box MkIII consisted of a wooden box, wireless connectivity and simple customisation. The wooden boxes do not insulate the Wi-Fi signal and can be purchased online, saving on construction time. The top of the box around the coin slot is

⁵⁰ A demonstration video of the MkII Connection Boxes is on the accompanying CD. Indexed CD-4.

⁵¹ See feedback Table 7.1

coated in blackboard paint, this allows the customer to customise the boxes with any slogan, advertising or marketing information they desire. Inside the boxes is a connection for a USB pen that would contain the appropriate sound tracks to be played when coins are dropped through the slot.

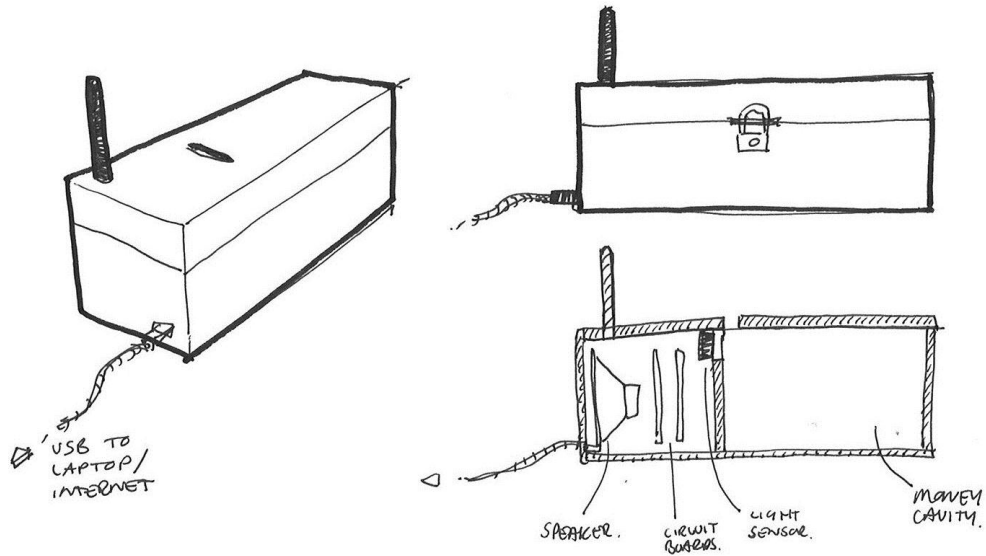


Figure 7.14: Sketch Development of Connected Collection Boxes MkIII. Steven Birnie. 2010



Figure 7.15: Connected Collection Boxes MkIII. Steven Birnie. 2010

7.7 Phase 7

Move in new directions or return to observe/reflect/act cycle

There have been many developments in the way donations can be made online through charity specific websites. Online tools have both raised awareness and accessibility making it easy for people who are digitally connected to make donations to charities. Online donations will, however, always be just one mode of income generation for charities. The sector has many distinct characteristics that make physical interaction between donors and fundraising campaigns an important part of the giving process. However, away from the computer a key touch-point between people and charities is in the form of collection boxes. Where web-based applications have radically enhanced the ease and speed of donation, the interaction with collection boxes has not changed.

In October 2011 a funding application through National Endowment for Science, Technology and the Arts' (NESTA) Innovation in Giving fund⁵² was submitted to explore wider and deeper audience interactions with the Royal National Institute for the Blind (RNIB) as a project partner. NCR have been working with the RNIB for almost 20 years. The proposal would involve creating the devices in larger numbers so they can be distributed nationally. Connecting via the Internet the devices have the potential to map giving geographically, create national feedback loops, collect physical and digital donations, and raise awareness of the need for charitable giving.

The proposal focused on social networking in the physical space between charities and people. It was a world wide web of collection boxes to exchange stories between people who have donated money to charities and people who have received money from charities.

⁵² The funding application for the NESTA project proposal can be viewed in Appendix L. There is also a short video that was created for the NESTA proposal that can be found on the accompanying CD. Indexed CD-5

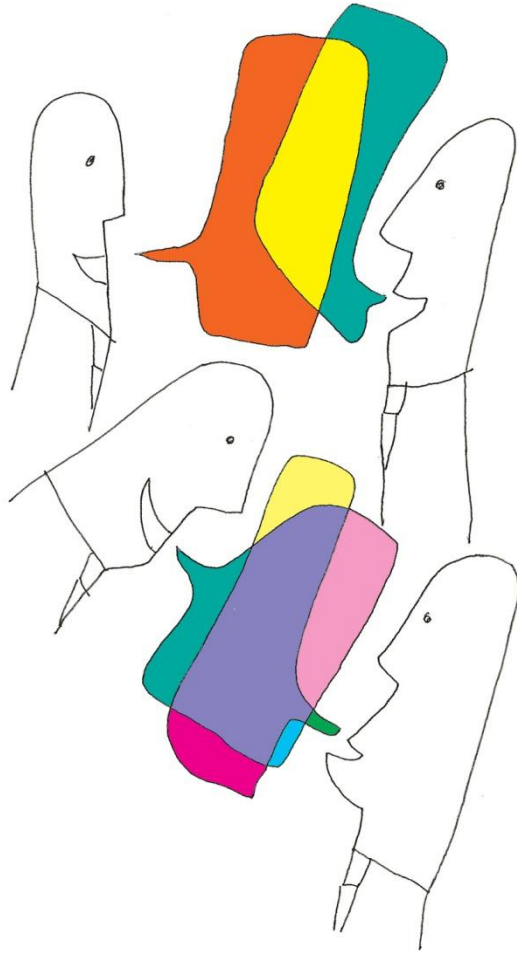


Figure 7.16: NESTA Funding Proposal Image. Steven Birnie. 2011

7.8 Summary and Insights

Through all the iterations of the Connected Collection Boxes the key elements have been communication engagement, fun, character and impact; words not often associated with collection boxes.

Through the development of this case study I realised that physical digital products can be used as research devices in their own right. The devices can be used to understand the interactions before and beyond usability studies, which is the common process within NCR. Placing the devices in context allows for the designer/researcher to gain insights into how the interaction takes place and can be developed. How I put this into practice is described in the Pillar ATM case study in section 9.0.

The use of video to gather insights that develop into new ideas has been brought into my own practice. I found the method of video to gather insights very useful as it can be efficiently produced with rich amounts of content that goes beyond data. As a designer I do not use data to inspire ideas; I use sights, sounds, observations, intuition and tacit knowledge. The majority of these can be captured through video as a way to inspire design. One of the strengths of the video content captured is often its ambiguity that can be interpreted in different ways and is open to interpretation. This is similar to Cultural Probes (Gaver et al., 2004) in that respect. Cultural Probes are a technique used to inspire ideas in the design process through the collection of inspirational insights into people; their lives, thoughts, values and environments. The Video Insight method is demonstrated further in the proceeding case studies.

Although the activity is on a small scale and not directly in NCR's line of business, the principles of interaction and the insights drawn can all feed into commercial development programmes. The knowledge gained from sounds used on the Connected Collection Boxes has fed into NCR's understanding of how self-service devices should respond to human interactions. There is an on-going programme of activity within NCR to develop richer, softer, more 'human' responses in the software and hardware interactions.

Throughout the process of the activity it was noted that there was a need to bring case studies closer to NCR's lines of business and make the case studies more strategically relevant. It was communicated through formal NCR review channels that members of the Cx Design group were feeling very detached from the work being conducted. This

guided the following case studies where the process and outputs were more strategically placed and could directly influence and inform design in NCR.

Referring back to the original project questions posed at the beginning of the case study the following answers can be drawn.

- *How can the charity connect with its customers locally?* Charities can connect in a variety of ways, the most important being 'understanding'. If a charity understands their customers and communicates with them in ways that they can associate with then it should be successful. This understanding can be facilitated by participatory design research methods of engagement. The conception of the Connected Collection Boxes could only have come through active participation with the Dance Base community. The physical objects and the design process used allowed the Dance Base team to better connect with their customers.
- *Do connected objects stimulate connectivity and communication within a community?* The Connected Collection Boxes have been a successful installation at Dance Base. This conclusion has been reached through observation and conversations with the Dance Base community. The adaptability of the devices in terms of the sounds they produce keeps the devices fresh and intriguing which makes them a talking piece throughout the environment. The case study has shown that digitally connected objects are interesting and inspire debate and conversation over inanimate objects. This type of interest and dialogue is what charities need to ensure people are aware of their needs as a charitable organisation.
- *How can a self-service device influence communication within communities?* In the Dance Base case study the self-service device did positively influence the communication within the community. From informal feedback from the Dance Base team I understand that there was lots of debate and discussion on what feedback sounds should go onto the boxes. This could be transferred to wider self-service devices and in the broader context of communities by the introduction of some sort of feedback loop between the community and organisation, charity or the self-service provider (e.g. bank or government).

Table 9 below highlights the insights gained through the case study in relation to the overarching questions of the thesis.

Thesis Questions	Case Study Insights
1. <i>How can design research play a role in the activity of a global technology company?</i>	The conception of the Connected Collection Boxes could only have come through active participation with the Dance Base community. This process and level of engagement can be applied strategically in early phases of NCR development cycle.
2. <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	Being a participant within the dance classes not only showed the variety of people that attended the one class but also allowed the participants and tutors get used to the project team, who were newcomers into their environment. This helped to break down barriers and allowed for effective communication.
3. <i>How can insights that have been generated through hyperlocal research be applied globally?</i>	The Connected Collection Boxes design and development has impacted on NCR's understanding of how self-service devices should respond to human interactions. There is an on-going strategy within NCR to develop richer, softer, more 'human' responses in software and hardware interactions.
4. <i>How can design research methods support socially-led innovation in NCR?</i>	The conception of the Connected Collection Boxes could only have come through active participation with the Dance Base community. The community of Dance Base were an integral part of the design process that meant the output was relevant to them.
5. <i>How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?</i>	The knowledge gained from the use of audio in the Connected Collection Boxes has fed into NCR's understanding of how self-service devices should respond to human interactions. There was a need to bring the case studies closer to NCR's lines of business and make the case studies more strategically relevant.

Table 9: Case Study Insights in Relation to the Thesis Questions

7.9 Future Work

The development of the Connection Boxes continues today on a less formal basis. Several meetings were held with the Byre Theatre in St Andrews regarding the development and installation of the MkIII devices. Unfortunately, before the devices could be deployed the Byre Theatre went into liquidation. In parallel with the interest from the theatre I was also in communication with Daljit Singh, founder of Digit and Executive Creative Director at ConranSingh. Daljit had some interesting ideas about a commercial enterprise and turning the boxes into joke boxes that would involve getting famous personalities to record jokes. Although this has not been progressed passed the discussion stages, it does show that there could be commercial possibilities in the future for the devices.

While there was some initial investment in creating the boxes, I did not have the time to pursue the opportunity with the determination required to get a product to market. One of the main challenges of the whole project was time. The project had been running for approximately two years at this point due to the PhD research being a part-time commitment. My commitments to the part-time research and NCR took precedence over commercialising the research objects.

As primarily research devices the next step from creating a network of devices connected via Wi-Fi is to explore the potential for Internet connectivity and the interaction between charities and people. The next step is to make a world-wide-network of collection boxes that explore the potential for wider and deeper audience interactions for raising social and economic value for and to charities by enhancing their relationship with the public.

The NESTA funding application highlights how the devices had become more than just a collection box; they became a tool for interacting with and understanding communities and their connection with digital products. The Connected Collection Boxes have also featured in an article about the design and experimentation of digital objects in society in *New Design* magazine (Rogers, 2009).

The next case study picks up on points raised regarding the introduction of self-service as a feedback loop between a local community and a global corporation. The Dance Base case study was conducted over an extended period of time, the development of this was to understand how the methods could be used in a workshop environment with

members of the local community and colleagues from NCR. It was necessary to apply the skills learned through the Dance Base engagement and apply them to a much more focused user group that had more corporate relevance. The case study examines how design research methods were used to facilitate the interaction between NCR, the RNIB and blind and partially-sighted members of the Dundee community.

Chapter 8: Case Study II

Act Local | *The Small Society Lab*

8.0 Introduction

The self-service solutions that NCR produce can be used by anybody, anywhere and at any time. This creates huge challenges for the designers who need to consider the wide and extreme physical and cognitive abilities of users across the globe. This was highlighted in Chapter 2, specifically *Section 2.2 Role of Design in NCR* regarding the guidelines and legislation in place in various parts of the world. One particular group of consumers of which the design team have limited knowledge and limited but growing interaction with are those with visual impairments.

The previous case study used participatory design methods over an extended period of time with a broad community of people, the next stage is apply that learning to a targeted group whose insights could be strategically relevant to NCR. But where does a large multinational start when it wants to engage with a local community? For NCR it was about creating the right partnerships. I facilitated partnerships between NCR, The Small Society Lab, the RNIB and members of the community in Dundee.

A series of research questions specific to the case study would be explored through the project activity that aimed to understand how participatory design methods could be used to better understand a local community group with very specific needs and how that understanding could be brought back into the product development cycle. These are answered through the body of the case study.

- *What is it like for people who are blind or have visual impairments to interact with self-service devices?*
- *How can we, as designers, make the solutions NCR deliver usable for those with visual impairments?*
- *How can they, as consumers, communicate their needs to the people within a large corporation that can influence the final solutions?*

This case study picks up on Lyle Sandler's message in Section 2.4 where he states '*that we DESIGN the everyday mechanisms that make life easier for consumers*' (2013). In order to understand how to make life easier we must understand the consumers' needs

through a process of engagement. As NCR moves towards a consumer-to-business model (as illustrated in Figure 2.4 in Section 2.2) it is critical that the experiences and interactions delivered through self-service channels are appropriate to the consumer. As the Consumer Experience Survey highlighted⁵³, senior management in NCR believe best in class consumer experience is valued, can be sold and would give competitive advantage. Usability has been high on the design agenda at NCR since the 1980s (see Figure 2.3 in Section 2.2), the NCR: Search for Design Excellence (1992) report specifically called out usability as the top factor for design excellence. What we understand now is that usability is more than pure human factors engineering but encapsulates an understanding of interactions and experiences. This case study is an attempt to understand the very specific needs of a particular local group and understand how this can be translated into global self-service interactions.

It demonstrates a shift in the way design can be used within the global corporation, moving up the 'Design Ladder' (Ramlau, 2004) as described in *Section 3.2 Design in a Corporate Culture*. The case study demonstrates design being used for innovation within the company as opposed to a styling or process exercise.

In the way Jodi Forlizzi's and John Zimmerman's approach to design research is to use practice to build theory (Forlizzi et al., 2009; Zimmerman et al., 2010) the case study uses participatory action research to understand how design research can be used in a global corporation. This is very much an applied approach to design research, working directly with people and being actively involved in the decision-making process, Ilpo Koskinen would call this constructive design research (Koskinen et al., 2011).

The approach taken was to try and break down the barriers between the local community and the design and development team within a global corporation. In a similar approach to PROUD and their project Beyond the Castle, which allowed the local community and the local council do have a better dialogue with one another, PROUD were able to use design workshops and public design-focused initiatives to illicit ideas and opinions from the community that the council could take on board in the development of a large public space.

Emily Pilloton, through her Project H activities, brings design as a tool and philosophy together with social entrepreneurship. She advocates designing *with*, not *for* people and

⁵³ See Appendix C for a report on the survey results.

communities (Pilloton, 2010b), which forms the basis of this case study. Her philosophy of *start locally and scale globally* is directly related to the words attributed to Patrick Geddes 'Think Global, Act Local'. She believes that designers need to be truly invested in a community to make any lasting social impact. This case study is an attempt to start that investment between global corporation and the local community. The aim is that through the engagement there would be increased dialogue, empathy and understanding.

8.1 Phase 1

Observe, take stock and identify concern

As a design group designing complex technological devices that are used by people and placed in communities for 24-hour access it is important that we understand what people really want, need and how they interact. Yet, as a small design group entrenched within the larger organisation, it is very difficult not to be preoccupied in the day-to-day development issues that need to be resolved. Due to the relatively small size of the Cx Design group and the large amount of active projects at any one time, the team's ability to gather knowledge on consumers is extremely limited. As a group this has been recognised and is one of the reasons behind this doctoral research activity.

There are different reasons why a corporation want to know people better. These can be financially driven and or socially driven; they can co-exist, as was highlighted in the Design in Socially-Led Innovation chapter with the examples from India. Through this deeper understanding of the consumer comes the ability to understand what type of experience should be delivered. The financial rewards for being able to deliver a premium differentiated service offering are recognised, as highlighted by Pine and Gilmore (1998). What consumer knowledge and engagement can also give is strength and validation to the value of design and the design group. As Lockwood and Walton (2008) illustrated, design research and user engagement allows design to inform the strategic direction of the organisation.

8.2 Phase 2

Reflect on possible ways forward and begin to plan a solution

NCR and in particular the Cx Design group needed to get access to the local community in order to engage in some sort of dialogue. It had the skills to facilitate an engagement,

what it needed was the local community to come forward and communicate in an open and relaxed way; in a context in which they were comfortable.

The Small Society Lab (SSL) was originally set up as a 'pop-up' group, first set up for two months in 2011 between the Product Research Studio at the University of Dundee and Dundee Contemporary Arts (DCA). It has now become a part of the strategy of the DCA for public engagement. The SSL aimed to explore and make use of community-centred art, design and technology practice. Through workshops, designed activities, talks, walks and films the lab wanted to crowd-source the inhabitants and businesses of Dundee to explore ways to make small changes to the community and to prototype potential for digital futures. It was an opportunity for PhD. researchers affiliated to the SSL, to which I was included, to put on a mix of workshops to provide new ways for communities and businesses to imagine and enable the future of their city and the digital landscapes.



Figure 8.0: The Small Society Lab. 2011

The SSL facilitated and enabled creative connections to people and ideas. The space at the DCA allowed the community and researchers to find new opportunities to rethink public services, the private lives, the business opportunities and the creative outputs for and of the people of Dundee. The participatory nature of the lab created sparks and connections between people to search for new outlets for creativity in Dundee. There was a wider remit for the group beyond the individual research goals of the students which was to find a space between the DCA and the University of Dundee where research and social innovation can emerge as a viable proposition for working in and for

Dundee. With this social drive behind the lab it was hoped it could support industry in Dundee in the generation of new ideas and new ways of working with people.

The case study focuses on one of the workshops that took place within the SSL that was facilitated between NCR, the RNIB and the local community. The RNIB were approached as they could make contact through the correct channels to the right people. Although NCR have a long history of working with the RNIB this was the first time the two had partnered on a collaborative design workshop. The NCR|RNIB workshop was to enable blind and partially-sighted people to engage directly with a design team and for that team to learn, understand and appreciate their daily challenges.

Similar themes were identified at the planning stages of the activity as that of the Dance Base project. They were:

- *Empathy* – Have an appreciation for what is it like for people who are blind or have visual impairments to interact with self-service devices.
- *Understanding* – Better understand the needs of the user group and develop channels of communication.
- *Engagement* – The workshop was focused around participatory design and giving consumers with specific needs a voice and the designers an enriched understanding.

The following methods were identified as being useful for this workshop format. As the workshop was held over a very limited timeframe the methods were selected that could yield visual and audio insights quickly and efficiently. The output from each of the methods used had the potential to be useful to others within the organisation and at later times:

Shadowing (Curedale, 2012; Kuniavsky, 2003; McDonald, 2005) – To get a deeper understanding of the needs of the participants. Shadowing allowed for an understanding of the different interactions that take place, in particular with self-service devices, and also gave insights into wider issues beyond NCR's remit. The process highlighted how the interaction with self-service devices was just one of the many challenges the participants had to overcome each day.

Video Insights (Buur et al., 2000; Gaver et al., 2004, 2003; Raijmakers et al., 2006; Suri, 2003; Ylirisku and Buur, 2007) – This method required community involvement. The purpose of using this technique was for gaining insights and design inspiration. The multi-sensory, audio and visual output that video provided was challenging for this particular study. While it was particularly useful for the design team we had to be sure to include all of the participants in the process and describe all the visual elements.

Focus Groups (Dean, 1994; Holtzblatt et al., 2005; Kuniavsky, 2003) – The focus group was facilitated by a representative from the RNIB. It allowed for targeted questioning of the participants so the wider group could get a better understanding of specifics of their daily lives and their interactions with technology. It allowed all the participants to communicate their feelings to the wider audience.

Digital Ethnography (Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004) – Controlled but the designers, the digital cameras and digital video cameras were used to capture images of the people in context. They helped to gather visual and audio information about the space in a quick, efficient and nonintrusive way.

As part of the wider SSL programme I conducted three further workshops that focused on charity, community and business. The participants were less targeted and open to all members of the community. The overall learning from those activities will be discussed in Phase 7 of this section but in the interests of clarity I will not go into the specifics in the main body of this case study⁵⁴.

Before the workshop could begin I had to ensure we had the support of the RNIB. I believed both NCR and the RNIB could learn a lot from a joint workshop. Initial introductions were made through existing channels of communication as the Cx Design team was already working with the RNIB on various usability evaluation projects. Usability evaluation is an important part of the development process but it generally comes after the solution has been designed, leaving limited scope for further change. What I was proposing was an engagement right at the very start of the design process. It was to use participatory design at the ideation stages of the process.

⁵⁴ A catalogue of the insights and ideas created during those workshops and supporting images can be found in Appendix O.

After an initial meeting with a representative from the RNIB we decided to have three main phases to the workshop.

Workshop Action 1 – Shadowing and digital ethnography

Workshop Action 2 – Focus group and Video Insights (Video Insights to be created in parallel)

Workshop Action 3 – Insights and ideas session

In order for the representative from the RNIB to understand what I intended to do with the Video Insights I created a short presentation of insights and ideas based on an official RNIB video from YouTube⁵⁵.

8.3 Phase 3

Take action to try out the solution

The workshop consisted of three industrial designers, an interaction designer, a design intern and two usability specialists from NCR, a representative from the RNIB, four supporting members from the SSL and seven blind and visually-impaired participants from the local community⁵⁶. The participants were of mixed ages with four being of working age and three being of retirement age, four were male and three were female. They had responded to a request to attend the workshop via the RNIB newsletter.

Preceding the workshop the RNIB representative gave the NCR and SSL members a brief introduction into how they should guide a visually-impaired person. This involved pairing up, one being the sighted guide and the other closing their eyes and playing the role of a blind participant. The process was surprisingly disconcerting and even that small exercise allowed the team members to empathise better with the participants.

When the participants arrived and we did the introductions I then gave a brief overview of how the day would map out. I introduced the concept of Video Insights and directed the whole group on where they could find self-service in the city centre.

Action 1: Shadowing and digital ethnography

⁵⁵ The presentation of insights and ideas can be found on the accompanying CD. Indexed CD-6.

⁵⁶ Completed consent forms can be found on the accompanying CD. Indexed CD-7.

The first activity was to pair up, collect video cameras and for the participants to be shadowed by a member of the NCR group. The focus of the shadowing and digital ethnography exercise was to ‘*Capture a journey to and use of self-service in Dundee.*’

The groups then went into the city centre, followed and supported by their partners. The shadowing exercise was not treated as a hands-off observational activity; it was participatory where questions were asked throughout the process; ideas were shared, issues discussed and situations better understood through this activity⁵⁷. This activity lasted for approximately one hour.



Figure 8.1: An Interaction Designer from NCR Shadowing a Participant. 2011

The shadowing activity allowed the designers to understand the particular issues blind and partially-sighted users have when interacting with self-service technology. The activity created a forum for the participant’s advice and knowledge to be fed back into the corporation and influence the development of the next generation of self-service devices. The majority of the NCR participants completed feedback forms after the event. This allowed the team to collate the feedback from local participants. The full feedback forms can be found in Appendix P-S, below are short extracts.

⁵⁷ A compilation of the videos created from the shadowing activity can be found on the accompanying CD. Indexed CD-8

'Participant D was not aware of the audio support on ATMs. I asked him if he could find the headphone jack on the fascia of the ATM: he couldn't, and said he would prefer not to use it anyway.'

'There are many electronic assistance devices for visually impaired people. These are awkward to carry together: Participant C has to use various bags and pouches to contain these.'

'Participant A stated that she would go out of her way to use the new SelfServ machine outside the Clydesdale bank at the DCA. She said the screen resolution and high contrast helped her to view the information on the screen.'

'Regarding the ticket machines at the train station, Participant A said she does not use them at all. She said when she uses the trains, she would get her white stick out (to make people more helpful) and go to the ticket office for help.'

Action 2: Focus group

The second part of the session gathered the views and needs of self-service from the participants in a focus group. The RNIB representative led the focus group; he was the only person asking the questions with members of the NCR group taking notes. This session proved to be very informative for the designers and would link closely with the following insights and ideas session.

There were a series of questions asked relating to specifics around self-service devices and their interaction ⁵⁸. Below is a list of the main points raised during the focus group.

- Have you used self-service machines previously? If so, what were your experiences?
- What type of machines do you currently use? Do you use them on your own or with assistance? How often do you use them? Are the types of machine you use due to familiarity?
- What do you like or dislike about self-service machines?
- General dislikes with touch screen based self-service machines.
- What would make these machines work better for you?

⁵⁸ Extensive notes from the focus group session can be found in Appendix M-N.

- Do you feel able to "walk up and use" these machines? Including reasons.
- Do you want self-service machines to be walk up and use for you?
- What could help you locate an ATM or other self-service?
- How do you find using a touch screen self-service machine (such as a self-service checkout)?
- Are the touch screen self-service machines "walk up and use" for you?
- Do you have any further comments regarding self-service machines?

As the participants and the NCR team members had spent time chatting and getting to know each other during the shadowing exercise it meant that the participants were relaxed and open to sharing their experiences and issues. They talked freely about their conditions, when it started, how they adapted their behaviours and how they coped with everyday activities. They went through their self-service experiences in detail, some of which had rarely included self-service, not believing they would be capable or being intimidated or put off by previous experiences.

Regarding self-checkouts Participant A stated⁵⁹:

'If they stay the way they are, I'll never go near them!'

Participant B stated:

'Generally it is OK until it goes wrong, but then can't see what has happened or know what to do.'

Participant C stated:

'I'm into gadgets, but have never used the self-checkout machines.'

Participant E stated:

'...do get used to the technology, but they (the designers of the products) assume those who use them are just like them, and are young.'

As a designer this type of feedback and consumer insights are invaluable and a welcome reminder that what we design affects people's daily lives. As Lyle Sandler states, 'we design the everyday mechanisms that make life easier for consumers' (2013), for this to be fulfilled a clear understanding of all consumers' needs is necessary.

⁵⁹ See Appendix N for notes on the focus group.

Action 3: Co-Insights and ideas session

In parallel with the focus group session some of the NCR group were asked to create a short Video Insight video. They very quickly edited a video that contained interesting elements they thought would inspire ideas and printed off screen grabs to be stuck on the wall.

The focus for all the ideas was to be: *How can NCR design interactions better for blind and partially-sighted people?* This was a joint exercise, with the NCR designers and supporting members from the SSL sketching the ideas coming forward from all the participants. At various intervals the RNIB representative would stop the proceedings and carefully describe each of the insights and ideas so every member of the group was aware of what was being produced.

The insights and ideas session was a risk. These were not people with design training or from an innovation background and the exercise is an inherently visual exercise. Yet, despite this, they contributed to the whole exercise with enthusiasm. The previous shadowing and focus group exercises had made the group comfortable with what we were trying to achieve which was to learn from them, understand their needs and to transfer that knowledge onto the products we design.

The session produced 54 new ideas in a 45-minute session⁶⁰. Not all the ideas were directly relevant to NCR's lines of business but all had the needs of visually impaired users at their heart.

⁶⁰ A full catalogue of the ideas from all the workshops which have taken place during the Small Society Lab can be found in Appendix O.



Figure 8.2: Insights and Ideas Session. Steven Birnie. 2011



Figure 8.3: Insights and Ideas Session. Steven Birnie. 2011

8.4 Phase 4

Monitor and observe the outcomes

The screen grabs from the videos worked very well in planting the seeds for new ideas to be generated. Most of the ideas created can be directly related to the insights generated during the shadowing and Video Insights sessions. The breadth of imagery and the insights gained from talking with and observing the participants generated a lot of ideas beyond self-service. With self-service at its core the session grew into understanding ways to make life easier for the visually impaired.

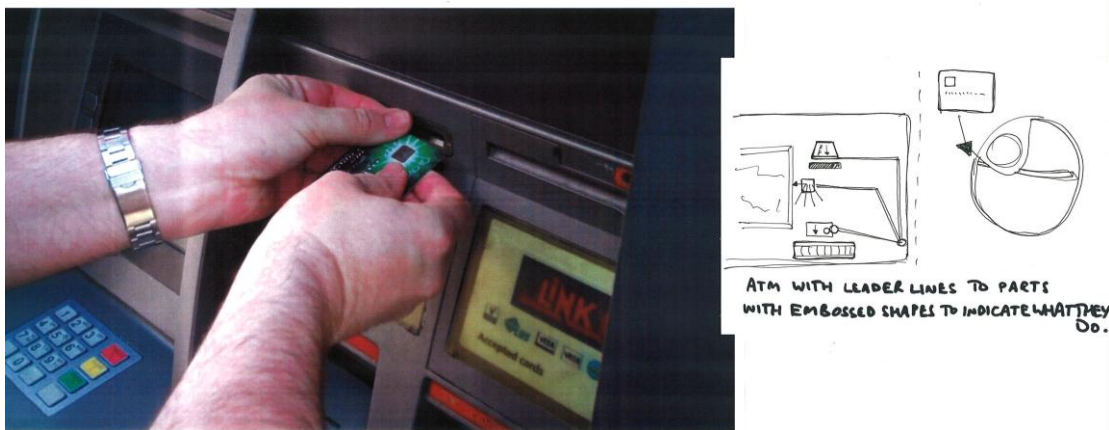


Figure 8.4: An Insight and an Idea. Cx Design. 2011

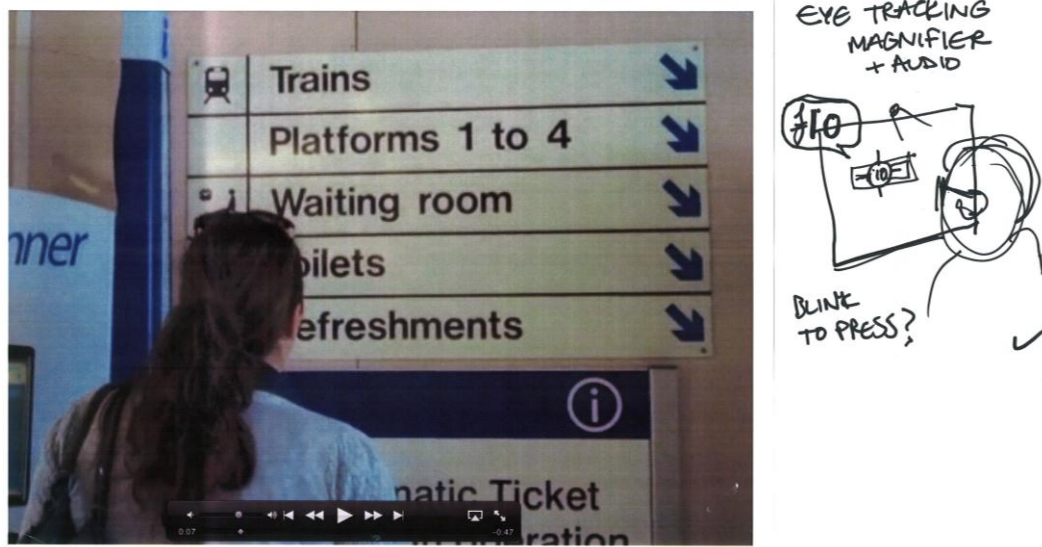


Figure 8.5: An Insight and an Idea. Cx Design. 2011

What became apparent was that a scheduled viewing of the Video Insights created would not have worked. All workshops need to have an element of flexibility, I realised that to view the videos that had been edited very quickly would not have been a worthwhile exercise for the participants. Having spent the day with the participants and

learned more about the varying degrees of their individual disabilities and their personal coping mechanisms, it would have been insensitive to ask them to sit and view the videos with the rest of the group.

The videos, however, have proved useful beyond the NCR|RNIB workshop. They have been used in customer meetings as a demonstration of how the team has engaged with user groups and striven for deeper insights and understanding of consumers (see Figure 8.6)⁶¹. They also continue to be a rich source of insights that can be referred back to at any time.



Figure 8.6: Video Insights. Steven Birnie, 2011

⁶¹ The full video can be found on the accompanying CD. Indexed CD-7.

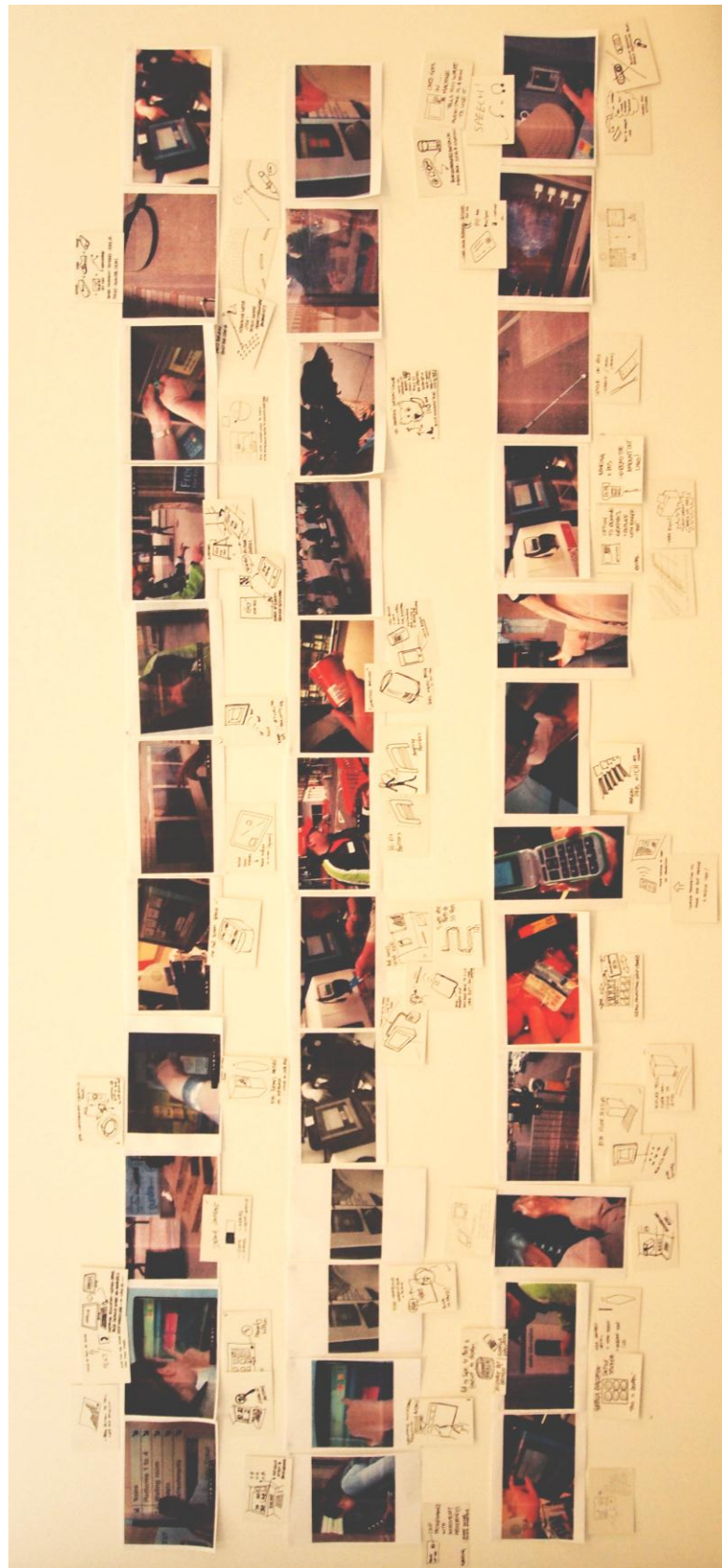


Figure 8.7: *The Collection of Insights and Ideas.* Steven Birnie. 2011

8.5 Phase 5

Evaluate and reflect on what has happened

Table 10 has been created to show the key learning points that I have taken from the NCR|RNIB activity. The points focus on areas specific to NCR's self-service design and development teams.

Key learning points from NCR RNIB workshop
1. Having the flexibility and adaptability during the day to work around any issues that arose. Viewing videos with visually impaired participants would have been challenging and unrewarding for the participants.
2. A real understanding of the participants' requirements is required so appropriate planning and preparation can be done before the workshop. This is not only so the event runs as smoothly as possible but it is also a health and safety issue.
3. Self-service devices are not generally used by the visually impaired – ATMs possibly, self-service checkouts very rarely if at all.
4. Having the ability to customise the screen interaction would be a huge benefit to the user – screen contrast, colours used, layout, font size.
5. High contrast and distinct colour coding would be very beneficial.
6. The bright MEEIs are helpful but could still be better at showing area of the slot of inputting a card. Often the MEEIs are located a few centimetres from the slot – these should be as close as possible.
7. Larger displays are better for the visually impaired if used in the correct way – correct contrast, scale, and layout. Touch screens are impossible if they do not have some sort of audio or tactile feedback.
8. Many of the visually impaired users were unaware of the ATMs ability to give private audio.
9. The audio jack is not always easy to find by some participants, although NCR does endeavour to keep it in a consistent location.
10. From the feedback forms, informed feedback and tacit knowledge I am aware that the NCR design team gained from this experience. There was an acute awareness of the impact of the design decisions made at the beginning of a product development affecting real people's lives.
11. The participants got something from the experience too. They were given the opportunity to get their thoughts, feelings, concerns and ideas across to people who can influence products that will allow them to have greater independence. All the participants wanted to be involved again in any further usability trials or workshops. That in itself is a great benefit to NCR as getting access to people with particular disabilities can often be a challenge.
12. Some of the participants stated that there was no opportunity for people with the same challenges as themselves to meet up and discuss things. This may be something that the local authorities could pursue.

Table 10: Key Learning Points from the NCR|RNIB Activity

8.6 Phase 6

Modify practice

On-going development activity can be directly attributed to insights gained through participatory design research techniques used during the NCR|RNIB workshop. The techniques allowed for an acute awareness of specific user needs with direct user feedback, this led to implementation of light halos and illuminated card reader apertures in the new ATM product range⁶².

The aim of the design was to create greater contrast around the slot so all users could clearly identify the card aperture. The design is a pulsing circular halo around the card reader with an illuminated slot. The circular card reader detail is a signature detail on NCR's ATMs as it can be clearly identified as the 'start point' for the transaction. Previous designs attempted to illuminate the whole area; this still proved challenging for visually-impaired consumers as the slot was not clearly defined.



Figure 8.8: Prototype Card Reader Halo Design with Illuminated Card Slot. NCR. 2013

This detail is an example where design ideas have greater strength and are less likely to be dropped through the development process if they can be associated with real user (or customer) input. In the case of the card reader the design team were able to strongly

⁶² See video Small Society Lab_NCR-RNIB_01.mov on the accompanying CD. Indexed CD-8: 1minute 10 seconds to 1minute 21 seconds.

argue the case for the development time and investment needed to re-evaluate the strong signature element.

8.7 Phase 7

Move in new directions or return to observe/reflect/act cycle

It was the participatory design process conducted through the Small Society Lab workshops that I facilitated that allowed for the insights and ideas to be appropriate. The workshops were relevant to the design team, the wider development community, NCR and the participants. Allowing the design team to communicate directly with consumers, not just observe them, is critical in building the relationship between consumers and organisations. After the NCR|RNIB activity the participants were keen to get involved in other such activities. This was noted in the feedback forms completed by the members of the Cx Design team that highlight specific issues their partner had and gave general feedback on the workshop⁶³.

I have categorised the main points of learning from all the Small Society Lab workshops I conducted below and grouped them into positive and negative aspects. These were collated from the feedback forms as well as general observations. The workshops were a learning experience; hence why I am keen to point out what worked and what did not work for when a similar exercise is conducted again. The learning and reflections have been separated into three categories, The Use of Video, Community Engagement and Insights and Ideas Session.

Positive	Negative
Video was good at focusing the participants on one particular area or problem.	The editing of the videos can be a time consuming process. This part was not well suited to a workshop format. IMovie is fairly easy to pick up for naive users, it still takes time to download, compose and create a viewable movie.
It allowed the participants to tell a story.	Asking the participants to venture outside and take video around Dundee was fairly risky as it is dependent on the weather. We were lucky and had no rain. The format of the workshop would have had to change if it was raining.
Using video allows a non-designer to get their point across in a visual way.	Printing the insights was an issue in the initial stages. Once a restriction on the number of insights to be printed was put in place it made the process simpler. It can be time consuming, as they need to be selected, printed then stuck onto the wall.
The method can be used in a loose, fun and dynamic way that is more accessible and potentially less intimidating to people than, for example, sketching.	

⁶³ The feedback forms can be found in Appendix P-S

The screen grabs from the videos allowed for a good discussion to take place and helped with the overall communication of the group.	
The Flip video cameras are very simple and easy to use. These devices were perfect for such a workshop and highlight the importance of selecting the appropriate tools.	

Table 11: Insight Workshop Reflections. The Use of Video

Positive	Negative
The insight workshops brought in people with visual impairments, design thinkers, MSc students, academics, designers, and representatives from national charities, industry and NESTA. A dialogue with such a wide and important group of people would not have been possible if the Small Society Lab had not been set up and the channels put in place for community engagement.	It was very difficult to get the word of the workshop out there. Greater publicity of the event may have helped. I should also have identified key participants for more targeted communication.
The insight workshops were able to adapt to the particular interests of the different groups – business, charities and communities. This allowed for the group to focus around a general theme. The important thing was that all these themes had a local emphasis and people involved all felt passionately about them.	In order to fully engage and communicate with the Dundee community the next stage of the Lab needs to be considered – collation, review, analysis, documentation and distribution of the insights and process. This could be a lengthy and time consuming process.
There were some genuinely interesting and potentially commercial ideas that came out of the workshops.	The potentially commercially viable ideas should be documented and investigated for further development and funding. There may be intellectual property issues with this. This was out of the scope and timescales of this research programme.
The workshops have led to further communication and potential of developing other workshops. I have had interest from NESTA, Dundee community projects and a charitable theatre group. There is also the potential of creating a workshop with local councillors.	The Labs did not get many people 'off the street', mostly people connected with the university. This may have been down to the location (basement of DCA) and/or the lack of communication of the workshops. It may be interesting to take over an empty city centre shop for a couple of months.

Table 12: Insights Workshop Reflections. Community Engagement

Positive	Negative
Using thick sharpies on small cards standing around the insights gathered to generate ideas worked very well. It is important to let people know that the sketches do not need to be great, it is more important to get the ideas down on the card and get them on the wall.	Generating the ideas does take a lot of work in order to stimulate the participants and get the discussion going. If there is a lull in the conversation it is important that the workshop leader takes the lead.
There is usually a good amount of insights generated. The discussion around the ideas is also important which should also be captured.	Descriptions of the insights have to be done on a regular basis so those with visual impairments can keep track of what is being sketched.
Generating Insights/Ideas is a catalyst for discussion within the group.	People need the Insights – they cannot work from nothing.
The 'question' for the insight/ideas session has to be something the participants feel passionately about so they can discuss the area and generate appropriate ideas.	

Table 13: Insights Workshop Reflections. Insights and Ideas Session

8.8 Summary and Insights

What can industry learn from the Small Society Lab? The Small Society Lab case study demonstrated that channels of communication should be opened up between the global corporation and the local consumers/customers. Once these channels are open a more open dialogue can start to happen. It will help to break down the barriers between a faceless corporation and the generic consumer.

The workshops conducted were reliant on using video. Video allows participants to create something during the workshop (or over a period of time) that will enable them to tell a story about a particular issue, environment or even service. This allows them to directly influence the design process and ultimately the outcome. Some consumers/customers will appreciate this involvement.

Community and consumer engagement is not just for the design team. The lessons learned need to be filtered throughout the organisation; this can be done more effectively if there is a range of people there from different elements of the organisation. This should stop the lessons being learned just staying within the design team. Instead of the design team being the voice of the consumer, having mixed group participation should mean the whole organisation should be more in tune with the consumers' needs. The NCR|RNIB workshop did not have members from outside the design group of Cx Design; this will be touched upon in *Section 13.5 Future Work*.

Organisations do not have to do it alone. It may be easier to get the right participants if they team up with charitable organisations or established networks (the University/DCA). Communication of the engagements is important. A simple website can be very powerful in letting people (clients, customers, consumers) know that the corporation engages in the design process and with people in this way.

The Small Society Lab workshops show that if you build it, they will come. The initiative needs to come from within the organisation to start community engagements. Once this is in place and with the proper drive behind it the consumers will come. A key factor from within the organisation is allocation of resource i.e. allowing team members to dislocate from projects and allocation of budget. This point is also valid when considering what the organisation does with the ideas generated. This will take a significant amount of time and resource to collate and disseminate. This should be considered before the activities take place so the budget and resources are in place.

The NCR|RNIB activity, its output and outcomes demonstrated the bringing together of NCR's knowledge of technology and an understanding people. The relationship between people and technology is intertwined and this case study shows that through participatory design initiatives corporations can begin to understand that relationship better.

Table 14 below highlights the insights gained through the case study in relation to the overarching questions of the thesis.

Thesis Questions	Case Study Insights
1. <i>How can design research play a role in the activity of a global technology company?</i>	The Small Society Lab case study demonstrated that channels of communication can be opened up between the global corporation and the local consumers/customers. Once these channels were in place an open dialogue can start to happen. It helped to break down the barriers between a faceless corporation and the generic consumer.
2. <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	It was the participatory design process conducted through the Small Society Lab workshops that allowed for the insights and ideas to be appropriate as it applied a variety of different methods. This process would not have taken place if the management team had not allowed team members to dislocate from projects and allocated budget. The initiative needs to come from within the organisation to start community engagements.
3. <i>How can insights that have been generated through hyperlocal research be applied globally?</i>	The workshops conducted demonstrated that generating insights and ideas became a catalyst for more and wider discussion within the group. The act of production stimulated more insights and generated more ideas. Workshops, such as those conducted through the Small Society Lab, conducted on a global basis have the potential to allow for a greater understanding of the difference between global markets /services /community infrastructure.
4. <i>How can design research methods support socially-led innovation in NCR?</i>	The relationship between people and technology is intertwined and this case study showed that through participatory design initiatives the group understood that relationship better. The participants were given the opportunity to get their thoughts, feelings, concerns and ideas across to people who can influence the product and interaction design.
5. <i>How has the research conducted throughout the doctoral journey impacted the activity of the in-house design team?</i>	The experience was the first time the Cx Design team had ever engaged in a design research activity with consumers. The techniques allowed for an acute awareness of specific user needs with direct user feedback, this led to implementation of light halos and illuminated card reader apertures in the new ATM product range. There was an acute awareness of the impact of the design decisions made at the beginning of a product development affecting real people's lives.

Table 14: Case Study Insights in Relation to Thesis Questions

8.9 Future Work

The NCR|RNIB workshop and the other workshops conducted as part of the Small Society Lab all demonstrated the value of participatory design engagement and communication at a local level. The workshops conducted locally can be expanded across the global organisation as it demonstrates that engaging a community through design-led initiatives can teach organisations a variety of things.

- Feedback on existing products or services.
- Deeper understanding of consumers' needs.
- Understanding of community infrastructure.
- Information gathered could lead to new service/product innovations.
- The more engagements/workshops, the more focused and efficient organisations become.
- Understanding of local service needs that may be appropriate globally.
- If workshops are done on a global basis there could be a greater understanding of the difference between global markets /services /community infrastructure.

With this amount of potential it would be in NCR's interests to conduct similar workshops on a more regular, perhaps quarterly, basis. That way, as new product developments are on-going, feedback can be gained from consumers early in the design process. Ultimately, it could lead to a co-design process where the consumer is an integral part of the design and innovation process.

The Small Society Lab was conducted locally in Dundee with residents of the city. The proceeding case studies illustrate how action research methodology and participatory design methods have been used in global markets. India is an emerging and important market for NCR, understanding the consumers on a local level is an important step in being able to deliver solutions that are relevant to the consumer in this culturally diverse market.

Chapter 9: Case Study III

Act Local in a Global Context | *The Pillar ATM*

9.0 Introduction

The Pillar ATM is an NCR concept that originated out of an investigation into low-cost emerging markets. The case study is focused in Mumbai, India; as a corporation NCR have been active in this area for some time with a focused effort on building relationships with financial institutions, investors and universities. This has allowed NCR to develop various financial self-service devices that cater for the specific needs of this market.

The Pillar ATM case study is a demonstration of a local study in a global arena. It takes the study away from the relative familiarity of working with communities situated geographically close by. While the methodologies and methods used are very similar to the previous case studies the context is very different. The case study allows for an understanding of how acting locally can have global relevance.

A series of research questions would be explored through the project activity that aimed to question various aspects of NCR's current understanding of consumers in India and question its understanding of self-service.

- *What should self-service channels look like?*
- *What functionality is applicable in emerging markets?*
- *What can we learn from the emerging markets that are leap-frogging established markets in the acceptance of technology in self-service?*

As NCR evolves from a traditional business-to-business (B2B) model, as described in *Section 2.2 The Role of Design in NCR*, into a more business-to-consumer (B2C) model, it becomes more necessary to have direct engagement and dialogue with consumers. As an organisation there is an awareness of the importance of the interaction experience of the services and devices NCR deliver. Design's role in this understanding is critical, as the Executive Vice President of NCR, John Bruno, states '*The role of design moving*

forward for our company has never been more important and has never needed to be closer to what consumers need and require.' (Bruno, 2009)⁶⁴

This need to bring design and designers closer to the consumers was highlighted in Section 3.1 where John Hooker proposes that with globalisation comes challenges, specifically, understanding the cultural differences and ensuring that one culture does not impose its standards over another. Projects like the Pillar ATM will illustrate that the unique differences can be used to mutual advantage. Hooker also believes that we are entering a '*new world order*' (Hooker, 2007) where the economic dominance of the West is shifting to the East. This means the Pillar ATM case study is strategically very relevant to NCR as it moves into this emerging market.

Applying design research techniques on this project demonstrates the importance of the role of design in NCR. As shown in Professors Bruce Tether's diagram in Figure 3.0, Section 3.3, design plays a significant role and was prominent throughout the project evolution. It was through the consumer engagements and workshops that the project team were able to better define the project requirements. This was more aligned to Chhatpar's strategic decision-making process (Chhatpar, 2008) where design research and user validation feed into the business validation and strategic planning.

The focus of the process was to empower the consumer in the design process, a new approach for NCR's design team. Bringing the consumer into the design process has been part of the evolution of the user-centred design approach as mapped out by Elizabeth Sanders (2005). The participatory design approach originating in the 1960s has been championed by IDEO and their Human Centred Design Toolkit (2012). Researching the community 'through' design while actively reflecting on the process is an approach taken by many practitioners such as IDEO (2012, 2002) and researchers such as Bill Gaver (Gaver et al., 2010).

It could be said that involving the user in the design process '*in equal stature*' (Sanders, 2005, p4) is not only mutually beneficial for all parties but is the socially responsible approach for a global organisation. While the statement that Corporate Social Responsibility '*means something, but not always the same thing to everybody*' (Votaw, 1972) is valid, it is the case that it is often about a brand image on a global scale and as

⁶⁴ The full transcript of the interview can be found in Appendix B and viewed on the accompanying CD indexed CD-1

Rachel Cooper states '*CSR is bound to fail where it is adopted for reasons of public relations* (2005. p17).' The Pillar ATM case study presents an opportunity where design begins to add value to the way in which industry engages with the community through Corporate Community Involvement (CCI). Though this is the start of this type of involvement it is a positive showcase of how the engagements can evolve and become much deeper.

Embedding the consumer in the design and development process was discussed in Chapter 5. A more open approach to innovation is being taken by many organisations; this involves bringing the consumer and other organisations into the innovation process (Gassmann et al., 2010). This approach is also advocated by C.K. Prahalad who is focused on applying new strategies to cater for the needs of the people at the bottom of the economic and social pyramid (Prahalad, 2010).

For any collaboration to be relevant and effective in India the corporation initiating the engagement must understand what will be the most effective approach. Different cultures act in different ways. According to Aradhana Goel, Director of IDEO India, designers need to balance the tension found between what is minimal, what is viable and what is good.

The case study uses consumer engagement and understanding of the context to produce tangible output that can then be used to engage further discussion. The output was the product of local consumer engagement and translating that into a device that could be globally accepted. Phases 1 to 7 describe the story of its evolution and impact on the role of design in NCR.

9.1 Phase 1

Observe, take stock and identify concern

As a nation India is trying to bring the below poverty line population into the financial system. One of the ways they are approaching this is through micro-finance; small loans with minimum repayments. Scott Sobel, at the time of the case study, was NCR's Vice President of Business Development and Government Affairs, said:

'The size of the unbanked population is too large and spread across too vast a geography for it to be properly served by conventional channels alone. Self-service technology

solutions are essential to address the scalability and sustainability challenges facing Financial Inclusion in India and other developing countries.' (NCR, 2009)

There is a significant problem with illiteracy throughout the country, especially in rural communities (Government of India, 2011). This is an obvious issue, as the majority of financial devices require you to read options or follow instructions from a display. It is an issue that the Indian Government is seeking to address but will be one that can take a generation to understand, target and control.

Mumbai is a densely populated city with an estimated population of 21 million in 2011 (Government of India, 2011). Inside the various regions within the slum area there is a thriving community with workshops, stores, schools, manufacturers and even banks. The NCR team was able to use a bank and several local stores as a base to test prototypes, conduct usability trials and observe the customers. This enabled the team to get a better understanding of consumer banking habits and self-service knowledge in order to build a set of product requirements.

The NCR project team consisted of me, an industrial designer from the Consumer Experience group (Cx) and approximately six other personnel consisting of programmers, engineers and project managers from NCR Labs based in Dundee, Scotland. A team of five usability analysis and support personnel came from the TATA Institute of Social Sciences, Deonar, Mumbai.

The methods used to gain insights into the people and context is highlighted below. As the research was conducted in the field and in an extreme environment it was necessary to apply methods that had the flexibility and adaptability suitable for that context:

Shadowing (Curedale, 2012; Kuniavsky, 2003; McDonald, 2005) – The slums in and around Mumbai are a labyrinth of housing on top of small workshops and places of work. Walking along the dirt paths with members of that community gives an insight into daily life, the conditions, and types of objects in use there already.

Digital Ethnography (Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004) – The environment in which the team was working was extreme: the heat, dirt, dust. Digital tools were required to record this so further communication and learning could be achieved when the project team were back home.

Co-Design Workshop (Bjelland and Wood, 2008; Egglestone and Rogers, 2010; Gaver, 2011; Press et al., 2011) – The workshop with the community helped to discuss and explore a range of concepts and interaction possibilities. Ideas discussed at the workshop were embedded into the final design.

A timetable for the various activities can be seen split over two pages in Figure 9.0.

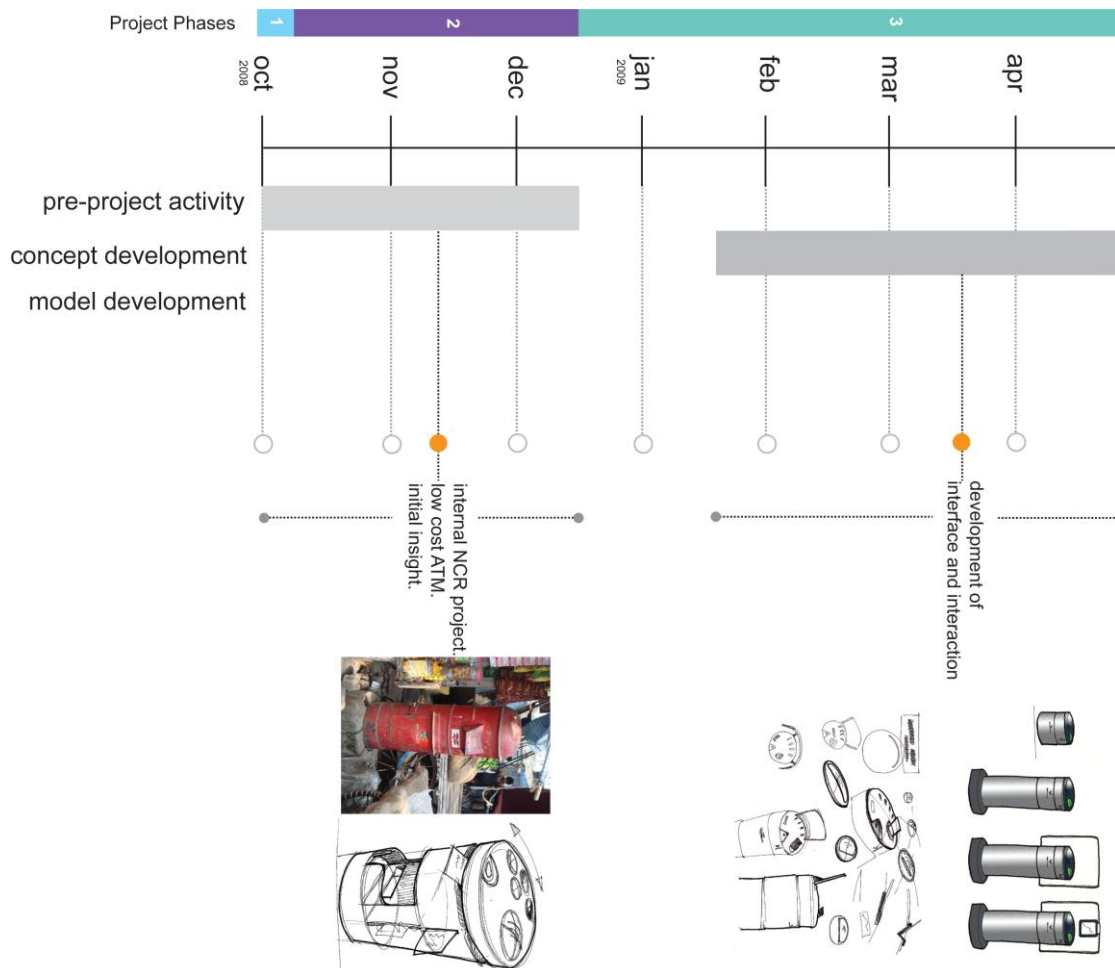
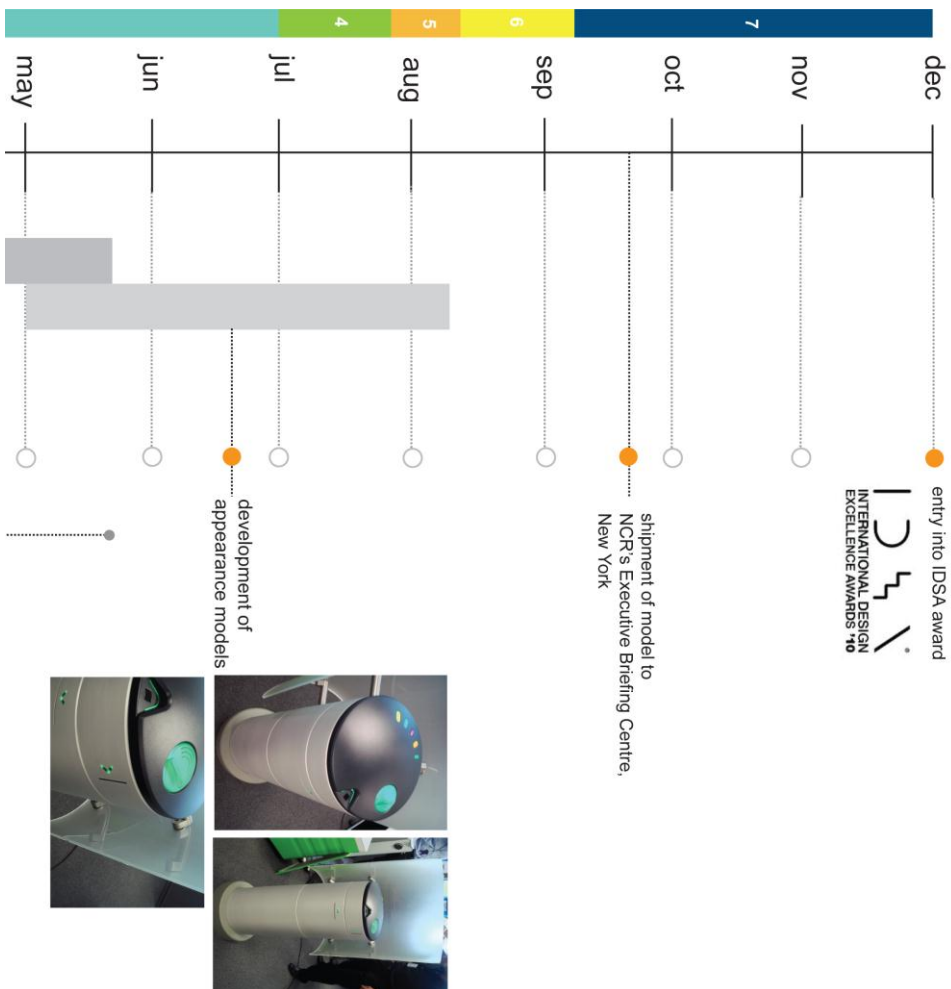


Figure 9.0: The Pillar ATM project Activity Timetable



9.2 Phase 2

Reflect on possible ways forward and begin to plan a solution

The device was initially conceived during a related research field trip in the slums of Mumbai. The initial outcome derived from research gathered in the field by the TATA Institute's usability team and from personal observations of people interacting with self-service devices.

The formal structured use of ethnographic tools is in its infancy within NCR. A project's time constraints and budget restrictions often drive a condensed design process that does not allow for extensive field and user research to be conducted. This has led to the need for the investigation, trial and on-going development of ethnographic tools and processes that can easily and cost effectively be used within a small design team, as described by Millen (2000). As NCR positions itself from a traditional business-to-business (B2B) supplier to a business-to-consumer (B2C) organisation, tools and processes to help understand consumers and identify service opportunities become more important.

Buchenau and Suri (2000) describe how taking design and a technology team outside their common design space is a good way to accelerate innovation. In the context of designing for India, NCR was interested in finding new ways to provide information self-services. The slum districts have a population of over a million people – all passing information between individuals, groups and communities. First impressions from the team were of chaos and invisible communication. However, the systematic use of information services became more in focus during the first day.

Rather than generate design requirements documentation we took an 'insight' lead approach, in other words, the aim of the research was to gather starting point insights rather than end point solutions. While more common in design research (Egglestone and Rogers, 2010; Gaver and Dunne, 1999; Gaver et al., 2004) this is a new approach for NCR.

Of the insights, a key observation was that it was an accepted practice for users to 'crowd-source' advice on how to use the ATM from others around, the purpose being to provide help, information, or just observing. This is in contrast to the accepted individual, security lead approach of European/USA interaction where it is a design requirement that we ensure consumers queuing to use an ATM are kept respectfully

away from anybody interacting at the machine. Shoulder surfing and other such methods of fraudulently taking consumers' personal account details are, unfortunately, a common occurrence (Gamman and Thorpe, 2010). This is not to say that it does not happen in India, but the design team observed that consumers did not seem to have the same attitude towards personal space.

Digital ethnography (Masten and Plowman, 2003) through photographs and video was a technique used to gather insights of the people and context of Mumbai and the surrounding slums (see Figure 9.1). The videos and photographs were used to communicate to the wider team back in Dundee; the video in particular illustrated the context, environment and challenges. Using video allowed for the communication of the sounds, movements and vibrancy of the communities to come through. The research was to use digital photography as a means of capturing the 'Thoughtless Acts' (Suri, 2004) of the way people interacted with the objects and environment in the shack-dwellers community.



Figure 9.1: Digital Ethnography: Observation, Documentation and Reflection of the People and Context. Steven Birnie. 2009

A core theme to the capturing of thoughtless acts was to look at the interaction between people and 'community objects', defined as products or service touch points used or placed within a public environment such as the public telephone, the post box or church clock. The design team was interested in understanding the relationship people in the community had with these objects. The aim was to try and understand if there was a sense of ownership or if they were purely seen as utilitarian objects. We were also interested in understanding the community's discernment of security while using self-service devices. Understanding these areas would inform the form factor, interaction models and manufacturing methods of the final design.

From the initial insights observed by the team it was clear that these objects were very utilitarian, often constructed or reworked out of sheet metal. Observed in the environment was an interesting culture of make-do and mend juxtaposed with high-tech capitalism (Goel, 2012). There were a number of payphones that would have a strong iron bracket bolted around it, secured in place with a large padlock. Security is an obvious concern and showing this in an obvious way was quite common. Interestingly, this crude display of security almost made a consumer more aware of its potential worth and vulnerability (Figure 9.2).



Figure 9.2: Public Telephone Boxes. Steven Birnie. 2009

One particular insight was the image taken of the post box in the heart of the Tunga Gaon district in Mumbai (Figure 9.3). It has a robust cylindrical form constructed from traditional materials set into a solid concrete base. It is bashed, weathered and dirty but clearly fit for purpose. This was the initial insight, the seed of an idea that I then developed at a later stage.



Figure 9.3: Insight and Idea. Steven Birnie. 2009

9.3 Phase 3

Take action to try out the solution

The initial concepts were roughly sketched and developed on paper. Ideas can be shared and adapted quickly and different forms explored. Selections of the strongest concepts were then developed further in the computer aided design (CAD) system. I created the concepts out of card; the card models can be reviewed and adapted economically with minimal time wasted. Methods of interaction can be prototyped simply using paper illustrations. This allowed for a better understanding of the constraints such as module sizes and ergonomic constraints. In order to get a true understanding of form, scale and the interaction the concepts have to be created in three dimensions.

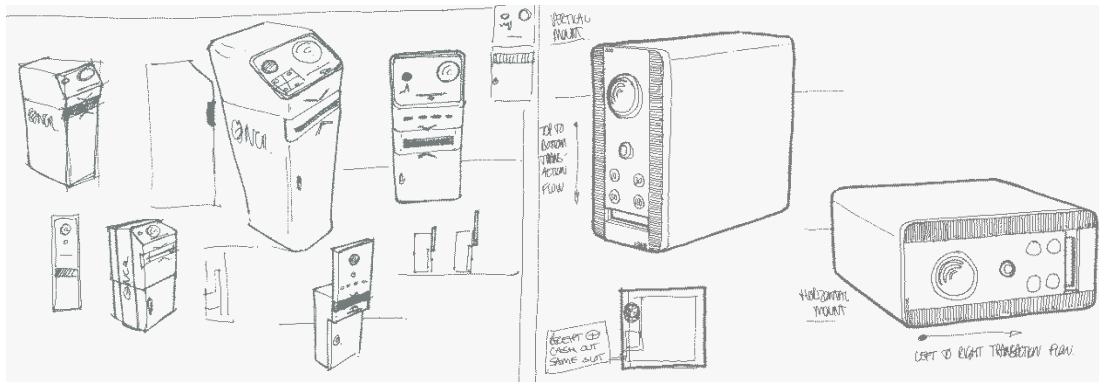


Figure 9.4: Initial Concept Sketches. Steven Birnie. 2009

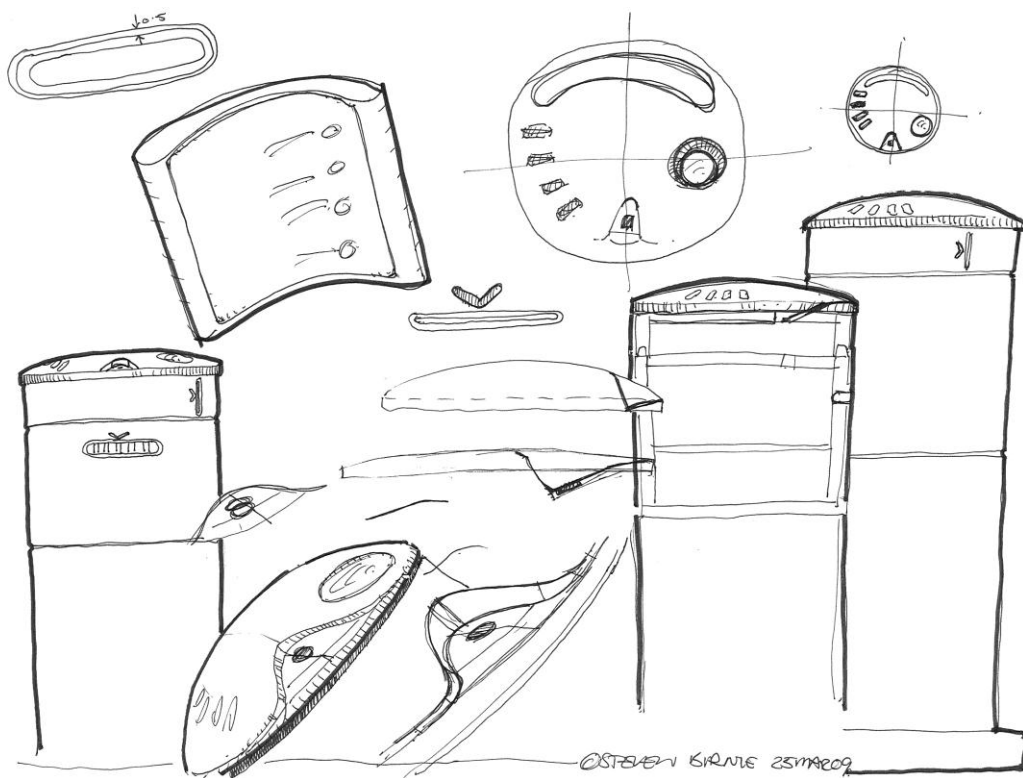


Figure 9.5: Pillar ATM Concept Sketches. Steven Birnie. 2009

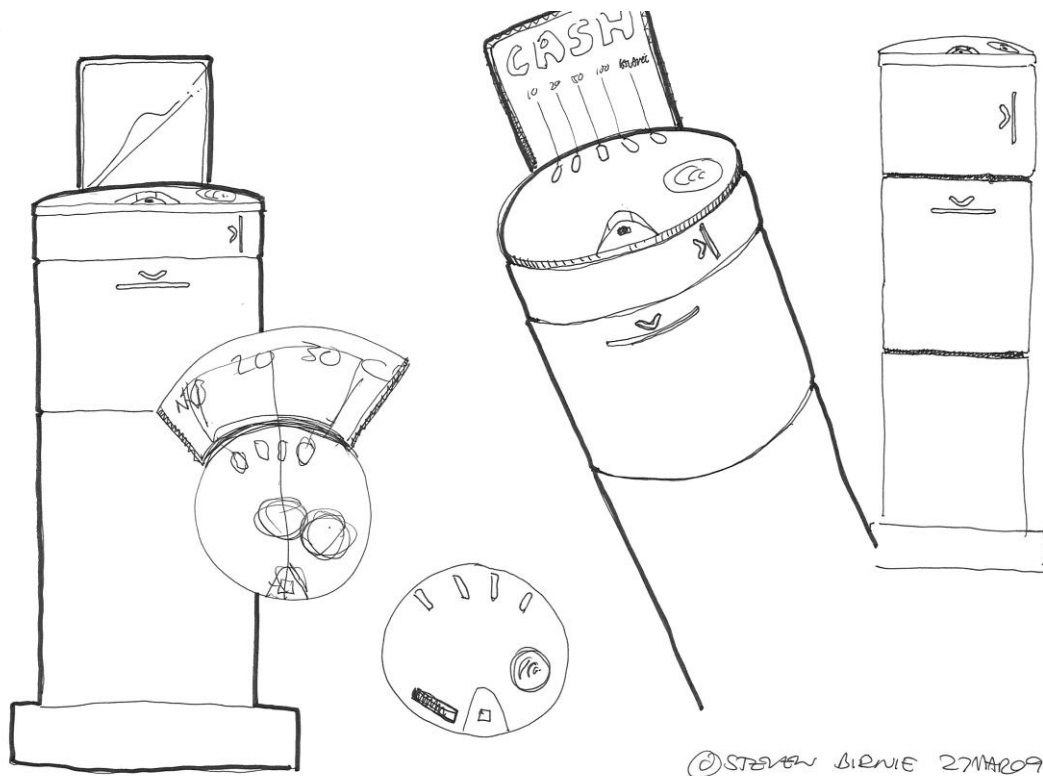


Figure 9.6: Pillar ATM concept sketches. Steven Birnie. 2009

Engaging with the community was an important factor of this project. The NCR design team needed to ensure they were listening to the real users of the solutions. Models of various concepts were shown to members of a local community on two occasions. On the first occasion there were 28 male and four female participants, on the second there were 30 male and three female participants. They provided feedback that would inform the development of the Pillar ATM concept. The community leaders were given a list of questions so the design team could gather insights into the concepts shown, better understand the community's banking habits and identify any cultural idiosyncrasies (Figures 9.7, 9.8 and 9.9)⁶⁵. For instance, it was noted that in the first workshop in 75% of the cases the females managed the home banking, while in the second it was even more, 85%. There was also a preference for the colour green to be included in the design. The results helped to provide useful insights and ultimately direct the outcome of the final design.

⁶⁵ A list of the questions asked and the feedback given can be found in Appendix T.



Figure 9.7: Community Workshop. Steven Birnie. 2009



Figure 9.8: Community Workshop. Mumbai. Steven Birnie. 2009



Figure 9.9: Community Workshop. Mumbai. Steven Birnie. 2009

The immediate difference with the Pillar ATM from a traditional ATM is the form of the device. It is cylindrical, simple and robust yet not intimidating. The cylindrical form allowed for more social interaction, if required, noted from the field observations. The bodywork has been pared back to its bare metal, highlighting its robustness while also reducing cost. The whole unit is secured in concrete, not a conventional method but suitable for the environment (Figure 9.10). The device has been designed to be scalable in both size and functionality to make it adapt to different contexts and markets. It can be both desktop mounted or mounted on a pedestal.



Figure 9.10: The Pillar ATM. Steven Birnie. 2010

The core module functionality is:

Fast cash buttons

Contactless card

Fingerprint biometric

Receipt printer

Dispenser (cash or other)

E-ink Display (optional)

There is no display on the ATM, display screens suitable for an external environment are expensive items and susceptible to vandalism, sunlight visibility issues and failures in the harsh, dusty, self-service environment. The simple lead-through is instead done by lighting and sounds. The user approaches the machine and places their account card in the contactless card reader pocket. The pocket is indicated clearly by the circular green disc on the top of the interface, a 'start point'. The indicator light around the fingerprint biometric reader then flashes, directing the user and ensuring correct authentication. Once authentication is complete a series of colourfully illuminated 'fast cash' buttons with varying dominations will begin to pulse. The amount required is selected and dispensed from the horizontal slot at the front of the device, followed by a receipt from the vertical slot. The lead-through is supported by audio instruction that can be

customised to the users' language; there are 16 common languages used in India, the most common being Marathi, Hindi Gujarati and English.

9.4 Phase 4

Monitor and observe the outcomes

To the naïve user an ATM can be complex, confusing and potentially intimidating. A core goal of the activity was the simplification of the interaction between the device and the consumer.

Through the community workshop it was clear that the consumers were not necessarily intimidated by the use of some advanced technologies that in traditional banking markets are less familiar. The community group stated that the use of biometric fingerprint readers is used to gain access to some mosques. The use of biometric readers in mature markets such as the United Kingdom or the USA has been trialled but is not universally accepted.

The emerging markets are not as burdened by a technology infrastructure so can adopt new technologies much quicker, wireless technology being an example. Another important point is that consumers in emerging markets are not burdened by preconceptions of how a specific interaction should be, so are more willing to adapt to new service models.

9.5 Phase 5

Evaluate and reflect on what has happened

An important outcome for the design team was the design process and recognition that the project highlighted the need to communicate directly with consumers. The design team was able to get into the field and experience the environment and culture of the community. Working with the TATA Institute meant the NCR team could leverage their local knowledge of the area and people to communicate effectively with the consumers and gather much richer insights of the people and the place.

It is important to highlight that the same manufacturing, engineering and cost restrictions and constraints of a true engineering lead project did not bind the Pillar ATM activity. It is a concept device and was driven from a consumer understanding

perspective. This allowed for a more open dialogue to open up between NCR and the consumer.

The project was participatory in nature but it could have gone further. The design value was limited to within the organisation rather than directly impacting on a community. This project did become a catalyst for beginning to understand how a corporation cannot just appear in a community (or 'market') without truly understanding the needs of the people. While the project was successful in its aim to deliver an innovative self-service solution it has never been taken forward in the intended market. This is because the community/market has not and will not 'buy' into it. They have no emotional or financial investment in the product or service. This realisation formed the basis of further research of trying to understand how companies can form that relationship through better engagements, understanding and communication.

9.6 Phase 6

Modify practice

The prototype was created to push the boundaries of current ATM perceptions and conventions. The original intention was to use the prototype in consumer experience workshops to gather information on areas of self-service, use the prototype as a technology probe (Fitton et al., 2004). Using the prototype as a research tool would have helped NCR to better understand its customers and end users. This knowledge could feed directly into the internal development community. Design and research teams can use probing research products like the Pillar ATM to try and better understand consumers, markets and product requirements.

Through the process of the case study it became evident that to get deeper insights and a better understanding of the community's needs, the design team needed to be more integrated with the community. This approach is similar to IDEO's Human Centred Design Toolkit (IDEO, 2012) and has been adopted in other organisations (Burns et al., 2006; Jung and Jan, 2008; Pilloton, 2010b). For NCR, it focused the understanding of the potential benefits of having designers on location, getting direct input from the people they would be designing for.

Illiteracy was a strong factor in the design of the interface. Not being able to read the screen or labels meant that the interface had to follow a logical flow. Consideration of

illiterate users' requirements and a logical flow of the transaction gives benefits in future products for all users.

9.7 Phase 7

Move in new directions or return to observe/reflect/act cycle

A key element to the project has been the cross-cultural engagement and the development of a project that has allowed for that to take place. The project gave a platform for understanding ways to engage with unfamiliar community groups and recognising what can be achieved by doing it.

An impact of this activity has been its contribution to the recognition of the importance of user-centred participatory design within NCR. Advanced concepts such as the Pillar ATM help to communicate NCR's ability to think creatively and innovatively both internally within the company and externally to customers (Macasai, 2010)⁶⁶. The Industrial Designers Society of America has recognised the Pillar ATM by nominating it as a finalist in the International Design Excellence Awards 2010 (Hamilton, 2010. p210)⁶⁷.

⁶⁶ See Appendix U for the IDEA Award Certificate.

⁶⁷ The Pillar ATM featured on promotional posters for the Dundee Science Festival 2011. See Figure 9.11.

Swipe it!



curious?

use your mobile device to
scan here and find out more



@dundeescifest

Figure 9.11: Dundee Science Festival Promotional Poster. 2010

9.8 Summary and Insights

The Pillar ATM project illustrates that participatory action research at a local level can benefit the corporation on a moral and practical level. Those affected and expected to interact with the device have had direct influence in its design. With that direct influence should derive a more useful and ultimately successful product.

The concept raised questions on what devices were required for low-cost emerging markets. Is an expensive, power hungry and potentially venerable display required on a device for this market? Can the display be removed and the interaction be dictated through an intuitive interface supported by lights and sounds? Can the display interface be a consumer's mobile phone?

Through the case study the questions drawn out at the start of the activity could start to be answered.

- *What should self-service channels look like?* There is no definitive answer to this but learning from the Pillar ATM it illustrated that they should be context appropriate. The harsh environment of the slums of Mumbai requires a particular aesthetic in order to last. The context, user requirements and transaction flow dictates the form and aesthetic.
- *What functionality is applicable in emerging markets?* Through the participatory design process it became evident that there was greater acceptance of different authentication technologies in the emerging markets. Considerations specific to the emerging markets are dictating the functional specification of devices. Power outages, network availability and dirt ingress dictate what devices are most suitable in that context.
- *What can we learn from the emerging markets that are leap-frogging established markets in the acceptance of technology in self-service?* The interest gained for the Pillar ATM in mature markets such as the USA has demonstrated that new forms of interaction and a shift away from traditional aesthetic generate interest. The subtle ambiguity (Gaver et al., 2003) in the form brings users to the device while the intuitive interface and transaction flow do not intimidate the user. These form and functional qualities were learned in the Dance Base case study and have been applied in a corporate context.

One of the key lessons from the Pillar ATM case study was about getting designers on location and using participatory design to gain insights into a specific hyperlocal community that could then be applied in the global arena.

The Pillar ATM is currently located in NCR's Executive Briefing Centre in the Number 7 World Trade Centre building, New York. Locating the device in an area of high visibility for our customers allows them to see how NCR can think conceptually and ethically while understanding consumer and market requirements. The project focused on the specific requirements of users and a community within a particular environment. The insights gathered have much greater influence and impact far beyond the dusty streets of Mumbai. While the device has been designed for the emerging markets it has received much interest and positive feedback from NCR's more traditional customer base.

Yet, critically, the engagement does not go deep enough. The design value was limited to internal company thinking rather than directly impacting on a community. This project did become a catalyst for beginning to understand how a corporation cannot just appear in a community (or market) without truly understanding the needs of the people. While the project was successful in its aim to deliver an innovative self-service solution it has never been taken back to the intended market for further analysis and debate. There are many reasons for this such as time constraints, budget restrictions and shifts in project focus.

However, the case study has formed the basis of further research, trying to understand how companies can form local relationships through better engagements, understanding and communication.

Table 15 below highlights the insights gained through the case study in relation to the overarching questions of the thesis.

Thesis Questions	Case Study Insights
1. <i>How can design research play a role in the activity of a global technology company?</i>	The Pillar ATM helped to communicate NCR's ability to think creatively and innovatively both internally within the company and externally to customers. Outputs from participatory design research projects allow customers to see how NCR can think conceptually and ethically while understanding consumer and market requirements.
2. <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	The Pillar ATM case study presents an opportunity where design begins to add value to the way in which industry engages with the community through Corporate Community Involvement. It was one of the first engagements of its kind in the company where insights were gathered from the field through community engagement.
3. <i>How can insights that have been generated through hyperlocal research be applied globally?</i>	Through disseminating and showcasing the work it allowed global customers to become aware of the project and its potential opportunities.
4. <i>How can design research methods support socially-led innovation in NCR?</i>	The Pillar ATM activity demonstrated that engagement with the consumer throughout the design process through community workshops provided a catalyst for innovative ideas. The company had to commit significant budget, personnel and resources to the activity.
5. <i>How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?</i>	The project has been locally and internationally publicised and was also a finalist in an international design award. The dissemination of this work has helped to elevate the role of design both within NCR and externally to our consumers, customers and competition.

Table 15: Case Study Insights in Relation to Thesis Questions

9.9 Future Work

The approach taken through the case study can be built upon with more and regular engagements with local communities. The element that the Pillar ATM did not manage to achieve was to engage with the community after the solution was produced. In a true development scenario this could and should be different.

One of the challenges was the fact that the majority of the team were based in Scotland, not India. This presented budget, cost, time and cultural challenges that had to be negotiated. Future development programs should have the core team based in India with the core of the development team being native to the region. Indeed, this approach is being taken by NCR in current development programs with project expertise being called upon from outside the region when and were required.

The Pillar ATM study has a local focus, from which a small degree of insights could be applied globally. The next stage was to apply the PAR methodology on a local level within a global context from which there could be wider insights drawn relevant to NCR's consumer and experience focus. The challenge was to take a team of researchers into an alien environment and work with local teams to gather a wide range of insights that could be transferred into globally relevant ideas.

Applying that thought process is discussed in the following section that describes an NCR research activity to try and understand Indian consumers' mobile use and relationship with the Internet. The Mobile Insights case study brings together the degrees of learning from the previous case studies; it communicates and discusses the application of participatory design methods in the development of self-service devices.

Chapter 10: Case Study IV

Think Global | *Mobile Insights*

10.0 Introduction

As discussed in the previous case studies, in order for NCR to deliver products, interactions and services that are relevant, usable and culturally aware they need to engage with local consumers in our global markets.

In January 2012, NCR sponsored MSc Product Design students to research and gather insights into the Indian market, the people and culture in relation to mobile use and the digital world. NCR commissioned a report in order to share the results from the 2-week research activity. I directed the activity having written the brief as part of my involvement with the University of Dundee through my part-time PhD research⁶⁸. Seven MSc Product Design students from the University of Dundee, Scotland conducted the research. The level four students from the National Institute of Design (NID), Ahmedabad, who provided local knowledge and valuable assistance, supported them. The report shared the experiences and methods of the insights gathering and illustrated a series of potential concepts, service ideas and interactions relevant to NCR's business.

A series of questions was raised at the start of the activity that the research aimed to answer. They were focused around local consumer habits and how these would be translated into the global self-service industry.

- *How do consumers in this market currently interact through their mobile devices with the retail, financial, hospitality and travel industries?*
- *How are mobile interactions going to shape these industries in the future?*
- *What does this mean for the future of self-service hardware and interaction design?*

The concepts created at the end of the case study as part of the output of the various participatory engagements aligned with NCR's consumer-to-business (C2B) model. This moves beyond the B2C model discussed in the Pillar ATM case study. The ideas created

⁶⁸ A copy of the original project brief given to the students can be found in Appendix V.

proposed new modes of consumer interaction through self-service channels. The case study investigates the area highlighted by John Bruno when he talked about the future of self-service interaction:

'With this massive proliferation of technology and this massive proliferation of broadband capabilities consumers of the future are no longer going to be B-2-C, business to consumers, but consumer to business. The consumers themselves are going to dictate how it is they want to interact with technology.' (Bruno, 2009)

If indeed the consumer is able to dictate how they interact with business then it is up to businesses to engage with consumers so products and services can be co-created to their specific needs and mutual benefit. This was identified in Section 3.6 where Prahalad states *'It also requires a new respect for consumers as co-creators of solutions and not just passive recipients of a product or service.'* (Prahalad, 2010. p15)

The Mobile Insights case study demonstrates how design research through participatory design methods can allow an organisation to be situated in the fourth and final stage of the Danish Design Centre's 'Design Ladder', where design is used as a process of innovation (Ramlau, 2004). While the structure for reporting the case study follows the process mapped out by McNiff and Whitehead (2011) the iterative process of the engagement is similar to the service design approach described by Stickdorn and Schneider (2010).

- Observation and recording: through digital ethnographic techniques.
- Co-design with consumers: design workshops, brainstorming, idea jams.
- Prototyping: service blueprinting, story boarding, model making.
- Testing: Experience prototyping, usability testing.
- Implementation: Story boarding, service specifications, service blueprint.

The Mobile Insights case study establishes how close engagement with the local community throughout the innovation process can be used to gain insights and co-create solutions that are relevant locally and globally. This approach is, as highlighted in the previous case studies, common to that used by Project H and IDEO. Both organisations act on a local level to deliver solutions that solve issues globally.

Ever since the publication of the Eames Report (Eames and Eames, 1958b) there has been an awareness of the social and economic issues requiring attention in India. Governments, NGOs and corporations are all involved at various levels with local communities. There are challenges when engaging in viable business opportunities with the Bottom of the Pyramid (BoP) yet, as Prahalad is quick to point out '*...if we stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value conscious consumers, a whole new world of opportunity will open up*'. (Prahalad, 2009. p1)

There are examples of where this has been done successfully; Section 5.6 highlights a selection of these. Aravind Eyecare and Jaipur Foot both service the medical needs of people of India in an ultra-low cost and efficient way. While consumers in the West would not accept certain elements of the service delivery, interestingly, the principles behind the service models and approaches are being analysed by Western medical practitioners. Providing cost-effective treatment is in everyone's interest and, as the examples show, a lot can be learned in this respect from India.

Phases 1 to 7 describe the process of the Mobile Insights case study. It was a study conducted over a tight timescale in an extreme environment where locally conducted participatory design techniques were applied to gain local insights that generated globally relevant ideas.

10.1 Phase 1

Observe, take stock and identify concern

The use of mobile technologies and communications in India over the past 5–10 years has been prolific. India has the world's second largest number of mobile phone users, with over 867.8 million as of 31st March 2013 (TRAI, 2013). Although the percentage of the population that has access to the Internet in any form is low, there are still 143.2 million users who use their mobiles to access the Internet (TRAI, 2013).

In countries such as the UK, use of the Internet has grown from fixed line access due to the legacy of copper cable infrastructure. Where in many Western countries the advent of mobile technologies was seen as an evolutionary step forward, in developing nations it could be seen as a mobile revolution, bypassing infrastructure investments other countries have made.

India does not have the same legacy issues as the UK and can effectively leapfrog the UK and move to a much more mobile and inherently accessible mode of Internet access. With countries such as India, China and those in Africa spearheading the mobile revolution, companies like NCR are looking to them to understand how business and consumers are adopting mobile technologies and the opportunities this may create.

10.2 Phase 2

Reflect on possible ways forward and begin to plan a solution

As my role was to direct the University of Dundee research team, I arrived in India three days ahead of the main group. This was necessary due to the tight timescales of the main activity. It allowed me to make the appropriate contacts in NID so when the Dundee team arrived they could get straight to work. Due to the nature of the project and the relaxed nature of NID, there was very limited planning that could be done before getting out there.

As with the other case studies, the core reasons for the methods were identified; this helped to select the most appropriate methods for the project and community. The reasons were:

- *Empathy* – Getting a deep appreciation of the people and the culture is very difficult over the short timescale of the project, which is where the close participation of the NID students was critical.
- *Understanding* – Understand the people, context and culture. This would be very difficult over the timeframe of the project, therefore, targeting appropriate areas and working closely with the NID students were essential.
- *Engagement* – This type of activity could not be done from afar; it was about communicating and interacting with the community in Ahmedabad in an efficient way.

Methods were identified that would allow for a broad range of insights to be gathered from different sources. As this activity was conducted over a two-week timeframe it allowed for a broader range of methods to be applied. The methods are highlighted below:

Digital Ethnography (Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004) – Having seven members of a core research team to gather insights into the local community meant that there was a large amount of digital data collected. In order for this not to become overwhelming the subject areas were targeted and the digital content reviewed at the end of each day.

Focus Groups (Dean, 1994; Holtzblatt et al., 2005; Kuniavsky, 2003) – A series of focus groups were held with the NID students who understood the local culture, customs and perceptions. These were held at the early stages of the process so the research team could go into the field informed and target the appropriate areas.

Shadowing (Curedale, 2012; Kuniavsky, 2003a; McDonald, 2005) – The research team from the University of Dundee shadowed the NID students who took them around appropriate places in the city. Working closely with the NID students meant the research team could get instant feedback and a greater understanding of the situation.

Questionnaires (Curedale, 2012; Holtzblatt et al., 2005; Kuniavsky, 2003; Lehtinen et al., 2009; Trochim, 2006) – Co-developed with the NID students, the questionnaires allowed for some quantifiable data to be collected from the local community.

Service Journeys (Curedale, 2012; Moggridge, 2007; Stickdorn and Schneider, 2010; Suri, 2003) – Experiencing and understanding various service interactions allowed the team to observe the differences between UK and Indian consumers and discover opportunities for NCR.

Semi-structured Interviews (Curedale, 2012; Holtzblatt et al., 2005; Kuniavsky, 2003) – Targeted interviews meant the team could query some of their initial perceptions and gather further evidence to support their concept direction.

Video Insights (Buur et al., 2000; Gaver et al., 2004, 2003; Raijmakers et al., 2006; Suri, 2003; Ylirisku and Buur, 2007) – Using video in a targeted way that was then used by the group to generate a range of ideas around self-service opportunities.

Co-Design Workshop (Bjelland and Wood, 2008; Egglestone and Rogers, 2010; Gaver, 2011; Press et al., 2011) – Having members of the community engage in a co-design workshop meant the concepts generated were appropriate for the market.

10.3 Phase 3

Take action to try out the solution

A range of actions was taken over the course of the two-week study. These have been illustrated in Figure 10.0 below.

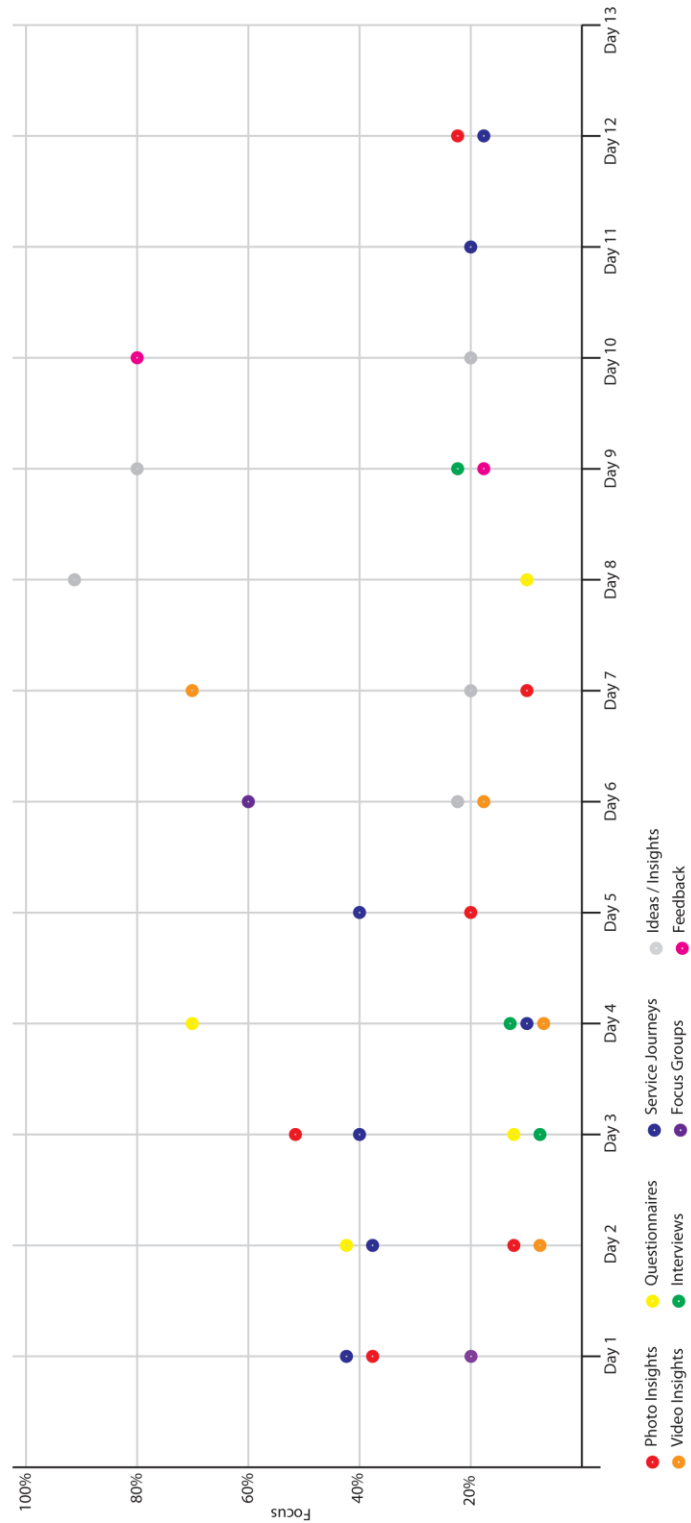


Figure 10.0: Mobile Insights. Methods Map. (Product Research Studio, 2012. p14)

Action 1: Photographic Insights

Photographic Insights are specific, targeted photographs in response to a question or project brief. The research team used these to generate appropriate insights and ideas.

The photographs captured images that are easy to explain. They allowed for insights of greater quality in that they had appropriate grounding, and allowed for and encouraged further questioning.

As mentioned previously, having a relatively large research team meant that by the end of our first week there had been a wealth of images collected. It became a daily task to categorise and analyse these photographs as a group. The photographs collected would be used in the co-design workshop that was conducted later in the process.



Figure 10.1: Photographic Insight, The Mobile ATM, Ahmedabad. (Product Research Studio, 2012. p15)

Action 2: Focus Groups

The focus group research involved organised discussion with a selected group of individuals in order to gain information about their views and experiences of a topic. This type of interviewing is particularly suited for obtaining several perspectives about

the same topic. The benefits of focus group research include gaining insights into people's shared understandings of everyday life.

Two focus groups were held with the NID students and the research team. The first focus group consisted of seven females (aged between 19 and 25, four of whom were from NID) and two males (aged between 24 and 34). I would lead the discussion with the research team taking notes and adding to the discussion where it was felt further information was required. The first focus group would inform the questionnaire while the second was focused on the validation of the insights gathered.⁶⁹

Discussions regarding how phones were paid were discussed, using terminology that was slightly different to how we would have approached it:

Participant (E) *'There are two kinds of things, you have a pre-paid account and you have a post-paid account, you could really ask about whether they have a pre-paid or post-paid connection. In a pre-paid connection you pay for your usage. It's more like a debit card. And post-paid is like a credit card... you have a choice...'* (2:20)

It became apparent through the discussion that the majority of people had more than one mobile phone, the reason being that they get charged different tariffs if they are moving from district to district, or will simply not work in different districts.

Participant (E) *'...if you have a pre-paid account the chances are it will not work because of the roaming charges where as in post-paid you are definitely going to pay for it...'* (4:11)

Participant (B): *'...as a student I would prefer a pre-paid so I can keep track of my calling but for someone who does not want to worry about running out of calling time would prefer a post-paid.'* (5:00)

Consumers' phone buying choice was discussed in detail. This would inform questions around what features consumers looked for and used on their mobile phones.

(SB): *'Can you categorise in terms of profession what type of phone that they have?'*

⁶⁹ Transcript extracts from both the focus groups can be found in Appendix W-X.

Participant (C): *'Yeah Yeah, mechanics will prefer to have a cell phone which is really sturdy, which you know if at all it falls down nothing happens to it. It probably has features like a torch, inbuilt torch... which is there in Nokia phones.'* (12:10)

Due to the Internet and infrastructure issues in India it has led to other forms of technology taking prominence. Bluetooth technology is used regularly; this is functionality that is available on most phones. In the West we are less reliant on it as we would use the Internet or Wi-Fi to connect or transfer files.

Participant (A): *'All my friends at home are very good with the Bluetooth, very fast. We can send files to each other, music. **This is something you will not be able to understand.** This is not Wi-Fi enabled and the Internet you get charged, so something you can do amongst yourself, something which is transferring music, they have a connection to their phone, to their other friend. These are things that are not Internet dependent.'* (13:15)

The second focus group consisted of eight females (aged between 19 and 25, four of which were from NID) and three males (aged between 20 and 34, one of which was from NID). We collated our notes from all the discussions with the variety of people we had talked to over the previous days and validated them with the focus group. It was important for us to do that, as some of our assumptions were not correct.

(SB): *'In terms of branding Nokia was one that was coming out. People can really associate that with being a robust phone but not a high-end phone. Obviously you have your iPhones, Samsungs, and stuff up in that bracket but the Nokia is very much seen as a lower end phone? Would that be correct?'*

Participant (A): *'...mmm no not. Nokia is seen as very good. In fact Nokia is in fact associated with a very high-end phone just before Samsung and LG hit the market. Nokia is not like a cheap good brand but a good good brand.'* (0:42)

Consumer purchasing behaviour and influences were discussed at length with brand loyalty being important to the consumers. Purchasing decisions are made through word of mouth or through past experiences they have had with the product.

(SB): *'Do you think brand loyalty still plays a very big part? Or are people willing to go with whatever? Very quickly switch onto different brands. Or is brand loyalty a big thing in India?'*

Participant (F): *'Yeah in India it is.'*

Participant (A): *'For purchasing, it is either past experiences or word of mouth from their neighbours.'*

Participant (F): *'It is a big thing, brand loyalty.'* (2:36)

During the discussion it became apparent that there were distinct roles played by males and females in the family.

Participant (A): *'Women are the ones who do the finances, they could manage, they could do the mobile banking, they could do the transaction, they could learn sitting at home.'* (1:21:20)



Figure 10.2: First focus group with NID students. (Product Research Studio, 2012. p17)

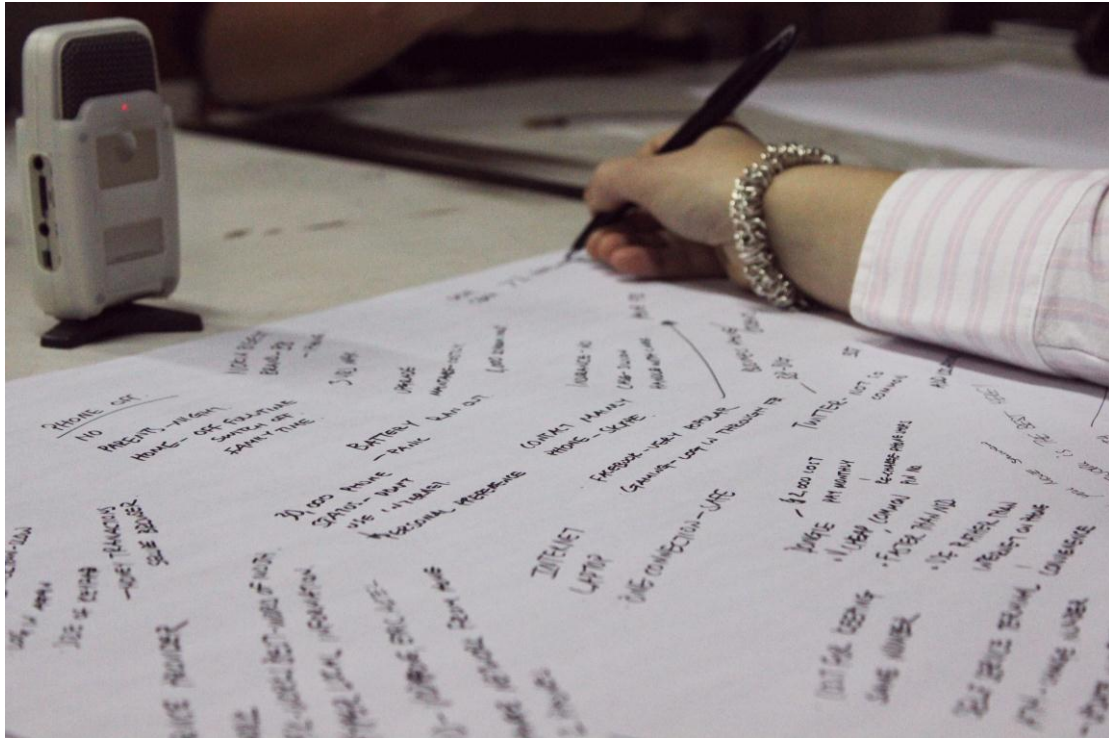


Figure 10.3: Note taking from the First Focus Group with NID Students. (Product Research Studio, 2012. p17)

It was important to validate the insights gained with the NID group. The research team needed to ensure the correct assumptions had been drawn. The second focus group gave a number of new insights as well as confirming initial assumptions. The focus group opened up the topic of 'What works in India?' The key findings were:

- Celebrity endorsement (especially Bollywood stars) drives sales in all products; people they see the most heavily influence consumers.
- Intimidation about technology leads to vandalism. This limits distribution of vending machines and automated retail devices. According to the focus group men, especially would feel like machines are making them look foolish and in turn would punish the machine.
- Tradition is strong in consumer behaviours (worshiping new cars, not shopping for metal on Saturdays).
- Successful companies and products in India need to be robust, trusted, recommended, reliable, aspirational and long lasting. Examples of such companies are: Amul, Flipkart, Avon, Jaipur Foot, Tupperware, Just Dial, OLPC, Godrej, TATA, Nokia, Reliance and Vikram.

Action 3: Questionnaires

There was a need to collect quantitative data to complement the qualitative information gathered through the participatory design research methods. The research team would co-design a questionnaire with the NID students that could be distributed, collated and evaluated efficiently⁷⁰.

With the support of the NID students the content of the questionnaire was developed that did not offend or put anyone off, and contained terminology appropriate to the target audience, such as using the terms post-paid and pre-paid, commonly used in India to define a contract payment plan, and a pay-as-you-go plan.

The data from 92 respondents was collected⁷¹. From this information the team were able to derive a selection of core and general insights.

Core Insights gained from questionnaires:

- Mobile phones are ubiquitous and many consumers have more than one mobile phone or SIM card.
- Cross functionality of phones such as torch, radio and Bluetooth are regularly deciding factors in consumer behaviour.
- Internet connectivity on mobiles is not a defining factor in consumer buying behaviour; however, social networking is a key function on a mobile phone.
- Consumers would use their laptop to access Internet banking. There is a lack of trust in digital services, especially banking – lack of 3G, tactility, interface.
- Bluetooth is a common attribute and is used for file and media sharing.

General Insights gained from questionnaires:

- Because of poor 3G/Wi-Fi, consumers use a dongle that they subscribe to on a pay monthly contract.

⁷⁰ A copy of the co-designed questionnaire can be found in Appendix Y.

⁷¹ An infographic of the questionnaire results can be found in Appendix Z.

- Mobile Internet news is used but generally just for notifications.
- Pre-paid phone (pay-as-you-go) packages are more popular/common than post-paid (contract).
- Roaming charges are high between states – reason for more than one SIM card/phone.
- Facebook is the most popular social networking medium; twitter is not as commonly used.

These findings acted as grounding for further research and informed the design stages of the project.



Figure 10.4: Questionnaires. National Institute of Design, Ahmedabad. (Product Research Studio, 2012. p19)



Figure 10.5: Questionnaires. National Institute of Design, Ahmedabad. Steven Birnie 2012.

Action 4: Service Journeys

The research team undertook several service journeys in each of the core sectors (financial, retail and travel) of the research. The service journey was undertaken to gain a greater understanding of the service procedure and consumer experience. This enabled the team to effectively map out service rituals, commonalities and anomalies, and identify opportunities for self-service improvements in customer provision.

In a service journey analysis the most important moments in the customer experience, those things that are critical to quality for customers, which have specific performance objectives, are actively tracked from the consumer's perspective.

The team investigated areas such as navigation to and from the facility; communication, technology, interaction, items and services available for purchase, layout and payment touch points.

The information and insights were gathered by asking for local knowledge, taking photographs and detailed note taking. An aim from these journeys was to discover

sections of a service journey that could hold opportunities for mobile, Internet and kiosk self-service opportunities⁷².

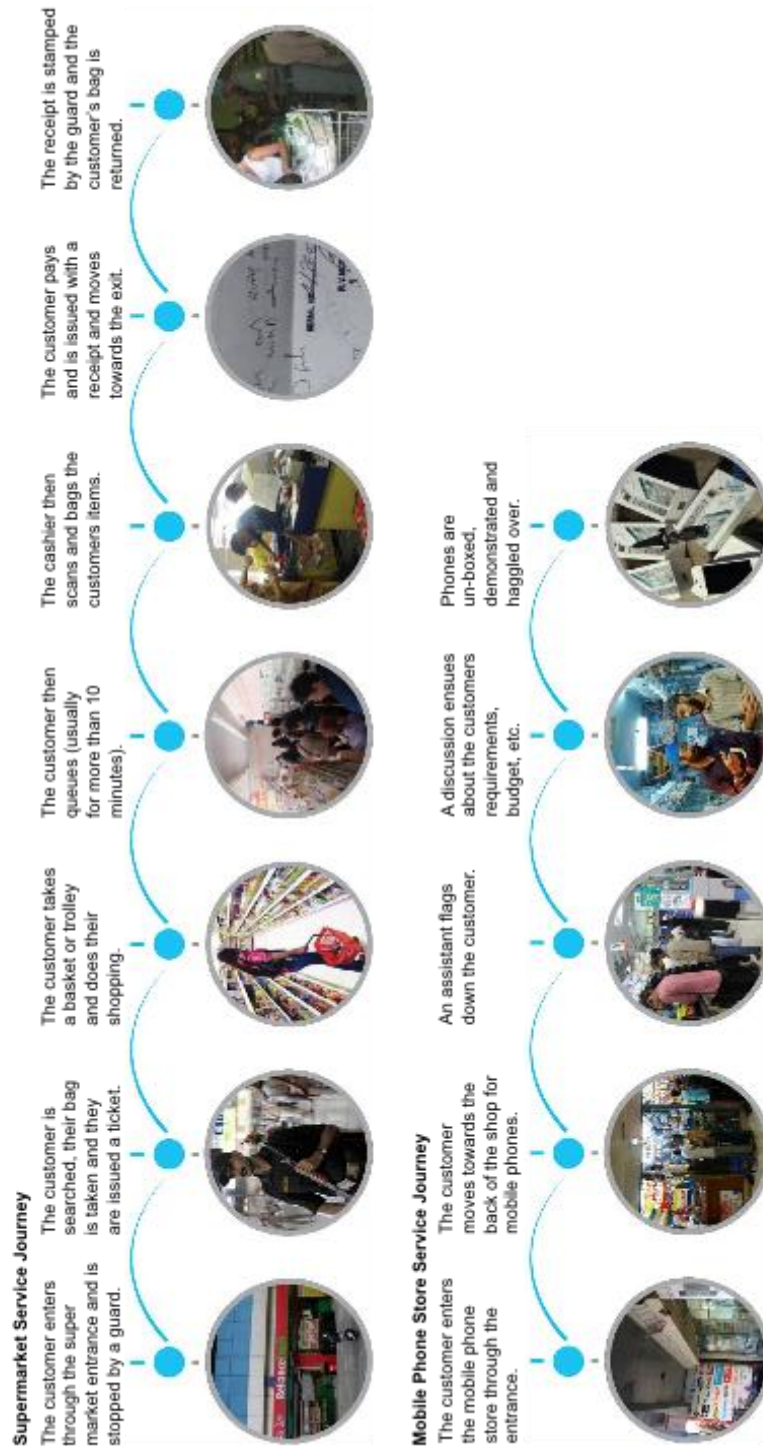


Figure 10.6: Service Journey mapping. Ahmedabad. (Product Research Studio, 2012. p26)

⁷² Further service journey illustrations can be found in Appendix AA.

Action 5: Semi-structured Interviews

The research team conducted two semi-structured interviews, one with a bank manager to understand mobile banking habits, the other with a mobile phone retailer to discuss mobile phone use⁷³.

With regards to mobile and Internet banking, the team found that there were several issues hampering mass adoption. The primary reasons were:

- *Infrastructure*: Power outages and loss of Internet connection is a common occurrence.
- *Computer literacy*: A lot of people have inhibitions about using computer technology and are intimidated by the interface.
- *Trust*: Due to the two reasons above, there is a lack of trust of Internet and mobile banking. They are not perceived to be as safe as traditional forms of banking such as in-branch.

Insights into retail habits and mobile phone use were obtained through the interview with the mobile phone retailer. In India, dongle subscription and usage is at an all-time high. The reason consumers in India have such an appetite for USB Wi-Fi adapters are that there is greater reliability and more financial control. Also, the lack of broadband in the country makes a dongle the best option.

The team observed a small ceremony the retailers perform when a phone is purchased. The customer is congratulated, the manager shakes the customer's hand and a photograph is taken to mark the occasion. This is common in India, where new purchases are celebrated formally. The personal human interaction is in contrast to many retail experiences in the West where self-service and homogenised services have become more prevalent.

⁷³ Findings from the interviews can be found in the Appendix BB.

Action 6: Video Insights

Video Insights are a specific time-framed video response to a question. The method is suited for use at the beginning of the design process to help understand communities, gain insights from users and aid in idea generation.

This method uses short, (no more than three minute), videos to record images, surroundings and people so the researcher can understand more about the participant's perceptions of a product or space. A researcher/designer can view the videos, using individual frames, the atmosphere, sound from the video to generate insights and ideas. This technique has been developed over the course of the case studies and within a commercial environment where researchers and designers do not have the luxury of spending large amounts of time analysing video diaries or collecting hours of video data from consumers.

The time the research team had in India to gather insights and generate ideas was short. They needed methods that allow them to capture large amounts of information, insights and stimulus. They have found that video can act as a large net; capturing subtle pieces of data that would otherwise have gone unnoticed.

Video Insights have been used in conjunction with the other methods such as photography, audio recording and questionnaires. While the questionnaires were useful in collecting high levels of quantitative data on consumers, it did not give qualitative insights that inspired new ideas. The questionnaires helped understand any trends and also helped establish areas that required further investigation. The research team could then target those areas with Video Insights.

The focus question for the Video Insights was '*What communication and interactions are used to perform everyday tasks in India?*' The research group split into two teams. One group focused on transactions and services, the other focused on communication and socialisation. Worksheets were used to catalogue and categorise the activity (Figure 10.7). Once the videos had been captured, screen grabs were taken of key frames that were of particular interest. The insights were then pinned up on the wall and discussed as a group. Ideas could then be generated directly from the insights. The association of the ideas to the insight allows for a greater understanding of the ideas generated and a story to form around its creation.

Video Insights

Video title: _____ Name: _____ File name: _____ Location: _____ Date: _____	CHECKLIST Camera: <input type="checkbox"/> Pen: <input type="checkbox"/> Spare batteries: <input type="checkbox"/> Sketch pads: <input type="checkbox"/> A question: <input type="checkbox"/> Video length: <input style="width: 50px;" type="text"/>	
What is my question? 	TOP TIPS Keep your insight videos to a maximum of 3 minutes long. Collect a variety of content people places atmosphere sounds Understand why you are capturing particular images as you may be asked to explain the video later. Initial insights and ideas can be taken from raw unedited video.	
STEPS 1: get camera 2: understand question 3: take video 4: edit content (if necessary) 5: pull out insights 6: generate ideas relating to insights 7: communicate insights/ideas		
What is the focus of my insights going to be? 		
Core Insight 1: 	Core Insight 2: 	Core Insight 3:
Core Idea 1: 	Core Idea 2: 	Core Idea 3:
sponsored by		

Figure 10.7: Video Insight Worksheet used during Mobile Insights Activity. 2012

Human power was very evident; they filmed a coconut vendor in a market using a bicycle to power a blade-sharpening disc. Before cutting the top off a coconut to give to a customer, he sharpens his knife. As there is a limited, wired power supply in the centre of a market or on the edge of a pavement, the vendor has devised a renewable source of energy that can also be used to power multiple things in the marketplace.

The importance of paper was observed; this may have been through using it to create packaging or through the receipts obtained when fulfilling a transaction. The analogue nature and tangibility of paper seemed to hold importance.

The Indian marketplace is a place where people haggle, bargain and negotiate the best price. There are clear values placed on human communication and conversation; an important part of the retail process is this human interaction⁷⁴.



Figure 10.8: Video Insights. (Product Research Studio, 2012. p32)

⁷⁴ A compilation of the Video Insights can be found on the accompanying CD. Indexed CD-9



Figure 10.9: Video Insights. (Product Research Studio, 2012. p32)

Action 7: Co-Design Workshop

To ensure the concepts were inclusive of Indian culture, an idea generation session was conducted with students from NID. Key topics from the insights gained over the past week were introduced and tied together with NCR's core business areas. This produced a clear focus for the conversations, further insights and ideas.

Insights brought a wide variety of concepts involving new products, services, brands, environments, communications, interfaces, and even business models. The group used strips of paper with 'Insight' and 'Idea' headings, with blank boxes for text and sketching. It was a very dynamic session, generating approximately 150 ideas covering retail, hospitality, finance and travel in India.

The insights were pinned onto the wall in appropriate clusters, which were supported with the insight photographs and video screen grabs. Generative idea development and evaluative concept feedback from the NID community helped understand the strongest and most appropriate concepts.



Figure 10.10: Co-Design workshop. NID. (Product Research Studio, 2012.)

10.4 Phase 4

Monitor and observe the outcomes

An exhibition of the insights and ideas was held for the students, staff and researchers at NID. The aim was to get further validation of the concepts developed and gather still more insights and feedback. Some of the photographs and screen shots from the Video Insights were mounted alongside the ideas generated at the ideas workshop. A long roll of paper was placed on a desk to encourage the sketching out of further ideas, insights and comments from the visitors to our stand.

Eight concepts were sketched out for discussion at the exhibition. All of the initial concepts were based on direct insights found in the field and were validated by the NID community.

The exhibition promoted an on-going conversation with the academics, visitors and students about the role of mobile and Internet technology in Indian society. The critical comments and feedback highlighted areas for development. The community observed that design for India must come from real experience, care and consideration for people and humanity. It was mentioned by one of the visitors that generating compassion and empathy in products and services creates thoughtful and respectful consumers.



Figure 10.11: Insights and Ideas Exhibition. Ahmedabad. (Product Research Studio, 2012. p37)



Figure 10.12: Insights and Ideas Exhibition. Ahmedabad. 2012



Figure 10.13: Insights and Ideas Exhibition. Ahmedabad. (Product Research Studio, 2012. p38)

10.5 Phase 5

Evaluate and reflect on what has happened

The Mobile Insights research activity highlighted 60 core insights and several broader insights relating to the use of mobile technology and the Internet in India.⁷⁵

Six key points, as mentioned in the Mobile Insights report, were relevant to the research area:

1. Mobile phones are ubiquitous pieces of technology that span the entire socioeconomic spectrum in India.
2. At present the network infrastructure is not robust enough to support or instil confidence in secure online services. This lack of stability is inhibiting mass adoption of mobile banking applications.
3. Word of mouth has influence on consumer buying behaviour; compelling and strong brand stories build companies and cooperatives that hold the trust and loyalty of the majority of the population.
4. The abundant use of paper in day-to-day transactions, contrasted with the desire for greater technology sharing, means the challenge is creating a marriage between analogue and digital.
5. Understandably, in a country with such a large population, there is a wide socioeconomic spectrum: the presence of a stark literacy division and contrast in technical understanding (computer literacy). Building trust in digital interactions is key to opening up the market to as many people as possible. The importance of social awareness and compassion for people and nature must be considered.
6. News distribution and physical media. There is a preference for analogue formats as opposed to digital.

⁷⁵ The full list of insights can be seen in Appendix CC.

The insights were gathered in a short time frame. The depth and breadth of these could only have been achieved through the support of the NID community. The cooperation between the research group and the community was necessary for the activity to be successful. Similar to activities discussed in the Design in Socially-Led Innovation chapter (Burns et al., 2006; Egglestone and Rogers, 2010; Pilloton, 2010), the Mobile Insights activity generated appropriate responses to the insights obtained through participatory design methods that could only be achieved by having designers actively engaging with the community.

10.6 Phase 6

Modify practice

As a project, what Mobile Insights clarified for NCR was the understanding that the Indian market has very specific needs. Products designed for the Western market would not necessarily work in India: there is not a one size fits all solution. Consumer attitude (trust in digital technologies), cultural differences (people-powered economy verses mechanised self-service), and environmental considerations (dust, dirt and heat) all influence solutions suitable for the Indian market.

As with the Pillar ATM case study, the ideas generated through the study of a specific hyperlocal community in India yields results relevant in the West. As opposed to the model of products designed in the West being positioned in Eastern markets, the two case studies raise the question of whether principles learned in designing for the Indian market can be applied in traditional, more established markets.

The ideas generated from the Mobile Insights activity have been socially led. They started with consumer understanding and use technology where appropriate to make the lives of the people easier. With consumer understanding as a starting point, socially-led innovation in self-services devices can be achieved and has been shown through the case study to be appropriate in generating innovative design solutions.⁷⁶

⁷⁶ All of the Mobile Insights concepts can be seen in Appendix DD.

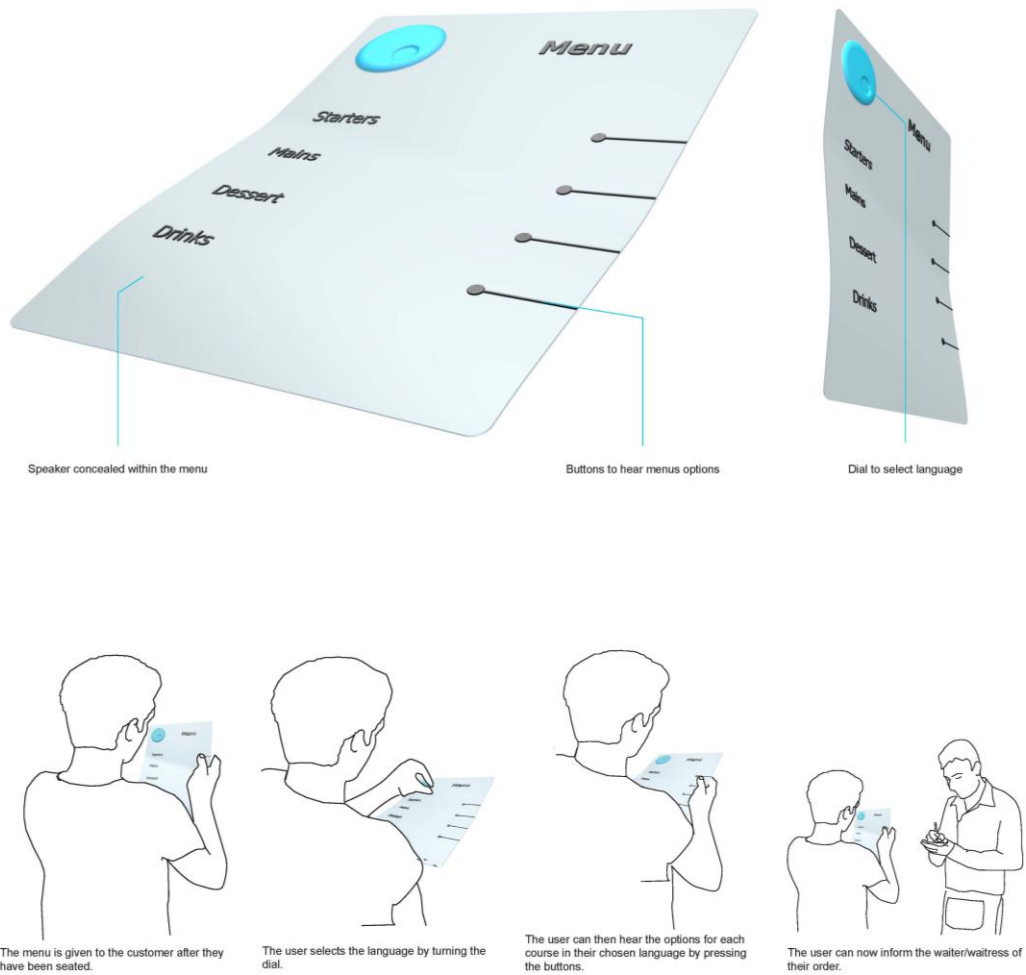


Figure 10.14: Development of concepts. (Product Research Studio, 2012)

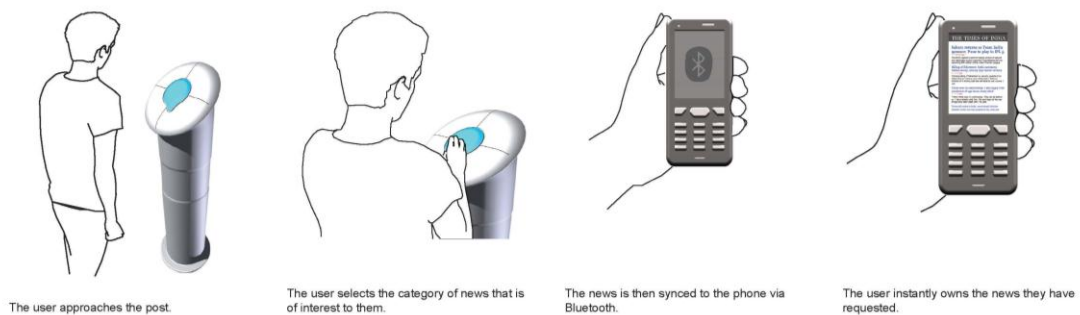
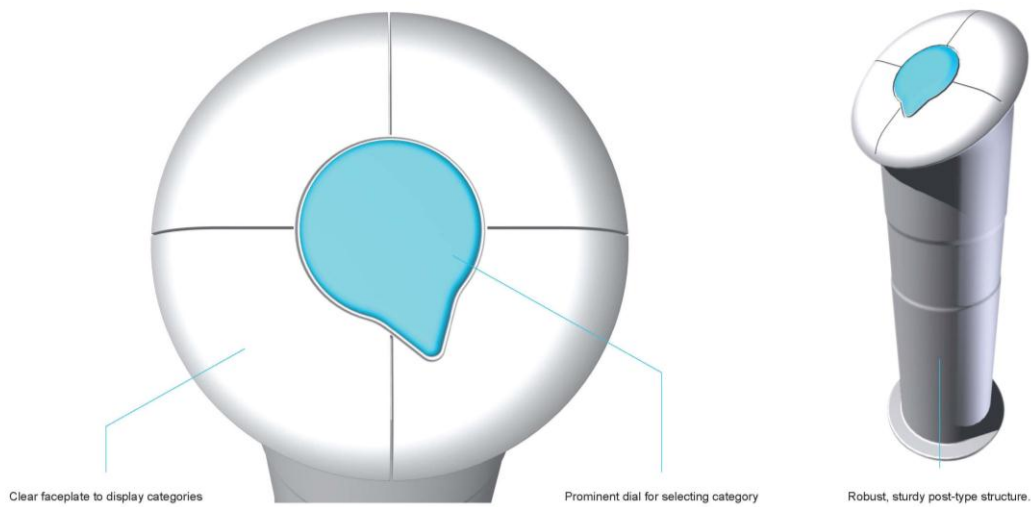


Figure 10.15: Development of concepts. (Product Research Studio, 2012)

10.7 Phase 7

Move in new directions or return to observe/reflect/act cycle

The challenge of self-service devices for the Indian market is still one that I am engaged in. I have been able to build on my learning gained through the Pillar ATM and Mobile Insights activities and employ that into development programs for that region.

Figure 10.16 below shows a concept deposit ATM for the Indian market that was developed after the Mobile Insights activity. One of the key aspects of this design was the dual-headed approach on a device with a small footprint. This was derived from observations of queuing and severe space restrictions in some bank branches. The case study illustrates how design research can be used to input into and potentially influence

business strategy. This mirrors the approach suggested by Chhatpar (Lockwood and Walton 2008. p19) where business validation, design research and user validation work through an iterative process, each developing from the other.



Figure 10.16: Indian Deposit ATM concept. NCR. 2012

10.8 Summary and Insights

Locally orchestrated design research played a strategic and positive role in the insights into consumer behaviour that allowed for the generation of a range of concepts that have global relevance. The Mobile Insights case study attempts to take the learning from the previous three case studies, build on the literature review and apply that to a strategically relevant area for NCR.

The case study demonstrated the role design research through participatory design methods could play in NCR. Through local community engagement, on an international level, insights, ideas and opportunities can be identified that are appropriate at the local and potentially global level.

At the beginning of the case study a series of questions were asked about digital technology in the Indian market.

- *How do consumers currently interact through their mobile devices with the retail, financial and travel industries?* The engagements with consumers through interviews and the questionnaires told us that, currently, there is very little interaction with these industries through mobile devices. The infrastructure issues that are common throughout India have led to mistrust in the interaction and technology.
- *How are mobile interactions going to shape these industries in the future?* While it is difficult to give a conclusive answer, having experience in the financial self-service industry I can say that mobile interactions and payments have significant interest from most markets. There would be benefits for the use of mobile payments in India as it may resolve some of the language and illiteracy issues with the interaction on a public self-service device.
- *What does this mean for the future of self-service hardware and interaction design?* Self-service devices are designed to make people's lives easier. Self-service is a channel that allows people to get on with their day quickly and efficiently. With mobile technologies being ubiquitous, the self-service channels will have to adapt to suit the consumer's need to interact and transact anytime and anywhere.

Table 16 below highlights the insights gained through the case study in relation to the overarching questions of the thesis.

Thesis Questions	Case Study Insights
1. <i>How can design research play a role in the activity of a global technology company?</i>	The Mobile Insights activity demonstrated the potential approach to the role of design research in a global organisation can be one of applying supported teams from academia to observe, record and reflect on targeted areas in the field through participatory design methods.
2. <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	The Mobile Insights activity generated appropriate responses to the insights obtained through participatory design methods that could only be achieved by having designers actively engaging with the community. This was achieved through McNiff's and Whitehead's reflective approach to action research reporting which allows the design/researcher to reflect on their practice through the process but in the majority of commercial engagements this is not achievable in the timescale allocated.
3. <i>How can insights that have been generated through hyperlocal research be applied globally?</i>	The project clearly demonstrated that participatory design engagements with communities allow organisations to use design as a process of innovation, as opposed to packaging or styling. It elevated the role of the design team to strategically target and engage with communities of people.
4. <i>How can design research methods support socially-led innovation in NCR?</i>	The activity put focus on India's service delivery models and their socially-led principles which are now being analysed by Western organisations. The Mobile Insights activity reinforced a respect for consumers as co-creators of solutions and not just passive recipients of a product or service as stated by C.K. Prahalad.
5. <i>How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?</i>	The experience of the Mobile Insights activity has been fed back into development programs in NCR that target emerging markets. It has allowed for the specific needs and the product contexts to be better understood.

Table 16: Case Study Insights in Relation to Thesis Questions

10.9 Future Work

The Mobile Insights case study is a model of industry and academic engagement that NCR, specifically Cx Design, can develop further. It is one of applying supported teams from academia to observe, record and reflect on targeted areas in the field through participatory design methods.

The approaches taken through the Mobile Insights case study can be a model of how Cx Design can apply design research strategically in the future. The next phase is to understand how this can be formally integrated in the activities of the group. While budget restrictions may pose an issue as such activities may not be customer funded, partnerships through academic alliances may be a sensible approach. It is a more open approach to innovation that in today's financial climate and with limited resources would make sense (Chesbrough et al., 2006).

Further understanding of the impact and potential role in which design research can play in the evolution of design at NCR is required. *Chapter 12: Reflections with Stakeholders*, explores this area through a series of interviews with people by whom the case studies have been influenced or have impacted on a local level, global level and at NCR.

Chapter 11: Case Study Reflections

This chapter has presented a series of case studies where PAR has been applied on a local community level and the insights gained in process and outcomes have been applied within a global technology company. The case study approach allowed for the testing and application of multiple methods in a variety of contexts and demonstrated how participatory action research as a methodology has been used to engage with people and communities on a local level. The outcomes from the studies were then used to both reflect on and influence the design practice within a global corporation.

The case studies were categorised into three categories Act Local (Dance Base, The Small Society Lab), Act Local in a Global Context (The Pillar ATM) and Think Global (Mobile Insights). They were presented in this way to aid the clarity and narrative of the thesis. While they have been categorised in this way, the actual running order was not as defined and there were significant overlaps in activity. The Pillar ATM project ran in parallel with the Dance Base project at the beginning, which in turn overlapped with the Small Society Lab in the middle, then came the Mobile Insights project at the end. Table 17 below shows an overview of the overarching key insights that can be taken from the case studies in relation to my research questions.

Thesis Questions	Case Study Key Reflection Headings
1. <i>How can design research play a role in the activity of a global technology company?</i>	Communication Participation Empathy
2. <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	Action Process Integration Method Adoption
3. <i>How can insights that have been generated through hyperlocal research be applied globally?</i>	Frequency and Location
4. <i>How can design research methods support socially-led innovation in NCR?</i>	Empowerment New Respect
5. <i>How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?</i>	Engagement Integration Legitimise and Authority

Table 17: Case Study Key Reflection Headings

I can now reflect on the main question and sub-questions of the thesis in turn and extract the applicable insights from the case studies. The key insight terms used are often applied broadly and refer to different aspects that will be explained in more detail.

11.0 How can Design Research Play a Role in the Activity of a Global Technology Company?

Key Insight: Communication

A core theme running through the insights I gained from the individual case studies in relation to this question was communication. The Small Society Lab case study, in particular, highlighted that channels of communication (established through workshops, focus groups or external mediators) between a design team in a global corporation and local consumers is valuable. The value for the stakeholders is in terms of knowledge of the consumer, of the community and the organisation, the building of trust and lines of communication. The communication links and engagement exercises help to break down the barriers between a faceless corporation and the generic consumer. This was supported by the Dance Base activity where the unique concept would not have been conceived without the active participation of the Dance Base community.

The communication of the role of design research was also an important factor that was revealed through the case studies. Bruce Tether's (2005) illustration showed that other groups within an organisation could often overshadow the role of design teams (see Figure 3.0). The communication and dissemination of consumer engagements, process and output from the case studies has helped to elevate the role of design and, as a consequence, design research within the organisation. The Pillar ATM has been a showcase for how the design team can actively engage with consumers and translates those engagements into tangible, strategically relevant outputs. These outputs can then be useful communication tools and aids to gather further insights from customers both internal and external to NCR. The production of the Mobile Insights document allowed the Cx team to distribute this to customers and visitors of the Dundee facility, showcasing the design research work that was being done and supported by the team.

An unexpected insight into the role of design research within the organisation is that communicating the act of research has been almost as important as any insights gained from doing it. Therefore, one of the roles of design research is to strengthen the visibility of design and the design team within the organisation.

Key Insight: Participation

The act of engaging with consumers is something that would be of benefit if incorporated into all levels of the organisation. An insight gained from the Small Society

Lab workshops was that community and consumer engagement is not just for the design team. Consumer engagement should be seen as an organisation-wide activity that every member can participate in.

In order for this to be feasible, methods need to be applied that are appropriate for non-designers to engage with. For every project the most suitable methods will have to be selected. The methods applied will depend on their appropriateness to the specific project but one particular method I found worked in a project and workshop context was the use of video. The use of video was applied in all of the case studies, sometimes by the core research team but in other cases by the participants, for example, the Dance Base case study. Video can be used in a loose, fun and dynamic way that is more accessible and potentially less intimidating to people than, for example, sketching. It is a method that bridges the key insights in that it can be an effective communication aid, allows mass participation, and helps the researchers better understand and empathise with the research area.

This approach would be a long-term goal as there would be structural, organisational and culture issues to overcome before this could be truly integrated into the fabric of NCR. In the short term, a potential approach would be one of applying supported teams from academia to observe, record and reflect on targeted areas in the field through participatory design methods. An example of this was the collaboration with the RNIB and the Small Society Lab, also, collaboration with the University of Dundee and NID throughout the Mobile Insights case study. The insights learned can then be filtered throughout the organisation through publications, internal workshops and presentations.

Ensuring that design research within the organisation is participatory in nature brings consumers closer to the corporation, which creates a platform of trust and allows for channels of communication to be created. The case studies have each brought the consumer into the research and design process in a way that has not been done before at NCR. This has allowed the insights to drive innovation; the innovation has come from people as opposed to technology. The participatory nature gives the design team strength and conviction that without the consumer engagement it would not have. As the insights have come directly from consumers it allows the research to apply strategically within the organisation.

Key Insight: Empathy

The third core role of design research in a global technology company is enabling their employees to empathise with the diverse range of consumers with different needs, wants and expectations. As stated in relation to the participatory nature of design research, local level engagements foster empathy within the organisation that allows innovation to be relevant to consumers.

Direct consumer influence should allow for a more useful and ultimately successful product. This was illustrated through the Pillar ATM activity where insights that are obtained through direct engagement with the research participants in their own environment allow for innovative solutions to be created that were sensitive to their specific needs. For example, the physical form of the device was derived through observations that there was often more than one person standing at an ATM machine and it mimicked the form of post boxes common in the area. The inclusion of colour-coded fast cash buttons was introduced through awareness that illiteracy was a real issue in the slums of Mumbai.

The Dance Base case study illustrated that empathy was a core component of design research. It was due to close engagement through enrolment in dance classes, employees participating in Video Insights and the creation of design workshops that allowed for the solution to be conceived and accepted.

An important element of the NCR|RNIB workshop was empathy; it put the designers in direct contact with people who had real challenges when interacting with their self-service solutions. The activity allowed the designers to better appreciate the challenges the participants had and, importantly, understand how as a design team they could design solutions that overcome them.

The Mobile Insights case study demonstrated that through local community engagement, on an international scale, insights, ideas and opportunities can be identified that are appropriate at the local and potentially global level. The research team used a variety of methods to better understand the market. This understanding allowed for their insights and ideas to be sensitive to the needs of the market.

The reflections are now applied to the sub-questions of the thesis.

11.1 How can Participatory Design through an Action Research Methodology be Integrated into the Design Process within a Global Corporation?

Key Insight: Action

It is through the act of doing and demonstrating the value of that action that participatory design or indeed design research can become an integrated part of the design process of the global corporation. While those in the executive level of the organisation (Bruno, 2009b) have communicated the value of design, it is the responsibility of those directing the design team to create an environment and process to allow participatory design to happen.

The Mobile Insights case study generated appropriate responses to the insights obtained through participatory design methods that could only be achieved by having designers actively engaging with and in the community. The two-week program of activity was planned and delivered in a relatively short timescale. It was the direct action that allowed the project to happen. It was not tied specifically to a development program, instead the insights were applicable across lines of business.

The NCR|RNIB workshop is another example of direct action; it came about through proactive engagement with institutions and the local community. A broad range of insights and ideas were developed from this activity that spanned all of NCR's lines of business.

Action also relates to the design team. Each case study was the result of direct participation and a process of reflection of that participation. Greater involvement across the design team will improve the process, allowing it to evolve and become more accepted and, as a result, integrated.

Key Insight: Process Integration

A current and on-going issue is the official lack of Cx Design presence in NCR's Program Line Management (PLM) development process. While this has been recognised there has been very little movement to rectify this issue from outside the design group.

For design research and participatory design to be integrated into NCR's development cycle, more specifically as part of Cx Design's program of activity, a process plan has to be created and proposed to the group in charge of the process. Once this is in place it

will allow the appropriate time, budget and resources to be allocated at the project planning stages. What was recognised through the Small Society Lab workshops was that a key part of the process had to be the allocation of resource i.e. allowing team members to dislocate from projects and allocation of the budget.

It would be naïve to think that this will happen overnight. In an organisation as large as NCR this process of change will take time as it is working over many levels from the development process, the group's focus and the company culture. Yet, the initiative needs to come from within the organisation to start community engagements. As was highlighted in the Mobile Insights case study, if the consumer is able to dictate how they interact with business then it is up to businesses to engage with consumers so products and services can be co-created to their specific needs and mutual benefit.

Key Insight: Method adoption

Each case study applied McNiff's and Whitehead's reflective approach to action research reporting as it allowed the designer/researcher to reflect on their practice through the process. This was applicable in the case of this PhD thesis as part of this process was about understanding what worked and what did not work, it also had similarities to the iterative design process that is commonly used by designers. The methodology was applicable to the thesis as it allowed suitable reflection on the process and outcomes of the research as an integrated part of the process. Yet it could be questioned whether following this exact process would be appropriate in the corporate environment. The process could be streamlined to be more achievable in time-compressed projects.

All of the case studies used a wide variety of methods. Not focusing on one particular method but allowing the most suitable methods to be used was a particular strength of the case studies. The Mobile Insights case study used a wide variety of methods; it was the use of multiple methods within the context of the project that allowed for the range of valid and rich insights and ideas; the strength was the multiple-method approach. It was also the participatory design process conducted through the Small Society Lab workshops, the Pillar ATM and the engagements with Dance Base that allowed for the insights and ideas to be appropriate as it applied a variety of different methods.

Reflecting on the different case studies it can be said that as a design group it is necessary to explore and be open to different approaches to extracting design insights.

11.2 How can Insights that have been generated through Hyperlocal Research be Applied Globally?

Key Insight: Frequency and Location

As mentioned previously, the conception of the Connected Collection Boxes could only have come through active participation with the Dance Base community. The community of Dance Base was an integral part of the design process, which meant the output was relevant to them. This was achieved through regular engagements and having the research embedded within the community for periods of time.

If this participatory design process is to be accepted within NCR it would have to become a regular activity as the more engagements and workshops the design team conduct the more focused and efficient they will become. Similarly, if the workshops are to be done on a global basis it would lead to a greater understanding of the difference between global markets, services and community needs.

While the Small Society Lab workshop conducted with the RNIB was well supported by local residents with visual impairments, there were no further workshops conducted with them. Today, NCR does engage with the RNIB to assess hardware and software interfaces but this engagement is not participatory in nature. If a plan of continued engagement had taken place then the community would have rightly become an integral part of the development cycle. For the consumer corporation relationship to build, the engagements need to be frequent, the innovation process open and the approach participatory.

11.3 How can Design Research Methods support Socially-led Innovation in NCR?

Key Insight: Empowerment

Each case study demonstrated how designers could use a variety of methods to engage with communities of people and collaboratively ask questions, and design and develop solutions that solve a particular problem or issue. The Small Society Lab workshops highlighted that once people have participated in such an event they want to contribute more. The community wants to engage, they just have to be given the right channels to do so. Sustained engagement to allow proper relationships and communication links to be built is important. The organisation has to commit in terms of budget, personnel and resources.

The case studies found that engaging with the consumer throughout the design process through community workshops empowers the consumer. The empowerment brings solutions that are more relevant to the consumer's needs. The process enables an environment where participants are given the opportunity to get their thoughts, feelings, concerns and ideas across.

Key Insight: New Respect

All of the case studies involved understanding the relationship between people and technology. They showed that the relationship is intertwined and that through participatory design initiatives corporations can begin to understand that relationship better. An example of this was the NCR|RNIB workshop through the Small Society Lab. In this case, the designers shadowed and recorded participants' interactions with technology; they were able to discuss the details of the interactions and aspects of the participants' lives. A new respect was formed, or at least reinforced, where the designers were much more aware of the need for change in future solutions.

Throughout the process of each of the case studies there was active participation from both the designer and the community. The designer would work alongside the participants, building up lines of communication, trust and respect on both sides. Participatory design and consumer engagements encourage a new respect for consumers as co-creators of solutions and not just passive recipients of a product or service. All of the case studies acknowledged and embraced this and demonstrated that innovative solutions can be created, the Pillar ATM being a particular example of that.

11.4 How has the Research conducted throughout the Doctoral Journey Impacted the Consumer Experience Design team in Dundee?

Key Insight: Engagement

As designers it is important to engage with the customers and consumers of the solutions as it provides a more in-depth understanding of what works, what needs refinement and what simply does not work. The reality is that these types of engagements are very limited. Unless there is a concerted effort to engage with people then there will always be many other things that take priority, for example, meetings, project activity and deadlines.

The Small Society Lab engagement with the Cx Design team and the RNIB was the first time design research methods had been used as a process of engagement and innovation. It demonstrated that with a small budget, a dedicated team and willing participants that a lot can be learned from one day's activity. That activity went on to impact the design of the next generation of ATM from NCR.

Key Insight: Integration

As mentioned above, some of the activity from the research activity and the case studies has filtered through and impacted the output of the Cx Design team in Dundee. The outputs from the research have been integrated, some more loosely than others, with the activity of the Cx Design team. The NCR|RNIB activity allowed for an acute awareness of specific user needs with direct user feedback. This led to the implementation of light halos and illuminated card reader slots in the new ATM product range.

Knowledge gained from sounds used on the Connected Collection Boxes, as part of the Dance Base case study, has fed into NCR's understanding of how self-service devices should respond to human interactions.

Both the Pillar ATM and the Mobile Insights output has been disseminated widely to internal and external customers and the general public through the Internet (Greenemeier, 2011; O'Laughlin, 2012; Walker, 2011), international competition entry, magazine articles (Hamilton, 2010; Macsai, 2010), an international conference (Birnie et al., 2011) and internal showcase events, presentations and publications. All of such examples impacted the Cx Design team as they showcased the work that is created and

how, as a team, we have engaged with communities and consumers through design research.

Key Insight: Legitimise and Authority

The use of design research conducted through the various case studies aids in the legitimisation and authority of the Cx Design group in Dundee. Tether (2005) highlighted that other departments can often overshadow design. The dissemination and publication of the research material from the case studies bring authority behind the voice and convictions that the group communicate. It demonstrates that the group has a better understanding of the consumers' experience as they actively engage with them. This increased authority brings the design team to the fore, ahead of other groups that do not have such direct consumer engagement. Being the only group in the organisation to have active engagement through design research and using that as a process of innovation helps to legitimise the group's role and value.

It was found through the Small Society Lab case study that design ideas have greater strength and are less likely to be dropped through the development process if they can be associated with real user (or customer) input. The Mobile Insights process and output has been fed back into development programs targeting emerging markets as the specific needs and product context have been better understood.

Allowing for the balanced input of design research, user validation and business validation is where Cx Design is uniquely situated within the organisation.

* * * *

Section IV, Analysis and Conclusions, brings the various elements of the thesis together. It discusses the core insights and contributions to new knowledge, and proposes future directions and challenges for the research. As part of this process, the section contains analysis and reflections on the thesis questions through various conversations with figures and groups directly or indirectly impacted by the research. These include members of the Cx Design team and management, the director a key cultural hub in Dundee, which is the DCA, and perspectives from India from a Senior Faculty member in Industrial Design at NID.

Section IV

Reflections and Conclusions

Introduction

The narrative of the thesis has taken the reader along a journey of the role of design research in a global technology company, NCR. The journey started with the author's great-grandfather and his awareness of social responsibility to his employees in the running of a collection of general stores in a small rural town. The influence of this directed the author towards an investigation into whether local action and socially-led principles can be applied to a global corporation.

The corporate history and evolution of design embedded in the organisation have been described as having six eras through the decades since 1884. The corporation has evolved through the mechanical era into the technological and forward onto the '*experience*' era. As a design group there is acknowledgement that there needs to be an awareness of the human beyond their physical interaction with technology with a deeper understanding of what experiences they expect and desire.

This then led onto a broader understanding of design in a corporate context. Illustrated was how design can be used beyond styling as a key component informing the innovation strategy of an organisation. Design research can work in parallel and inform the business strategy while obtaining user validation. This parallel approach, as opposed to a traditional linear approach, where business validation is then followed by user validation, will be discussed further in this section.

Underpinning the research work that has been conducted is the methodology. A participatory action research approach was taken where the researcher was an integral part of the process in which the participants were empowered in the generation of insights and ideas. The author took McNiff's and Whitehead's Living Theory, an iterative methodology in reflective action research, and applied that to a series of case studies. The case studies were a way of researching *through* design that applied a series of design research methods in real world situations.

The author argues that involving communities of consumers in the design and development process is not only a socially-responsible act but also one that can be mutually beneficial for both parties. Presented were a series of community-focused design initiatives where there has been close and targeted engagement with local

communities. The local studies have used approaches and had outputs that are relevant in a global context. A lens was then placed on India where there has been much progress in this area and which is strategically relevant to NCR.

The case studies were separated into different categories, Act Local, Act Local in a Global Context and Think Global. This highlighted their focus and context. A series of overarching key insights were taken from the case studies in relation to the research questions. These insights will form part of the summary and conclusions of the thesis and form a key part of understanding the role of design research at NCR.

A summary of the key insights in relation to the case studies and research questions are as follows:

How can design research play a role in the activity of a global technology company?

Communication: The act of design research is in the building of lines of communication between the global corporation and the communities in which it operates. The communication and dissemination of design research will also elevate the role of the Cx group in the organisation.

Participation: The design research process can be broadened to include a wide range of interested parties across the functional areas of the organisation. This also includes bringing consumers closer to the organisation and embedding them within the ideation and development process.

Empathy: Consumer engagement across the organisation and specifically the design group would lead to employees having a deeper empathy with the different needs, wants and expectations of the consumers and community in which they interact.

How can participatory design through an action research methodology be integrated into the design process within a global corporation?

Action: It is through the act of doing and demonstrating the value of that action that participatory design and design research can become an integrated part of the design process of the global corporation.

Process Integration: For design research and participatory design to be integrated into NCR's development cycle a process plan has to be created and implemented.

Method Adoption: An appropriate methodology for the integration of design research in a global technology company has to be applied. The use of multi-method approaches

to extracting design insights and developing ideas was appropriate in the case study context.

How can local insights be brought into an organisation and applied globally?

Frequency and Location: This was achieved through regular engagements and having the research embedded within the community for periods of time. If this participatory design process is to be accepted within NCR it would have to become a regular activity as the more engagements and workshops the design team conduct the more focused and efficient they will become.

How can design research methods support socially-led innovation in NCR?

Empowerment: Sustained engagement to allow proper relationships and communication links to build up is important. The organisation has to commit in terms of budget, personnel and resources. The empowerment brings solutions that are more relevant to the consumers' needs.

New Respect: Participatory design and consumer engagements encourage a new respect for consumers as co-creators of solutions and not just passive recipients of a product or service.

How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?

Engagement: As designers, it is important to engage with the customers and consumers of the solutions as it provides a more in-depth understanding of what works, what needs refinement and what simply does not work.

Integration: The output from the research activity has been integrated into the output from the team. Elements of the research have indirectly impacted the Cx Design team; they demonstrated how, as a team, we have engaged with communities and consumers through design research.

Legitimise and Authority: The use of design research conducted through the various case studies aid in the legitimisation and authority of the Cx Design group in Dundee. The balanced input of design research, user validation and business validation is where Cx Design is uniquely situated within the organisation.

The following chapters reflect further on the role of design research in the activity of a global technology company. *Chapter 12: Reflections with Stakeholders*, brings together other voices from both within NCR and externally to reflect on the research questions.

Through a series of conversations, the author can compare and contrast their opinions with those presented in the thesis. This further reflection helps to contextualise the findings and shape the thesis conclusions.

Chapter 13: Thesis Conclusions will draw out the overall conclusions that define the contributions to new knowledge. The conclusions are based on the insights gained from the broad literature review and contextual understanding, and also the series of case studies that were conducted. The result is the introduction of a Participatory Action Based Strategic Design Process that aligns the needs of consumers and communities with the strategic goals of the company.

This thesis concludes with an understanding of the limitations of the research and a series of proposals for future work. The chapter will map out the potential future application of design research in NCR that builds from the case study experiences and connections made through this research activity. The conclusion of this thesis is very much the beginning of a new chapter in the design evolution of NCR. The next stages are to understand, implement and integrate the components highlighted in the thesis conclusions.

Chapter 12: Reflections with Stakeholders

12.0 Introduction

This chapter gives the opportunity to discuss and reflect on the research questions of the thesis with a range of stakeholders who impacted the research. This section takes each of the research questions in turn, bringing in different voices that offer new insights that contribute to the overall conclusions. The resulting evaluation will allow for the proposal for the adaption to McNiff's and Whitehead's action-reflection methodology and Chhatpar's strategic decision-making process.



Charlie Rohan, the Director of the Cx Design group, is a key stakeholder in the research conducted within the thesis. Charlie has been at NCR in various roles for 28 years. He has been a key contributor to the thesis and is well placed to discuss elements of Cx Design's process and the vision he has for the role of design in the organisation.

As the team that will be most impacted by any refocus onto design research it was important to engage with the Cx Design team and understand their thoughts and opinions on the role design research can and should play within the organisation. Also, it was necessary to understand what the realities of this refocus would be. The discussion took place with five members of the Cx Design group from across the disciplines of design, usability and interaction. The individual members of the team have been anonymised.



To understand part of design's evolutionary role in NCR it was necessary to engage with Graham Johnson, the Director of the Research Ethnography and Design (RED) group in NCR, which is based in Singapore. Graham has been at NCR for 21 years in various roles, primarily in research. He has directed the RED team since its conception in January 2013.

To gather insights from outside NCR, a discussion took place with Clive Gillman. Clive is the Director of a key cultural hub of Dundee, Dundee Contemporary Arts (DCA). The conversation with him focused around how he perceives the interaction between local communities and economies interacting with global industry.



As there has been a strong focus on India throughout the thesis it was important to get a true Indian perspective. For this, Praveen Nahar, the Senior Faculty member in Industrial Design at the National Institute of Design (NID) was approached. Praveen was involved in the organisation of the Mobile Insights case study; it was at NID that much of the activity took place.

The discussions were reflected upon through a process based in grounded theory (Dawson, 2007. p20-21)⁷⁷ (see Figure 12.5 at the end of the chapter). The author used word clouds to extract dominant areas of discussion and concern⁷⁸. These are then reflected in the overall thesis reflections illustrated in table 18.

⁷⁷ The emphasis of grounded theory is on the generation of theory that is grounded in data. In the case of this research, the data is word clouds that have been generated through the stakeholder interviews. The theory is then extracted from the data, illustrated in table 12.0. This research methodology contradicts traditional approaches that selects a theoretical framework and then only applies framework to the area of study.

⁷⁸ The individual word clouds can be viewed in Appendix EE-II.

Thesis Questions	Thesis Reflections Headings
1. <i>How can design research play a role in the activity of a global technology company?</i>	<p>Process structure and integration</p> <p>Design research as catalyst for innovation</p> <p>Communication of value</p>
2. <i>How can participatory design through an action research methodology be integrated into the design process within a global corporation?</i>	<p>Strategic awareness</p> <p>Evolution of design in NCR</p>
3. <i>How can local insights be brought into an organisation and applied globally?</i>	<p>Community innovation</p> <p>Appropriate engagement</p>
4. <i>How can design research methods support socially-led innovation in NCR?</i>	<p>Human focus to design and research</p> <p>Building connections</p> <p>Core competences and community needs</p>
5. <i>How has the research conducted throughout the doctoral journey impacted the Consumer Experience Design team in Dundee?</i>	<p>Need for design research</p> <p>Perceived impact</p>

Table 18: Thesis Reflections Headings

12.1 How can Design Research Play a Role in the Activity of a Global Technology Company?

The main question of the thesis was to try and understand what role design research could play in the context of a global corporation. Upon reflection and through discussions with groups and individuals from inside and outside NCR, the results can be separated into three main headings: *Process structure and integration*; *Design research as a catalyst for innovation*; and *Communication of value*.

12.1.1 Process structure and integration

Since the PhD research started in 2008, design in NCR has evolved, both in terms of its perceived value and structurally within the organisation. In 2008 the group was not called the Consumer Experience Design group and there was no Vice President of Design in place. Yet, fundamentally, there has always been a part missing and that has been the formalisation of design into the official PLM (Product Lifecycle Management) process. Although Cx Design has always played a significant role in the ideation and development process of all of NCR's consumer transaction technologies, without proper integration into the PLM process then design misses out on some critical points. The main points are budget allocation and design sign-off. Having a project budget allows the design team to properly research, design, iterate and evaluate the concepts created. Without sign-off then it significantly reduces the capacity of the design group to control, in terms of design integrity, the various global development programs.

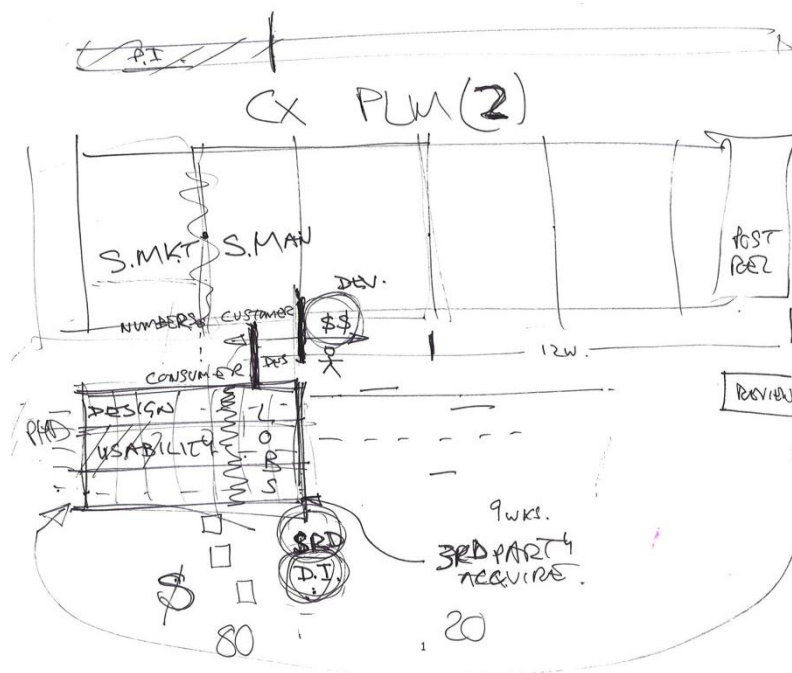


Figure 12.0: Charlie Rohan Sketch during Conversation. (Rohan, 2014)

In discussions with Charlie Rohan it was clear that getting Cx Design integrated into the PLM process is a key objective of 2014 and one that will continue the evolution of the role of design in NCR. Charlie sees design research being of significant value in this evolution and for it to be integrated into the core function of the Cx Design group.

'If we can formulise this and get some investment to do it, that's the key... Most of it should be defined out there [pointing to end of initial phases] it means a change in our activity, it means a change in knowledge base. Also, we need to make commitments earlier on what is the product going to be...' (Rohan, 2014. CD-10. 15:21)

There is a real ground swell of feeling and awareness within the team that they should be actively engaging in design research with customers and consumers and ensuring that it is integrated into the culture and processes of the group. In discussions with the Cx Design team members it was stated that:

'We want to create an environment where we can do this thing [design research] professionally, creditably and repeatedly over and over again. People know that's what we do and not just 'I'm going to steal this moment now' and do what I can do. It's about creating an environment where we can do that properly.' (Cx Design Team, 2014. CD-12. 1:05:13)

Through the various discussions a common theme of corporate culture would come up. Discussions around the integration of design research into the Cx Design group go hand-in-hand with discussions about the culture of the organisation.

'...structurally the process has to change, I don't think we need to have a different organisation. The process has to change and the PLM Process is the conduit for that. Changing the process and what we do within it will drive a cultural change.' (Rohan, 2014b)

Stronger emotions were brought out when this area was discussed with the team but still pointed to a cultural challenge within the organisation.

'...the culture here is you can only be justified in allocating time to things that are connected to something, otherwise it's... it's great we can talk about how we are going to

achieve it but if we can't defeat the culture or the top down business structure that we have then maybe this is a futile exercise.' (Cx Design Team, 2014. CD-12. 13:06)

'I think if you do want to progress it then you need to be in a situation where it's a carte blanche and you admit your failures and we need a re-structure and a rebranding almost because anything other than that then we are putting lipstick on a pig.' (Cx Design Team, 2014. CD-12. 1:02:35)

The obstacles for achieving an integrated design research element within Cx Design are NCR's current internal development and sign-off processes as well as the current design culture and focus in the Cx Design Group, and budgetary restrictions, which are currently aligned to specific projects as opposed to general design research and development.

'It's about 'how'. Project structure, you can't abstract research from project structure and time and everything else because the two are inseparable.' (Cx Design Team, 2014. CD-12. 37:55)

'The obstacles are 'process', 'cultural practice'. What we have done is, we have been good, the good guys and helped out all over but it means we don't have a lot of time for when we want to do our own projects, they are not vanity projects, they are value projects. We need to change our own thinking, but having this here [pointing to Cx Design integration in PLM process] should mean that we are not hand holding all the way through, we end up supporting on a daily basis today, but if we defined design intent early and followed up with consulting as required it would give us a little more bandwidth. In tandem we need recognition of pre-project budget.' (Rohan, 2014b)

This points to the current situation being that design is undervalued and overshadowed by the needs of others within the organisation. This is not dissimilar to what Tether (2005) points out with regard to design's role within an organisation often being unappreciated or overshadowed by other groups whose organisational processes are more structured. While the Cx Design group advocates the iterative design process model (as illustrated in Figure 4.1), the statements above show that there is often limited time or the will from other parts of the organisation for iteration and conceptual development. The practice of design iteration in the context of NCR is often counter to the theory.

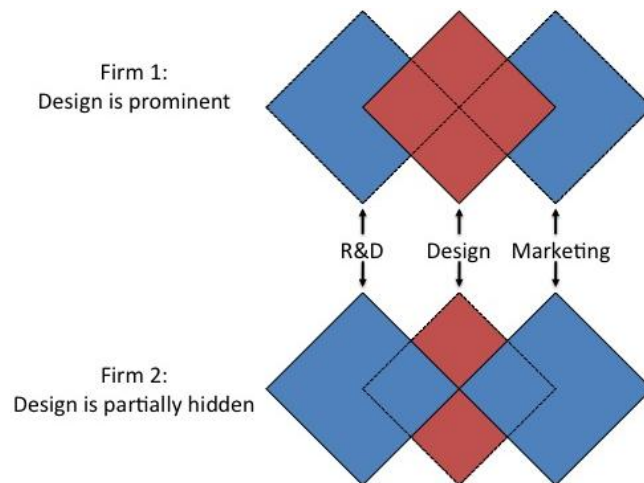


Figure 12.1: The Importance of Design – A Matter of Perspective? (Tether, 2005)

For design research to play a proactive role in the organisation then clearly defined processes and roles need to be defined and communicated throughout the organisation. At the moment, the current state is that this structure is not in place; there is an opportunity to re-evaluate what the key roles of the group are and understand how it fits into the rest of the organisation. The traditional approach as illustrated by Ravi Chhatpar, (Chhatpar, 2008) Figure 12.2, shows a very linear approach where the business validation is complete before any user validation is considered. This approach mirrors that of NCR’s current PLM process; see Figure 2.5 and 2.6.

Traditional Approach

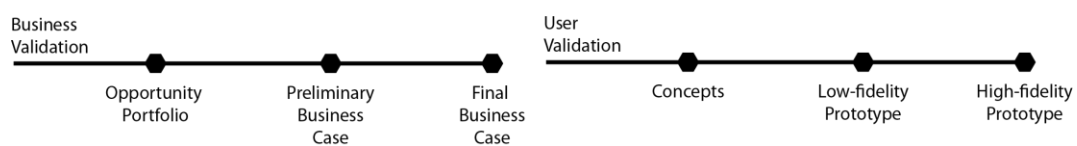


Figure 12.2: Traditional Strategic Decision-Making Process (Chhatpar, 2008. p19)

The Cx Design group are in the position now that there can be a redefining of that process, one that brings the focus of the design group to the front end of the process. This is in line with Chhatpar’s ‘New Approach’ (see Figure 12.3) where the design research feeds into the business validation and works in parallel with defining the business strategy and direct user validation.

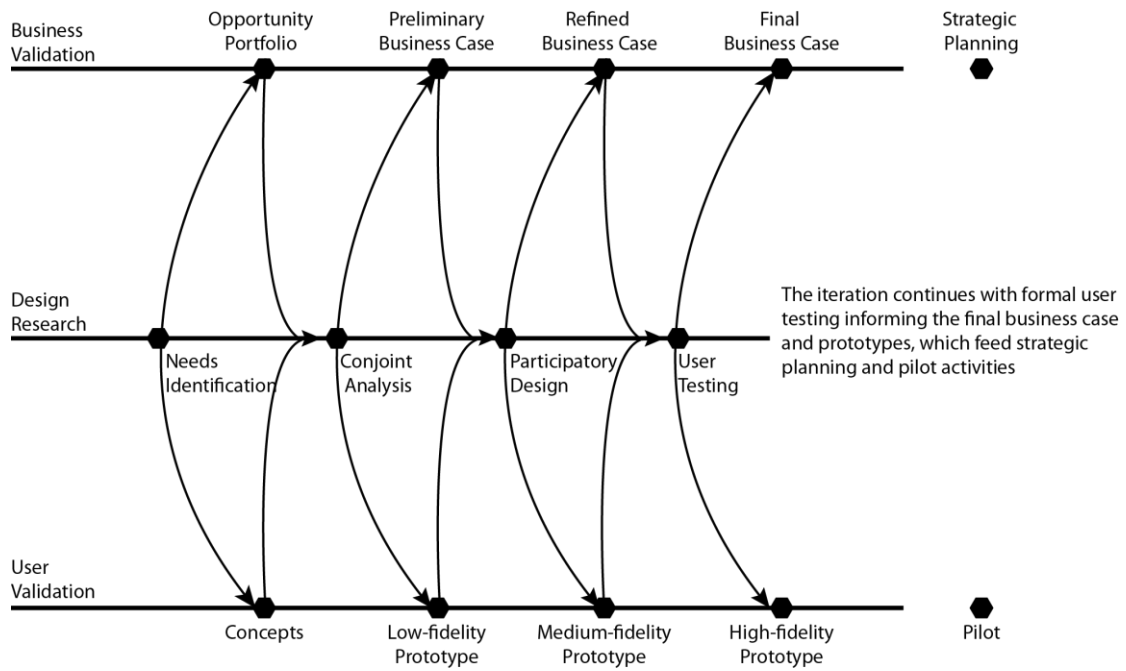


Figure 12.3: Chhatpar's Strategic Decision-Making Process (Chhatpar, 2008. p19)

It is this type of model that will be more appropriate for the group, one that encourages participation on various levels and fosters empathy, across the organisation, of the needs of the end users. The challenge will be ensuring it is simple and clear enough to be understood and accepted as a process by those within and outside the team and by the rest of the organisation. This will be discussed in greater detail in *Chapter 13: Thesis Conclusions*.

12.1.2 Design research as catalyst for innovation

Culturally within the organisation there is a wide and varied interpretation of what 'research' actually is. In the main, the role of research is considered to be validation or testing; the testing of a current product or one that is in the latter stages of development. *'...research isn't viewed as a catalyst to innovation or spark for innovation or something new. [There is] an overwhelming acknowledgement that research is testing.'* (Cx Design Team, 2014. CD-12. 6:00) *'Research is more justifying rather than driving of things.'* (Cx Design Team, 2014. CD-12. 43:00)

This came up when discussing with Graham Johnson where RED fits within the organisation, the role of design in NCR and its evolution since the PhD research started in 2008.

'On the research side, I don't think that NCR, in the context of design, does much/any. Ok. In many respects that was the starting point with regards to my thinking about RED and what that could be. So, we do studies and investigations as you mentioned in the usability area, in the most part... that tends to be within the evaluation area. It's more a test and quality control, aspirationally, that seems to be more what it's about. You could easily argue that that's part of research, in that it's gaining some knowledge that we didn't have before, but that's the broadest understanding of what research is. Within the context of design and thinking about research as a catalyst, or a starting point or a motivator or an informer, or even a driver then it's different and I don't believe we do much at all.' (Johnson, 2014. CD-11. 3:40)

This points to where design and design research in NCR is currently placed on the Design Ladder. Presently it could be argued that Cx Design is positioned in the bottom stages of the Design Ladder.

'Step No. 1: *Design is an inconspicuous part of, for instance, product development and performed by members of staff, who are not design professionals. Design solutions are based on the perception of functionality and aesthetics shared by the people involved. The points of view of end users play very little or no part at all.'*

'Step No. 2: *Design as styling. Design is perceived as a final aesthetic finish of a product. In some cases, professional designers may perform the task, but generally other professions are involved.'* (Denmark. National Agency for Enterprise and Housing, 2003)

Cx Design as a group want to be positioned higher on the Design Ladder. Integration into the development process and alignment to the front end of that process should allow this to happen. This does seem to be where RED are aiming to take design and design research, acting in the front end of the design process and using the research as a catalyst for innovation. Although a small newly-formed team with six newly-recruited members based in Singapore, working on more of a professional services model, RED is to use ethnography, design and research as a catalyst for innovation.

'To a certain extent, I don't see six newly recruited in a faraway place solving that problem for the whole corporation. I think one of my tasks is to demonstrate, clearly in a business-like fashion, the value of doing that. Despite the constraints that's what we are about...'
(Johnson, 2014. CD-11. 4:37)

It is an attempt to bring the human element into the innovation process and researching *through* and *for* design. The approaches and outputs from the RED team could be integrated into the wider organisation through a development of the Cx Design development process, if one existed.

12.1.3 Communication of value

The role of design research is important on different levels in terms of communication. An integral part of participating in this type of activity is the communication of the value of the output, the process and the team. For a group to make a cultural shift then the rest of the organisation has to understand the value, especially if they are to be paying for part of it or not getting the same level of support they once had.

'If you are looking at doing something that is different from today, and let's face it, any kind of research would be different to what is done today, you have got to know your audience and the audience is quite diverse. If you think who is involved in a project from marketing to engineering to solutions management, you have got to know your audience. If you want to start to make inroads into changing something then you have got to push their buttons, if you don't they are [be] supportive to minor adjustments to what already happens, let alone a complete change in process. It's about, I hesitate to use the word stakeholders, but it's about stakeholders and what they value.' (Cx Design Team, 2014. CD-12. 18:18)

The RED group have been aware of this and are keen to demonstrate their value to the organisation through a range of tailored dissemination methods. *'...in different ways, they [customers] often have different agendas and we often have to play to that. The first thing I did was make sure that we actually delivered tangible things.'* (Johnson, 2014. CD-11. 21:14.)

Steven Birnie: 'So it is really a case of knowing your audience and tailoring the output to suit?'

Graham Johnson: 'I think it is but I also think there is an honesty or integrity bit of it which is to make it clear to people what we are not, which is important as well. It is so easy for people to assume that we can do this and do that and the other but actually we have a tight remit and an unusual one and it's one that is qualitative consumer research and design group.' (Johnson, 2014. CD-11. 22:30)

The value comes in by being able to communicate and engage with appropriate user groups and customers. It also comes back to points raised in *Section 11.1.1 Process structure and integration*, where value of the group is highlighted through the active engagement with customers and consumers.

12.2 How can Participatory Design through an Action Research Methodology be Integrated into the Design Process within a Global Corporation?

While closely related and intertwined with the process structure and integration of the design group with the rest of the organisation, the integration of a participatory design methodology would be achieved through two main points: *strategic awareness* and an *evolution of design in NCR*.

12.2.1 Strategic awareness

There are obstacles in any organisation when it comes to process and cultural change (Ahmed et al., 1999; Clemente and Greenspan, 1999; Greenberg and Baron, 2003; Sadri and Lees, 2001). Cultural change is especially difficult to alter when practices and perceptions are so engrained. Leading on from Sections 11.1.1 to 11.1.3, the integration of a participatory design methodology in the development structure would be easier to achieve if the group and its outputs are aligned to be relevant across all of the LOBs,⁷⁹. This means that the group should have an awareness of the strategic directions of the LOBs so it can do targeted consumer engagements that can deliver strategically relevant insights.

The current position is that the group do not have the structure in place to concentrate on the front-end participatory work as the group's focus is distributed throughout the development process. *'The way I see it is that if we do 80% here [pointing to beginning of PLM process], it is going to take a while getting to that as at the moment our effort is spread almost equally across all of the stages.'* (Rohan, 2014b)

A strategic focus at the front end of the PLM process will allow for more appropriate solutions to be created and strategic development decisions to be made earlier. Ultimately, loading the activity at the front end of the process should allow for quicker delivery of solutions at the back end of the process.

'The more we do at the very start of the PLM Process the shorter this [later phases of PLM process] will become because we can do better design. We can iterate here, we don't get to do that here [pointing to later phases of PLM process and Cx Designs current point of

⁷⁹ Section 2.3 refers to NCR's Lines of Business (LOBs), which include Financial, Hospitality, Public Sector, Telecom and Technology, Retail and Travel sectors.

engagement in development programs] at this point in time because it's too short.' (Rohan, 2014b)

Having awareness across all of the LOBs is a big task, especially for such a relatively small group. To be relevant to an on-going development program participatory engagement would need to be done within an efficient timeframe and targeted to get the maximum impact. While discussing with Charlie Rohan how the Mobile Insights activity (Chapter 9) was conducted over a two-week timeframe he acknowledged that future participatory engagements might need to be condensed to similar timescales. Charlie recognised that there was a need to have on-going research, design investigation and iteration so that knowledge assets are coming out of the team constantly.

'Maybe that's what it should be, these sprints. We talk about SPRINT and LEAN, all these terminologies but it doesn't really translate very easily to what we do... we have to have ongoing research, design investigation and iteration so that knowledge assets are coming out of the team constantly. There is a body of work, a body of knowledge... 'things we have tested out' we could put that on the shelf. It's there for whenever we need something... That's where we want to get to.' (Rohan, 2014b)

While this may be the case for short-term insights and results, a long-term approach can also be taken. Going back to Prahalad and his statement that there should be a consideration of consumers as co-creators of solutions (see *Section 3.3 Service Design and the Consumer Experience*), building up this type of a relationship with communities and consumers will take time. *'It also requires a new respect for consumers as co-creators of solutions and not just passive recipients of a product or service.'* (Prahalad, 2010. p15)

A deeper participatory design approach can lead to mutual long-term gain. Realistically, this co-design and consumer integration into the development process would be a longer-term goal; there is a lot that would need to be considered before that could be achieved. The first step is to acknowledge there is a lack of participatory engagements and then to define a process for that to take place.

Steven Birnie: 'Is the value of it [Referring back to Chhatpars 'new approach' structural model] the participatory nature?'

Charlie Rohan: 'Yes. It should be, absolutely. It absolutely should be and we haven't done that participation, it has been at arm's length, it's been behind the doors of this building or the Duluth building and not really had access to customers.' (Rohan, 2014. CD-10. 38:00)

12.2.2 Evolution of design in NCR

As described in *Chapter 2: The Role of Design in NCR: PAST, PRESENT and FUTURE*, the role and perceived value of design in NCR have evolved over the years. As NCR moves into the 'experience era' (*Section 2.2 Role of Design in NCR*) there is an ever-increasing need for consumer engagement and understanding. *'Do we need research? Yes. Should some of this be weighted more towards a sort of co-design participation model? I think it should.'* (Cx Design Team, 2014. CD-12. 48:58)

This evolution will be challenging and relates to how the group is perceived and how they communicate their value, as a group, and the output they deliver.

'So process wise even within the PS [Professional Services] context we [Consumer Experience group] are seen as supporting projects rather than leading them or driving them. There is a bit of that perhaps. Our influence is ultimately affected by how design is perceived within the organisation. It is typically perceived without that much clout.' (Johnson, 2014. CD-11. 16:50)

Bringing participatory design through an action research methodology into Cx Design would be another step in the group's evolution. It is recognised that Cx Design needs a research element that has the ability to engage, reflect on and communicate with consumers and customers. Graham Johnson states some of the challenges of setting up the RED group that is situated under the overarching Cx umbrella:

'My concern at that time was how to justify and business validate in a world that is either traditional, if we accept that NCR might be that type of company, or one that is dominated by numbers, strictly speaking a positivist, empiricist view of the world... So the rationale was rather than count busses... let's ask people what their travel experience is and why they chose them, let's attend to some of the basics of the busses rather than the number of them. If you see what I mean... perhaps a poor analogy.' (Johnson, 2014. CD-11. 23:12)

The case studies followed a seven-phase process that integrated the designer or design teams in the participatory process with communities of people. Reflecting back on the

process and understanding the time, cultural and budgetary constraints that are formed in a global corporation, a future approach may need to be re-evaluated. A clearer, more compressed methodology would be more appropriate in the context of global organisation.

Phase 1: Observe, take stock and identify concern.

Phase 2: Reflect on possible ways forward and begin to plan a solution.

Phase 3: Take action to try out the solution.

Phase 4: Monitor and observe the outcomes.

Phase 5: Evaluate and reflect on what has happened.

Phase 6: Modify practice.

Phase 7: Move in new directions or return to observe/reflect/act cycle.

While McNiff's and Whitehead's cycle of action-reflection was appropriate for the process of the case studies, in that they allowed the author to engage, reflect and evaluate as an on-going process, this model could not easily translate or work alongside NCR's PLM process.

The development of McNiff's and Whitehead's action-reflection model will be investigated further in *Chapters 13: Thesis Conclusions*. The development of the model is so that it can be positioned in the early stages of the PLM process, as illustrated in the red box below in Figure 12.4, the aim being that the streamlined process is easy to understand and communicate to the team and those outside the group.

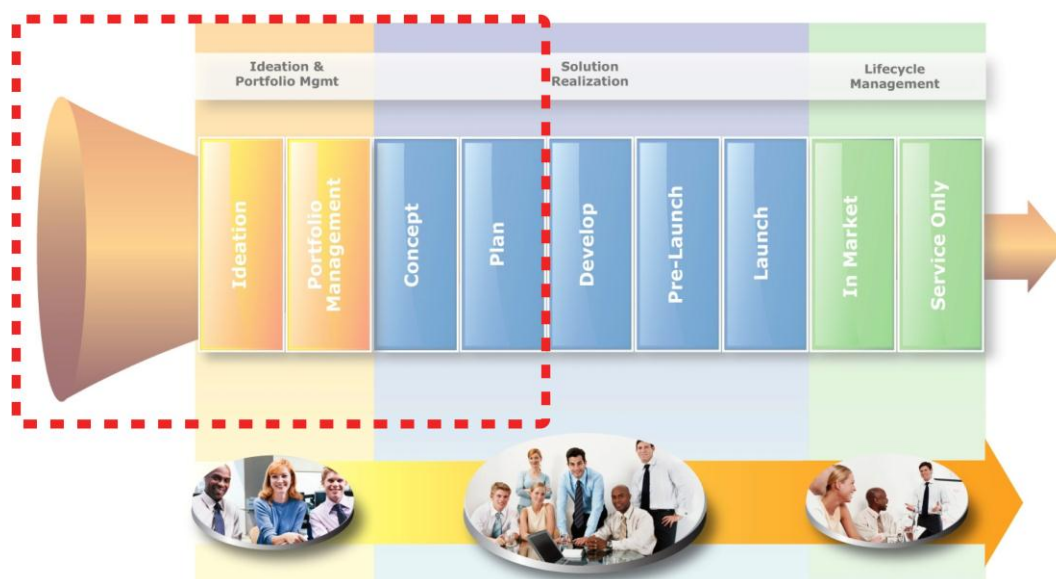


Figure 12.4: Cx Design's Core Target Position on PLM Process Map.

12.3 How can Insights that have been generated through Hyperlocal Research be Applied Globally?

As previously mentioned, there is an awareness that there needs to be increased engagement with customers and consumers, globally. As a small group within a large organisation it would be impossible for Cx Design to target every market segment NCR currently operates in. Appropriate engagements need to be found that will support any gaps in knowledge the team or wider organisation have. It should be recognised that communities are not passive; they can be an active participant in the ideation and development process of innovation. Two main topics have been identified to answer this thesis question: *community innovation* and *appropriate engagement*.

12.3.1 Community innovation

A community can be defined in many different ways. The case studies demonstrated different interpretations of community: the Dance Base community was a diverse range of people brought together through dance; the Pillar ATM focused on the geographic location of the community in the slums of Mumbai; the NCR|RNIB workshop brought a community of people with visual impairments together; and the Mobile Insights activity focused on a particular geographic area and applied the insights broadly.

“The notion of community and the granularity of what is the community is quite a tricky one because there are lots and lots of different way in which people do kind of aggregate. So it might be that there is a bunch of people that have some kind of common interest but actually individually they have got lots of different values that they are bringing together at that point so they are congregating around a specific singular interest or it might well be that there is a genuine sense of people who have shared lives and people who kind of don’t necessarily congregate particularly closely but if you started to assess the values they work with they would have something in common. I think that’s quite a big continuum, all the different communities that you might define exist on different that continuum.”
(Gillman, 2014. CD-13. 1:00:00)

Leveraging the appropriate community that is suitable for the insights required and applying them in a global context is a challenge. In the context of a global corporation, Cx Design ought to position itself to be able to leverage and work alongside other teams in NCR, such as RED.

'Because we are in the global market place for almost everything we do and the aspiration is for everything to be global... it would be impossible to research all of that in detail, there is just no way we could do it, so we do need to cherry pick to a degree... the acting local is not necessarily acting local here, its acting local globally.... We need to also leverage Graham's group [RED], they have got a research focus, a research remit, so whatever they can bring to the table as well... we need to use the knowledge but choose the locality based on the value to the global....' (Rohan, 2014. CD-10. 52:36)

The case studies reflected that engagement with communities could foster innovation. In the past this approach to innovation has been kept at arm's length. The case studies from Beyond the Castle, BESPOKE and Project H (see Section 5.2), all demonstrated how close community engagement could be the catalyst for innovation.

Clive Gillman was interested in understanding community perceptions and interpretations of the devices NCR manufactures. The questions he raises would potentially spark a reinterpretation of existing solutions, again demonstrating how community engagement could be used as a catalyst for innovation.

'Do you localise these things? Do you make them something that is simply the same ATM that exists everywhere else in the world or do you give them a sense of local ownership and local character, that's something I guess which is an unknown to whether or not people would actually want that.' (Gillman, 2014. CD-13. 30:00)

'Do you want them to be landmarks, that people get some kind of pleasure from so people associate that with the company. They become beautiful objects, interesting things. There is that interesting thing that sometimes, describing an ATM as a bit of a victim, but sometimes the ATM is the only thing that is lit in a street. That is really quite a valuable thing in that way.' (Gillman, 2014. CD-13. 55:44)

12.3.2 Appropriate engagement

If a participatory design process is to be accepted in NCR it would have to become a regular activity as the more engagements and workshops the design team conduct the deeper the relationships with communities can be formed and the more focused and efficient the activities will become. The application of locally generated insights will not always be appropriate in a global context; this should be understood in the early stages

of the engagement. Discussing the application of locally generated insights and applying them globally with regards to RED, Graham Johnson states:

“It depends on the project; it depends on the product. The intent is to have this team able and qualified to be mobile.... From a cost and business point of view I think it was a ridiculous notion to have people fly half way around the world to do a study that is perhaps only costed at four times the price of that fare. So we have to work that out and I think that having established the viability of the team then it would make sense for NCR as a global organisation to replicate that in other parts of the world.” (Johnson, 2014. CD-11. 18:45)

Designing something *with* users as opposed to designing something *for* users (Robertson and Simonsen, 2012), as discussed in greater detail in *Section 4.3 Participatory Action Research*, puts the user/community/customer on the same level as the designer. They are each bringing their own expertise, interpretations and experiences to the process (McCarthy and Wright, 2004; Wright and McCarthy, 2010). Elizabeth Sanders (2005) points out that businesses recognise that allowing their ‘consumers’ to become ‘co-creators’ can allow them to offer a unique selling point (USP) over their competitors.

It is up to the corporation to use the combined tacit knowledge of the team, coupled with the experiences gained through community engagements to understand what and where insights can be used. In the dynamic corporate environment where perhaps academic rigor is not as important as time and cost then applying tacit knowledge to insights appropriately and strategically is important. What has been found through the experiences of this thesis is that community engagement will help to guide the decisions in a way that works from a business and consumer perspective.

12.4 How can Design Research Methods Support Socially-led Innovation in NCR?

The application of an action-based participatory design methodology in the development process of NCR would naturally raise the awareness within the organisation of the real needs of the customers and consumers. How this would be achieved is categorised under three main headings: *human focus to design and research*, *building connections* and *core competences and community needs*.

12.4.1 Human focus to design and research

The present situation is that there is a strong technology focus to design and innovation in the organisation; innovation starts with the piece of technology and then applications are found where this may be appropriate. What participatory design research methods allow is a redirection of that focus on to what people want and need and then to find the appropriate solution for that. *'This should be about people, experience and places. Knowledge that we gathered that is applicable across our business areas. We then apply filters to get the appropriate outputs for specific projects in specific industries.'* (Rohan, 2014b)

Clive Gillman raised interesting comparisons between India and Dundee, or more widely, East and West. The West is in a post-industrial era where generally people are somewhat disengaged from their environment and the wider society around them. He states that it is important for global corporations to try and understand this different and ever-changing relationship people have with their environment, culture, society, corporations and the other people around them.

'Have you met Praveen... He said something when he came to Dundee. When he walked around Dundee he didn't see anyone making anything. For someone coming from India that actually is a big shock... actually there is a hollowness to that and that is not necessarily people with a steel or iron forge in their back gardens but even just making food. If you walk around the city centre you think you might expect to even buy street food. People are not actually making it. So something has been removed from that equation and there is something in that it is important to who we are as people and the fact that we have been through that, it's a 200- 250-year cycle whereby we went through that process of industrialisation. In that process of industrialisation we changed how we understand our relationship of how we understand people and the world around us, we are now coming off the back of that trying to relearn those relationships. The habits of industrialisation have

informed who we are but that's not necessarily who we are going to be in the future. We need to be thinking about how do we make that work, how do we actually support people in evolving to the next stage rather than just saying well that's it we are broke and that's it we just have to give up and become victims now. That for me is really, really important and in some ways I suppose the big industries that do survive are those that will learn how to re-map themselves onto that emerging future rather than relying on those old models. Some are doing that I suppose.' (Gillman, 2014. CD-13. 22:37)

Not every company can, or indeed would want to, engage in socially-driven initiatives if they cannot profit from it in some way. There are a large amount of 'for profit' companies working in the likes of India. According to Praveen '*Social Entrepreneurship is becoming a big thing in India. People are doing work in the social development areas... providing livelihoods to people, they are making some money but the people are also making money too.'* (Nahar, 2012. CD-14.19:05)

12.4.2 Building connections

The key to socially-led innovation is one of empowerment to the people who need the service and, importantly, to have a clear understanding of the real needs of the people. '*...building up those connections. Engage with people locally, co-design is the key'*. (Nahar, 2012. CD-14. 23.34)

Praveen has seen all too often investors going into the country and just dumping their ideas on the people. Praveen believes passionately that it must be a process of '*engaging with people so the whole system sustains'* (Nahar, 2012. CD-14. 24:01); this is in line with Prahalad's thinking (Prahalad, 2010). It is about understanding the local infrastructure, the communities' wants and needs, and the cultural nuances. With this deep understanding it can then allow a corporation or NGO to design a product or service that includes the community: the inclusion of communities at its heart can allow it to become self-sustaining.

The Small Society Lab case study (see Chapter 8) was about building connections, connections between global industry and local communities. It is through these connections that richer insights can be gained (Blum-Ross et al., 2011; Egglestone and Rogers, 2010).

'The Small Society Lab has not got a focus on business improvement. It got focus principally on community improvement. So it's thinking about how we can improve the lot of the community. If that means supporting the community in how it transacts and exploring? then I think that is quite an interesting thing to be doing.'(Gillman, 2014. CD-13. 51:40)

12.4.3 Core competences and community needs

There are a lot of socially-driven initiatives underway in India, some charitable, some for profit, some government funded, some purely driven by business. It is interesting to understand what drives business to get involved in socially-driven initiatives in the first place. Praveen Nahar states *'A lot of the time it is driven by the passion from the top level.'* He calls these *'passion driven projects.'* (Nahar, 2012. CD-14. 6:00)

The CEO of a company sees an opportunity and can align their own particular passions with the skill set of the company they run. Nahar sees this to be the key with many of the successful corporate-driven initiatives. *'It is about understanding the core competences of the organisation and using them in a socially driven way.'* (Nahar, 2012. CD-14. 28:04)

There is the thought that if you are able to create jobs, if you are able to give wages then that is a corporation's social responsibility. A socially-driven initiative that also makes profit is the model often described when discussing this in relation to India. This was described in detail in *Section 5.6 Socially-Led Innovation in India* where examples such as Jaipur Foot, Aravind Eyecare and Amul are described. The key driver is socially driven but in a commercial environment often a balance needs to be found. *'There are thousands of NGOs who are doing grass roots work around India, raising money from corporates and other organisations, governments, trying to engage directly with the people to do something.'* (Nahar, 2012. CD-14. 16:40)

The central factor for industry engagement in a socially responsibly context is for an understanding of what the company's core capabilities are and aligning them with a need for the people. Techniques used commonly within the design process can aid in this alignment, demonstrated throughout the case studies. *'You can engage with marginalized communities through the design process. Design thinking techniques, brainstorming, service mapping, idea generation and interviewing people. Generating a lot of ideas, synthesizing them.'* (Nahar, 2012. CD-14. 37:45)

Design insights and engagement techniques are becoming more commonplace within larger organisations. The use of such techniques along with an awareness of the company's core capabilities should allow for a more mutually beneficial relationship to be fostered that is socially driven and ultimately profitable.

12.5 How has the Research conducted throughout the Doctoral Journey Impacted the Consumer Experience Design team in Dundee?

The research program started in 2008. Since then the dynamics of the group have evolved as team members come and go, group focus shifts, and corporate strategies emerge. It would be true to say that the activity has not been positively welcomed by all team members who have made elements such as communication and wider engagement challenging. This has led to the activity being relatively self-contained so it does not directly impact the other team members' day-to-day activities and was sensitive of colleagues' feelings towards the work. Yet, there has been recognition from the entire group that design research is required. From the conversations with the group it is clear that there is a longer-term shared aim to engage with design research to enable them to work more strategically. These tensions between strategic decision-making and delivery of day-to-day activity within NCR informed the thesis, as illustrated in Figure 4.0.

The shifting dynamics of any group within any organisation have to be clearly understood if such an undertaking is to be achieved without disruption. The primary level of support came at the evaluation stages of the process where they help inform, shape and direct the final output. The role, purpose and impact of the research program should also be well communicated to all the individuals impacted. The core areas of focus relating to this question are *perceived impact* and the *need for design research*.

12.5.1 Perceived impact

The perceived impact of research has been low; in contrast, I believe it has influenced and impacted the nature of Cx Design and how they are beginning to be perceived in NCR and beyond. The Pillar ATM is an example where output from the research has been disseminated globally and recognised beyond the usual customer base, having featured on design blogs, websites and been an Industrial Designers Society of America (IDSA) award finalist (Greenemeier, 2011; Macsai, 2010; Walker, 2011). The Mobile Insights and NCR|RNIB activities are both regularly communicated to internal and external customers as 'what we do'. As part of the action-reflective process of the case studies it showed that elements have either directly but more commonly indirectly impacted the output from the Cx Design group.

This has not necessarily been recognised or appreciated as was clear in the discussion with Charlie Rohan. Yet it was recognised that the research activity has highlighted the need for design research to be an integral part of the group's capabilities.

'Impacting the practice, I don't think it's impacted the practice much yet. I think it has been an input to some things that we are doing, and hopefully has helped crystallise some of this but I think the proof has still yet to be pulled out. The current process doesn't leverage this [design research] if this is where we are always going to be [Cx Designs current state] this is a nice academic exercise.' (Rohan, 2014. CD-10. 42:00)

It was stressed that there has been a slight cultural shift as well as a structural shift in where the group are going and that the organisation is moving culturally towards a more design-orientated structure. It is hoped that elements of the research can influence and impact the front end of the PLM process activity.

'Yeah definitely, I'm looking for more the output of this; the things that you believe are the right things of this to be fed into here (the PLM 2 process). What works, what doesn't work, how can we learn from the pilots you have done of things that are the right ways to do things, the wrong ways to do things.' (Rohan, 2014. CD-10. 42:50)

Abstracting the research work from the day-to-day activities has been a safe approach for NCR. Mistakes can be made and wrong directions taken with relatively low impact on the rest of the team or wider organisation.

'It's funny isn't it, as doing it in the relatively safe context of this PhD is quite useful as well as that there is always that fear, I think. That if you actually go out and start to ask your customers, you may find out something that actually you don't want to know. Which is the things that they actually want you to do are not things that you are able to do, not capable of doing or want to do, or that your ability to shift to that position creates big challenges, in terms how you then shift the culture of the company to acknowledge that and work with that. I think that can make people sometimes quite nervous of talking to people.' (Gillman, 2014. CD-13. 7:10)

A failing on the author's part has perhaps been to not have the confidence to communicate the process and outputs effectively. This has not always been easy as these

elements have not always been clear enough or have been a moving target throughout the lifetime of the research.

12.5.2 Need for design research

The process of the PhD research activity has helped to crystallise the awareness of the need for design research in the Cx Design group. Instigating activities such as the NCR|RNIB workshop and the outputs like the Mobile Insights document show the group and wider audience how valuable design research can be.

'When you ask about the value of the PhD research, it should combine what's in here [the PLM process sketch, Figure 12.0] but a lot of things you have touched on, the prototyping, the participative parts are key to making this happen. It would be wrong to say we were not aware of it but this helps to crystallise the idea that we were just not doing enough of that.' (Rohan, 2014. CD-10. 42:50)

'We are doing still too much product packaging, I know we are doing better than that but we are still doing too much. We get a set of bits and a set of requirements and put them in a box that is as small as it can be. We don't really think about the subtleties... we chase the product packaging ideas that we think or know are right. I have crystallised some of this, I think there is still a lot to do, defining what is design research in here, what bits are appropriate to us. Hopefully that's what comes out of this research program.' (Rohan, 2014. CD-10. 43:15)

The other Cx Design team members acknowledge the need for participatory consumer engagements.

'I think there is a sort of acknowledgement that unless you go out and bring in sort of things upon which to act... we've only got a finite pool of knowledge and experience between us relative to NCR so unless you've got sort of a new stream of... or a pipeline, bringing new streams in, you get to the point where you have pretty much exhausted everything you already know. It's not exactly fresh collateral for doing new things because it's just sort of a rehash of what you knew. So yeah, it's vital.' (Cx Design Team, 2014. CD-12. 2:15)

As highlighted in the case study reflections, actively doing design based research with consumers and customers strengthens the group's authority by building up a pool of

knowledge that can be accessed for a range of different projects across all the lines of business.

12.6 Chapter Conclusions

This chapter brought together the previous three sections and reflected on the process, learning and outcomes. It has taken each of the research questions in turn, combined the understanding through the literature review with the learning from the case studies. Through a series of discussions with various influential people in NCR, design and community engagement, the author was able to provide overall insights into each thesis question. Table 12.0 below takes each question in turn and presents the overall reflection headings.

Local insights can only be brought into a global organisation if they are appropriate for the project. However, local engagements can be a valuable source of innovation. The case studies and examples outlined in the literature review demonstrated that. Close community engagement through participatory design methods can act as a catalyst for innovation and development of insights that can have applications across the lines of business.

Design research can support socially-led innovation when there is an awareness of the real needs of a community or market, they can then be aligned to the core competences of the company. The process of participatory design fosters a deeper understanding and new respect for the consumer as a co-creator. This process empowers the consumer or community group building a connection between the corporation and their consumers.

The research conducted through the doctoral journey has indirectly impacted the team in various ways. While the perceived impact has been low, it has crystallised the awareness of the need for design research and consumer engagement in the group. Elements of the research have also demonstrated how the group can utilise design research methods to engage with and understand the consumer. This has been communicated broadly to the wider organisation, customers and beyond.

The resulting conclusion from the conversations and reflections is that for design research to play a role in a global technology company it must be an integral part of the design group's function. In order for that to happen, a methodology and process has to be defined. This will be explored and defined in *Chapter 13: Thesis Conclusions*.

Chapter 13: Thesis Conclusions

13:0 Introduction

Through the reflective process that resulted after the series of interviews and feedback sessions described in Sections 12.0 to 12.5.2, the thesis now focuses on the elements that will contribute to both NCR and to the wider action research community. The proposal is the modification of both the participatory action research methodology used during the case studies and Chhatpar's strategic decision-making process described in *Section 3.6 Review of Chhatpar's strategic design approach*. While still retaining the core principles of the action-reflection process, the modifications will create a Participatory Action Based Strategic Design Process that could be used by design teams and integrated into the research and development processes of a global corporation.

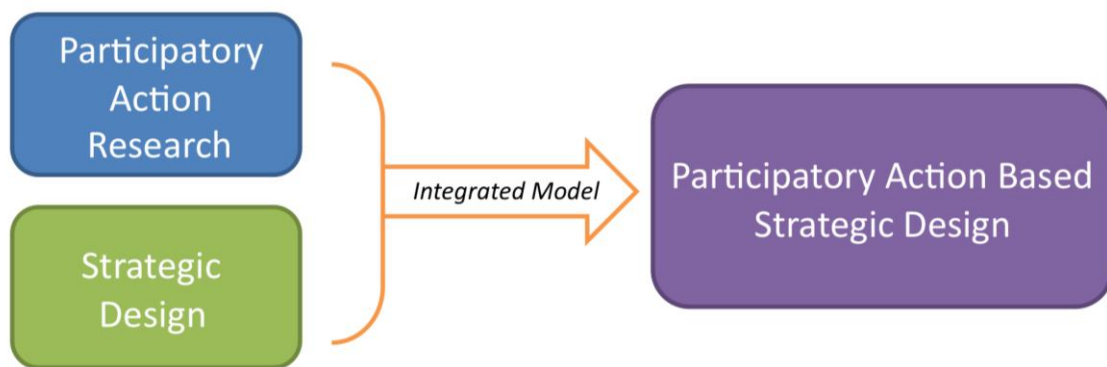


Figure 13.0: Thesis Conclusions – An Integrated Model

Section III of the thesis and the resulting reflections have demonstrated that action based participatory design research methods can and will continue to play a role in NCR's Cx Design group going forward. The reflections showed that the role of design could be used strategically to engage with communities and consumers through design research methods by means of a participatory action methodology; this was demonstrated through a series of case studies. The use of such methods would take the focus away from the solutions being purely driven by new technology and instead allow the most suitable technology to be used in the delivery of solutions that are most appropriate for the community or consumer.

The primary intention in this research was not to develop new methods but to demonstrate to NCR and the wider corporate community that there is an alternative

method of product ideation that is through consumer engagement. The contextual review illustrated that engagement through mutual understanding of needs can lead to the development of products and services that benefit the community, consumers and business. The thesis has also demonstrated to the participatory action research community how methods and methodologies from that area can be applied within the context of a global technology company.

The original contribution to new knowledge is the design and development of a Participatory Action Based Strategic Design Process. The following parts of this chapter describe the methodology and process adaptation's required and how they will be combined and integrated into NCR's PLM process⁸⁰.

13.1 Modifying the Action-Reflection Methodology

As identified in *Section 12.2.2 Evolution of design in NCR*, the McNiff and Whitehead action-reflection process could be revised to be more appropriate for a global technology company, such as NCR. The author acknowledges that it was a suitable process for the case study activities, providing a balance between action and reflection that ensured the author evaluated the process, the outcomes and the impact of each study. However, through a greater awareness of NCR's PLM process and the understanding of the need and desire to incorporate design research into Cx Design, a suitable action based, participatory, design orientated model would be required.

'...things that you believe are the right things of this to be fed into here (the PLM 2 process). What works, what doesn't work, how can we learn from the pilots you have done of things that are the right ways to do things, the wrong ways to do things.' (Rohan, 2014. CD-10. 42:50)

'...defining what is design research in here, what bits are appropriate to us. Hopefully that's what comes out of this research program.' (Rohan, 2014b)

From the feedback that was received, it was evident that development and definition of a design research orientated process that was suitable to be integrated into the Product Lifecycle Management (PLM) process was required. Reflecting on the process used throughout the case studies there were a relatively high number of stages to progress

⁸⁰ NCR's PLM process is discussed in Section 2.2 Role of Design in NCR

through. The core principles of McNiff's and Whitehead's process, as mentioned in Section 4.2 *Action Research Methodology*, are the understanding of the need, active engagement, reflection, modification of practice and communication of the outcomes. These overarching principles form the basis for the development of a Cx Design group's participatory design methodology.

McNiff and Whitehead: Action-Reflection Methodology	Modified Terms
Phase 1: Observe, take stock and identify concern. Phase 2: Reflect on possible ways forward and begin to plan a solution.	FIND
Phase 3: Take action to try out the solution.	ENGAGE
Phase 4: Monitor and observe the outcomes. Phase 5: Evaluate and reflect on what has happened.	UNDERSTAND
Phase 6: Modify Practice. Phase 7: Move in new directions or return to observe/reflect/act cycle.	RE-DIRECT
New Phase: Value and Communication	COMMUNICATE

Figure 13.1: Action Research Adaption

Phases 1 and 2 of the action-reflection process can be combined into one action, *find*. This clearly identifies the first stage as an investigative phase that engages with the relevant parts of the business that can influence and direct the focus of the activity. The *find* stage is a collaborative process in order to define topics of strategic relevance to the business. It is also the point where contact with appropriate communities of consumers is instigated.

The next stage is *engage*; this is the primary participatory design phase of the activity. Design research methods are applied in various ways to illicit insights and generate ideas. This process is done in collaboration with the communities, consumers and customers identified during the *find* stage. Table 19 shows some of the methods applied during the case studies. This is not an exhaustive list; Robert Curedale's (2012) book illustrates 200 ways to apply design thinking.

Method	Reference
<i>Digital Ethnography</i>	(Curedale, 2012; Fitton et al., 2004; Hulkko et al., 2004; Masten and Plowman, 2003; Suri, 2004)

<i>Shadowing</i>	(Curedale, 2012; Kuniavsky, 2003; McDonald, 2005)
<i>Service Journeys</i>	(Curedale, 2012; Moggridge, 2007; Stickdorn and Schneider, 2010; Suri, 2003)
<i>Video Insights</i>	(Buur et al., 2000; Gaver et al., 2004, 2003; Raijmakers et al., 2006; Suri, 2003; Ylirisku and Buur, 2007)
<i>Co-Design Workshop</i>	(Bjelland and Wood, 2008; Egglestone and Rogers, 2010; Gaver, 2011; Press et al., 2011)
<i>Experience Prototyping</i>	(Buchenau and Suri, 2000; Buxton, 2007; Moggridge, 2007; Suri, 2003)

Table 19: Selection of Design Research Methods

Phases 4 and 5 have been combined to create one stage, *understand*. This is the reflective stage of the process where the team and the research participants can validate the insights and ideas against the original need that was identified. This process of validation may be done through a variety of ways such as focus groups, user testing of initial low-fidelity mock-ups or questionnaires. This is also a stage where there is validation of the actual need that was initially identified. It should be understood that this is an issue that needs to be addressed on a business and consumer level.

Phases 6 and 7 have been combined into a *redirect* stage. If during the *understand* stage it has been identified that the initial direction, topic, research participants or outcomes are not strategically appropriate then the focus should be re-directed. This stage should involve close participation and communication with the research participants so a deeper understanding of any issues can be obtained.

The final stage is *communicate*; this involves timely and targeted communication of the results of the study in the most appropriate manner for the customer and project. An integral part of this stage is the communication of the value, the value of the process, outcomes and group.

Stage	Definition
Find	Collaboration with Solutions Management, Sales teams and RED to define topics of strategic relevance to NCR.
Engage	Community engagement through design research methods. <ul style="list-style-type: none"> • Validation of topic • Participatory design with community • Active engagement
Understand	Validation of Insights and Ideas <ul style="list-style-type: none"> • Feedback • Observation • Continued communication with community
Redirect	It may be appropriate to redirect the activity once a deeper understanding of the topic is achieved through Phases 1 to 3.
Communicate	Tailored to nature of feedback and audience Communication of the results and the value <ul style="list-style-type: none"> • Value of project and of team

Table 20: Methodology Stage Definition

The evolution of the action-reflection process is only one part of the overall process. To be appropriate for the development organisation there must be an understanding of how this process integrates with the rest of the wider organisation and their development procedure.

13.2 Modifying Chhatpar's Approach to Strategic Decision Making

Chhatpar's strategic decision-making process as identified in *Section 12.1.1 Process structure and integration* is a design strategy appropriate for in-house design groups to adopt. Design research feeds into the business validation and works in parallel with defining the business strategy and direct user validation. This approach encourages participation on various levels and fosters empathy of the needs of the end users as they are integrated into the process.

Reflecting on the process there are modifications that are required in the timing and focus of some of the design research elements, as highlighted in Figure 13.2 below. The

elements highlighted in blue show the points in Chhatpar's model that have been adapted.

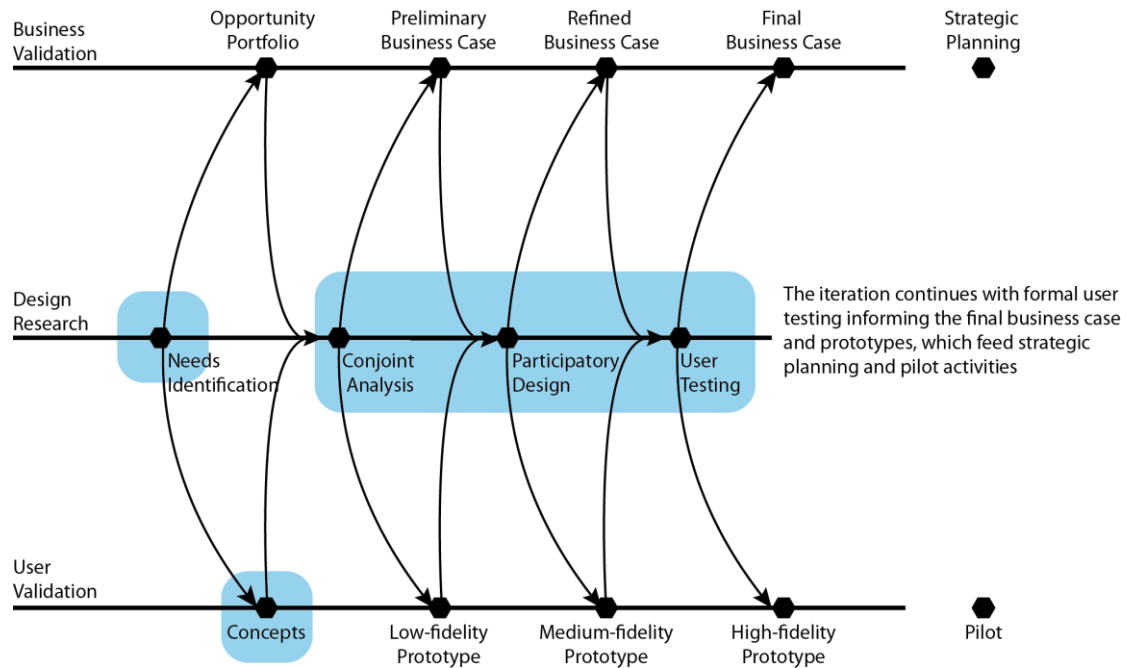


Figure 13.2: Strategic Decision-Making Modification Areas

Figure 13.3 below illustrates how user validation and business validation feed into the *needs identification* and vice versa. This is a more collaborative process than what exists today but all elements should inform each other.

The concepts phase has been taken out at such an early stage of the process. This has been changed to *community engagement*. As with BESPOKE, Beyond the Castle, DOTT, Project H and all of the case studies, community engagement at an early stage is an important stage in the participatory design process.

To ensure there is appropriate participatory design conducted as early as possible, this element has been introduced at the beginning of the process. This will coincide with low-fidelity prototypes that could be sketches or cardboard models, rough interpretations of insights and ideas.

While conjoint analysis is a popular approach for measuring consumer preferences in marketing research (Ramírez-Hurtado, 2010) this is only one of a broad range of methods that can be used to validate insights and ideas. Focus groups, questionnaires,

initial user testing and observations call be included in this third stage of *validation of insights and ideas*.

The final stage is *disseminate insights and ideas*. This stage is in parallel with the production of a resolved business case and the production of high-fidelity prototypes for continued user and customer testing, validation and communication. The disseminated output should be targeted appropriately for the project and desired recipient.

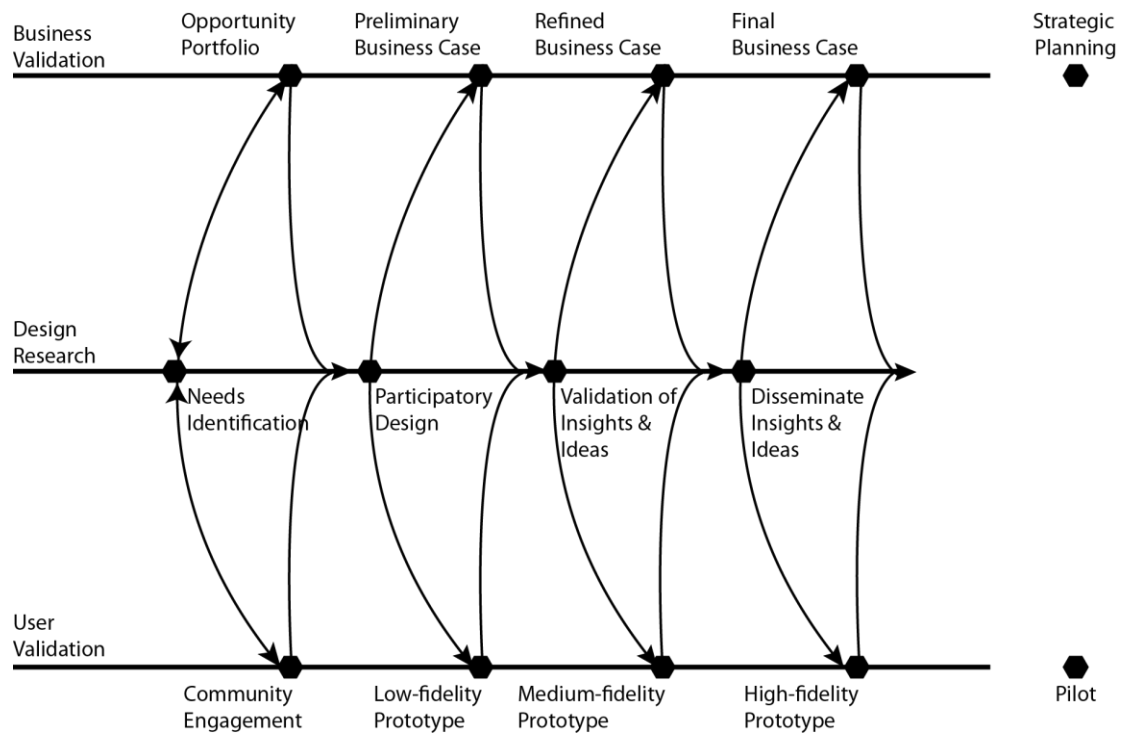


Figure 13.3: Adapted Strategic Design Process

The iteration continues with formal user testing of high-fidelity prototypes informing the final business case, which feed strategic planning and pilot activities.

What has been illustrated is a methodology and process adaption that brings together various points raised through the literature review, the case studies and the thesis reflections. The proceeding chapter brings the two elements together and demonstrates its integration into current NCR processes.

13.3 Integrating Action Research with Strategic Design

The adaption and combination of McNiff's and Whitehead's action-reflection model and Chhatpar's strategic decision-making process has created an interconnected process

that is appropriate in the context of a global technology company as it brings the corporations strategic vision and users together through design research. The adapted process overlays the modified methodology to create a combined Participatory Action Based Strategic Design Process that can be integrated alongside existing groups and processes. This new process puts participatory action research at the core of the design group’s activities.

Figure 13.4 illustrates the combined process; each stage is colour coded and feeds into the proceeding stage.

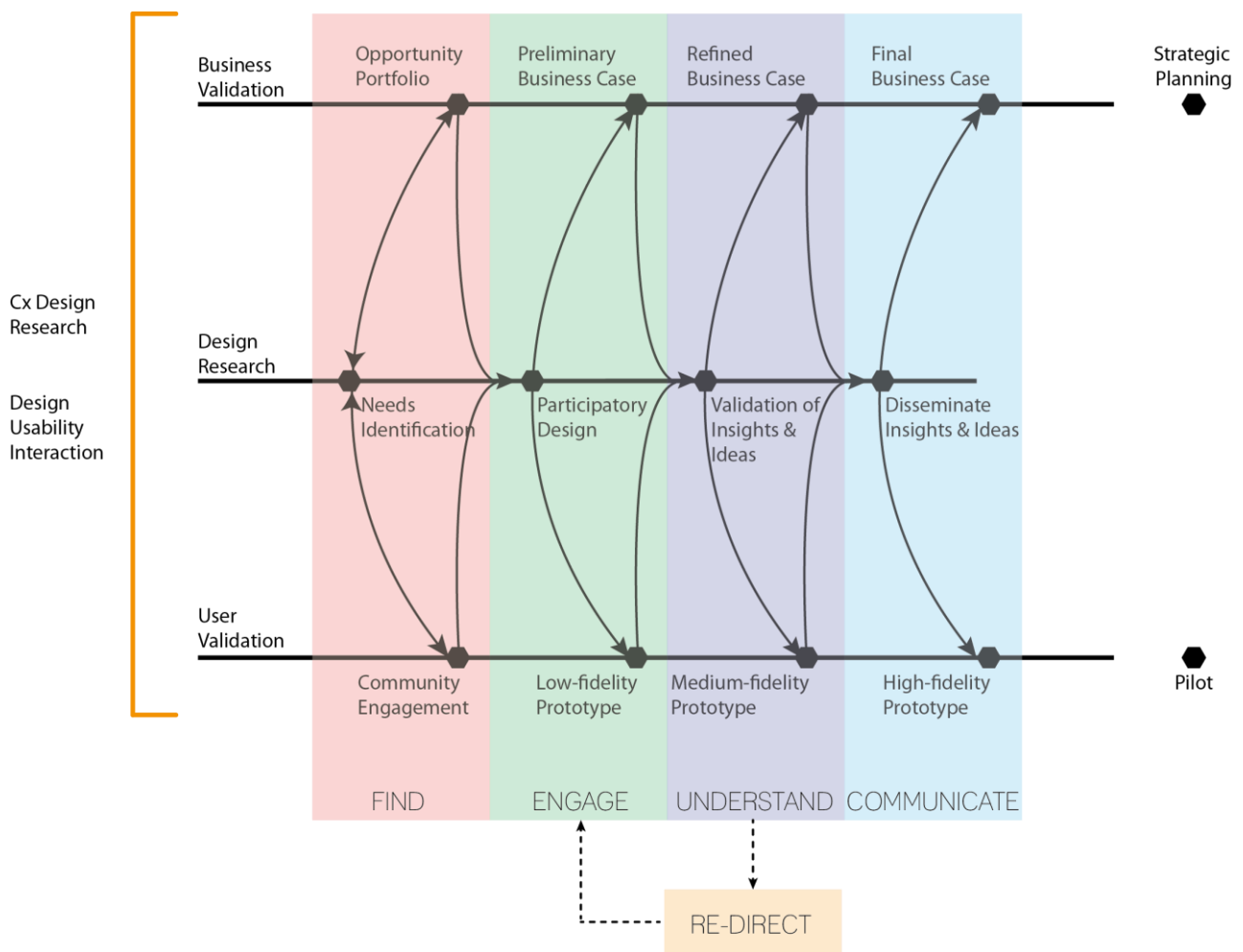


Figure 13.4: Participatory Action Based Strategic Design Process

The iterative process would be positioned in the preliminary stages of NCR's PLM process; the area identified in Figure 12.4 in *Section 12.2.2 Evolution of design in NCR*. It is proposed that the main focus of the group is within this area, with supportive roles provided to the product development in the later stages. *'The way I see it is that if we do 80% here [pointing to beginning of PLM process], it's going to take a while getting to that as at the moment we do approximately 10% [spread almost equally across all of the stages] all the way along.'* (Rohan, 2014. CD-10. 15:55)

Clearly defining the core area of focus for the group through a clear strategy is an important step in the evolution of the Cx Design group. Defining a clear process and understanding how it can be implemented will allow Cx Design to be properly integrated in the organisation's PLM process.

For design research to be integrated into the corporation it should be integrated with the rest of the organisation through a strategic awareness of the desired direction of the corporation. The Participatory Action Based Strategic Design Process conceived as an outcome of this research activity proposes closer alignment between Cx Design and other groups such as RED and Solutions Management.

13.4 Influencing Factors In The Process Development

The development of the process has evolved through the insights gained during the case studies and the engagements with the key stakeholders discussed in Chapter 12. This has been an evolutionary process and one which the different case studies had more influence in different parts of the process than others. The illustrations below highlight the key areas of influence.

The Dance Base case study was influential at the front end of the process and through the prototyping stages. It was through the close community engagement that clearly identified the areas of need for Dance Base and influenced how the project would develop. The role of participatory design methods early in this project illustrated its importance and potential application within the Cx Design group. This project was strong on the prototyping elements of the process. The case study highlighted that having 3D prototypes to discuss, test and trial are important when engaging with community groups.

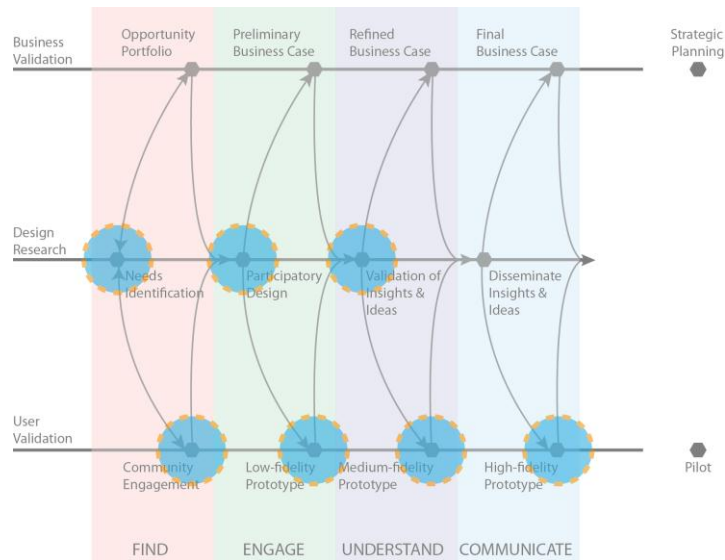


Figure 13.5: The Dance Base Case Study Areas Of Primary Influence

The Small Society Lab case study was similarly influential at the front end of the process; it did not progress beyond low fidelity prototyping, sketches. NCR currently work with legislation and guidelines regarding self-service interactions for those with visual impairments and there is a high awareness of this within the Cx Design group therefore there was a business need identified early in the process. The case study used a range of participatory design methods in a workshop format that illustrates that they can be flexible enough to work on both short-term and long-term project activities.

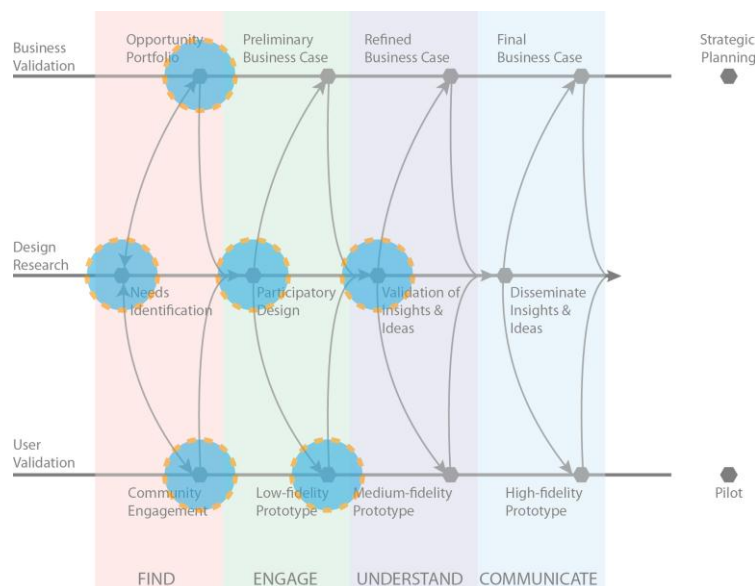


Figure 13.6: The Small Society Case Study Areas Of Primary Influence

The Pillar ATM case study touches on the majority of the key stages of the Participatory Action Based Strategic Design Process. This activity was driven by NCR so therefore had a clearer business mandate at the beginning although this was not continued through to a full business case. All levels of prototyping were conducted which was essential both for the community engagement and for the clear communication with the global team working on different elements of the project. The activity highlighted the importance of prototyping for external and internal communication at every stage of the activity.

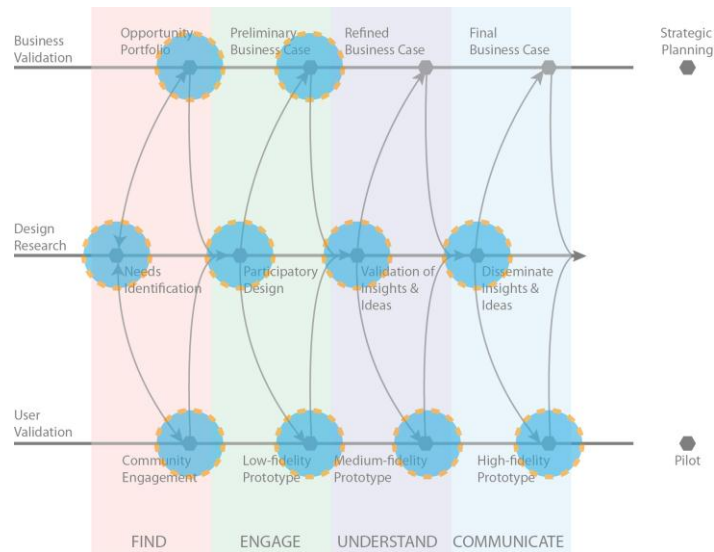


Figure 13.7: The Pillar ATM Case Study Areas Of Primary Influence

The Mobile Insights case study was similar in its influence as the Small Society Lab although it was over a two week time period and had a global aspect to its research. Importantly, due to the clear communication of the process and output of the activity through the widely distributed Mobile Insights Document it potentially had a greater impact. The production of the document highlighted the importance of dissemination of work at the end of an activity. This communication was useful both internally to communicate to other groups the role of design and externally to customers to highlight the design research engagements that take place.

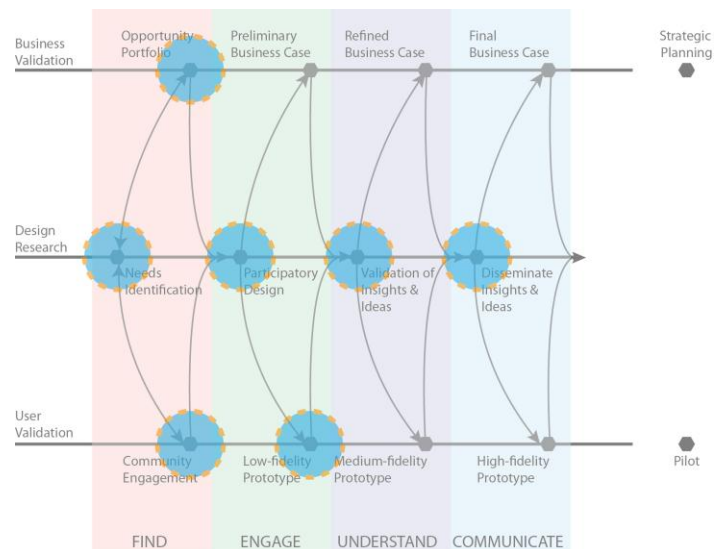


Figure 13.8: The Mobile Insights Case Study Areas Of Primary Influence

The evolution of the process was heavily influenced by discussions that took place with key stakeholders, as described in *Chapter 12: Reflections With Stakeholders*. Through the conversations it became clear that the primary focus of the end output should be a way of integrating the insights learned through the case studies into the development process of NCR and the working practice of the Cx Design group going forward.

In the early stages of the research journey it was initially conceived that the development of new methods, appropriate for use in a multi-national corporation, would be a suitable outcome for the research. The literature review highlighted to the author the amount of methods available and the case studies showed that there are plenty that are suitable for different levels of community engagement.

Through the interview stages of the research it became clear that defining a process that could be used by design teams that allowed them to engage with communities of people while also aligning closely with the business needs of the corporation would be the most fitting and appropriate outcome. Conversations with Charlie Rohan and the design team were particularly influential in the recognition that the process development would be valued.

'...structurally the process has to change, I don't think we need to have a different organisation. The process has to change and the PLM Process is the conduit for that. Changing the process and what we do within it will drive a cultural change.' (Rohan, 2014b)

'It's about 'how'. Project structure, you can't abstract research from project structure and time and everything else because the two are inseparable.' (Cx Design Team, 2014. CD-12. 37:55)

'The obstacles are 'process', 'cultural practice'... We need to change our own thinking' (Rohan, 2014b)

'Within the context of design and thinking about research as a catalyst, or a starting point or a motivator or an informer, or even a driver then it's different and I don't believe we do much at all.' (Johnson, 2014. CD-11. 3:40)

The interview with Praveen Nahar was undertaken relatively early in the research process. The conversation focused around co-design and community engagement and heavily influenced the socially-led values of the research. Similarly in discussions with Clive Gillman the need for industry to understand and engage with people was clear.

'...building up those connections. Engage with people locally, co-design is the key'. (Nahar, 2012. CD-14. 23:34)

'The habits of industrialisation have informed who we are but that's not necessarily who we are going to be in the future. We need to be thinking about how do we make that work, how do we actually support people in evolving to the next stage rather than just saying well that's it we are broke and that's it we just have to give up and become victims now. That for me is really, really important and in some ways I suppose the big industries that do survive are those that will learn how to re-map themselves onto that emerging future rather than relying on those old models.' (Gillman, 2014. CD-13. 22:37)

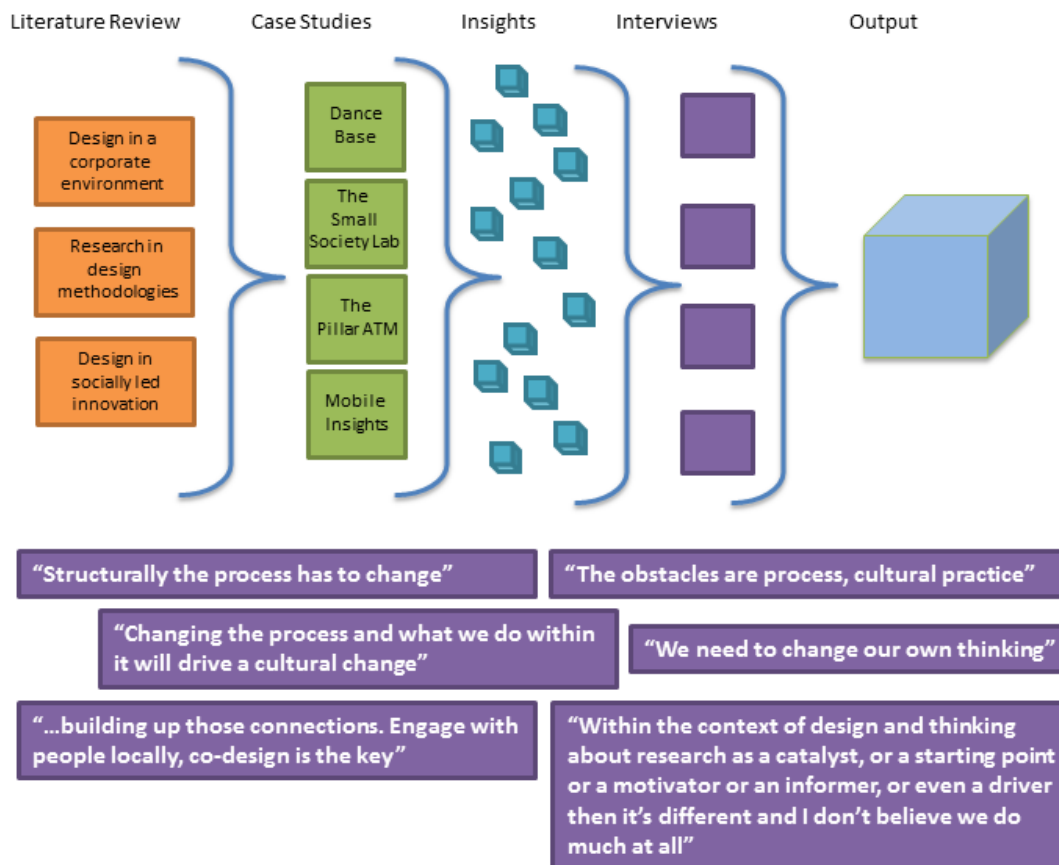


Figure 13.9: Key Stakeholder Primary Influence

The Participatory Action Based Strategic Design Process evolved through the understanding from the literature review, insights gained through the case studies and input from key stakeholders. This has allowed the process to be most appropriate for adoption in a multi-national corporation while still retaining the core socially-led values highlighted in *Chapter 5: Case Examples In Socially-Led Innovation*.

13.5 Limitations of Research

In any research activity there are strengths, weaknesses and limitations. The purpose of this chapter is to highlight the core limitations of the thesis and their potential impact on the research process and outcomes. These limitations can be identified under three main headings, these are: *methodological and researcher bias*, *applied scope* and *verification*.

13.5.1 Methodological and researcher bias

The design-led and action-orientated nature of the case studies mean that much of the insights generated and outcomes produced were self-reported. It is recognised that self-reported data contain several potential sources of bias. The first is *selective memory*; inevitably there will be occasions where experiences or events that occurred will not be remembered correctly or at all. The author tried to limit this by taking notes, photographs and video routinely throughout all of the exercises. The second potential area of bias is *attribution*; remembering positive events and outcomes and attributing them to one's own work. The action-reflective process used throughout the case studies attempts to alleviate and redirect this bias while also acknowledging the impact of the designer's/researcher's involvement. The third area of bias is *exaggeration*; the misrepresentation or embellishment of outcomes to be more significant than in reality. The author has attempted to associate all the outcomes of the research to live project activities. The outcomes and associated claims have been regularly reviewed by those overseeing the research from within the organisation in an attempt to alleviate any false or overstated claims. A fourth potential bias is *intent*; the overall intention of the research which may direct the understanding of the outcomes. The author has been open about this throughout, stating that from the beginning the intention has been to demonstrate to the Cx Design group the application and value of participatory action research methods in the design process of NCR. The author has attempted to report on the positive and negative aspects of the research in a balanced way.

The nature of the research conducted draws from both design and craft making practices alongside design research methodologies, it is neither a scientific or social science PhD, it should be firmly placed within design. It has been dependant on the author as an individual reflecting and iterating on the potential of design research within NCR. If similar research were to be conducted again in another organisation it

would be recommended that it is conducted by a team of individuals from a broad spectrum of expertise, not only from a design background.

13.5.2 Applied scope

The application of the thesis has been within the context of one organisation, the NCR Corporation. The process and outcomes focused on and developed solutions for issues that were specific to NCR and the Cx Design group within the corporation. While it could be assumed that the process developed and issues highlighted through the reflections chapter are not confined to NCR alone, this is still an unknown.

The processes that have been developed are believed to be broad enough to be applicable to other organisations. An area for future research and development would be the implementation and study of appropriateness in other organisations.

13.5.3 Verification

The outcome of a research and a contribution to new knowledge has been the adaption of an existing methodology and process to create a new Cx Design process. The journey of the thesis has led to the identification and development of a model but this has not been fully applied or tested. While the author has described how it could be applied in theory, it has yet to be verified.

What is required is to understand how the process stands up in the context of a global organisation and how it applies to active projects. This will be the focus of the continuation of the research described in *Chapter 13.6: Future Work*.

13.6 Future Work

The research journey has started a process of inquiry, implementation and development that has not reached its end point. The work completed thus far is the beginning of two key areas for further investigation. These are as follows:

- I. **Implementation and testing within NCR:** Implementing and testing the proposed Participatory Action Based Strategic Design Process and ensuring its formal integration into the PLM process at NCR. This may lead to further development and refinement.
- II. **Implementation and testing outside NCR:** The author would also be keen to understand whether the process developed is applicable in a broader context. Future research may also focus on applying the process in other organisations, institutions or external projects.

13.6.1 Implementation and testing within NCR

The author aims to embed the principles and methods described in this thesis into the fabric of the Cx Design group. The elements that require focus are the application of design research methods and the implementation of the Participatory Action Based Strategic Design Process within the structure of the group and wider organisation. The author is keen to explore in greater depth how this can be achieved and participate in activities that are focused around the participatory design process with communities of consumers.

The work contained within the thesis has primarily focused around the implementation of participatory action based design research methods in the design process of projects relevant to NCR. An outcome of this was the development of a new design process suited to the development organisation. At this stage the process is a theoretical process as it is currently untested. As yet it is not fully integrated into the process of the Cx Design group, it is estimated it will take approximately six to twelve months to integrate the model fully. The author aims to take a primary role in the testing and continued development of the process; part of that will be to capture and understand the impact the process has on the design group and wider organisation. As part of that on-going exercise a breakdown of the process in relation to NCR has been started (see Figure

13.9). This breakdown defines each of the key node points and how they relate to NCR's business groups and output expectations.

As part of the implementation stages, a collaborative project with NID is a potential opportunity. NCR has been in communication with NID since initial contact was made through this research activity and India is still a key market for NCR. Collaborative projects into the potential of low-cost self-service opportunities and ways to understand the needs of the rural and urban communities are where the Participatory Action Based Strategic Design Process would be well suited.

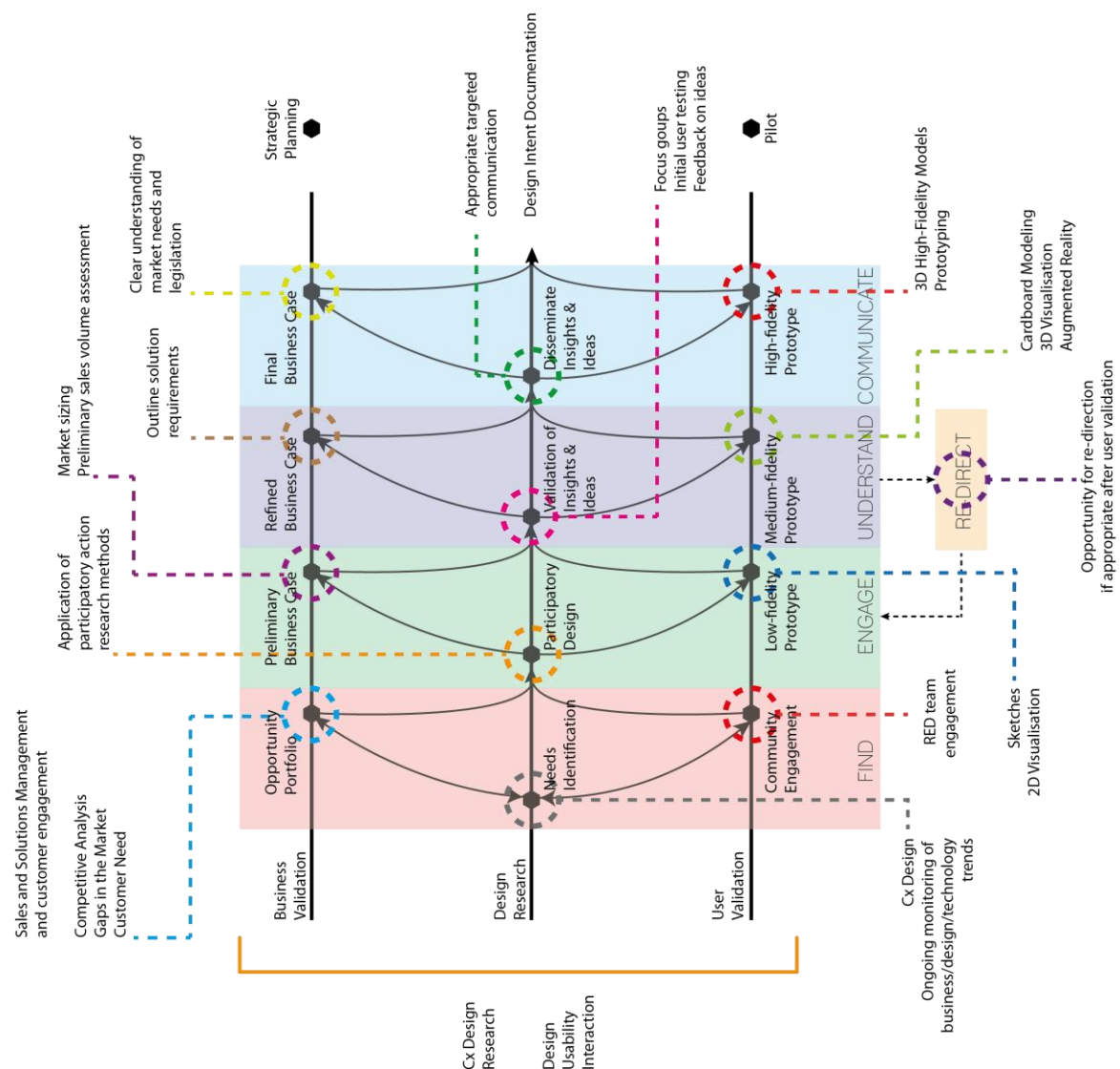


Figure 13.10: Participatory Action Based Strategic Design Process – Breakdown specific to NCR. (Graphic has been rotated by 90 degs)

13.6.2 Implementation and testing outside NCR

As mentioned in *Section 13.4 Limitations of research*, the research activity has primarily focused on activities inside or relevant to NCR. The author is keen to understand how relevant the process is outside NCR.

There have been two avenues already identified, the first being integrating the process through potential community projects with the Small Society Lab through the DCA. The DCA is a key community hub in the East of Scotland with strong links to community and industry leaders. Potential collaborative projects have already been discussed with Clive Gillman, Director of the DCA, that aim to investigate community needs and self-service opportunities; community relationships with money, banks and access to funds; and NCR's role within a community and the potential for socially-driven innovation.

The second opportunity is through the University of Dundee and applying the process within the upcoming EPSRC project Connected High Street. As NCR is a strategic partner on the project it will allow the application to be tested outside the structure and process of the organisation and also allow the insights and learning to filter back in. The Connected High Street project is an investigation into the Internet of Things on the high street.

An outcome of all the potential collaborative projects outlined in the future work will be suitable communication, dissemination and publication of the work. The work conducted through NCR will be publicised internally through customer meetings, poster displays within the building and short publications giving an overview of the activity. Wider dissemination will be through targeting relevant journals and conferences. The communication of the role design research has within the NCR Corporation will act to strengthen the perceived value of design and show NCR to be a thought leader in the industry.

13.7 Closing Remarks

The author's doctoral journey has been a long but ultimately rewarding experience. The journey started in childhood through an understanding of the author's great-grandfather's entrepreneurial character and inherent awareness of his social responsibility to his employees and larger community. The connection he had with the community and his customers is not something that is easily transferred to the dynamics, culture and infrastructure of a multinational corporation.

The research demonstrates that the Cx Design group in the NCR Corporation is uniquely placed to bring the needs of the community and consumers together with the capabilities of the organisation. The research journey is not over and the author looks forward to applying the skills and learning from the research in future commercial projects at NCR.

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