Designed From the Inside Out

Developing capacity for Social Sustainability in design through collaboration.

'Designed from the inside out'

Developing capacity for social sustainability in design through collaboration

by

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Abstract

The paradigm of design is changing. Designers now need to be equipped with the skills and knowledge that will enable them to participate in the global move towards a sustainable future. The tenets of Sustainable Development and Design: economy and environment are being dealt with extensively in both practice and theory. The social elements, unfortunately, have proven more difficult to define and implement. The challenges arise as social sustainability deals with *softer* and more complex issues as diverse and unquantifiable as ethics, values, cultural diversity, holistic perspectives, collective and personal responsibility. The competencies needed to address these '*wicked*' problems are based in the realm of Social Sustainability and require a shift in how designers are taught as students and will subsequently practice as professionals. This thesis proposes that by introducing various models of collaboration into design education the capacity for responsible design practice can be developed. Arguably, by capitalising on the process of collaboration a culture of individual and collective sharing can be encouraged leading to new knowledge and openness to multi-disciplinarity, holistic perspectives and diverse cultural backgrounds.

Across a Delphi Study and four consecutive phases of Action Research, the competencies for social sustainability in design are identified and their emergence evaluated through practical collaborative projects in an educational setting. From the panel of twenty-one design experts the Delphi Study developed a construct for social sustainability in design, as well as an initial Framework of the key competencies. These two tools were then used to underpin the planning, implementation and subsequent analysis of the four Action Research phases. The pragmatic nature of Action Research allowed for continuous iteration and development, where data gathered through each phase informed the proceeding phase so as to fix on an approach that is both realisable and realistic.

This thesis does not offer a panacea solution but rather a pathway towards achieving the necessary changes in design practice. The findings clearly show that building capacity for responsible design practice is not a simple or 'one size fits all' approach, as each individual experience is different. The construct, framework of competencies (and their interconnections) along with the guidelines for effective collaboration, provide a starting point that can be built upon, evolve and progress as the debate around sustainability becomes more clearly defined. Over time these generic design skills can be honed and refined to meet previously unmet societal challenges.

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List of Publications

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Glossary of Terms

Asynchronous Communication: Indirect communication over time where participants are in different places at different times.

Co-Located: Team members are located in the same geographical location.

Competency: The ability to do something.

Distributed: Team members are spread across two or more geographical locations.

Synchronous Communication: Direct communication where the individuals are present at the same time but in a different place.

[AI] Appreciative Inquiry

[AR] Action Research

[AR1] Action Research Phase 1

[AR2] Action Research Phase 2

[AR3] Action Research Phase 3

[AR4] Action Research Phase 4

[CT] Critical Thinking

[ESD] Education for Sustainable Development

[HU] Hogeschool Utrecht, The Netherlands

[IRL] Ireland

[IRL NL] Ireland Netherlands project

[IRL NZ] Ireland New Zealand project

[IRL US] Ireland United States project

[KRNW] Knowledge Resource Nomination Worksheet

[LSAD] Limerick School of Art and Design, Ireland

[NL] The Netherlands

[NZ] New Zealand

[R1] Delphi Study Phase 1; **[R2]** Delphi Study Phase 2; **[R3]** Delphi Study Phase 3

[S1] AR4 Pre Project Questionnaire

[S2] AR4 Post Project Questionnaire

[SS] Social Sustainability

[SD] Sustainable Development

[UL] University of Limerick

Unitec: Unitec Te Whare Wananga, Auckland, New Zealand

[US] United States of America

[VCU] Virginia Commonwealth University, United States of America

1 Introduction

This chapter introduces the thesis by providing a background context for the subject matter under research. The aims and objectives are detailed followed by the research questions that will be addressed in order to meet these objectives. Finally an outline of the thesis structure is provided through both a visual and a written overview.

1.1 BACKGROUND AND CONTEXT

1.1.1 Focus of the Research

> *'Because design is subject to modulations in the culture, such knowledge seeking must anticipate where design is going, not focus on where it has been'* (Davis 2008, p.73).

It is generally accepted that sustainability incorporates three central tenets: society, economy and environment. Addressing these in parity is where problems have arisen, as every discipline and culture comes from a very different perspective and therefore has very different priorities (Casimir and Dutilh 2003, Moore 2011). Each discipline and individual interprets the desired outcomes from their own unique perspective and to date this focus in design has been on environmental and economic factors. End of pipe solutions, energy and resource use, green materials and processes and more recently social innovations, systems design and design for behaviour change have dominated the sustainable and eco-design agendas (Chapman 2005, Sherwin 2004, Dewberry 1996, Krull 2010, Manzini 2009a). With emphasis placed on the other two tenets, confusion exists as to how social sustainability relates to designer's practices and how they should interpret and apply the complex concepts that underpin it.

The challenges and changing paradigm of design requires the re-structuring of knowledge and the acquisition of new knowledge. The role of design must change and with it the designers themselves (Cumulus 2008). It cannot continue to add to the incessant production- consumption loop without cognisance of the impact this has on the individual and society. Today, there is an increasing impetus on professional designers to practice in a responsible and 'sustainable' manner, with equal emphasis on society, economy and the environment (Fletcher and Dewberry 2002). This is an enormous challenge as the skills needed to develop sustainable and holistic solutions can be extremely complex and

'wicked'. In order to do this effectively, this thesis argues that designers need to be introduced to a set of competencies that go beyond the traditional design skills and capacities.
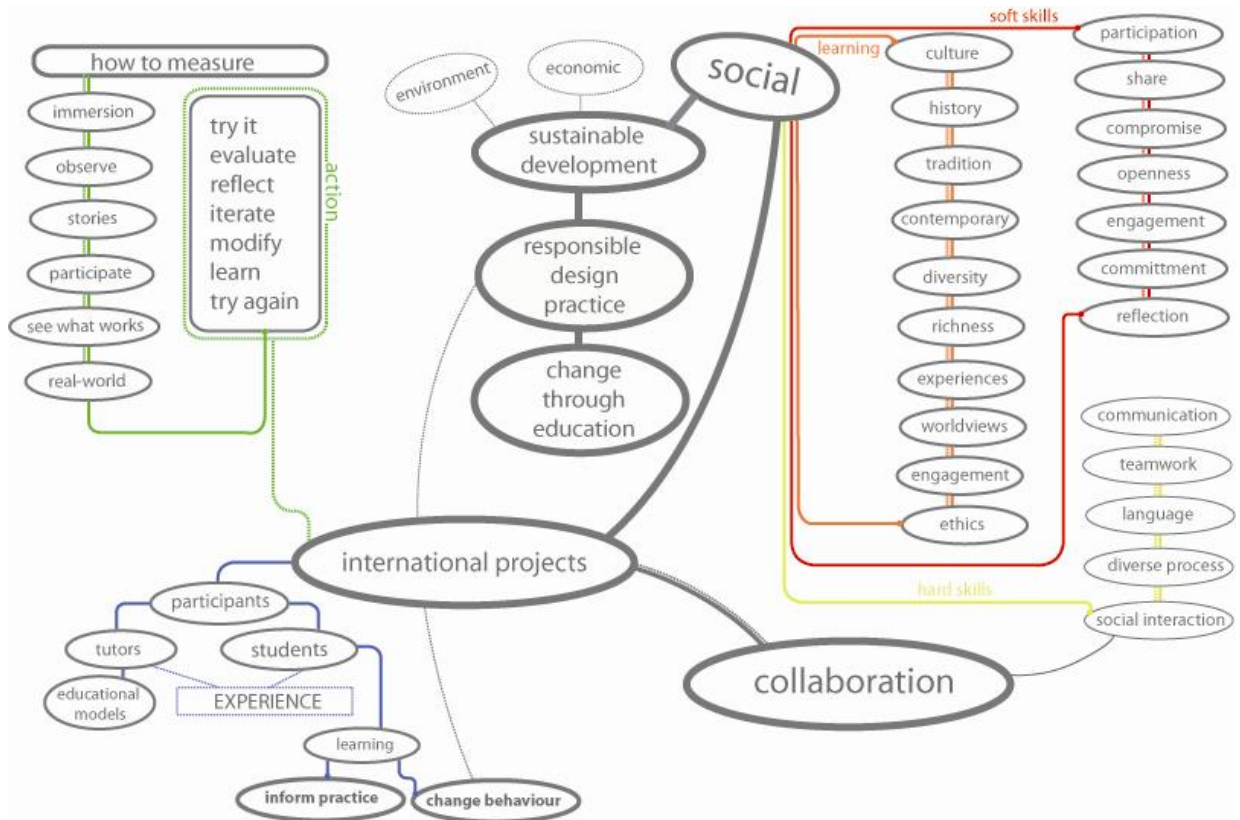
Figure 1: Research Approach

Attaining these competencies will require a shift in how designers are taught as students and subsequently practice as professionals. Yet education often fails to equip design students with these necessary skills (ibid). The key premise of the study is to investigate how social sustainability can be integrated into design[1] education, through collaboration, to encourage more responsible professional practices. The research undertaken in this thesis isn't serving to re-examine the principles of sustainable design or current strategies, but rather to look at the underpinning behaviours and capacity of designers to deal with the changes in practice required by sustainability. The work focuses on collaborative projects as a mechanism to foster the necessary competencies which facilitate designers in looking more broadly and critically at their own work and that of others. Figure 1 above illustrates the overall project map from the key aims at the centre of the diagram to the research methodology (left) for qualitative testing and analysis, and the desired skills and capacities on the right.

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[1] Design for the purposes of this thesis refers to both Product Design and Industrial Design.

Sustainability shouldn't be piecemeal or a choice, it must be an inherent consideration in design projects and not as a standalone or bolted on agenda (Fletcher and Dewberry 2002). The bolted on approach has a resultant detrimental impact on the adoption of sustainability in the greater community (Manzini 2004). The approach adopted in this thesis is to address sustainable subjects without framing them in explicitly sustainable ways. This will ultimately allow designers to build sustainability issues inherently into their project work in tandem with other more 'traditional' factors e.g. functionality, usability or manufacturing requirements.

1.1.2 Sustainable Development

Development, as it is understood to date, is about the modernisation of society in terms of economic growth, with more production leading to increased consumption and economic prosperity (Baker 2006). This linear and 'unsustainable' model of growth relies on drawing down natural resources. These natural resources are limited and these limits unfortunately are defined by the carrying capacity of our planet. It is only due to the disparate distribution of resources that we have been able to develop along Western models for so long (Meadows et al. 1972)[2].

A growing awareness of the relationship between human developmental activities and natural systems, in the early 70s, led to the term Sustainable Development [SD]. Its fundamentals lie in the desire to conserve what remains and, if possible, to reverse the bad practices we have displayed over the past two hundred years. It is an emotional subject that brings forth emphatic language and heated debates as it deals with the future of the planet. In essence what is called for is a holistic reappraisal of the present in order to create a promising future.

It is clear that Sustainable Development has become an extremely critical issue in the past decade and that it will continue to dominate well into the future. Sustainable development *'...is development that meets the needs of the present without compromising the ability of future generations to meet their own needs'* (Brundtland 1987). It is a dynamic process that, when positively spun, offers people the ability to realise their potential and partake in positive action that improves their own quality of life, and those of others, and the well-being of the planet (Forum for the Future 2009).

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[2] 80% of the world's resources are used by 20% of the global population (http://stats.oecd.org/index.aspx).

1.1.3 The Triple Bottom Line

Sustainable Development is no longer a 'fad' or fashionable theory; it is now being recognised as a valid and necessary approach to restructuring the global system in order to continue providing for human welfare. Sustainability requires a deep transformation of both production and consumption activities in terms of the Triple Bottom Line of economics, society and the environment[3] (McDonagh & Braungart in Charter and Tischner 2000).

The three tenets of Sustainable Development are difficult bedfellows. How can the economic aspects be satisfied in conjunction with environmental issues? Economics historically concerned itself with the fulfilment of human welfare. Over time, however, it 'evolved' and became a complex model built on the generation of profit and the accumulation of material goods above all else, even the interests of the community (Doutwaite 1992). Contrary to environmental beliefs, economic sustainability calls for a non-decreasing level of consumption, stable growth and development. The environment requires the opposite: a slowing down of growth and a vast decrease in our use of resources. It is extremely difficult, impossible even, to retain current rates of economic growth whilst operating within sustainable rates of natural resource use.

Conflicting opinions argue that equilibrium can never be reached between the tenets, as each pillar has a specific worldview and will negotiate the other tenets from this viewpoint (Casimir and Dutilh 2003). The compromises tend to be so great that projects conducted from a Sustainability perspective have largely been unsuccessful (Findeli 2008). This caution is worth bearing in mind but there is no denying that each pillar, is intrinsically linked to the others and a sustainable solution cannot exclude any of them (Dale and Newman 2005). Arguably, the underlying concepts of SD are so abstract and undefined that they may not be useful in any pragmatic way (Findeli 2008). The 'formula' of economics, environment and society has become so overused that no-one understands what it means, nor can experts find a consensus in these meanings (ibid). What is needed is a definite shift from the conceptual and philosophical into the practical realm where change can be demonstrated and measured. Pragmatic changes in design practices have the potential, and in some cases have been proven, to have a positive impact on the environment. Similarly, a growing awareness amongst the business community points towards the advantageous influence on markets that a 'deeper awareness & understanding of contemporary world

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[3] Or as McDonagh & Braungart term them: Equity, Ecology and Economy.

issues' can offer (Koshalek et al. 2008). However these changes must be made in parallel with social changes for the sustainability tripod to be evenly balanced.

1.1.4 Social Sustainability and Design

The emphasis in sustainability, to date, has tended to be placed on economics and environmental issues as these are tangible, measurable and in some respects the 'lowest hanging fruit' to address. First published in a 1999 OECD expert workshop, and becoming more prevalent in the contemporary SD debate, is the need to shift the balance between economics and environment to include social and human concerns (OECD 2000). Social sustainability, although not clearly defined or agreed upon, is often the place where all the indefinable elements of SD are placed. If an aspect cannot be dealt with by economic or environmental strategies it has traditionally been termed a social consideration (Findeli 2008). As a result social sustainability deals with the 'softer' or unquantifiable issues such as human behaviour, cultural diversity, ethics, values, active citizenship, participation, personal responsibility as well as holistic perspectives, human rights, equity of living standards, justice, social governance and corporate responsibility (Bramley et al. 2006). Although recognised as a difficult but necessary task, the inclusion of social aspects in any agenda leads to immeasurable elements. Social and human behaviours are intangible, unpredictable and difficult to control, ergo, difficult to change (IDEO 2008, OECD 2000). Solutions to these social and complex issues, however, always represent a trade-off between advantages and disadvantages. On the one hand, there may be resolution to certain aspects but with it comes resultant impacts on another.

These complex challenges present an opportunity for design as the solutions for sustainability must be creative and innovative if they are to generate any impact. Fortunately, design can offer this creative platform as it is the convergence of science, technology and the arts (Sotamaa 2009). It is unrealistic to assume that designers can develop and implement these solutions on their own and the importance of collaboration, social interactions, and mentoring in creative work cannot be overlooked. Collaboration in dealing with complex issues and creating solutions does so by motivating individuals, building social relationships and increasing communication (Gokhale 1995).

Collaborative work is of major importance, because with increasing complexity, groups of individuals can work together in order to accomplish problems they cannot solve on their

own (Stempfle and Badke-Schaub 2002). The potential of improved outcomes from collaborating experts and non-experts offers unique opportunities for designers to engage in the resolution of complex social sustainability problems (Johnson and Johnson 1986, Davis 2008). Multidisciplinary team-work, though well practiced in industry is much rarer in education (Simpson 2007, Davis 2008). Traditional methods of learning have focused on the individual. Newer perspectives of learning, however have recognised that learning is less a solitary act and more about the collaboration with others to pool knowledge, skills and tools (Jonassen et al. 2006). The advantage is that individuals take a more holistic approach to projects with a good understanding of other perspectives; enabling them to work effectively with broader understanding and knowledge.

1.2 AIMS AND OBJECTIVES

The aim of this research is to investigate collaborative projects as a means to support the acquisition of key competencies for social sustainability in design.

The overall aim will be fulfilled by meeting the following objectives:

1.2.1 Objectives

Objective 1: To understand the literature and current practices in the fields of *sustainable design*, *education for change* and *collaborative practice* and identify how these can   converge to develop new pathways in sustainable design practice.

Objective 2: To define what social sustainability means to Design.

Objective 3: To identify the key competencies necessary to integrate social sustainability into design practice.

Objective 4: To ascertain the success factors that contribute towards, and the complications that detract from, planning and implementing successful collaborative projects. And to what extent the collaborative model used impacts on the project experience.

Objective 5: To explore the pathways to, and barriers against, the adoption of Social Sustainability competencies into design practice.

Objective 6: To understand *how* and *when* the competencies emerge through the collaborative process.

1.2.2 Research Questions

→ What is the relationship between design, sustainability, education and collaboration? (Objective 1)

→ How can designs role in social sustainability be 'defined'? (Objective 2)

→ What are the competencies necessary for designers to practice responsible design? (Objective 3)

→ What is the link between collaboration and these competencies? (Objective 4)

→ Can collaborative projects lead to the integration of social sustainability into design practice (both student and professional)? (Objective 4)

→ How can the effectiveness of these projects be evaluated and subsequently repeated? (Objective 5)

→ What are the barriers against and pathways to the adoption of Social Sustainability competencies into design education? (Objective 5)

→ What benefit can sharing ideas, skills, experiences, history and culture across an international platform bring to building a more socially aware designer? (Objective 6)

→ How can these interactions be facilitated effectively to improve the learning on both the part of the student (participants) and the tutors (planners) involved? (Objective 6)

Thesis Structure

Background
Chapter 1

Context
Aim
Objectives
Research Q's

Research Method
Chapter 3

Qualtiative
Real-world
Pragmatic
Design-Led

Literature Review
Chapter 2

Sustainable Development
Education for Sustainable Development
What is Design
Sustainable design & the role of the designer
New design methods
Design education
Collaboration

Action Research

Delphi Study
Chapter 4

Framework

Collaboration
Interaction
Communication
Project Process
New Opportunities
Critical Thinking
Social Interaction
Project Planning
The Lighter Side
Researcher Learning

Expert panel
Capture expertise
Gain consensus

Round 1, analysis
Round 2, analysis
Round 3

Feedback
Develop construct
Develop framework

Research Cycle

Action Cycle

research cycle
action cycle

Chapter 6

Chapter 5

Phase 4

Phase 3

Phase 2

Phase 1

Planning
Background
UL & VCU
'Box Clever'

Implementation
Project Brief
Project Logistics
Participants
Project Outcomes

Evaluation
Observations
Video Recordings
Blogs [6]
Field Diary
Pre-survey [72]
Post-survey [52]
Reflection Session
Focus Groups [6]
Conversations
(tutors)

Analysis
Story building
Coding
Data analysis
Key findings
Recommendations

Planning
Background
UL & HU
'Take Flight'

Implementation
Project Brief
Project Logistics
Participants
Project Outcomes

Evaluation
Observations
Video Recordings
Blogs [6]
Field Diary
Pre-survey [72]
Post-survey [52]
Reflection Session
Focus Groups [6]
Conversations
(tutors)

Analysis
Story building
Coding
Data analysis
Key findings
Recommendations

Planning
Background
UL & LSAD
'One mans meat..'

Implementation
Project Brief
Project Logistics
Participants
Project Outcomes

Evaluation
Process:
Observations
Video Recordings
Experience:
Storytelling [26]

Analysis
Story building
Coding
Data analysis
Key findings
Recommendations
Changes

Planning
Background
IRE, NZ & CHILE
'Food for thought'

Implementation
Project Brief
Project Logistics
Participants
Project Outcomes

Evaluation
Process:
Observations
Ning
Twitter
Video Recordings
Experience:
Ning
Diaries
Pre-survey [26]
Post-survey
Interviews
(students)

Analysis
Story building
Coding
Data analysis
Key findings
Recommendations
Changes

Planning
Background
IRE & NZ
'Cultural Leanings'

Implementation
Project Brief
Project Logistics
Participants
Project Outcomes

Evaluation
Process:
Observations
Video Recordings
Experience:
Vox
Diaries
Post-survey [35]
Interviews [4]
Conversations

Analysis
Story building
Coding
Data analysis
Key findings
Recommendations
Changes

Evaluation

Qualitative
Quantiative

Quantitative
Analyse data
- Delphi
- Survey
[P1,P2,P3,P4]

Qualitative
Use framework to analyse
Coding
- Project Process
- Reflection Sessions
- Focus Groups

Discussion
Chapter 7

Key results
Experience
Planner
Participant
Construct
Action Research
Implementation

Conclusion
Chapter 8

Meeting of aims
New Knowledge
Limitations
Lessons learned
Future work

Figure 2: Overall thesis structure (See Appendix A for larger copy)

1.3 THESIS STRUCTURE

The thesis comprises seven chapters in addition to this one. Figure 2 provides a visual map of the project structure, outlining the connections between each chapter and the flow progression from one to the next. The content of each chapter is described briefly below:

→ Chapter 2

Chapter 2 provides the background information on sustainable design, education for change and collaboration. The chapter begins by discussing education for change and what approaches to teaching and learning best support the attainment of sustainability. The second section deals with current practices in design and identifies the direction in which sustainable design is moving. The barriers and enablers to collaboration are outlined and a preliminary list of the core competencies for social sustainability is extracted from the literature. The final section distils the gaps in literature, in order to place work that follows within the context of current literature and practice.

→ Chapter 3

This chapter details the methodological structure of the research project. It explains why Action Research was chosen as the overarching research strategy and outlines the methods employed to develop and implement the primary research phases. The chapter continues to describe the data gathering and analysis methods used in the Delphi and the four phases of Action Research. The chapter concludes by explaining how validity, reliability and reflexivity are dealt with in order to ensure a robust approach to the primary research.

→ Chapter 4

Chapter 4 outlines the details of the planning, implementation and analysis of a Delphi Study comprising a panel of 21 international experts. These experts undertook three rounds of questionnaires, after which the results were collated in an effort to arrive at a consensual construct for what social sustainability means to design and what core competencies designers needed to address the challenges it presents. A framework was constructed from their responses, this offers a 'list' of 23 competencies and their definitions in relation to design practice.

→ Chapter 5

The first three phases of Action Research comprise Chapter 5. Following the ITDEM (Identify, Think, Do, Evaluate and Modify) model, a brief description of each AR project is provided. Both AR1 and AR2 involved distributed projects between product design students located in Ireland and New Zealand, while AR3 was a trans-disciplinary co-located project with product design and sculpture/ combined media students. The three projects are analysed in tandem and the evaluations discussed in an effort to identify the optimum conditions for effective collaborations.

→ Chapter 6

Chapter 6 focuses on the final phase in the AR cycle by detailing two parallel projects between The Netherlands and Ireland; and The USA and Ireland. The development and implementation of both projects is followed by the evaluation stage, where the teams' experiences are mapped along three intersecting paths: Communication, Interaction and Critical Thinking. Critical junctions along these paths are highlighted to identify how the competencies, derived in Chapter 4, did or did not emerge through the project process.

→ Chapter 7

Chapter 7 extracts the key findings across all of the primary research. A discussion follows on how these points of interest argue with or against current literature and practice to highlight the unique contribution of this research.

→ Chapter 8

In conclusion, Chapter 8 presents the overall thesis conclusions. The chapter sections that follow describe how the aims and objectives outlined above were fulfilled and pinpoint the contribution to knowledge this thesis purports. The chapter closes by explaining the limitations that impacted on the research and details how the work could be built upon in future projects.

2 Literature Review

This chapter engages the literature across a wide variety of fields and draws them together into a comprehensive framework that builds knowledge in the area of Social Sustainability in Design. The first section describes Sustainable Development [SD] as the overarching context in which this project is placed. The literature review then drills down into the educational theory behind SD and design. It continues by defining the notion of what design is (in a contemporary context) and its progression in a more sustainable direction-highlighting the need for deeper integration of social principles. A critical overview of the literature on collaboration is reviewed in order to identify barriers and enablers towards its effective implementation. By extracting the key literature findings the final section of the chapter offers a tentative list of the key competencies for social sustainability in design. The chapter concludes by identifying the gaps in current literature and practice that the subsequent chapters will address.

2.1 INTRODUCTION

Literature on the stance of design within the Sustainable Development agenda has been gaining prominence in recent years. The majority of the literature, however, deals more comprehensively with environmental and economic factors than with social issues. This leaves designers in a vacuum as to how they can adjust their practice to begin to address the complex issues surrounding social sustainability. Social problems by their very nature are complicated and 'wicked'[4]. They represent an additional layer of complexity in the design process that cannot be dealt with by individual designers. With these impending changes in the design process, a shift is required in the focus of design education onto a set of skills and competencies that allow designers to pragmatically address these complex issues.

In order to bring about change in the design approach it is first necessary to have a deep understanding of current practice and future directions across all of the key topic areas. The literature review aimed to discover the pre-defined knowledge, methodologies and techniques in the areas of Teaching and Learning for change; Design and Collaboration. This served to identify the most appropriate approaches being used, both directly in design and elsewhere in related fields, from which lessons and inspiration can be drawn. The review

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[4] Wicked problems will be dealt with further in Section 2.3.4.

also identified gaps in the literature that the subsequent primary research aimed to address.

2.2 SCOPE AND DIRECTION

The initial reading in the area covered a broad range of literature on the subjects of design, Sustainable Development [SD] and Sustainable Design, Education for Sustainable Development [ESD] and Collaborative practice. A number of initial questions were devised to help navigate through the literature, refining and capturing the most relevant theories and knowledge.

→ What is current practice in Education for Sustainable Development? What are the current best practices in *teaching* and *learning* for change?

→ Which of these practices are the best fit approaches to integrate social sustainability fully into design practice?

→ How does Social Sustainability fit into the Sustainable Design paradigm?

→ What are the barriers from and enablers to effective collaborative work in education and beyond?

The scope of the review was then narrowed and focused onto the key sub topics of:

→ Teaching and Learning for change

→ Education for Sustainable Development

→ Education for Critical Thinking

→ Collaborative Practice.

→ Sustainable Design Practice and the Role of the Designer

→ Social Sustainability in the context of Sustainable Design

The diagram (Figure 3) below provides a visual representation of the areas explored during the literature review. Core topics appear at the centre of the map, with related areas branching out in order of importance and relevance.
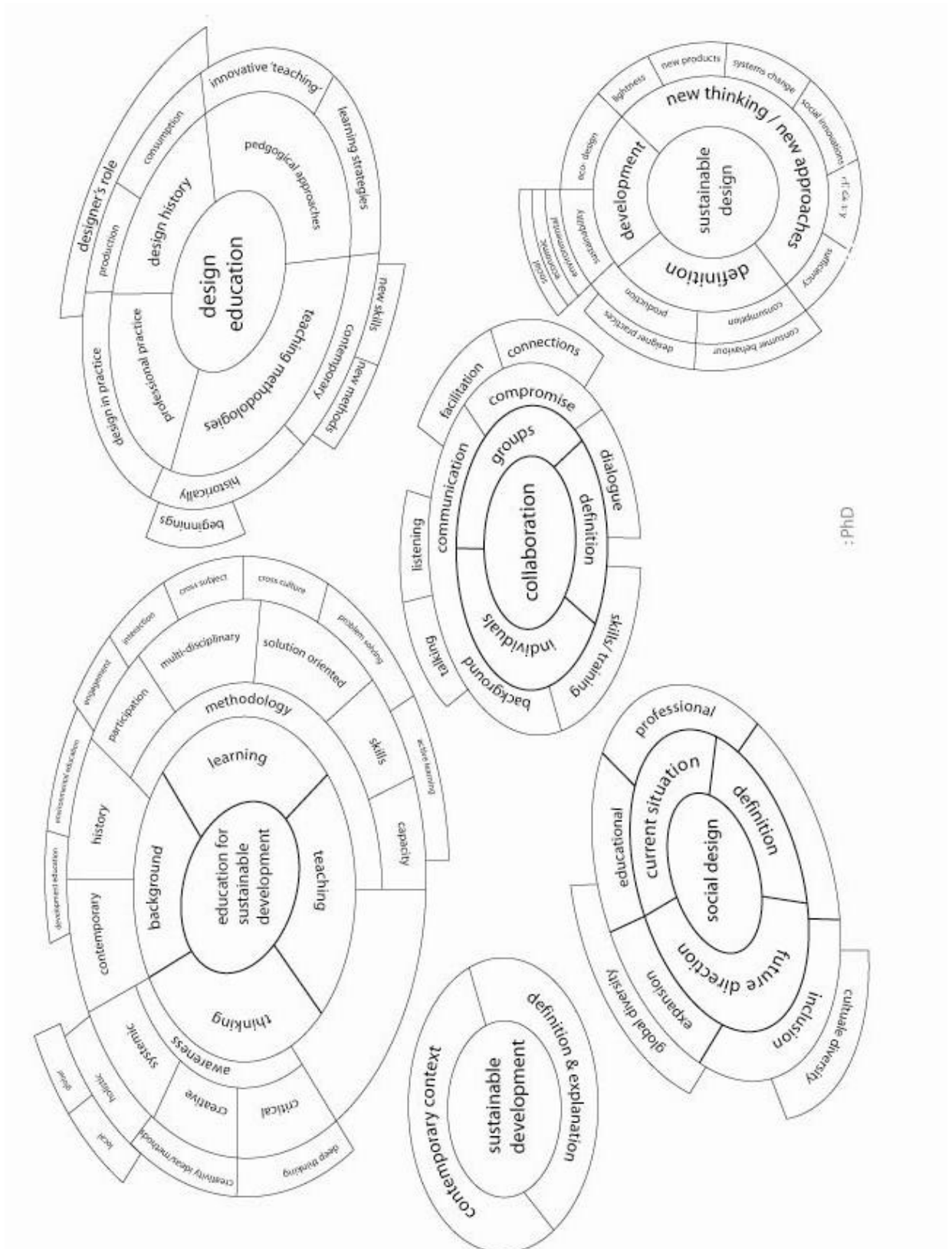
Figure 3: Literature Review Map

2.3 EDUCATION FOR CHANGE

> *'The key to creating a more sustainable and peaceable world is learning'* (Sterling 2001, p.12)

The purpose of the following section is to situate this study in the context of the body of literature on teaching and learning for change and Education for Sustainable Development [ESD]. By examining the teaching and learning strategies employed in ESD and other non-traditional educational paradigms we can identify the most appropriate theories and approaches that could be transferred into Sustainable Design education.

2.3.1 Engaging People in Sustainability

Sustainable Development is such a difficult and undefined subject that a challenge emerges when asked to educate for it (Steiner and Posch 2006, Mochizuki and Fadeeva 2012). As a result students often struggle with marrying the complicated, contradictory and all too often confusing concepts that underpin it (Casimir and Dutilh 2003, Moore 2011, Steiner and Posch 2006). Education and Sustainability are inextricably linked as it is seen as the key to effectively implement change (McKeown 2002). The complex real world issues raised by Sustainability highlight the need for innovative dynamic educational approaches that facilitate real cross-disciplinary thinking (Warburton 2003, Steiner and Laws 2006, President's Council on Sustainable Development 1995).

Education is critical in promoting SD and in capacity building, so people can address environmental, economic and social issues effectively (UN 2005, UNESCO 2004, Tilbury and Wortman 2004). This poses a challenge for education and suggests the development of new approaches; approaches that engage learners to look at a wide variety of possible futures and decide for themselves on which one they choose to work towards (Tilbury and Wortman 2004). Education for Sustainable Development offers one such pathway as it is based on the values and principles that underpin SD (Mochizuki and Fadeeva 2012). It allows for the diversity of ideas surrounding SD to be presented to learners and in turn learners are given the opportunity and resources to reflect and act on these meanings in informed ways (Huckle and Sterling 1996). Firstly however, the meaning of SD must be clarified so students are given a methodology for drawing the complex strands together in a way that is meaningful and relevant for them (Ibid).

2.3.2 Education for Sustainable Development

Education for Sustainable Development [ESD] fundamentally calls for a change in the way we educate (teaching methodologies); what we teach (curriculum and subject matter) and why we do it (outcomes) (Bhamra and Dewberry 2007, Tilbury and Wortman 2004). It also aims to challenge the accepted norms and push the boundaries of educational practices. ESD concerns itself with the understanding and addressing of Sustainability issues as they affect individuals, local communities and nations. The United Nations Decade of Education for Sustainable Development [UNDESD], from 2005-2014, asks for a re-assessment of current educational strategies towards a more holistic and inclusive approach. Some of the decade's primary goals are to facilitate networking and collaboration amongst the stakeholders in ESD as well as increasing provision, for both teachers and learners, of the space and opportunity for disseminating and translating the complex issues into reality (UNESCO 2004).

ESD differs from traditional education in that it promotes interdisciplinary approaches, urging 'students' to gain a holistic perspective in understanding and resolving both global and local issues. Breaking away from subject based learning and into a realm where critical thinking, participatory and multi-method approaches are encouraged to solve problems on a more local level (UNESCO 2009). Not only do students of ESD need to display skills in *'foresighted thinking; cosmopolitan perception; trans-cultural understanding and co-operation'* they also need to be empathetic, self-motivating as well as being capable of motivating and engaging others (Barth et al. 2007, p.418). Education must not be about mastering specific subjects but instead about mastering one's self. And it is how we employ this knowledge where the transformations occur (Orr 1994). Perhaps Orr's most pertinent point is that we cannot fully say we know a subject until we understand the impact it has on all people and every facet of society (ibid). This confirms the need for a holistic approach to the way we educate and questions the focus on discipline specific teaching methods.

2.3.3 ESD in Higher Level Education

> *'Educating for sustainability will enable the dynamic building of the intellectual capacity which will carry us toward the fulfilment of our highest aspirations'*
> (Espinosa & Perrault in President's Council on Sustainable Development 1995, p.1)

There have been a myriad of national and international strategies outlining the need for ESD to become mainstream in both formal and informal education. Since the first of its kind in Stockholm in 1972 (UNESCO 1972), to the latest strategies compiled as part of the UNDESD. The emphasis of all of them has been on holistic education, capacity building, raising awareness and changing attitudes (Wright 2002, Thomas 2004, UN 2005, The Development Education & Research Network 2007).

As Moore (2005b) observes, universities have the potential to become leaders in research in the formal (and the informal) field of ESD as they are places where concepts are challenged, new ideas are generated and people have the freedom to express, question and develop . Universities *'bear a profound moral responsibility to increase the awareness, knowledge, skills and values to create a just and sustainable future'* (Cortese 2003, p.17). They are also the meeting point of people, research and teaching and can drive both the development and implementation of ESD principles that engage not just campus communities but the wider community as well (Moore 2005b, Wals and Jickling 2002).

Many educators are at odds with each other as to how to effectively implement ESD. Opinions diverge from arguments on stand-alone courses (Kliucininkas 2001), to others for embedding SD inherently into all third level programs (Jucker 2001) while the most radical re-builds the entire curriculum with SD underpinning it (Mulder et al. 2012). ESD and the complex nature of the SD challenges require a joined-up approach with collaboration and it is essential that there is cooperation between disciplines. Unfortunately this is often difficult as higher level institutions have become more 'silo' driven with the organisations divided into highly specialised areas of knowledge and research (Thomas 2004, Cortese 2003, Moore 2005a). Individual agendas must be abandoned and replaced by a holistic awareness and critical questioning of current information streams (Tilbury and Wortman 2004). This is often a difficult issue to overcome as universities have a tradition of individual expertise competing for incentives, thus discouraging interaction and interdisciplinary work (Cortese 2003). Slowly, fortunately, universities are recognising the benefits to be gained from combining expertise and courses are beginning to emerge in both tertiary and fourth level education, that capitalise on the collective knowledge of diverse disciplines (British Council 2010). This approach not only exposes students to a broad range of opinions and expertise, it also encourages dialogue amongst faculties.

ESD is being explored across different disciplines in universities around the world. These projects have been explained by numerous writers and span across all fields, from

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Environmental Management Graduate students and Business undergraduates in Ontario Canada (Dale and Newman 2005) and post/under graduate Humanities initiatives in the University of South Pacific (Thaman 2002) to the School of Social Science and Planning in Melbourne, Australia (Thomas 2004). However, all the projects outlined, are discipline specific or are limited trans-disciplinary projects and don't appear to have been adopted as standard practice within their universities as a whole. Thomas (2004) argues that graduates are only becoming experts and literate in Sustainability through specific programmes such as environmental science, engineering or environmental studies and not across the broad base of tertiary education as is the desired outcome of ESD.

Unless the principles of SD are adopted uniformly across entire institutions then the efforts are not holistic and tend to become piecemeal and abstract. Universities' reluctance to adopt SD principles can be attributed to a number of factors, amongst them the lack of resources and personnel to deal with the issues along with the feeling that it is too broad, ambiguous and non-scientific an area (Filho 2000, Thomas 2004). When discussing the reasons for why ESD might fail it is important to note that a certain amount of responsibility rests on the shoulders of both teachers and learners as well as on the larger organisation. A lack of individual willingness, awareness/understanding and ability have been cited as reasons why students fail to contribute to sustainable development (Lidgren et al. 2006).

As with the entire Sustainability debate it is apparent that what educators of ESD struggle with is the holistic nature of the subject and often find the focus of their projects becoming environmental with little or no formal mention of social considerations (Ali Khan 1998). The agenda is always tilting in favour of environment (and to a lesser extent economics) because the cause and effects are more apparent and measurable (Thomas 2004, Ali Khan 1998, Huckle and Sterling 1996, Tilbury and Wortman 2004). With little mention of social impacts there is clearly a need to address these issues and integrate them seamlessly into both formal and informal educational strategies (Tilbury and Wortman 2004).

2.3.4 Implementing ESD

> *'The first object of any act of learning, over and beyond the pleasure it may give, is that it should serve us in the future. Learning should not only take us somewhere; it should allow us to go further more easily'* (Bruner 1969, p.17).

Mastering the complexities of SD will require a re-orientation of education towards more cross-disciplinary, learner-centred, open and flexible structures that takes cognisance of the

evolving nature of sustainability (Lidgren et al. 2006, Mochizuki and Fadeeva 2012, Barth et al. 2007). When bringing about changes in educational strategies it is important that there is clarity as to what skills students and educators are expected to master and the competencies that they are to acquire. These competencies arguably cannot be taught but should be the end result of students participating in learning experiences and are essentially the *'ability to do something'* (Mochizuki and Fadeeva 2012, Barth et al. 2007).

For students to engage with the complex issues of SD they will need to be equipped with a set of competencies that build on the pre-requisite ability to analyse, plan and make decisions (Steiner and Posch 2006). These higher order competencies include adaptability, creativity, communication skills, openness, critical thinking ability[5] and social competencies (ibid). The intention of these competencies is that students can not only acquire and create knowledge but also understand the *why* and *to what end* their actions will impact on the local and global communities (Tilbury and Wortman 2004, Barth et al. 2007). As such we can further explain the remit of ESD as a system where critical analysis, reflection, action, empowerment and transformation drive the process through which knowledge is acquired and implemented (Gyoh 2008, Secretariat of University Presidents for a Sustainable Future 1995). All of these competencies married with the capacity for empathy and the ability to become a pragmatic and action-oriented person, can lead to the effective realisation of sustainable development outcomes (Tormey 2002).

According to ESD principles the most effective learning is when the process is stressed as highly as the outcomes. University courses with direct links to the external society encourage the necessary interaction, deeper understanding and 'real world' learning (Orr 1994, Warburton 2003, Sterling 2001). The approaches to teaching and learning that facilitate the acquisition of these competencies must empower learners by encouraging participatory learning and forward thinking all the while maximising individual development (Mochizuki and Fadeeva 2012).

In addition to being one of our greatest resources, Schumacher warned, that education could be a destructive force unless it clarified *'our central convictions'* (Schumacher cited in Sterling 2001). For education to be effective it must break down barriers between 'teacher'

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[5] Critical thinking is discussed further in section 2.3.6.2 below

and 'student', by offering dialogue as a means to facilitate the shift from transmissive[6] to transformative education (Freire 1973).

2.3.5 Learning strategies

Given the challenge of ESD and the goal of developing a rounded individual capable of dealing with complexity and change, we need to identify how acquiring these competencies can be realised through design. By exploring a range of learning strategies we can assess what type of approach may be a best fit for sustainability within the context of design education. Learning occurs at every stage in our lives, from the incidental learning through simple daily tasks, to the more formal learning in simulated situations of school and then on to higher education (Smith 1997, Browne and Keeley 2001). Learning is dependent on learning environments as well as a student's pre-disposition to specific learning styles.

Sterling (amongst others) calls for the employment of non-traditional learning strategies to bring about a transition from a culturally stymied system towards an educational paradigm that is meaningful, far-reaching and progressive. In essence an adaptive and flexible process more open to change and development (Sterling 2001). The most relevant of these non-traditional methods are deep learning, transformative learning, experiential learning, mastery and discovery learning. Researchers have found these methods engage the learner on a personal level and result in deep level change in attitudes, knowledge and cognitive ability particularly suited to SD issues. Amongst these are critical thinking, creative thinking and holistic thinking (Sipos et al. 2008).

The literature deals comprehensively with learning styles and strategies and the key characteristics of the most relevant methods are described in the sections and Table 1 below.

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[6] Transmissive Learning is about transferring information from teacher to learner in a one-way dialogue. This didactic model does little to encourage deep thinking or critical reflection, but instead focuses on imparting large volumes of information. Instruction and teaching form the basis of this approach. It is more focused on the accumulation of knowledge than the processing and analysis, as the knowledge is seen as a fixed entity rather than a process. This format whilst it may seem to be an inappropriate way to teach learners the skills of learning is the most common form of education practised in third level- Miller, J. P. (2001) *The Holistic Curriculum,* Ontario: OISE Press.

Table 1: Learning Models

Learning Model	Key Characteristics	Learner Impact
Discovery Learning	Self-directed Independent Learning Engagement Problem Solving Generate interest	Excitement Confidence Responsibility Independence Engagement
Mastery Learning	Guided Experience Skills Acquisition Knowledge transfer	Learn skills Acquire Knowledge Individual Growth Incremental Learning
Experiential Learning	Immediate Creative Pragmatic Emotive Reactionary Contextual	Learn by doing First-hand experience
Transformative Learning	Critical Reflection Iterative process Question Values Paradigm Change Reflective Decision-making	Profound Changes Question beliefs & assumptions Reflection Comfortable with change
Deep Learning	Independent Learning Personal development Problem based Learning by doing Metacognition	Personal Motivation Engagement Holistic awareness Reflection Understanding

2.3.5.1 Discovery Learning

Discovery learning [DL] involves the grasping of general principles. It covers the development of an attitude toward learning and enquiry that leads to the possibility of solving problems on one's own (Bruner 1969). The key aim of DL is to foster a sense of excitement about self-direction and an aptitude for independent learning; to spark a personal engagement and interest in students by exposing them to the wider world.

Discovery is driven by self-directed learning with the 'teacher' merely acting as facilitator (Christensen and Kirketerp 2008). This advocates an aptitude for self-reliance, allowing learners to shape their own experience (Barth et al. 2007).

2.3.5.2 Mastery Learning

A mastery experience comes from incrementally making a task more difficult. This is controlled by the 'teacher'. Through evaluation and reflection (between the tutor and the learner), the positive and negative aspects of the learning experience can be highlighted. Ideally at the end of any educational process learners should have had many mastery experiences (Christensen and Kirketerp 2008). The fundamental difference between Mastery and Discovery learning is that in a mastery environment individual responsibility and participation, on the part of the student, is encouraged but the control over content and delivery methods lies with the teacher.

2.3.5.3 Experiential Learning

Experiential Learning is learning through primary experience or 'learning by doing' (Kolb 1984). Here learners experience first-hand the events, carry out actions based on them and see the immediate impact of their actions. The application of knowledge, skills, and feelings are both immediate and relevant (Mellick Lopes and Shumack 2012). By being there and experiencing the event learners are given the opportunity to grasp abstract concepts and apply knowledge in real and tangible ways (Baker et al. 2002).

2.3.5.4 Transformative Learning

Transformative learning is defined as the learning process where students begin to question practices and as a result analyse and develop their own perspectives (Warburton 2003). Critical reflection, open ended enquiry, iterative learning, reflection and capacity building are all necessary capacities for transformative learning.

Encouraging this type of learning is a difficult task because it's essentially deprogramming and introducing learners to a completely new paradigm. An essential part of the process asks individuals to critically reflect on their assumptions, beliefs and values. A change then occurs in their frames of reference. By critically reflecting on their assumptions and beliefs, learners consciously create new definitions for their worlds. The ultimate aim with this learning model is to bring about meaningful and profound change in learners lives (Sipos et al. 2008).

2.3.5.5 Deep Learning

Deep learning is about *'the ability to organise and structure different types of information into a coherent whole'* (Warburton 2003, p.45). Common approaches include: Independent learning; personal development; problem-based (rather than puzzle-solving) learning; reflection; independent group-work; learning by doing; developing the necessary range of learning skills; project work; understanding thoroughly enough and having sufficient commitment to teach others (Ali Khan 1998). And, as with discovery learning students are encouraged to take responsibility for their own learning. More and more (even in higher education) we are seeing a tendency towards a 'spoon-fed' or transmissive approach. Deep thinking allows for the links between complex and contradictory elements to be made (Warburton 2003). It also requires the thinker to be capable of organising and structuring disparate types of information into 'a coherent whole' (ibid)

Deep Learning involves paying attention to underlying meaning (Metacognition). It should be personally motivated to ensure true 'buy-in' from students. The onus is on educators to provide a suitable environment for students to become personally engaged in the learning experience (Warburton 2003).

The heuristic learning models described above encourage students to actively experiment with and discover a wide breadth of information, analyse it, reflect upon it and develop independent opinions and perspectives. The focus of the models is clearly on the learner taking responsibility for their own learning with the 'teacher' adopting roles of varying depth and 'intrusion'. One thing is clear, that within the variety of learning models is the need to be flexible, as different models are relevant in different times in a student's journey in both the short and long term.

Many authors recommend mixing models so as to develop a generic set of skills and competencies that facilitate students in understanding, managing and questioning knowledge and then implementing change and effecting action (McKeown 2002, Sterling 2001, González-Gaudiano 2005). This is a difficult task not only because of the depth and complexity of the information to be synthesised but also because students often do not have the capacity to deal with the contradictory opinions in a critical manner (Wiek et al. 2011). Through critical and creative thinking learners are encouraged to ask deeper questions and in answering them can begin to understand the diverse opinions and perspectives that exist on sustainability (Tilbury and Wortman 2004).

2.3.6 Thinking Styles

2.3.6.1 Critical Thinking

Critical thinking [CT] is appropriate when people are faced with complicated, ill-defined issues (Halpern 1998). It can be simply defined as the higher level merging of *'reason and intuition'* where the emphasis is on the quality of thinking in a formal manner (Miller 2001, Tilbury and Wortman 2004, Halpern 1998). CT explains how our experiences are shaped by our beliefs, values and culture and that there are a myriad of different perspectives and opinions on any given issue or problem. It is in the ability to take these diverse and often opposing perspectives and objectively form an individual opinion that the key to critical thinking lies. The ideal critical thinker is an individual who is '*inquisitive, fair-minded, flexible, diligent, and focused in inquiry'* (Giancarlo and Facione 2001, p.31). Facione goes on to explain the core skills of an effective critical thinker (Figure 4): Analysis; Inference; Evaluation and Interpretation along with Explanation and Self- Regulation (Facione 2009).

Analysis
To identify the relationships among a variety of statements, opinions, descriptions etc.

Inference
To identify & draw diverse elements together to extract reasonable conclusions, to form hypotheses & conjectures

Interpretation
To comprehend & express the meaning or significance of a wide variety of experiences / opinions/beliefs

Explanation
The ability to explain thoughts to others as well as how these ideas were arrived upon

Self-Regulation
To apply the thinking to themselves & improve on previous opinions

Evaluation
To assess the credibility/ logical strength of statements of people's beliefs or opinions

Figure 4:The Skills of Critical Thinkers (Facione 2009)

Education for CT therefore requires a move away from the 'spoon-fed' approach to a situation where learners are encouraged to take responsibility for, and constantly question, their own work and that of others. Here learners don't assume understanding of situations but objectively take information generated by observations, experience, reflection, reasoning and actively question, argue, provoke, and act (Facione 2009). CT is about the ability to cognitively analyse information, decide on its relationships with other ideas, assess the credibility of these relationships and to form hypotheses based on the

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information. And then to go further and clearly explain these ideas to others whilst also having the ability to apply the critical thinking process to one's own ideas so that they may positively change and adapt (ibid). Arguably the best location for this type of independent discovery learning is outside of the formal academic setting. Where this isn't possible introducing real-world issues in an atmosphere of multi-directional learning and openness (between learner and 'teacher'), will develop skills that are transferrable beyond formal learning environments (Halpern 1998, Brookfield 1987).

Brookefield (2001) outlines the characteristics of Critical Thinking as: a productive and positive experience; it is process-oriented and not concerned with the outcome; it is context driven and will vary according to the situation; both positive and negative experiences go towards shaping the thinkers perspective because it is both emotive and rational. Critical thinking is a catalyst for change because it asks us to questions ourselves, our opinions and those of others (Barratt 2009). The key characteristics of effective CT are outlined below in Table 2.

Table 2: The key skills of Critical thinking (Kolb 1984, Cottrell 2005, Ali Khan 1998, Giancarlo and Facione 2001).

The key skills of Critical thinking
Evaluate the information in a meaningful way.
Make critical judgements.
Analyse differing and opposing arguments.
Challenge assumptions and preconceived ideas (both personal and those of others).
The ability to imagine and explore alternative ways of doing things.
Reflecting on the issues drawn out from the conflicting perspectives.
Ability to present the viewpoint to others in a coherent and logical manner.

Perhaps the key relevant point of CT is that it allows for the inclusion of values based problems that are not resolvable by scientific methods. As such it is a logical vehicle by which to deal with Social Sustainability issues. In doing so, critical thinking provides new inspiration for contributing to change for sustainability in preventative not just palliative ways (Tilbury and Wortman 2004). According to Facione (2009) Critical Thinking must have a point. It has to be grounded in pragmatism otherwise it has no value. This is essential for ESD as it has to result in practical and relevant outcomes.

2.3.6.2 Creative Thinking

Unlike Critical thinking Creative thinking comes from a more positive place. Although it can be difficult to define Creative Thinking is the ability to *'imagine or create something new'*

and can be seen as a pattern of cognition rather than a specific cognitive process (Smith 1992, Harris 2012). Creative thinking can be either *problem solving* or *solution oriented*. The difference between the two approaches is that problem solving is focused on problems where-as, solution oriented is fixed on a finding a feasible solution. Solution oriented results in goals and solutions rather than exploring and analysing existing problems. It widens the breadth of opportunity by not only being problem focused, thus becoming inclusive and positive. Both approaches however, provide learners with the skills to apply knowledge across a variety of sometimes unpredictable situations (Jucker 2001).

Creative thinking requires a move from a problem-centred to a vision-directed approach, from a short-term to a long term time frame-looking beyond the now and into scenarios that don't exist yet. It calls for more than one answer to any issue (Robinson 2010). The move from a problem solving to a solution-oriented approach demands that the focus be on the process and not on the outcomes (Ibid). If learners can understand the process and apply it across a wide variety of projects then they are prepared for unpredictability and can accommodate scenarios that may be unconventional (Robinson 2010). Through creative thinking learners have the ability to manage change and challenge conventions, skills that will prove essential in our ever changing society.

2.3.6.3 Holistic Thinking

In order to deal with the conflicting issues related to SD and encourage balance, and connection a holistic approach must be adopted (Miller 2001). Holistic education is intrinsically linked to Systems Thinking where the emphasis is on the entire system instead of individual units. Not only does it focus on the bigger picture and this allows us to begin to solve complex issues such as those offered by SD, it also facilitates a joined up approach, participatory partnerships and inter-disciplinarity (Sterling 2004).

Holistic thinking requires a focus on the arrangement of elements that creates the whole and on the interplay between them. Systems only function correctly when all elements are in place (O'Connor and McDermott 1997). Education for holistic thinking, in turn, calls for learners to approach issues from a systems perspective, to find the links between elements (and stakeholders) and to understand the consequences of actions and reactions. It is essential that learners are made aware of the system in which they reside and that the actions carried out by the stakeholders have causes and effects on the entire system (Thaman 2002). This type of perspective can be difficult to grasp and thus an ability to look

at an issue from a variety of perspectives, analyse it, and form a coherent argument (as advocated by critical thinking) is necessary (Kolb 1984).

2.3.7 Decision – Making & Reflection

Within Critical, Creative and Holistic thinking certain competencies emerge as essential. These are *decision-making* and *reflection*. Decision-making is the capacity to move from awareness to knowledge to action (McKeown 2002). The key is in knowing when to transition from one stage to another within any project. There is no denying that learners must know when to progress within any project. But these decisions are not made arbitrarily. It is through a process of iteration and continuous improvement that the right decision is reached. Reflection is required at every stage to ensure the decision is the best at a specific time given the specific influences and stakeholder requirements. Good decision-making leads directly back to critical thinking. If learners are required to make decisions they should be presented with the broadest and deepest scope of information available (however conflicting), so the decisions come from a well-informed position (Shapiro and Stefkovich 2001).

Knowing that we don't always have to choose is an often forgotten element of decision-making. At times the best ideas present themselves or there is the opportunity for more than one direction to be pursued (Designerinnen 2006). Decision-making skills connect directly to compromise and the ability for partaking in dialogue. Compromise can be constructive and can demonstrate to individuals that their individual preferences (or needs) can be replaced with something equally as valuable (Shapiro and Stefkovich 2001).

2.3.8 Conclusion

All the literature concurs on the point that education plays a pivotal role in realising change towards a more sustainable future. ESD in principle offers the ideal model for curriculum development that encourages learners to engage deeply with the principles and values of sustainability. Similarly engaging with Sustainability encourages *'critical and creative thinking, problem-solving, effective decision-making and conflict resolution'* (Warburton 2003, p.48). Drawing parallels between the literature on learning styles and ESD the most general recommendations seem to be that open, flexible teaching and learning styles that

cultivate independent learning and engagement, are best suited to introducing the principles of sustainable development (ibid). The competencies and skills they acquire from these learning experiences can then be applied in professional practice. These competencies however must go further than traditional educational competencies by encouraging the learner to engage with diverse, complex and often contradictory perspectives in order to resolve the complex issues presented by social sustainability (Wiek et al. 2011).

2.4 DESIGN & THE ROLE OF THE DESIGNER

> *'There are an unlimited number of ways of thinking and perceiving. In my understanding, to design is to intentionally apply to ordinary objects, phenomena and communication the essence of these innumerable ways of thinking and perceiving'* (Hara 2009, p.IV).

Historically design has been seen as the practice of giving form to consumer objects. But this is no longer true as design is a growing discipline in a constant state of flux as it comes under the influence of current social, political, economic and environmental concerns (O Murchu 2012). The following section discusses the contemporary understanding of designer practices as it attempts to ground sustainability within the context of current and future directions in design.

2.4.1 The origins of Product Design: A very brief history

The Industrial Revolution gave wide scale visibility to design. The early 20th century gave it a title and a direction. But the origins of design go back to the beginnings of man as they worked to put a form on natural objects in order to bend them to their will (Potter 1980, Hara 2009, Heskett 1985). In the early 20th century designers worked to make the harsh aesthetic of the Industrial Revolution a more palatable experience, whilst the mid-20th century saw designers employ their skills to push mass consumption and stimulate economies. With the advent of the information age, design emerged as a way to make the technological experience a simple, exciting and usable one (Heapy 2010).

So why do we design? One theory is that design allows us to process and change our surroundings (Friedman 2003). Change, in turn, encourages us to design because we need to shape our lives in order to understand and utilise the changes that occur. Design can

also be viewed as a specific attitude to creating and putting an intentional form on to something that didn't previously exist (Fallman 2003). We design to survive, to improve, to develop, to thrive, to evolve, to serve others, to make something of lasting quality and to create something of real consequence (Nelson and Stolterman 2003). All 'men' are designers as they intuitively organise, plan and put meaning on their surroundings (Papanek 1972 (2000)).

Another perspective, especially in more 'developed' countries, is that humans design to control nature through our intellectual endeavours, whereas we should be allowing nature to direct and lead us (Hara 2009). Today, unfortunately, the ever increasing pace of technological developments and the advances in the tools available to designers means we often feel obliged to create 'objects' that we might not necessarily want or need (Nelson and Stolterman 2003, Papanek 1972 (2000)).

Design is a practice that begins with society (Hara 2009). The act of designing begins with a common issue. The effort of resolving this shared issue ensures that all in society are personally committed to the process and have an understanding of the resultant solution. Successful design therefore, stems from an understanding of human needs, values and spirituality as well as physiological needs.

2.4.2 Design as cultural stimulus

> *'Design is about two things: creating beauty and fulfilling our destiny to make things better'* (Veimeister 2003, p.164).

It is wrong, however, to assume that the designer's role is merely to give shape to products (Moritz 2005). It is also to give meaning, provide cultural contexts and the contexts for individual expression (Julier 2008, Buchanan 2001, Walker 2006). What does this mean in a world where attitudes change every day and become homogenous in a global society? Designers must readdress the roles they and their designs play in such a society (Loewy Foundation and Konig 2004). Industry does not always appreciate the value of design and the impact it can have in terms of product improvements and increased market awareness as well as the impact it can have on human lives both positively and negatively. Arguably a shift is needed, refocusing from profit and efficiency onto equity and the valuing of long term product/user relationships (Bautista and John 2011, Kolko 2012, Rittel 1973).

Designers, as well as being a stimulus for culture, can also be stimulated by cultural diversity. There is a real opportunity to learn through cultural differences and by experiencing new things; designers can learn by being challenged (Bautista and John 2011). Through their relationships with these differences designers can begin to understand themselves as well as gaining an understanding of other cultures. This cultural sharing and growth, however can only come from immersive, high quality and deep interactions (Bautista and John 2011).

> *'People become aware of their culture when they stand at its boundaries; when they encounter other cultures; or when they become aware of other ways of doing things'* (Cohen cited in Edwall and Hessellund-Beanland 2007, p.69).

In order to understand cultures that differ from their own, it is advised that designers first understand the culture in which they are located. The better the understanding of one's own cultural background is, the better they can understand the context of another. The first step in understanding your own culture is to define what filters you possess. These are formed by where you come from and what your frames of reference are. By asking the questions: *What are your experiences? To what segment/ group of society do you belong?* knowledge of the drivers that serve to shape one's frames of reference and perspectives is identified (Edwall and Hessellund-Beanland 2007). So often the habits, customs and unspoken rules that form the basis of a culture are taken for granted. It is through the exploration and voicing of our own cultures that we can examine what drives another. These customs and invisible habits are often the strongest guide to understanding cultures. Acknowledging geographical, historical and contemporary contexts, needs, wants and dreams can all lead to new insights (Edwall and Hessellund-Beanland 2007).

2.4.3 Design as Creative Thinking

Design thinking is inextricably linked to creative thinking. It is solution oriented and as such relies on the creative and critical thinking abilities of designers (Cross 2006). As complex as it is to define, the kernel of creativity can lie in either magic or in hard work and perseverance (Lawson 2006). Creativity can come in the form of a 'Eureka' moment that forever changes the way the world operates 'A Tipping Point'-(Historically Creative) (Papanek 1972 (2000), Winslow 2009). Or it can come from an individual who perceives of an existing idea in a new way -(Psychologically Creative) (Winslow 2009). *'Creativity is organic, you can't plan for it, you can only give it room and freedom to grow'* (Goodey 2006,

p.32). Much of the literature concurs that all humans are born tacitly creative. It is how it is developed and nurtured that is of interest (Lawson 2006, Potter 1980, Nelson and Stolterman 2003).

Creativity is about taking risks, moving away from the status quo and breaking the rules in order to bring about new ways of doing things (Kelley 2000). Creativity has been linked to *constructs* such as risk-taking, problem-finding and innovation (Svihla 2012). Because creativity isn't a right first time process and so the design philosophy encourages failure and iteration (Kimbell 2011). Design thinking relies on the prior knowledge and experience the designer can add in order to bring novelty to the situation (Fallman 2003, Kelley 2000). This prior knowledge must be fused with skills, understanding and imagination, as well as risk-taking, problem-finding and innovation (Potter 1980).

Psychology has shown that in order to activate creativity, it isn't sufficient that an individual perceives that there is a problem to resolve (Meroni 2007). It is essential that the individual recognises that a disconnect exists between their own way of acting and interpreting reality and that of the social system they are part of (Inghilleri cited in Meroni 2007). S/he must have some vision of how things could be and be motivated to pursue this vision, preferably with the assistance of others. One way of ensuring this is to expand beyond the act of *Problem Solving* and look at a *Solution Oriented* approach. This can offer even more potential as it promotes a more holistic and perhaps positive approach to undertaking a project (Nelson and Stolterman 2003). In these situations designers are not coming from a negative perspective and assuming there is a problem to be solved. Instead projects begin with an open mind and a positive attitude. This can lead to new situations that are more '*desirable and appropriate'* (ibid).

2.4.4 Design for 'Wicked' Problems

Searching for problem solutions can be defined as '*a process in which we perceive and resolve a gap between a present situation and a desired goal, with the path to the goal blocked by known or unknown obstacles'* (Huitt 1992, p.2). Above all else, designers are problem solvers who are firmly focused on a solution. The secret to motivating them is to make them feel there is a problem worth solving (Seymour 2005). If the goals set for them are aggressive and different from the norm, they are forced to shun incrementalism and instead- to use a cliché- think outside the box for new ideas (Ottman 2005).

Designers must be brave and willing to stretch the boundaries and limits of known solutions. Concept generation is the stage where the most novel ideas are born. More emphasis must be placed on this in order to place greater emphasis on innovative and progressive solutions. Only then can '*…Designers...rightfully own the power of design to intend, to manifest and to lead*' (Laurel 2003, p.316). Designers traditionally solve problems by taking apart situations and searching for alternative ways of addressing the issues (Kimbell 2011). Considering these, Dorst (2011) states that Abductive Reasoning best describes the process of dealing with problem solving in design. Wicked and complex problems present designers with two parallel unknowns of what will they design and how will this be done to meet the end value they need to achieve (Figure 5). The only known in the equation is that the designer wishes to reach a solution at the end of their process. By employing abductive reasoning designers are best equipped to deal with the open and undefined nature of 'wicked' problems through conceptual design (Dorst 2011). They are also adept at dealing with the *'uncertainties, contradictions and with partial knowledge'* that define the design process (McDonnell 2012, p.56).

??? + ??? leads to VALUE
(thing) (working principle) (aspired)
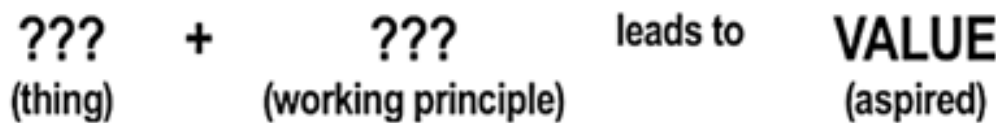
Figure 5: Abductive Reasoning process (Dorst 2011).

Unfortunately the problems linked with sustainability and in particular social sustainability are, by their very nature, extremely complex and fall under the category of 'wicked' problems (Kolko 2012, Steiner and Posch 2006). Wicked problems are defined as *'multifaceted and complex problems whose incomplete or contradictory nature is such that each attempted solution often seems to create a new problem'* (Berger 2009, p.307). These complex 'problems' react in a non-linear and unpredictable fashion and more often than not result in unintended outcomes (Design Council 2006). Wicked problems do not lend themselves to quick resolution as they stem from complex social issues that revolve around the unpredictability of human behaviour and the conflicting value system each person holds (Kolko 2012, Rittel 1973). They have been characterised as complicated problems without any clear (or indeed any) solution, as every solution that can be offered presents new symptoms and resultant problems (Nelson and Stolterman 2003, Kolko 2012). Instead of trying to solve the wicked problems some research argues that design should aim to mitigate against or try to decrease the negative impact presented by the wicked problems (Kolko 2012).

Real world social issues are complex because they involve conflicting goals, multiple solution methods, unanticipated problems, multiple forms of problem presentation, distributed knowledge, constraints from other disciplines, cross collaboration and experience to solve them (Jonassen et al. 2006, Voss and Post 1988). Because there are no clear or prescribed solutions to wicked problems cross-disciplinary approaches play an extremely important role in initiating and resolving them (Steiner and Laws 2006). The variety of voices, expertise and perspectives can introduce diversity that individuals do not.

The design attitude towards problem solving assumes the difficulty is in designing a good alternative. But once you have developed a truly great one, the decision about which alternative to select becomes trivial (Boland and Collopy 2004). Design itself has been described by Buchanan (1992) as a wicked problem as it lacks a single, clear and unarguable definition. Design deals with such a diverse range of ideas, processes and solutions that it difficult to define (Svihla 2012). This, in itself, poses a huge challenge for designers and those purchasing design. Not only do they have to find a clear and logical definition for their work they also have to convince their users to 'buy into' sustainability which brings a myriad of wicked problems.

2.4.5 Design as a Leader

It can be argued that designers can potentially lead and not follow in stimulating society and in affecting behaviour change. By building on the traditional skills of designers, the design process and design thinking can be used as the glue to join a wide variety of collaborators together in solving complex issues (Buchanan 2001). A 2005 Design Council Scoping Report states that even though designers may be placed far down the product development process and other sectors within industry often play bigger roles in developing new solutions, the skills they hold are perfect in driving a path towards Sustainability (Richardson et al. 2005). These three and two dimensional skills include Visualisation, Storytelling, Ergonomics, User Understanding, Communication and Presentation, Prototyping, Computer Modelling and above all the creative ability to generate original ideas. As holistic problem solvers designers understand consumer behaviour and motivation and also the language spoken by industry and business. Design is a creative process capable of developing ideas in an imaginative way that other business and engineering models often cannot (Kelley 2000). Designers have the vision to predict a sustainable future, and to marry these visions with both user needs and industry

requirements (Seymour 2005). The Scoping Report asks that designers begin to bring about rule changes in terms of the future demand of business and consumers (Richardson et al. 2005).

Undeniably it is beneficial to all concerned if multi-disciplinary teams undertake tasks. A driver, however, is needed and there is simply no reason why designers cannot fulfil this role (Kimbell 2011). Designers need to exert more force within the product design and developmental phases. They must convince society of the skills they have and the benefits these skills can offer them.

2.4.6 Design for Future-proofing

Many designers and visionaries are now calling for us to look firmly into the future and to design boldly and imaginatively in order to implement change and future-proof our planet. Bruce Mau calls for a collective multi-disciplinary approach where design thinking forms the basis of the process (Mau and The Institute Without Boundaries 2004). Manzini's approach asks designers to become agents of change through engagement with services, systems and social innovation (2009b). Redressing the relationship between designer-product-user is where Walker believes the future of Sustainable design to lie (2006). Contrary to these approaches Japanese designer Kenya Nara seeks to live in the present and look at the familiar in an unknown way. He observes that continuously looking towards tomorrow means we miss out on the experience of living fully in our own era. This experience relates to sensory immersion and the legacy left for the generations of the future (Hara 2009).

So how should designers deal with the changes? Toynbee (1988) suggests four ways in which society has historically reacted when faced with change:

→ A *return to the good old days* -how things used to be done thus not embracing any of the new developments and advancements made in the interim.

→ *Hang-on to the Present*- where we doggedly try to retain what we have, irrespective of how ineffectual the current system is.

→ *Reach for a Utopia*- aspire to a perfect and ideal scenario no matter how unrealistic.

→ *Radically transform the existing-* new ways of doing things combined with new ways of perceiving our reality.

This latter recommendation can unfortunately be met with the biggest resistance because humans are uncomfortable with major change (Toynbee and Somervell 1988). These roughly correlate with the seven different ways to operate in a design practice namely: choice based; convention based; situation based; strategy based; experience based; creating new schemata and the redefinition of the field (Dorst 2011). Each way requires a varying degree of shift in current paradigms. The changes necessary for 'true' sustainability require major changes across all stakeholder groups.

2.5 SUSTAINABLE DESIGN & EDUCATION

'As organisms, we're feeling biologically vulnerable again, but in this case it's not the sabre tooth tiger that's threatening our lives. It's us. And that discomfort is providing the push towards innovation' (Benyus cited in Mau and The Institute Without Boundaries 2004, p.156).

In order to explain Sustainable design as it is understood and practised today, it is necessary to briefly trace the evolution of the area from its first inception as Green Design to where it currently stands. Sustainable design has become a vehicle for designers to future-proof society, empathise with user needs and design for responsibility in an open and transparent fashion (Sherwin 2004).

2.5.1 Eco Design

Eco–design and the concept of Sustainability is by no means a 21st century idea. In the 70's Victor Papanek pioneered the campaign in his seminal book, 'Design for the Real World' (Papanek 1972 (2000)). No designer had before asked for an ethical approach to design in such a compelling and convincing manner. Not only does the book highlight the problems with designer practices it also offers practical solutions[7] and a roadmap to achieving them. Even though the book quickly became a bible for designers worldwide, the changes recommended by Papanek were not accepted by the public as readily as he would have liked. People saw no need to adopt the recommendations, as it seemed, that money and resources were limitless.

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[7] The majority of design concepts in 'Design for the Real World' are patent free as Papanek believed there was something fundamentally wrong with profiteering from the needs of others. (Papanek, 2000).

As early as the 80's, however, the design community began to seriously concern itself with environmental issues. These efforts tended towards the 'Greening' of the product supply chain and the products themselves through measures such as better material selection, waste reduction and prevention, employing cleaner production methods and the curtailing of end of pipe emissions (McKenzie 1991). The 5R's - Reduce, Reuse, Recycle, Rethink and more recently Respect- were recognised as a realistic and attainable way of achieving responsible design solutions. The solutions offered although innovative, were essentially product focused and did little to solve the fundamental issue of product consumption or indeed the behaviour of designers. Consumption is consumption whatever slant is put on it (Cooper 2000). Also the 'Green Washing' of product design was regularly used as another selling tool in a long line of fads and as a result failed to make any permanent inroads into resolving the underlying issues. 'Green Design' was such a popular term in the 80's that it was used over 30,000 times in newspapers and magazines in only one month (Whiteley 1993). During the same era the design community were reminded that green design principles must run in direct parallel with sensible design principles and designers would eventually have to shift the focus in their practice towards more ethical directions (Bayley 1991).

Green solutions are limited in the benefits they can offer as they do little to address the problem of consumption which continued to rise despite the 'eco-design' developments. In fact eco-design often encourages further consumption, as recognised by Prof. Gerhard Scherhorn at the Wuppertal Institute. The 'Rebound Effect', as it is termed, springs from the practice that because a consumer has purchased an environmentally benign product they can forget about its negative impact in use[8] (Grepperud and Rasmussen 2003). These eco-design solutions focus primarily on environmental impacts whereas Sustainable solutions must consider economic and social factors in tandem with the environmental issues. The design agenda therefore must go beyond the environmental optimisation of products and processes. Instead they require radical and creative thinking that changes behaviour and positively alters underlying systems.

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[8] An example often used to demonstrate this effect is where a consumer purchases an energy efficient light bulb and proceeds to leave the light switched on continuously.

2.5.2 From Eco to Sustainable Design

The various types of eco-design have been divided into four hierarchical levels (Bhamra and Sherwin 1999). Level 2 is perceived to be this 'greening' of the product chain and production process, and the level at which most industries place their developmental emphasis. Whilst Level 4 is where a system's level reappraisal is instigated and more sustainable solutions focusing on the reduction of material, energy and space requirements are developed. Even though the researchers believe that this level is unattainable in the near future, it can be argued that in order to bring about fundamental changes in the current patterns, radical innovations and system changes are a necessity, not a choice.

Similarly Tischner (2000) breaks these approaches to design into three distinct methods of problem solving: Eco-Design; Eco-innovation and New Concept Solutions. The former falls under Bhamra's level 2, whilst Eco-Innovation involves the integration of environmentally conscious practices from the start of the design process. Far more radical approaches to problem-solving are required with New Concept Solutions where user needs are fulfilled in ways which may be completely different from current solutions.

Other authors differentiate between the two approaches by applying the terms Eco-Efficiency and Eco Sufficiency. The former being the reduction of the negative impacts of existing products, more from less, also termed 'Reactive Design'. And the latter ('Pro-Active Design') deals with attaining a similar level of welfare with a lower material requirement (Robins and de Leeuw 2000). Again it is clear that Eco-Sufficiency is the approach that must be adopted. Like New Concept Solutions and Level 4 systems intervention, Eco- Sufficiency requires fundamental behavioural changes from both industry and individual consumers.

2.5.3 Sustainable Design

Sustainable design aims to go beyond meagre eco-design solutions (IDEO 2008, Charter and Tischner 2000). *'The present environmental problems are profound, structural and society threatening. Fine tuning is clearly not the answer'* (Bakker 1995). The debate within sustainable design is that it is evolving in a more holistic direction. These moves are justified by saying that there is little benefit in curing the symptoms of a problem when the system within which it operates is inherently flawed. Sustainable design must be preventative and not simply curative (Chapman 2005, IDEO 2008, Fletcher and Goggin 2001). Sustainable design is a dynamic paradigm that questions everything about why and what we are

currently doing and asks us to shift our individual and collective goals for the greater good (Chapman 2009).

This type of thinking began to seek prevalence in the late 20th century/early 21st century, where design theorists started asking designers to not only design to repair but to inherently improve the quality of life for all stakeholders in the 'product' system (Birkeland 2002, Lewis et al. 2001, Papanek 1972 (2000)). Research has shown that various innovative approaches to sustainable design are being explored. Amongst these are: 'Cradle to Cradle' theory (McDonagh and Braungart 2002); Biomimicry and Bio-thinking (Benyus, 1997); Emotionally Enriched Product (Consumer Engagement) (Chapman 2005, Van Hinte, 1997),; Dematerialisation and Lightness (Walker 2006); Social Innovation (Manzini 2007); Systems Thinking, Service Design (Saco and Goncalves 2008, Moritz 2005) and Product Service Systems (Bhamra and Lofthouse 2007).

The very concept of Sustainability however, holds *'fundamental and uncomfortable challenges to the design status quo, as it does to other professions and disciplines'* (Madge 1993, p.149). Industrial design mainly concerns itself with the design of products for mass production and solving problems with consumption oriented solutions. And so follows the question of how to design in a world of finite resources when *'design for sustainability aims to generate as much utility and enjoyment as possible out of the smallest possible quantity of natural resource over the longest possible period of time'* (Bhamra and Dewberry 2007, p.2).

Within the field of design there is enormous potential to integrate sustainability issues as design is a process that can be used to enable innovative yet practical alternative solutions (The Designers Accord 2010). It seeks to bring out new ideas of things that do not already exist as well as the putting together of standard known routines in a novel way (De Bono 2000). Richard Seymour concurs that designers should lead the way with new visions of the future that are better than those we have. He states that this is not the task of the consumer or business (Seymour 2005). In order to be a thoughtful and responsible designer the challenge lies not in changing the designer's skills, but about questioning and analysing what design is by those stakeholders affected by design acts (Nelson and Stolterman 2003). In turn Manzini cautions that designers must be optimistic and realistic about their ability to help resolve the problems we are now faced with (Manzini 2009b)

It is recognised that a paradigm shift in how design is approached may be required if sustainability concepts are to be correctly integrated into the entire design process. Design must become about '*mobilising creative thinking and technology to secure humanity's future on this small planet of finite resources'* (Rogers 1997, p.74). With 80% of a product's cost and environmental and social impacts being determined during the design, development and product planning phase (Tischner et al. 2000, Lewis et al. 2001, Bhamra and Lofthouse 2007) it is clear that emphasis in a 'products' life cycle must be placed at the stages of inception (Cull and Malins 2003). Here, creativity and the formation of innovative ideas play the key roles (Bramston 2009). Arguably the designer's potential for innovation is at its highest at this stage in the project and ergo the most radical changes can occur (Lawson 2006).

Concerns are growing, as are the number of people who are becoming aware of the necessity for more responsible design choices and practices. Through governmental and non-governmental action groups designers are finally being given the platform through which to explore and discuss new ideas and theories. Some of these include The Design Council (U.K) The Centre for Design Innovation (Ireland), and open forums like the international O2 Network, Forum for the Future, The Sustainable Design Network, ReDesign, Massive Change, the Eco-Design Foundation, Cumulus, Design without Borders, The Designers Accord and Open IDEO (to name a few). These must be built upon and developed if the environmental, economic and social considerations of Sustainability are to become inherent principles within the Industrial design process.

2.5.4 Social Sustainability in Design

Although Social Sustainability has been on the agenda since the very beginning of the Sustainable Design debate there seems to be little consensus as to what it actually means. The majority of literature describes the social elements of Sustainable Design to mean issues of health and safety, equity, social entrepreneurship, consumption habits and efficiency (The Designers Accord 2010). Lilley has distilled Social Sustainability to include the softer agendas *'of governance, corporate social responsibility, personal responsibility, equitable distribution of social capital, meeting basic needs, quality of life, health, well-being and happiness, democratic participation, trusting, harmonious and cooperative behaviour and preserving social and cultural dynamism'* (Lilley 2007, p.1). This can be further expanded to include history, traditions, dialogue, equity in expressing ideas,

diversity, collective responsibility, compromise, accountability, self-fulfilment and altruism (McKenzie 2004, Willard et al. 2010, Nagel et al. 2012). Collectively these have been categorised as *social capital*, *social engagement*, *social cohesion* and *social exclusion* (Bramley et al. 2006). All 'definitions' of Social Sustainability however, call for the human being to be placed at the centre of the design process (Klein 2009).

Like the notion of social impacts in Sustainable Development, the idea of social sustainability in design presents more problems than it resolves. Arguably the conflicts arise because the 'person' is at the centre of the social dynamic and individuals behave in an unpredictable fashion. Very complex drivers come into play when trying to understand individual behaviour within a social context. The private, public, collective selves all have influence over how people integrate into society with vastly different probabilities in different kinds of environments (Triandis 1989). Cultural parameters such as history and contemporary conditions all come to bear and it is in the explorations of these different contexts that real understandings of social drivers and individual behaviour can emerge.

In 2004 the British Design Council established a research and development group whose task it was to investigate the social responsibility of design and its impact on social issues. RED delved into design led projects that improved public services for all. These included projects in healthcare, crime, education, politics and the elderly (Design Council 2006). The outcome of this work highlighted clearly the need for design to become embedded in solving social issues with multi-disciplinary teams implementing creative and innovative strategies (Burns et al. 2006).

2.5.4.1 Design for Social Engagement

The designer's role has often been described as someone who makes something better for someone else (Saco and Goncalves 2008). In the 1990s the understanding of Design for Society was in terms of designing for minority and marginalised global citizens. This design was focused on ensuring that everyone in society could participate on an equal footing irrespective of ability, gender or race. Universal Design or Design for All (Lidwell et al. 2003). Whitely (1993) describes Social design as design for disabled (termed design for all) or design for developing countries.

This design approach-often called Design for the Bottom of the Pyramid, Design for Social Inclusion or Design for the Other 90%[9]- seeks to resolve the basic challenges of survival and

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[9] See Smith, C. E. (2007) *Design for the Other 90%,* New York: Editions Assouline.

progress faced by the world's poorest and marginalised sectors of society (Smith 2007). The idea being that it flips the 'design for *desires* rather than genuine *needs*' paradigm on its head with developed countries offering developing countries opinions on what is best for them (Huppatz 2007). Whilst this approach may demonstrate innovative thinking it can sometimes be adopted in a patronising manner by ignoring the capabilities of every person to solve their most pressing problems in the most appropriate way for them (Alur 2010). These solutions should be driven by the social, economic and environmental issues that have direct consequence in the local community and not on assumptions made by external parties.

The efforts are undeniably laudable, but it shouldn't be a case of telling people what they need and how they must behave. Instead we should adopt a co-design approach where the knowledge and experiences of all involved are recognised equally. Some of the approaches to 'Design for the other 90%' do involve the community stakeholders as the experts. The design team work at realising and implementing the solutions based on the insights offered by the clients. For example the 'not for profit' collective Design that Matters recognises that there must be value other than altruism in any collaborative project in order for it to be economically sustainable as well as socially responsible (Prestero 2009).

Socially responsible design-as advocated by Whiteley, Smith etc. is not the same as social sustainability in design as it does not consider the larger notion of society. Rather it is focused on securing the individual's role in society and not on how they impact on or are impacted by their social surroundings. What is needed is a shift from 'design for society' to 'design by society' where participatory design approaches focus on real user needs (Dong 2008, Amir 2004). This approach is built on shared understanding and not on assumptions about the underlying complex inter-relationships that exist (Amir 2004).

2.5.4.2 Design for Social Capital

Social capital deals with the connections within and between networks. At its core lies the benefits to be gained from fostering and nurturing connections between individuals (Lesser 2000). Working in networks not only has the advantage of pooling collective knowledge and combining expertise, it also asks us to reflect on our individual behaviour. We are not always asked to account for individual behaviour but when we are working in networks/groups we are asked to account for our actions and modify our behaviour so it accommodates for the perspectives and opinions of others (ibid). Design for social capital can maximise the intellectual capacities and skills in our society and apply them in a fresh

way to resolve emerging issues. Sharing knowledge and ideas is a vital skill for social sustainability and with this sharing comes the need to take part in dialogue, listen, find compromise and communicate effectively.

2.5.4.3 Dialogue and Communication

Knowledge exchange is vital in a world where the tendency is increasingly towards building individual expertise (Sterling 2001). People are no longer 'Jacks of all trades' - instead highly skilled workers occupy the workforce. Problem solving must become a collaborative process between these 'experts'. Mau urges a multidisciplinary approach to design of the future with design moving beyond disciplinary confines. It must transgress disciplines and be free of space, location and the individual, and become *'distributed, plural, collaborative'* (Mau and The Institute Without Boundaries 2004, p.17).

This transition towards a holistic and inclusive dialogue can only be achieved through sparking conversations between stakeholders (or actors). These direct and open lines of communication must straddle between disciplines (business, manufacturers- materials experts, engineers, government bodies and non-governmental groups, the Media, Scientists, Futurists, Sociologists, Psychologists, Anthropologists, local communities and of course the individuals[10]). Thus creating a symbiotic relationship where knowledge becomes a valuable commodity to be shared and where a heterogeneous group of actors work together to create new solutions (Mau and The Institute Without Boundaries 2004). It is important to recognise, however that leadership is necessary in the governance of any with no- one to control or steward it can quickly become uncontrollable and unpredictable. The notion of collaborative design is by no means novel, in the 60s and 70s Buckminster Fuller pulled together experts over two five-year projects in order to create his ambitious World Design Science Decade plan in an effort to demonstrate that '*the world could be made to work for 100% of humanity'* (Fuller 1965).

2.5.4.4 Design for Social Innovation

For centuries designers have created links between society and technology. Up until now they may have focused on technical innovations and creating manifestations of new technological innovations that have physical or psychological benefits for society. Social Innovation [SI] can be employed as a great driver for change as it mobilises diverse social resources- in terms of creativity, skills, knowledge and entrepreneurship - in order to

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[10] The list of Stakeholders is not conclusive as it is almost impossible to perceive who will be involved in future solutions.

promote sustainable ways of living (DESIS 2010). A challenge now presents itself for design to conceive new 'technologies' or 'products' that can manifest shared visions, promote collaboration among diverse stakeholders and realise a new future where the impact is lighter and more enjoyable. To do this designers may have to rethink their role and re-assess their modes of working (Margolin and Margolin 2002 , Thackara 2006).

Innovation in the creative industries has been examined for years; social innovation on the other hand is a relatively new area of study particularly in relation to design (Mumford 2002). Social innovation deals with social relationships and social organisation. It refers to the way in which individuals or communities act to generate new initiatives or to solve existing problems. These innovations tend to be driven, not by technological innovations or for financial gain (although this may be a positive consequence), but by pressing social problems, everyday issues and resultant changes in behaviour (Mumford 2002, Meroni 2007). As a result social innovations typically emerge from bottom-up rather than top-down processes with strong peer-to-peer interactions (Jegou and Manzini 2006b).

Social Innovation offers opportunity for all sections of society to become involved in finding solutions. Providing opportunities isn't enough however and individuals need to feel enabled to participate and contribute. Individuals, unfortunately, don't always know how to 'do their bit' or what their role could be and so collaborative innovations tend to be most the successful and resilient. The collaborative process makes sure skills are shared and diversity is recognised and capitalised upon (Broberg 2008). The collaboration should team diverse partners together; social entrepreneurs with community, governmental and industry partners, to ensure sufficient take-up from stakeholders[11] (ibid).

Whilst all social innovators and social innovation projects don't deny that change and sacrifice is necessary to bring about a sustainable future, they offer real and practical ways to achieve it through social innovation strategies. Through SI projects local communities can be enriched, social cohesion can be generated, economies can be stimulated and social capital maximised (Murray et al. 2010). Although social innovation may have only recently been formalised the paradigm has been in use for centuries, more commonly from necessity rather than by design. The design profession has begun to advocate social innovation projects as a way in which the designer can connect with community and add value to society instead of working for industry by stimulating consumption (Papanek 1972

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[11] See Appendix B for case study discussions of Social Innovation education projects including Kaospilots, DESIS and EMUDE.

(2000)). This approach has the positive offshoot of letting designers add a sense of meaning to their work by removing social barriers and allowing them to look positively to the future.

2.5.5 Design for Social Sustainability

From the large breadth of literature dealing with Sustainability and design practices one thing clearly emerges; the field of design is evolving and its current paradigm must change. Employing a design approach brings with it a number of crucial benefits. Burns et al. (2006) outline these key features and identify how they could impact on the resolution of the complex issues surrounding social sustainability.

- → Facilitating multi-disciplinary teamwork.
    - → Integrating expertise from different disciplines.
    - → Adopting a co-design approach - where experts as well as community partners participate in the design process.
- → Provides a non-linear process that can change and evolve as necessary.
    - → An on-going, interactive and iterative process.
- → Encouraging dialogue and interaction.
- → A highly creative approach.
- → The ability to think holistically.
- → Consideration of the User as the key in any solution.
    - → Relate the 'product' story so it holds meaning and relevance for the user.
    - → Integrate between the functional and emotional elements of any solution.
- → Provide a vision of the future and can adapt as changing visions require.

2.5.6 Conclusion

Alongside the dearth of a definition there is also a lack of discussion on how to practically implement social sustainability in design. With this relatively new field the emphasis has been on definitions and measurement in an effort to build understanding and consensus (McKenzie 2004). Despite the growing interest in sustainability we have yet to map and identify the competencies and capabilities needed to achieve it in any real way (Dilnot 2009). And so our next steps must be to explore methods of bridging the gap between theory and practice. Designers must learn to translate the rhetoric into action and this could potentially be achieved by developing ways to combine local small-scale projects to create more global widespread impact. This larger impact does not have to be immediate

but can be a gradual process that, by its nature, brings about sustainability over the longer term. Alongside understanding how to do this designers need to learn how to *'operate it and live through it'* and develop ways to measure the impact in real terms (Dilnot 2009, p.104).

Another suggestion of how we can bring about social sustainability is through trans-disciplinary design projects. This should not be done through a reductionist approach where everything is distilled to mono-definitions or homogenous perspectives. Instead the approach must acknowledge and integrate the broader agendas of all the stakeholders involved (McKenzie 2004). McKenzie argues that we don't need a cohesive single definition per se for social sustainability. Instead we should explore the breadth and depth offered outside the traditional literature in order to develop understanding and collaboration that moves beyond current praxis (ibid).

As discussed in Section 2.2 above, education can play a transformative role in redirecting both attitudes and behaviours towards sustainability. So it stands that design education can bring about a much needed change in designers practices as it intervenes in the earliest stage of a designer's 'life' (Cull and Malins 2003). *'Design education in the larger service of society is not a new concept. Awareness of its importance, however, is steadily increasing in the public realm, in business and industry, and—most encouragingly—among designers themselves'* (Amatullo and Clark 2005, p.5). For this transformative change to take place paradigm changes need to take place in the focus of design education. There are two ways in which sustainability can be considered in design education; one as an inherent part of the design process or the second where design is considered a dimension of sustainability and a vehicle by which to achieve it (Fletcher and Dewberry 2002). Within both these models, however, design and sustainability are inextricably linked and interdependent in a much clichéd 'chicken and egg scenario'. Irrespective of the *how* sustainability becomes an inherent consideration within the design process educating for it requires a broader perspective where cross-disciplinary and real-world projects encourage participation, creativity and practical learning by doing (Bhamra and Dewberry 2007).

2.6 COLLABORATION

Design educators have begun to realise that complex issues require a mix of voices in their resolution. Both ESD and sustainable design call for a move beyond disciplinary expertise, into a situation where learners are aware and capable of working effectively with a variety of disciplines. The following section deals with the practical and theoretical implications of collaborative projects from the perspective of both the individual and the team.

2.6.1 Design is changing

It is naive (if not a little pompous) to assume that designers can single-handedly solve all social problems through the design of innovative new solutions. Some authors believe that design is becoming uniform and hackneyed and what was once innovative and novel is being mimicked with modern twists that add little value (Casey 2009). Learning from, and not mimicking, the past is the best way to achievable sustainable behaviour (Thackara 2006). And so by immersing themselves in diverse perspectives, cultures, attitudes and values designers can begin to truly understand and empathise with the real individuals and issues involved. Through their design solutions designers should begin to bring together the different strands of thought surrounding sustainability. '*Innovation happens in the social encounters between people*' (Burr 2009, p.29). This cannot come about until designers themselves understand those strands and the differences and similarities that exist between them (Berger 2009).

The traditional image of a designer single-handedly creating and producing masterpiece products no longer applies in contemporary practice (Kelley 2000). More often than not designers work within teams of varied experts who inform the process at the different stages. Designers now recognise the richness of experience that can come from creating dialogue between these partners, whether they are experts or social collaborators. Within teams exists a wealth of experience, worldviews and stories that can be drawn on; stories of culture, history, differences (and similarities), traditions and contemporary practices, as well as environmental factors such as geographical and climatic drivers.

Undeniably, designers need to be more outward looking and to examine more closely the relationship of design to society's *'role and purpose'* (Whiteley 1993). Sustainability requires widespread participation as communities everywhere need to begin to shape what they wish their collective solutions to be (Wahl and Baxter 2008). The act of concentrating solely

on one's individual interests and desires can weaken the ability to think critically and creatively. Therefore the benefit of expanding the designer's surroundings and influences cannot be undervalued (Lau 2007).

Design is inherently a social process where the best ideas and innovations are generated collectively (Svihla 2012). Design Collaboration therefore serves to facilitate the sharing of ideas, expertise, resources and responsibilities (Chiu 2002). As Volpentesta et al. (2008) observe the most creative of endeavours in industry involve a mix of disciplines offering different perspectives and experiences far richer than an individual could. Assumptions can be questioned and challenged allowing new innovations to emerge (Lasker et al. 2001). And as such, collaboration is a necessary component of developing creative concept solutions to the wicked problems presented by sustainability (Mamykina et al. 2002, Dykes et al. 2009).

2.6.2 Learning through Collaborative Work

> *'Collaboration is a mutually beneficial and well-defined relationship entered into by two or more organisations to achieve common goals. The relationship includes a commitment to a definition of mutual relationships and goals; a jointly developed structure and shared responsibility; mutual authority and accountability for success; and sharing of resources and rewards'.*

(Mattessich 2005, p.4)

Collaboration, simply put, is the integration of a collection of individuals who work together to reach a set of agreed goals (Gardener 2005, Chiu 2002, Kvan 2000). Teams are of major importance in any organisational context because, with increasing complexity, groups of people can work together in order to accomplish problems they cannot solve on their own (Stempfle and Badke-Schaub 2002, Steiner and Posch 2006, Kvan 2000, Denton 1997). Complex problems with their interconnected, dynamic and continuously changing elements need to move beyond one-dimensional conversations within disciplines (Steiner and Posch 2006). The very act of navigating through the collaborative process, understanding the other 'players', finding mutual understanding of the problem, collectively developing and evaluating solutions mirrors the process of solving a complex real-world problem (Steiner and Laws 2006). Similar to environmental, social and economic impact, collaboration is most beneficial at the early stages of a design project when many of the key decisions are made (Chiu 2002).

Collaboration can be classified as either structured or unstructured. Structured collaboration is where the participants share a common goal which requires effective negotiation, consensus and compromise to achieve this. Unstructured collaboration, on the other hand, does not involve shared goals and is often defined as the sharing of ideas with minimal dependency on each other for success (Chiu 2002). Formal design projects can fall under the classification of structured collaborations as the teams within the collaboration, whether they are mono or multi-disciplinary, tend to revolve around fulfilling a common goal or delivering a shared outcome.

Multidisciplinary team-work is well practiced in industry but is much rarer in education (Design Council 2007, Davis 2008). Traditional methods of learning have focused on the individual. Newer perspectives of learning, fortunately, have begun to recognise that learning is less a solitary act and more about the collaboration with others to pool knowledge, skills and tools (Jonassen et al. 2006). The advantage being individuals take a more holistic approach to projects with a good understanding of other specialisms; enabling them to work effectively with colleagues. An additional benefit is mutual learning, where designers learn about other disciplines and those from other disciplines learn about design (Design Council 2007). It is within cross-disciplinary and collaborative project work that a real opportunity now exists to find methods of bridging and reconciling *'disparate discourses, traditions and methodologies'* (Warburton 2003, p.1).

Collaborative learning emerges when individuals interact with others to create knowledge by discussion, information sharing and active participation (Leidner and Jarvenpaa 1995). The benefits of working in teams cannot be ignored – the depth and variety of collective knowledge available and the diversity offered by individual perspectives all enhance the effectiveness of shared workloads. Successful teams are built on energy, trust, openness and a '*pervasive sense of possibility'* (Scharmer 2007). Once the interpersonal foundations are in place, the members need to establish what outcomes, goals, roles and interdependencies will exist within the team (Kvan 2000). These scaffolding structures ensure the potential of the collaboration is maximised.

Team-work enables participants to look beyond their own individual limitations, their history and culture. Participants are given the freedom to think deeper and more objectively about how they can bring about change in the larger system (Scharmer 2007). Through the collaboration individuals *'exercise, verify, solidify and improve'* their own understandings of the issues thus the individual's learning is enhanced as well as the

contribution to the development of the group (Leidner and Jarvenpaa 1995, p.268). The most effective teams within collaborations are those who can identify as a united team yet still allow the individuals to contribute in different ways (Svihla 2012).

Within multi-disciplinary teams there exists a wealth of experience, worldviews and stories that can be drawn on. The benefits of expanding the student's surroundings and influences cannot be undervalued (Lau 2007). Each team member brings a language and a different frame of reference that can both enrich and complicate the process as team members strive to find common language and goals. Teams *'must have sufficient common ground and knowledge in common to enable a rich, mutual understanding'* (Shaw 2009, p.66-67). Finding this understanding and common ground can be difficult to achieve as individuals struggle to deal with the complexity of team work.

2.6.3 Effective collaboration

From a study of the literature on collaboration certain criteria have been identified that have an impact on how successful or unsuccessful the experience will be. These criteria are discussed below.

2.6.3.1 Interpersonal Ties

Interpersonal ties play a huge role in the ability of groups to co-operate successfully. In the instance of *strong ties*, individuals share the same background, social networks and are unlikely to provide vastly different or new knowledge or contacts (Lesser 2000). *Weaker ties* contrarily infer individuals who are not previously known to each other but happen to share a connection via work or personal life. Researchers exploring the ideal relationship to optimise creativity suggest that *weaker ties* amongst individuals who are unknown to each other can produce more innovative results (Hansen 1999).

Weaker ties have also been proven to play a key role in bringing about social cohesion (Lesser 2000). These collaborations between groups who don't know each other can bring a fresh and alternative approach to undertaking project work. The reason for this is that strangers can provide access to new information and draw on diverse experiences that those who are familiar with each other can't offer (Hansen 1999). Knowledge share becomes more efficient and ideas can be stretched further as unknown individuals seek to

find common ground and an understanding of each other's motivations and practices (Lesser 2000). Group members also learn from each other as each one shares their history and experience. This diversity of input can stimulate new thought processes that wouldn't have occurred with individuals working alone (Wals 2010). By combining these different experiences an expansive and interconnected view of the world can be created. "Innovation is about culture" and the more diverse the cultures involved the greater the potential for creativity (Simpson 2007). The positive interactions that occur between members of a network, however informally, can build social capital.

2.6.3.2 Synergy

Synergy is the ability to combine perspectives, resources and skills within a team of people (Lasker et al. 2001). It goes beyond the mere sharing of resources and into a situation where, like the Gestalt Theory in Art, the whole is of greater significance than the sum of its parts. Essentially finding synergy ensures that a collaborative team can create something '*new and valuable'* by working towards a common agreed goal (Ibid)*.* Lasker (2001) cautions that synergy can be very difficult to determine within a collaborative effort and as such the efforts to 'measure' it have focused on the individual components within the collaboration. By focusing on the individual the interactions between the team are often overlooked. The emphasis when evaluating the impact of collaboration therefore should be focused on the collective rather than the individual experience. Here the synergy of a team is reflected in how the individual skills, resources and perspectives combined to strengthen and enrich the team.

2.6.3.3 Positivity

The very fact that team members have to work with others means they must look beyond what they know as individuals and open themselves to the unthinkable by trying to achieve what may appear to be impossible. Innovation, according to Scharmer (2007), occurs when we don't focus on the negative happenings of the past, but instead use intuition and creativity to look to the future, however fearful this may be. By opening ourselves to this, the fear and risk of failure are negated by the fact that we are part of something that is emerging; a positive step in the direction of change (Scharmer 2007).

2.6.3.4 Sharing Ideas

Dialogue and debate are extremely important in creating new ideas. Collective levels of awareness don't always exist and so facilitating diverse groups can be an onerous task. Teamwork is more effective and constructive when ideas can be shared on an equal footing

(Paulus 2002). The intellectual dynamics of sharing and 'joint efforts' can all complement each other in order to create a holistic picture . As well as looking at existing problems in novel ways, diverse groups can bring about the co-construction of new knowledge by creating collisions and dialogues that never occurred before (John-Steiner 2000). Even contradictions and conflicts can steer conversations in new and exciting creative directions. Collaboration is a cyclical process of consultation, negotiation, compromise, decision-making, agreement and reflection (Chiu 2002).

2.6.3.5 Holistic Thinking

Innovation *'does not happen in solitary manner or in harmonious unison it is a collaborative and dialogic process'* (Engestrom 2001, p.135). Equally, change doesn't occur in a vacuum and designers, perhaps more than anyone, need to understand all the elements need to be at play in a system in order to effect real change. Understanding, according to Senge et al. (2005), begins with understanding the nature of wholes and how the parts of the whole are connected. We shouldn't accept reality as it is presented to us. Instead, we should question everything and view it with 'fresh eyes'. It can often be difficult to find 'fresh eyes' especially if a designer's experiences are limited. Even if designers have a wealth of experience to draw on they cannot rely on this to provide the whole picture.

2.6.3.6 The Individual in Collaboration

Our notion of ourselves is constructed by how we perceive ourselves in society and the active role we take in our communities and cultures (John-Steiner 2000). This notion bears heavily on how we participate and interact in dialogue with others. We must learn to move outside our comfort zone and away from what is termed as the 'Voice of Judgement' from constantly working in the same group of people. 'Familiarity breeds contempt' and this voice of judgement can often stifle creativity and limit what people feel comfortable doing or saying in a team (Ibid). The purpose of design education can be argued to be an ideal vehicle to stimulate a curiosity for different approaches to design (Beucker 2004).

Each individual brings a disciplinary gaze to the collaborative project that is built on their past experience and individual world view (Schön 1983). Allowing the individuals to contribute from this gaze can be intrinsic to engaging them within the collaborative effort (Cheng and Kvan 2000). If the participants feel their opinions are being considered and they are contributing to the decision-making then they are more likely to continue this contribution.

2.6.3.7 Dialogue and Communication

Communication between the participants is critical in collaboration. The participants must understand the language and behaviour of the different disciplines involved in order to share and create new knowledge (Valkenburg and Dorst 1998). Communication is also important for resolving the practical issues of sharing information, decision-making and co-ordinating tasks (Chiu 2002). Having the ability to communicate with a variety of people from different backgrounds and different countries is an invaluable skill in making sure collaborations are successful. Designers need to learn the core communication skill of talking *'with one another rather than past one another'* (Eagan et al. 2002, p.49). Decision-making hinges on effective communication in design collaborations, impacting directly on consultation, negotiation, evaluation and confirmation (Chiu 2002).

Collaborative teams comprise a group of individuals who are working towards a collective goal. Because of this the individuals often need different information or types of communication to fulfil their portion of the task. This can add complication to the process as the different strands of communication get 'tangled' in each other, leading to misunderstanding and confusion. Chiu (2002) recommends organising the people, the technology and their communication paths within the collaboration to assist teams in sharing information and solving specific problems. Contrarily designers and sustainability practitioners need to be comfortable with incomplete, contradictory and 'messy' processes in order for them to develop capacity for 'wicked' problem solving (McDonnell 2012, Wals 2010). So a *semi structured* approach where external individuals can facilitate communication if the teams are struggling, could be the best for projects within a learning context.

Dialogue and communication don't always have to be positive and encouraging. A healthy amount of debate, critical commentary and arguing is beneficial to taking advantage of and finding a balance between the diverse opinions of the team members (Sobol 2012). Communication involves the use of symbols which are representational of something else. They don't have to be only verbal but can involve non-verbal displays (written, gestural, mathematical, musical etc.) and objects (Gudykunst and Young 1996). Interpretations of symbols can vary from culture to culture and person to person (ibid). Symbols only hold particular meanings when a group of people agree what this meaning is, so a shared understanding and finding common language prove critical for effective collaboration.

2.6.3.8 Compromise

If collaboration is to be successful compromises will have to be made and this stems from an understanding of and appreciation for other peoples' opinions and ways of working. The need for compromise and compassion cannot be underestimated. One way of ensuring that all the partners are heard and listened to is to construct convincing stories that tell the history and motivations of various partners. When dealing with people from diverse backgrounds the need for stories becomes apparent (West 2002). People relate through stories. Placing scenarios in context helps make sense of complex ideas related to culture and society. The clearer the story the better the relationship will be. These stories can facilitate deeper understanding and open perceptions beyond our traditional ways of making sense of the past and help us to perceive a new future (Senge et al. 2005). Table 3 below describes some additional characteristics and conditions necessary for effective and successful collaboration.

Table 3: Characteristics of effective collaboration (Gardener 2005, Mattessich 2005, McDonnell 2012, Maher 2010, Lasker et al. 2001).

Characteristics of Effective Collaboration	Description
Know yourself	Allow for individuals and teams to grow in parity. The teams must figure out what the collaborative process means specifically to their team and what are their expected outcomes from the experience. Shared values and goals are essential for effective collaboration. Each team member must reflect on their own values, goals and motivations as well as those of their team mates. Share understanding and respect for each other's cultural norms, values, limitations and expectations.
Diversity	Teams must leverage diversity. Value and manage diversity. Conscious efforts must be made to optimise diversity. Diversity strengthens and enhances collaboration. Must be open to diversity or opportunities will be lost-could lead to limited solutions. Balance voices from different perspectives Capitalise on strengths.
Conflict	Task conflict: Differences in judgement as to how to achieve a common goal. Emotional conflict: Differences in relationships between individuals. Productive if managed correctly Acknowledge and work through the inherent, informal hierarchical structure that exists. Create an even balance of power. Manage conflict through *creative integration* that meets the differing needs of the collaborators. Accommodate different parallel lines of enquiry. Participants should be comfortable with disagreement.
Dialogue	Dialogue facilitates thinking & questioning. Clarifying different viewpoints. Effective communication across disciplines, cultures and industries is essential. Open, frequent communication. Use both formal and informal communication channels. Must provide space and facilities for people to communicate (Maher 2010).

Interpersonal Skills	Co-operation. Individuals must be flexible & willing to change Patience and objectivity are essential. Systems and holistic thinking are necessary- participants must be able to see the whole picture. Fosters *comprehensive* thinking where the whole picture is focused on instead of a *compartmentalised* view (Lasker et al. 2001). Self-confidence and assertiveness.
Collaborative Journey	'It's a journey'. Requires time and effort to be effective. Relationships evolve and change over the project process. Request and provide feedback between team members. Relationships take time to establish. Build on previous experiences. Mutual effort required to reach conclusions.
Sharing	Shared decisions - better decision-making with diversity. Sharing information leads to learning. Individuals must feel like they will gain something from the collaboration. Individuals must feel 'ownership' for team effort.

2.6.4 Co-Design

Collaborative work has more recently been called Co-Design or Participatory Design within the design realm. Co-Design is defined as the act of co-creation[12] within the specific discipline of design but involving continued participation from stakeholders and practitioners (Binder et al. 2008, Sanders and Stappers 2008). It is a technique that has historically been best employed by Marketing to add competitive value to a product by gaining a true understanding of user needs through discussion, focus groups and user testing (Sanders and Stappers 2008). Contemporary design has elaborated this to include projects that work with social partners to create 'products' of real meaning and value. In order to effectively implement social innovation projects, collaboration and participation must be maximised, as social issues generally comprises a large variety of stakeholders with diverse needs, perspectives and backgrounds. Hence the co-design approach can and is successfully employed as a means of drawing together the mix of stakeholders in an effort to create socially beneficial solutions.

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[12] Co- Creation has been defined as the act of collective creativity involving two or more participants.

To design is inherently human and so we all have the capacity to undertake design work. Co-design offers the opportunity for non-designers to become involved in the design of the products that will eventually impact on their lives. The trans-disciplinary process allows for different people with different backgrounds to collaborate (Moritz 2005). More integrated and collaborative ways tend to be more successful as they tap into collective creativity (Burns et al. 2006). However, it does require for those who would be traditionally 'in charge' to relinquish control and allow for greater parity between stakeholders (Sanders and Stappers 2008). Engaging participants in co-design isn't always easy, as it demands new ways of working and thinking that are based on equitable co-operation and parity amongst all participants. This in itself can lead to conflict and complications.

2.6.5 Collaboration typologies

One of the key aspects to integrating ESD is the notion of cross collaboration within and between educational institutes and external partners. Since the problems and issues associated with the three tenets of SD are extremely complex we need inclusive educational approaches that are framed in and across disciplines (Jucker 2001, Barth et al. 2007). Complex problems demand '*a dynamic, continuous, and on-going problem-solving process'* that crossing disciplinary boundaries can offer (Steiner and Laws 2006, p.325). The levels of collaboration between different disciplines can vary from 'lighter' collaborations to deeper and more immersive co-operation (as outlined in Table 4).

Table 4: Collaborative Learning Typologies (Maher 2010, Lasker et al. 2001, Stein 2007, Miller 2001, Steiner and Laws 2006, Lozano 2006).

Cross Collaboration Type	Description	Learning Style
Multi-disciplinary	Co-operation between various disciplines, where there are 'light' links between content and methodology of each discipline. No permanent relationship is created between the disciplines and autonomy remains.	Transmissive
Cross-disciplinary	Individuals acquire an understanding of the practices and methodological process from other disciplines, as it relates to their own discipline. This enables them to communicate effectively and work with these other disciplines to solve problems.	Experiential
Inter-disciplinary	Co-operation between a small number of disciplines that pivots around a dominant discipline. Involves a common problem, methodological approach and theories. Efforts are made to try to speak 'one language'.	Problem-solving
Trans-disciplinary	Holistic integration and homogenisation of disciplines around a common theme or problem. Co-operation takes place between other stakeholders involved as well as the discipline specialists. Co-operators share a theoretical understanding and an agreed interpretation of knowledge.	Transformative

The ideal is the trans-disciplinary model. However this is an aspiration and a difficult task as holistic integration requires compromise on all sides and the development of a language that moves beyond disciplinary nuances. These compromises may be so drastic that nobody's needs are being met. An acceptance of different perspectives while ensuring there is mutual learning is key to ensuring success in collaboration (Barth et al. 2007).

Unfortunately, as discussed previously, the notion of a trans-disciplinary approach in education, whilst it may be desirable, is rarely practised. Practitioners often fall back into their specific disciplines without recognising the need for a holistic approach (Clark et al. 1995). The key problem with this type of approach may be that the compromises are too great on both sides that neither feel their specific needs are being met. What is required is a means of highlighting the connections and interdependences that already exist between the disciplines and to find ways of building new connections that make sense to all participants. Being cognisant of the key concepts, the scope, limitations and complimentarity that collaboration may bring is crucial to successful co-operation. Warburton (2003) observes that a real opportunity now exists to find methods of bridging and reconciling the diverse voices and perspective in order to create a true cross-disciplinary approach that offers a variety of perspectives giving a vision of the whole.

2.6.6 Conclusion

There is no denying the need for collaboration between disciplines for learners to understand the systems nature of SD and to recognise the connections between the various stakeholders within this system (Huckle and Sterling 1996). In order to resolve any complex issues a variety of opinions and a diversity of skills are required to ensure the solution is both valid and viable.

The challenges of collaboration are evidenced as being far outweighed by the benefits it can bring. These include an appreciation of diverse perspectives; the ability to critically evaluate, synthesise and analyse these diverse perspectives; the capacity for change and ambiguity; more creative holistic and broader thinking abilities; increased humility and empathy; listening and communication skills and assuming responsibility whilst working together (Eagan et al. 2002). Research has even shown that it is in the struggle to deal with the complexity of collaboration that effective team work and the generation of innovative solutions lie (Denton 1997).

If collaboration is to be successful, compromises will have to be made and this stems from an understanding of and deep appreciation for other people's opinions and ways of working. Trans-disciplinarity offers learners new perspectives and opportunities for the acquisition of novel knowledge and skills, as well as the re-framing of their previously held beliefs and knowledge. Participation in this type of educational experience can develop core competencies that engage learners on a deeper more transformative level. *'Competencies are acquired not least by the restructuring of knowledge and new formulation of personal understanding based on experience, viewpoints and contexts'* (Barth et al. 2007, p.424).

Unfortunately the variety of 'language', voices and methodologies across different disciplines makes trans-disciplinary collaboration complicated. As a result collaboration is an often overlooked method of conveying the complexity surrounding Sustainable Development. By discussing the competencies required for effective cross-disciplinary collaboration we can see direct parallels with those required to undertake sustainability issues.

2.7 COMPETENCIES FOR SOCIAL SUSTAINABILITY IN DESIGN

Recent research conducted by a number of authors has begun to add depth to the discussion around competencies for sustainability and trans-disciplinary practice for sustainability. Most notably Wiek et al (2011) highlight the collective need for a coherent framework of competencies for application across sustainability education and research. They have attempted to amalgamate these into five competency categorisations: Anticipatory, Normative, Systems Thinking, Strategic and Interpersonal. These accompany the need for basic competencies in Critical Thinking and Communication that every rigorous educational program should incorporate. The most pertinent of these for trans-disciplinarity are the competencies that fall under the Interpersonal umbrella. This is the ability to motivate, enable, engage, negotiate, understand and facilitate collaborative and participatory research as well as solve problems. To do this successfully requires advancing skills in communication, leadership, empathy and holistic thinking (Ibid). Obvious overlaps exist between this Interpersonal competency and the German 'Gestaltungskompetenz' classification of *shaping competencies* or the capacity to act and solve problems (de Haan 2006). Through an educational programme that encourages innovative, participatory and collaborative learning the following competencies can develop:

→ Competency in foresighted thinking.
→ Competency in interdisciplinary work and learning.
→ Competency in cosmopolitan perception, transcultural understanding and co-operation.
→ Participatory skills.
→ Competency in planning and implementation.
→ Capacity for empathy, compassion and solidarity.
→ Competency in self-motivation and in motivating others.
→ Competency in distanced reflection on individual and cultural models.

(de Haan 2006)

Other authors concur that the trans-disciplinary model of education offers the basis of holistic and systems thinking required for successful sustainability integration (Parker 2010, Barth et al. 2007, de Haan 2006, Nagel et al. 2012). Collating the literature has allowed the generation of a tentative list of competencies that begins to paint a clearer picture of what social sustainability requires from designers. This is by no means a complete list nor at this stage has the literature offered any definitions as to what this means to designer behaviour and practice Figure 6.

Competencies for Social Sustainability in Design
Responsibility, Accountability, Responsibility, Openness, Empathy, Critical thinking, Dialogue, Communication, Pragmatism, Decision-making, Holistic Thinking, Understanding, Reflection, Creativity, Flexibility, Risk-taking, Acceptance of Diversity, Compromise, Negotiation, Sharing, Confidence, Judgement, Engagement, Investment.

Figure 6: Competencies for Social Sustainability in Design (Willard et al. 2010, Barth et al. 2007, Mochizuki and Fadeeva 2012, Parker 2010, McDonnell 2012, Wiek et al. 2011).

There is, unfortunately, a lack of evidential research as to whether the competencies put forward will actually impact on the success of sustainability research and practice. Similarly the research to date has provided little in the way of critical detail or operational descriptions as to how to implement and evaluate these competencies (Wals 2010, Parker 2010, Wiek et al. 2011, Scholz et al. 2006). In spite of the ambiguity there can be no denying the need for the competencies to move beyond a 'laundry-list' and into a realm of clearly defined interconnected and interdependent key competencies (Wiek et al. 2011).

2.8 CONCLUSIONS

The literature review in this chapter has allowed the threads of sustainability, design and collaboration to be drawn together. The review has shown that design and sustainability are not mutually exclusive paradigms (Nagel et al. 2012). Both transcend disciplinary boundaries and call for creative, participatory and innovative thinking in order to generate solutions to the complex issues we are faced with. These future solutions will have to be generated through a process of collaboration, collective knowledge, trans-disciplinarity, holistic perspectives and diverse cultural backgrounds. The competencies needed for this type of practice are based in the realm of Social Sustainability and require a shift in how designers are taught as students and will subsequently practice as professionals. If they are to be responsible, innovative and pragmatic, design students must develop the ability to think critically, tie together disparate strands of information, apply systems thinking, co-operate in co-design projects and also imagine and realise new ideas. The broader the diversity of information, practices and cultures the students are exposed to the more open their perspectives will be.

The key literature in the area concurs that higher education must play a critical role in developing these diverse and holistic learners who are capable of addressing the wicked problems presented by sustainability. Studying the literature has identified what differentiates sustainable design from other fields and what are the key competencies that designers need to acquire in order to meet the challenges it presents. The limitations in the information on sustainable design reveal that the tenets of economy and environment are being dealt with extensively in both practice and theory while the social elements are proving more difficult to define and measure. Clearly a lot of the problems stem from the lack of joined-up thinking surrounding our relationships with the environment, society and the economy (Parker 2010).

Whilst the current literature surrounding sustainability, design and collaborative learning acknowledges the necessity to move beyond descriptions and definitions, several gaps exist. Most notably these are *what* social sustainability means to design and the *how to* of moving the field forward. By closely examining the criteria for and characteristics of effective trans-disciplinary collaborations we can begin to see potential links between the practice of collaboration and the development of certain competencies for sustainable practice. There exists a need to cultivate a coherent set of skills and competencies that go beyond the traditional design skills and draw together the parallel paths of sustainability

(responsible practice) and design through educational changes. Although these competencies have been identified a practical way of transitioning from discussion to action still remains under-defined.

2.9 NEXT STEPS

The findings of the literature identify the potential that exists for designers to take up a key role in bringing about new solutions for a more sustainable future. However given the gaps that exist in bringing about a move towards practical realisation of these aspirations a number of key steps must be taken. These include meeting the definitional deficits that exist in relation to social sustainability in design. The subsequent studies also aim to identify and define what competencies are most relevant to developing capacity for social sustainability in design and how these can potentially be developed through collaborative projects. The following chapters will describe a number of studies undertaken to fulfil these key objectives.

3

Research Methodology

This chapter discusses the methodological choices and the research approach that was employed throughout the project in order to answer the research questions and meet the objectives of the thesis as outlined in Chapter 1. It justifies why an Action Research framework, framed in an anti-positivist context, was most appropriate for fulfilling the project aim and proceeds to outline the research methods used to plan, gather, collate and analyse the data across all four phases of the Action Research process. The chapter concludes by describing how the abstract research questions were practically addressed, in an effort to answer them throughout the project while still ensuring validity and reliability.

3.1 INTRODUCTION

Research is an interactive process that is shaped by our worldview, personal history and background. It can provide a deep understanding of situations, analyse and understand the relationships between people, places and objects, as well as uncovering behaviour patterns and habits by sharing, comparing and contrasting our realities (IDEO 2010, Koch 1998). It is conducted for a number of reasons, amongst them: to expand knowledge; to explore specific subjects in depth (existing or emerging); to evaluate theories (in either artificial or real contexts); to build and prove theories (exploration); or to produce findings of social value and significance (Gray 2009, Robson 2002, McNiff and Whitehead 2006). The latter two reasons are the best to explain the purposes of this research project. The primary focus of this research is to explore new perspectives in the field of Design for Social Sustainability. These new perspectives will form the basis of 'educational'[13] strategies which can then be implemented across a number of design based/driven situations.

The limitations identified through the literature review in Chapter 2 highlighted the need for additional studies to be undertaken. These studies not only needed to identify what social sustainability means to design but also to evaluate how collaborative projects could facilitate the development of core competencies for practising social sustainability. As such, the nature of the research undertaken in this project is open, iterative and seeks to identify and offer suggestions of how a pragmatic approach can be employed in the exploration of what are often complex theories (Figure 7).

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[13] Education in this context covers both the formal and informal spectrum.
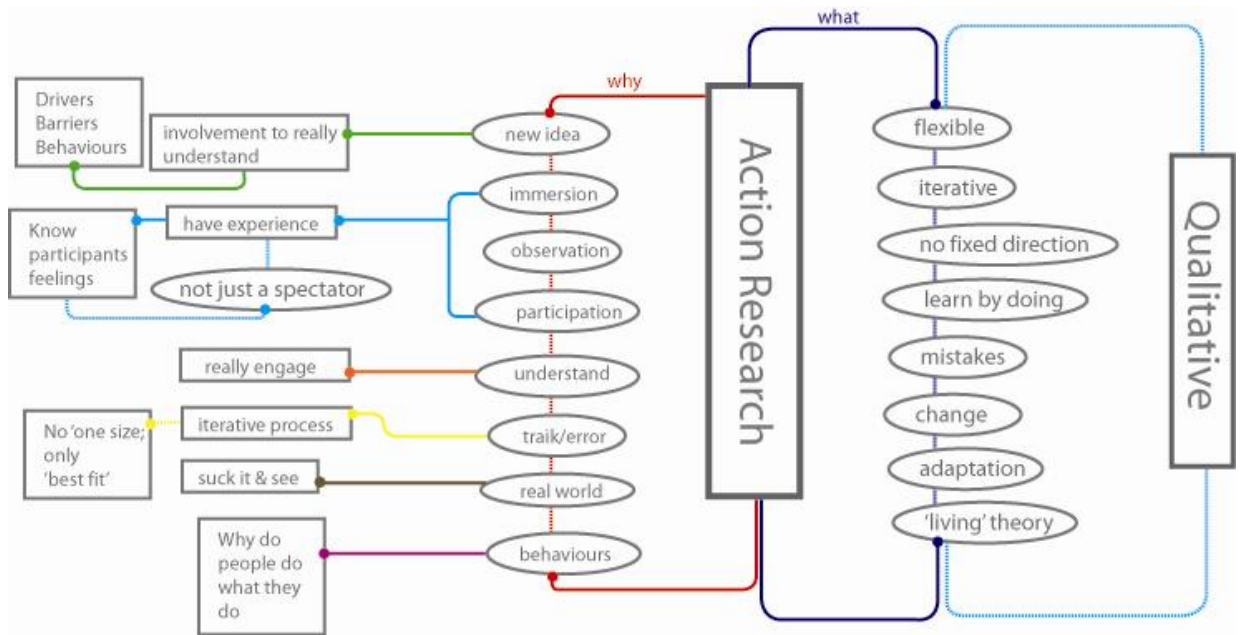
Figure 7: Research Approach

3.2 RESEARCH TYPES

There are typically two types of research: Fixed (Quantitative) and Flexible (Qualitative). Both types are discussed and described widely in the literature. In essence one (Quantitative) is a fixed method where a clear path is available to the researcher, in that they know what they are going to do and how they intend to undertake the project before they begin their fieldwork (Robson 2002). The results in this instance tend to be measurable and concrete (Russell Bernard 2000). Contrarily, the second (qualitative) is a non-linear approach where there is no clear objective at the outset, and the very act of researching forms the fundamental question (Robson 2002, McNiff and Whitehead 2006). As the questions evolve through the research this process allows for iteration and continuous development. While this may be somewhat simplifying the two processes, as there are crossovers between them at various stages in the process, but the need to go into depth with the explanation of these methods falls outside the scope of this particular project. When referring back to the thesis aim and objectives however, a clear logic to choosing the flexibility of the qualitative method emerges.

3.3 RESEARCH PARADIGM

The notion of integrating Social Sustainability into Design Education to date has been somewhat piecemeal and ad hoc and so the approach to research needs to be a flexible

one. The research path is not clearly defined and as such the theories will evolve and change as new questions are unearthed- the theory will effectively be grounded in the research. The method must be loose enough to allow for the 'fickleness' of human behaviour (e.g. the tensions that exist between the individual's motivation and ability to change) and the transformative nature (thus inherently complex and difficult to define) of the educational strategies that will be used. Both requirements necessitate space for iteration and continuous development in answering the research questions and fulfilling the objectives.

There are several different theoretical stances or paradigms under which research is conducted. The Anti-positivism paradigm recognises that knowledge is soft, personal, unique and subjective and that individuals are the creators and controllers of their own environments (Cohen et al. 2000, Robson 2002). People are deliberate and creative in their actions; they act intentionally and make meanings in and through their activities. This consideration is essential to bear in mind as the notion of Social Sustainability deals with personal interpretations of the issues involved and how each individual implements and resolves these issues depends on their unique perspective, worldview and experience. The recognition that there are multiple perspectives on any event requires that contexts and situations need to be interpreted in more than one way. And for these 'thick descriptions' to evolve collaborative project participants need to be studied in their natural settings whilst reminding ourselves of the contexts and backgrounds to the event (historical, cultural and societal influences). This research, therefore, can be described as *Anti-positivist* and is most appropriate for a number of reasons as detailed below (Table 5):

Table 5: Principles of Anti-Positivist research paradigm (from Cohen et al. 2000)

Principles of Anti-Positivist Research
Naturalistic settings are the principle source of data (in-situ research)
Thick descriptions (use more than one method of data gathering)
Data is socially situated, socially and culturally rich and saturated
Researcher is part of the researched world and is the key instrument of research (see 2.12)
Understanding others' understanding of the world.
Holism
Process more important that outcomes.
Data is analysed using language the participants understand.
Data is presented in terms of the respondents rather than researchers.
Data must represent the entire sample, cannot cherry pick results.
Seeing and reporting the situation and experiences through the eyes of the participants.
Catching meaning and intention is essential (must understand the specifics of the situation, background context etc.)

3.4 RESEARCH METHODOLOGY

Given the anti-positivist paradigm, the characteristics of the research approach and subsequent information gathering needed to include the ability to be immersive and flexible; to allow for the emergence of new ideas through the process; to have the opportunity for participation from the researcher; to accommodate a 'trial and error' approach and to provide deep understanding of the behaviour of all participants. It also needed to be firmly based in real world situations. On this premise Action Research was explored as a viable framework under which to conduct the research.

3.4.1 Why Action Research

An Action Research approach is deemed appropriate for a number of reasons. Action Research (AR) is used when people want to take action to improve their own or others' personal or social situations (McNiff and Whitehead 2006, Carr and Kemmis 1986). The

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process assists in real- world problem-solving by expanding knowledge and in linking theory to practice, in an effort to gain clarity on often complex social situations (Baskerville and Wood-Harper 1996, McKay and Marshall 2001).

The AR model also lends itself to situations where the researcher wants to evaluate, whether and in what way, their practice is influencing learning, either their own or other peoples' (Jupp 2006, McNiff and Whitehead 2006, Baskerville and Wood-Harper 1996). It is embedded in collaboration and does not involve researching 'on' other people; rather it is research by particular people on their own work, to help them improve what they do and how they do it (Cohen et al. 2000, Baskerville and Wood-Harper 1996, McKernan 1996). Thus, this approach can be employed in the design educational setting to discover how effective the learning for social sustainability is and what changes need to be made to deepen and develop 'studio' practice, in order to capitalise on the collaborative experience (Elliott 1991, Smith 2007). And, because Action Research focuses on studying practice from within the practice itself, it requires engagement from, and reflection on, the behaviour of all the participants (researcher and subject). This 'learning by doing' approach emphasises future improvements, system change, collaboration and group-work (Elliott 1991, Jupp 2006, Susman and Evered 1978).

From a cross –section of relevant literature the key features of Action Research are outlined in Table 6 below (McNiff and Whitehead 2006, M.K Smith 2007, Cohen et al. 2000, Elliott 1991, Riel 2010).

Table 6: Key features of Action Research

Key Features of Action Research
There is no need for concrete ideas and methodologies at the outset, these can develop and change over time.
It is a collaborative process (not an individualistic one) each participant's perspective, opinion and interpretation enhances the validity and depth of the outcomes/ results.
Research is conducted 'in – situ'
Allows for theories to evolve and form over time.
Flexibility to accommodate for changes in underlying strategies and in recognition that situations are changing and fluid.
Encourages continuous and iterative testing and development.
Accounts for unpredictability of persons and places under research.
Continuous feedback loops mean that mistakes are a valid part of the experience.
Evaluation, reflection and resultant practice changes are key.
New ideas can stem from exploring the initial idea, as one question is answered others can emerge.
Advocates being self-critical both within communities of participants and for the researcher..
Is dialogical and encourages discourse.
The outcomes are practical and usable by the participants.
Require collaborative participation to be most effective.

Unlike fixed research, Action Research is not just problem-solving, it is also problem-posing which is motivated by a desire to understand and change the world (Cohen et al. 2000). It is the problem-posing and solution–oriented approach that attracts design (particularly in this instance) to employ the Action Research model. Also, the emphasis that it places on turning research into action appeals to the pragmatic nature of designers as it allows for greater agreement between theory and practice.

3.4.2 How to do Action Research
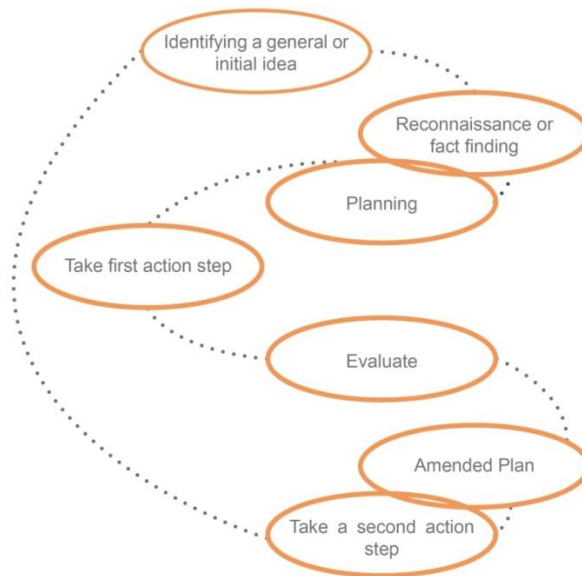
Figure 8: Action Research (image from Infed.com) (Smith 2007)

The flexible 'learning by doing' approach of Action Research leads to a cyclical or spiral process (as seen in Figure 8), with feedback loops informing change at all stages. The AR process has been described as the 'ITDEM Model for Action Research'(McDowell et al. 2008). A problem is identified (I), ways of addressing it are thought of (T), do the project (D), evaluate and interpret the outcomes (E), modify it (M) and begin the process again. Similarly Smith describes it as a continuous loop 'LTA cycle' (Look, Think, Act) (2007). All cycles, however are fundamentally the same and are based on a closed loop process of action-reaction-reflection- action with the emphasis on taking stock, critical thinking, reflection and the questioning of assumptions at every stage (McNiff and Whitehead 2006, Baskerville and Wood-Harper 1996, Carr and Kemmis 1986, Jupp 2006, Riel 2010).

Given the complexity of both social sustainability and the problems related to it, the iterative nature of Action Research in this instance has allowed for the study of the issues posed by attempting to understand and change designers practice (McTaggart and Kemmis 1995).This approach is highly relevant to meeting the project objectives, as it encourages the continuous implementation, reviewing and tweaking of the collaborative project process.

Figure 9 outlines the ITDEM model as it is employed for the overarching project structure. This process was repeated four times, with each iteration comprising the planning,

implementation and subsequent rigorous observation and reflection on the outputs of the collaborative projects.
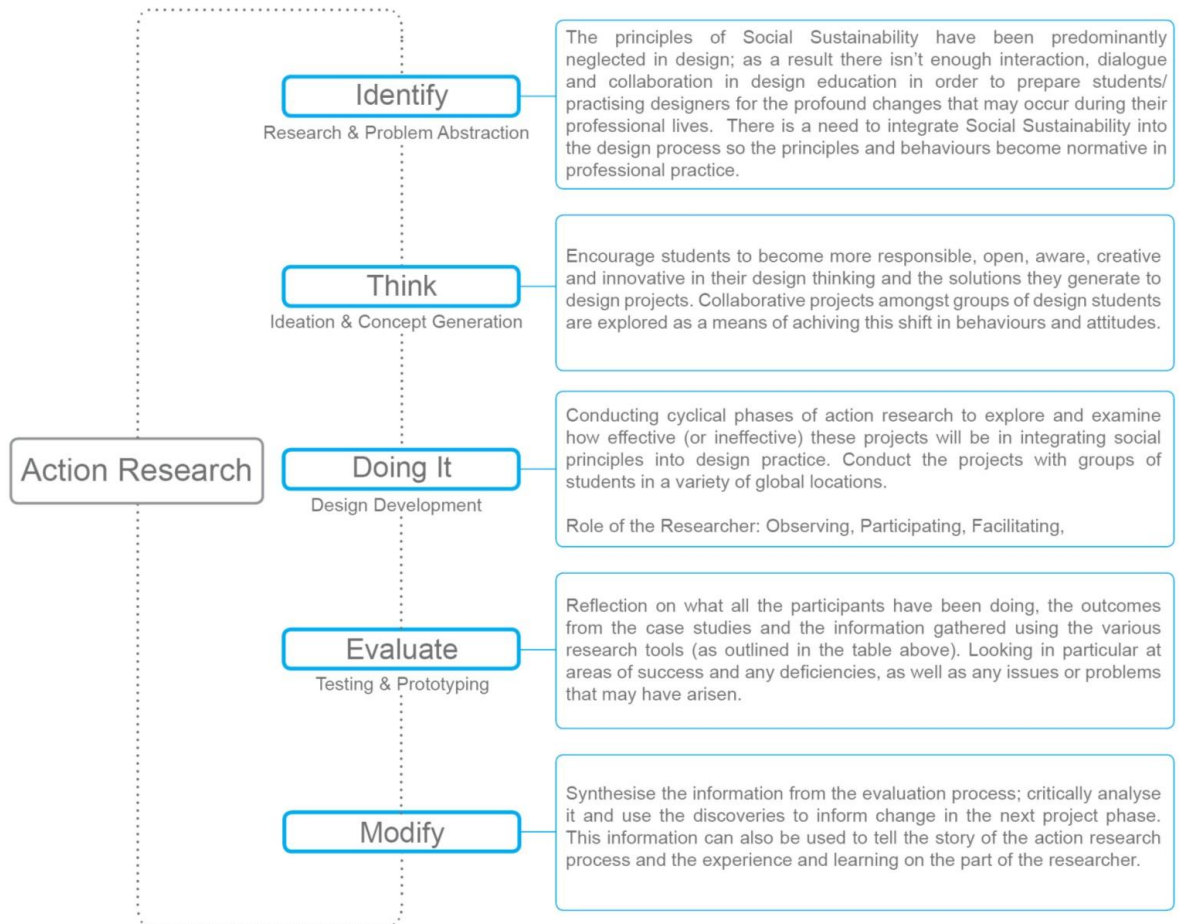
Figure 9: Using the ITDEM Model to describe the specific research approach (see Appendix C for larger image).

3.5 ACTION RESEARCH AND QUALITATIVE RESEARCH METHODS

Qualitative research simply put, places research in the real world and is concerned with why something happens. *'Qualitative methods can help unveil people's social, political, economic, and cultural opportunities and barriers in their own words'* (IDEO 2009, p.21). It is a naturalistic approach that understands and is sensitive to the 'person' and place under study (Creswell 2007). The flexible nature of qualitative research allows for ideas to change and evolve over the duration of the project (Robson 2002). The methods used with the majority of design projects are inherently qualitative, in that no fixed answer is available at the inception stages of a project and it is only through research, idea generation and development that a solution (or solutions) can emerge.

So why take this approach in this project? Qualitative research accepts that people bring their own perspectives to their study. This perspective (or worldview) comprises experiences and beliefs that underpin and inform a project (Creswell 2007). It is acknowledged that these beliefs will drive the approach a researcher takes to their project (ibid). The crux of this idea is that researchers come to a project with assumptions and knowledge that they use to build theoretical frameworks and interpret the information in their studies. Within the Action Research framework, these personal worldviews and prior assumptions have a large bearing, because the researcher is both an active participant and independent observer. McNiff and Whitehead (2006) describe the main assumptions underpinning the Action Research model and the importance of being keenly aware of these when employing this approach.

The epistemological assumptions of Action Research accept that knowledge is uncertain and that there is no single and correct answer. The acquisition of knowledge is a collaborative process and there may be contradictions in the various viewpoints of the collaborators. The ontological assumptions are that it is a value laden approach; the researcher is generally passionate about the topic and so their values guide the process. In this instance, it is important that the researcher be cognisant of not enforcing his/her values on the participants as s/he must be free to decide their own belief system. The social purpose of Action Research is to bring about change through good educational practice as well as facilitating people to take responsibility for and to reflect on their own behaviours and practices. The methodologies in Action Research tend to be open-ended and subject to iterative improvement. The researchers in this instance are agents of change and through continuous questioning and development, improved scenarios can emerge (McNiff and Whitehead 2006).

3.6 RESEARCH DATA GATHERING METHODS

The research methods generally associated with Action Research and the anti-positivist approach are all firmly based in the qualitative realm and include anecdotal conversations, participant observations (in situ) supplemented by field notes, non-directive interviewing, document analysis[14], episodes and accounts (in the form of focus groups and reflection sessions) (Cohen et al. 2000, Gray 2009, Bogdan and Biklen 2007). These methods marry well with the flexible nature of the Action Research approach, by broadening the

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[14] Documents in this project comprised video, audio, field notes and participant diaries.

researchers understanding of the participant experiences across the various phases, whilst also allowing for a design approach to be adopted.

When choosing the research methods it was necessary to choose more than one method at every data gathering stage to ensure the data can be triangulated and thus the approach is not only rigorous but also valid and reliable (see 3.9 for more on ensuring validity and reliability within the project).

3.6.1 Delphi Technique

The Delphi Technique was used to create a construct for what social sustainability meant to design. Given the ambiguity and often conflicting meanings in the literature, further research was needed in order to develop a construct that would be fit for the purpose of the thesis. A Delphi study is a participatory approach to decision making where through several rounds of questioning and analysis a consensual series of responses to particular questions are derived (Cohen et al. 2000). Chapter 4 describes the study and its results in detail.

3.6.2 Action Research Data Gathering Methods

The following sections and Table 7 below describe the various data gathering methods used during the four phases of Action Research. Not all methods were employed during each phase as specific methods were deemed most appropriate at the various phases. In each phase however, a number of methods were employed to ensure the data could be triangulated to ensure 'thick descriptions' and rich stories could emerge.

3.6.2.1 Observations

Observation involves the investigation and interpretation into long term behaviour of groups in their natural setting (Creswell 2007). Observations were employed across all four phases of AR because of its flexibility as a method. Observing the projects unfolding not only increased understanding of the situations as they occurred, it also helped explain the factors and driving forces behind them (Mamykina et al. 2002). This immersive investigation attempted to explain the interconnectedness and interdependence of individuals within the participant teams and how the project experience occurred in 'real-time' (Fetterman 1989).

Observations took place across all four AR phases and occurred at every stage of the projects. Structured observations took place at key project stages where teams were presenting their work. Informal observations took place during the individual team meetings and various workshops across all the AR phases. All of the observations allowed the researcher to 'step' outside the research and look at the situations objectively.

Observations were supplemented by anecdotal conversations between project participants and facilitators. These conversations are considered a valid data and offered an informal insight into the participant experience (McNiff and Whitehead 2006).

A number of the observation sessions were recorded on video and audio in order to allow for post analysis. The audio recordings were transcribed in full and transferred into NVIVO software.

3.6.2.2 Field Notes

Field notes were used extensively in all phases of Action Research and were written during observation sessions and shortly after to accurately document the events. These field notes contained the researcher's descriptions and observations on what had happened, as well as the researcher as 'observer' comments on insights, hunches, feelings that came to mind while observing the participants in situ (Cohen et al. 2000, Bogdan and Biklen 2007).

In addition to the researcher's own field notes the other facilitators in the projects took notes which were used as data sources- once again these contained details and observations on the participant's processes and the design outcomes. These additional notes were used to avoid reflexivity.

The live nature of field notes allowed for the recording of events as they occurred, whilst also enabling the researcher to make connections between these occurrences and also make parallels between participants across the previous AR phases. Field notes also served to stimulate critical thinking about what was occurring instead of simply recording everything verbatim. When words or circumstances occurred they were recorded and expanded on once the observation session had ended. This way the field notes were enriched by post event reflection on how and why the specific actions occurred.

3.6.2.3 Participant Diaries

In each phase the teams and/or individual participants maintained diaries for the duration of the projects. Within these the participants wrote about themselves and their team's

processes and project experiences (Bogdan and Biklen 2007). These descriptions are particular to an individual or team and allowed an in-depth look into how the project happened for that particular team. Diaries allow for on-going reflection as the descriptions of events as seen through the participants' eyes are recorded (Jupp 2006). The diaries also served as communication tools between team members where the participants kept their team-mates updated with their work progress, shared ideas, gave critique and feedback and posted work (see Chapter 5 sections 5.5.5.1 and 5.5.6.1).

The diaries in AR1, AR2 and AR4 took the form of Online Blogs generated and maintained by the entire project team. In AR3, the project diaries were hand-written individual reflections. Very little direction was given by the project facilitators as to how these 'diaries' should be maintained in order to allow for the spontaneous recording of relevant and usable data (Jupp 2006).

3.6.2.4 Questionnaires

The primary purpose of the questionnaires was to gather feedback from the project participants. The anonymous web based questionnaire format used in all AR phases, was decided upon in order to gather information quickly from the students irrespective of their location and to allow them to answer unbiasedly.

The structures of the questionnaires varied across the phases but all comprised a mix of three types of questions; simple yes/no, agree/disagree; summated rating questions based on a Likert-type scales - where students were asked to rate statements from 'Excellent' to 'No Benefit'/ 'Bit of hassle' and Open ended questions- where students could give more in-depth feedback if they wished (Robson 2002). It was decided to keep the language casual in all of the questionnaires to reflect the relaxed mood of the projects. The closed questions served to gauge the students' initial reactions and attitudes towards broad aspects of the projects. The open-ended questions afforded students the opportunity to provide more reflective and deeper feedback on specific areas of the projects.

The questionnaire in AR1 was completed post project, as was the questionnaire in AR3 (Section 5.6), these captured the experience and opinions of the participants. The AR2 (Section 5.6.3) questionnaire was delivered pre-project and two questionnaires were completed in AR4- one pre and one post (Sections 6.7-6.9). All of the questionnaires were subjected to pre-testing with a number of independent individuals to ensure clarity and relevance.

The closed nature of the questionnaires meant that other data methods needed to be employed to give a full understanding of the occurrences (Jupp 2006).

3.6.2.5 Interviews

Semi-structured interviews were held with a number (n=8) of the AR1 participants (see Appendix D for the questions posed during the interviews). This semi-structured format allowed for flexibility, depending on the interviewee and the direction the interview takes (Robson 2002). The information gathered during these interviews provided qualitative evidence of the subsequent impact the project had on their work (King 1994). The reasons for conducting the interview were to understand the experience of the participants, how they felt about both the subject matter and the collaboration element and also to see how the project has informed their practice since. It was decided to conduct the interviews in the same pairs in which participants worked for the project. This afforded the opportunity to assess the dynamic between the team members as well as understanding how they found the international collaborative element of the project.

These interviews were recorded on both video and audio and were subsequently transcribed (Appendix D).

3.6.2.6 Focus Groups

This group interview method was used to learn about the thoughts and experience of the individual participants as well as the interactions between the group members (Jupp 2006). Focus groups were also used to provide a glimpse into the dynamic between the members of the local team, the different methods of communicating that they use in their interactions which included jokes, anecdotes, teasing and arguing (Kitzinger 1995). The group discussion within the sessions also encouraged the participants to share and compare their thoughts on the project. The focus group model allows for the expression of unsolicited views both positive and negative which is something that was required to get an accurate representation of the experience (Gray 2009).

Each team had a completely different experience with the project and in order to build a rich narrative the participants needed to give specific examples of exactly what happened when they were discussing these experiences. Probing questions and cues were used to get them to explain things in more detail where necessary[15]. Arguments and critical comments were encouraged, from the very good to the very bad. The arguments were used to

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[15] See Appendix E for focus Group facilitator notes.

encourage participants to clarify their point of view and why they think the way they do (Jupp 2006).

A visual representation of the with the project stages was used at the start of the focus group to relax the participants and to initiate the discussion. The participants were asked to visually represent their collaboration process on the timeline and to use it to pinpoint when the process was going well and when their team was struggling.

Once again the focus groups were recorded on both video and audio in order to ensure reliability in analysis.

3.6.2.7 Reflection Sessions

Reflection sessions were held with each project group one week after the project ended. The sessions, lasting an hour each, served to elicit the 'inner dialogue' of the participant experience in smaller groups. These inner dialogues told as stories brought to light people's interpretations of events and decisions and often deal with issues that can't be discussed in official forums (Bushe 2005). The stories were collectively discussed in order to create new, generative ideas or images that aided in the developmental change of the collective discussing them. The post project reflection sessions in AR4 drew on the participatory approach of Appreciative Inquiry [AI], as this has been found to be useful in collaborative situations (Gardener 2005).

> 'Appreciative Inquiry (AI) suggests that we look for, and focus on, "what works well" in a group, or organization. When we look for problems we find them. When we look for successes, we can find those, too. By studying the problems, we learn what "not to do." By building on successes, we already know what works; and we need to learn how to build upon those successes for the future'.

> (Msukwa et al. 2003, p.19)

AI is positive in its approach and differs from problem solving because it focuses on previous successes, and as such, how to build on them for future success and positive change (Cooperrider and Whitney 2001). Problem solving looks first at problems and then explores for solutions; AI on the other hand suggests looking at what works and focuses on the ideal scenario. The stories gathered through AI were grounded in real experiences and the participants were encouraged to relate their experiences through positive stories (Hammond 1998, Cooperrider and Whitney 2007, White 1996).

The facilitator, in this instance, was an independent individual based outside the project and had no prior link to the research. This ensured the participants could be honest and open in their discussion without influence or direction from the project facilitators. During the sessions the facilitator acted as a guide bringing the participants through a number of open, unstructured questions and offering cues to expand on interesting topics as they arose (see Appendix F for Facilitator notes).

Table 7: Data gathering methods

Data Collection Method	AR1	AR2	AR3	AR4
Observations	X	X	X	X
Field Notes	X	X	X	X
Participant Diaries	X	X	X	X
Questionnaires	X	X	X	X
Interview	X			X
Focus Group				X
Reflection Sessions				X

3.7 ANALYSING DATA

As there is no single way to analyse data resulting from qualitative studies, it was decided for the purposes of this research to assign a 'best fit for purpose approach' (Cohen et al. 2000). The first step in the data analysis was to define the purpose of the analysis. Given the Action Research approach, analysis of the data was undertaken in order to understand the individual and idiographic features/ behaviours of the project participants in order to build a collective understanding of the projects. Each phase of Action Research was analysed once the project was completed, so that the evaluations would drive modification in the subsequent phase. While the analysis allowed the development of theories from each individual phase, it also served to understand the differences and the similarities between the four phases.

3.7.1 Preparing the data

The second step in the data analysis process was the organisation of the data (Bogdan and Biklen 2007). The formats varied across the four phases of Action Research and for convenience and manageability, all of the data was imported in an NVIVO database and arranged according to AR phase. The audio recordings were transcribed and the web-based information, field notes and participant diaries formatted into summary sheets. All of the data was reviewed and sorted through to identify the initial patterns or codes.

3.7.2 Analysing the data

The data was analysed using a Grounded Theory Approach. This inductive method allows for theories to emerge as the data is collected, explored and interpreted (Robson 2002). Grounded theory as an analysis style has direct comparisons to the Action Research process, as it encourages several visits to the field of study (phases of AR) with analysis between each of these 'visits'. The data within each AR phase was reviewed initially to allow a small number of Open 'a priori' Codes to emerge (Robson 2002). These codes were reviewed and comparisons and similarities were drawn between the various data sources in the specific AR phase (Ryan and Bernard 2012).

The data was coded further into Axial Codes, consisting of codes and sub codes, to identify the connections between categories and understand the context in which the instances occurred (Gray 2009). Finally the data was analysed again and re-organised into Consolidated Coding to identify specific events or occurrences (Ratcliff 2012). These consolidated codes were modified into abstract concepts and the theories were built by drawing a logical scheme from the arrangements of the concepts. The theories evolved as new concepts emerged (again this is drawn from the data) in continual, iterative cycles (this fits the AR cycle) (Susman and Evered 1978, Robson 2002). Negative cases that refuted the theories were also considered, as these cases necessitated modifying the theory so that it was more robust and valid (Jupp 2006, Barbour 2008). This logical scheme was then used to build the narrative for the evaluation and modification stages of the four Action Research projects.

Analytical memos were used throughout the coding process to allow for continuous reflection, commenting and theorising (Gibbs 2007).

A detailed account of the specific coding analysis used in each phase of AR can be found in the Evaluation sections of Chapters 5 and 6.

3.8 VISUAL REPRESENTATION OF DATA

Given the quantity and depth of the qualitative data gathered across all four phases of AR the task of communicating the findings in an accessible way became an integral part of the analysis process. This proved to be of key importance in AR4 when thick descriptions of each participating teams experience emerged. Once the data was coded and analysed from the various sources (as described in 3.6.2 above), collective stories of each project team could be created. In order to convey these stories, a visual timeline was created for each team that mapped their project journeys and pinpoint the particular junction at which the story occurred in the project process. Examining these critical junctions in a visual way allowed for the easy identification of when and how the competencies emerged in each teams' process. Figure 10 below shows the development of the visual timelines from the initial coded data through the building of collective narratives and the identification of the competencies.
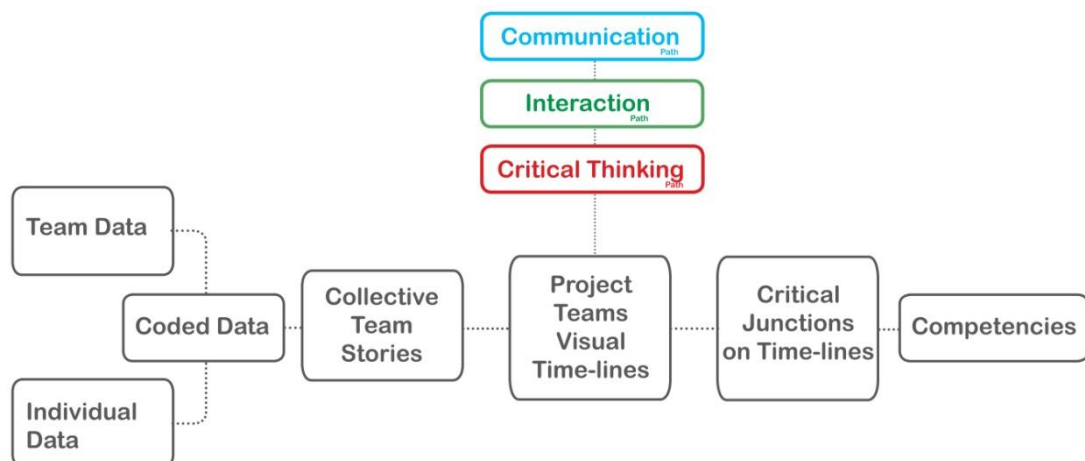
Figure 10: Development of the Visual Timelines from the coded project data

3.9 SAMPLE GROUPS

Being able to define and specify the size of the sample population can be difficult prior to beginning a flexible study. The general consensus is that sampling continues until a 'saturation' point is reached and no new information is revealed in the studies (Robson

2002, Creswell 2007). Qualitative methods allow for a smaller sample size of people to be studied but the information gleaned needs to be richer and deeper (Cohen et al. 2000). Given that the aim of the research focuses primarily on designer behaviour in relation to social sustainability, the core sample of participants in the four phases of Action Research comprised undergraduate design students, or students in related fields undertaking design based projects. The project tutors in the partner colleges made up the remainder of the sample group.

The necessity to gather groups of diverse participants was highlighted in the literature review and on this basis the research population came from a cross-section of undergraduate students (and their tutors) from different disciplines and geographical locations. The diversity of location and disciplinary situations offered a mix of cultures, traditions, practices and experiences not offered in a single location or discipline. Due to labour intensive data gathering methods and the external factors (such as academic calendars, availability of students, time constraints, limitations of technology and materials)- the sample size was small (Simpson and Tuson 2003, Robson 2002). Given these relatively small sample sizes it was necessary to be cognisant that generalisations couldn't be readily drawn from such a group.

Prior to beginning the studies consent was gained from the participants to record and use their conversations, presentations, design work, diaries and blogs from the project (see Appendix G for copy of consent form). It was made clear to the students that the information being used and analysed through the research was NOT the work that was being marked or graded. To overcome 'conflict of interest' the work was double marked for objectivity by another course tutor not involved in the project.

3.10 AVOIDING BIAS

3.10.1 The role of the Action Researcher

The role of the Action Researcher is as a facilitator, guide, formulator and summariser of facts (Cohen et al. 2000). All Action Researchers are advised of the importance to reflect on their own learning experienced during the project as well as on their actions and findings (McNiff et al. 2003). There will be two processes at play in this project; 1- the action of conducting the research studies with the student groups, collating and analysing the

findings and 2-the act of learning from being involved in the process on the part of the researcher. This learning forms part of the inherently personal and reflective journey of this research work and led to the iterative generation of theories. The theories derived could potentially inform future teaching and practice in design '*Your actions embody your learning, and your learning is informed by your reflections on your actions*' (McNiff et al. 2003, p.50)*.

In all the 4 phases of Action Research, the researcher was an integral part of the research process and the projects undertaken. This role involved the researcher planning, implementing and subsequent analysis of the outcomes. This 'participatory' role was chosen as the preferred method of Action Research because the researcher worked closely with the project participants as both a lecturer and project tutor.

3.10.2 Reflexivity

With the Action Researcher immersed heavily in the project another consideration particular to the project was that objectivity can be lost (Robson 2002). The delicate balance of involvement and separation was the key to ensuring validity and reliability of the outcomes of this research. The notion of reflexivity within the AR projects acknowledges that it was impossible for the researcher to remain 'outside of' the subject matter when conducting the research (Nightingale and Cromby 1999). Reflexivity urged that account be taken of the personality and presence of the researcher in the process and explored how this involvement could influence and inform the research (personal reflexivity).

Given the researcher was both a designer and an educator, certain values, attitudes, perceptions, opinions, actions and feelings impacted on the situations being studied (Cohen et al. 2000, Ryan 2005, Nightingale and Cromby 1999, Robson 2002). Overcoming or acknowledging this required self-examination resulting in self-improvement; the researcher remaining objective when necessary -not influencing behaviours or outcomes during data collection or analysis; taking the 'outsider stance' when necessary within the projects and employing independent perspectives (through the Delphi Study) to develop robust project constructs (Ryan 2005).

The researcher also accepted that s/he may change his/her personal perceptions and opinions over the course of the four phases of research. Cohen (2000) advises that the participant, as both researcher and practitioner, needs to subject him/herself to similar

scrutiny as s/he applies to the other participants and, to do this, the 'successes' as well as the failures were acknowledged within the planning and implementation stages of Action Research.

3.11 VALIDITY & RELIABILITY

The majority of literature cautions that one single research method cannot provide a comprehensive qualitative study (Robson 2002, Gray 2009, Russell Bernard 2000, Barbour 2008). Combining methods proved to be the most effective way of gathering a broad base of information generating 'thick descriptions'. The data was then triangulated to ensure validity and reliability within the findings (Bogdan and Biklen 2007). Like the Gestalt theory in Art and design which states that, 'The whole is greater than the sum of its parts' every action or communication must be taken as a part of the whole phenomenon of a certain community or culture. It was intended that combining the data gathering methods and undertaking rigorous analysis of the data provided a holistic perspective of the projects. And by offering a thorough understanding of the experiences of all participants, as well as the underlying drivers for their behaviour and the learning that occurs during the project, concrete theories have emerged.

Peer auditing between the tutors on the four projects (of which the researcher was one) and other design tutors who were not directly involved in the projects, also helped to ensure the instance of reflexivity was minimised.

Validity and Reliability was attained by employing the following procedures (Cohen et al. 2000, Robson 2002, Barbour 2008, Jupp 2006):

Table 8: Achieving Validity and Reliability

Achieving Validity and Reliability
Triangulation of methods, sources, investigations and theories.
Persistent observation 'in-situ' or 'in-vivo' examined participant behaviours in natural environment. This provided data/information as well as presenting an understanding that could only be gained from being 'on location'. Must understand the context, history and background in which incidence and experiences occur.
Interpreted and understood observations through 'participant eyes' (focus on interaction and language used in the studies-not the researcher's voice- hermeneutics).
Peer Debriefing- asked peers to review data collection methods as well as project outcomes to overcome potential bias. Colleagues were asked to review the projects during the planning stages. Design outcomes, that were being assessed, were double reviewed by another colleague to ensure objectivity of the researcher and to avoid bias from the participant perspective.
Negative case analysis-thoroughly explored cases that disproved the theories being explored- this ensured thoroughness and honesty and a holistic view of the issues.
Honesty, richness and depth of data that represented the entire sample (even if some perspectives may be negative) and the multiple perspectives/realities that exist.
Addressing reflexivity (both personal and epistemological).
Adaptiveness and flexibility- willingness to shift if unanticipated outcomes occurred.
Used respondent's voices- presented data in terms of the respondents rather than the researcher.
Member checking - offered participants the opportunity to add further information by returning to them with results and interpretations once the phases were complete.
Audit Trail- maintained a full record of activities while carrying out the studies and analysis.
Ensured that meaning and intention were captured accurately and maintain through the transcription and interpretation of the data.
Independent external facilitators were used in a number of the data gathering methods (in AR4) to ensure there was no researcher bias and to allow participants to be open and honest in their responses.

3.12 CONCLUSIONS

This chapter has outlined the research methodology, of Action Research framed in an Anti-positivist context, underpinning the project and how the related data gathering and analysis methods have served to fulfil the aim and objectives. Details of how validity and

reliability have been provided including specific information on dealing with the complexity of reflexivity within the AR framework. The following chapters give detailed accounts of the Delphi Study and the four cyclical phases of Action Research.

4

Social Sustainability in Design: A Delphi Study

This chapter outlines the planning, implementation and analysis of a Delphi Study comprised of three rounds of interrogation and analysis with 21 experts from around the globe. Each of the three rounds is described and explanations follow, on how the results and analysis from each round informed subsequent rounds and the eventual outcomes. From the Delphi a construct for Social Sustainability in Design was formed that will be used for the purpose of the thesis, as well as a framework for use in the planning and evaluation of the final phase of the Action Research Process.

4.1 BACKGROUND

The reason for conducting the Delphi study (within the larger research project) is due to the lack of a consensual definition for social sustainability within design. And, as such, there was difficulty in finding a suitable construct for the purposes of the research project. The literature review not only identified gaps in knowledge; but it also highlighted that disparity existed between understandings of what social sustainability meant to design (and the skills necessary to effectively implement it through design work), leading to a narrow and unrefined definition. Moving from the literature review and into the Phases of Action Research both Objectives 2 and 3 of the research outlined in Chapter 1 remained unaddressed. In order for the phases of Action Research to be formed on a valid and reliable 'definition' of social sustainability in design, further research was required. This research aimed to clarify both the construct for social sustainability (within the context of this research) and identify the core competencies designers may need, to practise sustainability. This fulfilled the following key objectives:

Objective 2: To define what social sustainability means to Design.

Objective 3: To identify the key competencies necessary to integrate social sustainability into design practice.

And answer the related Research Questions:

→ How can designs role in social sustainability be 'defined'? (Objective 2)

→ What are the competencies necessary for designers to practice responsible design? (Objective 3)

→ What is the link between collaboration and these competencies? (Objective 3)

The Delphi method can be used to develop causal relationships in complex social phenomena or when a problem doesn't '*lend itself to precise analytical techniques but can benefit from subjective judgements on a collective basis'* (Linstone and Turoff 2002, p.4).By collating the written responses of a group of experts a wide range of knowledge is gathered in an effort to reach consensus on an area where there is incomplete knowledge (O'Neill et al. 2009, Skulmoski et al. 2007, Landeta 2006, Wicklein 1993). The Delphi method allows for a group of individuals, related by discipline, to collectively deal with a complex problem (Linstone and Turoff 2002). It is seen as an effective, successful and efficient tool for problem-solving and gathering current data not accurately known or available (Skulmoski et al. 2007, O'Neill et al. 2009). The method also prevents reliance on one point of view, because it amalgamates the perspectives of a number of individuals under one combined outcome (O'Neill et al. 2009).

The need to conduct further primary research became apparent following the literature review to find a consensual understanding of social sustainability in design. After exploring a variety of research methods (including interviews, questionnaires and nominal group technique) a Modified-Delphi method was identified as the most appropriate means for the following reasons (Cohen et al. 2000, Landeta 2006, Martin et al. 2008):

→ It can harness the expertise of a variety of experts from around the globe without requiring any travel.
→ It gathers perspectives of experts and those practising in the field.
→ It allows for construct definition validation.
→ The recommended sample size for Delphi is relatively small (between 10-18 members).
→ It ensures privacy (the names of the expert panel are known only to the researcher).
→ It clearly identifies areas of consensus and dissent.
→ It uses an iterative process (comprising 2/3 rounds) where continuous feedback between rounds ensure that a valid consensus can be agreed with which all participating experts are comfortable.
→ It eliminates reflexivity on the part of the researcher as their own bias is not influencing the outcomes. The researcher is merely collating and analysing the results- the participants will ultimately decide on the final statements.
→ The feedback is controlled so all irrelevant information can be eliminated quickly (Landeta 2006).

Choosing the modified method, over what is termed as the '*traditional Delphi'* can be justified by a number of reasons. Firstly traditional Delphi studies begin with an open-ended questionnaire which is time-consuming and ambiguous in nature as it is often too broad in scope (O'Neill et al. 2009). Also, the researcher had a pre-established set of competencies to present in the first round of the study (derived from existing literature) thus providing a more structured platform from which to begin. This not only drastically reduces the time for the study, by cutting out the time required for collating the first set of results, but also assures that the most relevant and important topics are being dealt with from the offset.

4.2 PLANNING THE STUDY

The first step in planning the study was to compile a list of experts. Research has argued that this is in fact, the most important stage of the process, as the choice and participation of the experts determines the quality of the outcomes (Okoli and Pawlowski 2004). The experts were divided into three relevant categories:

→ Academics (particularly in product/industrial design);
→ NGO's (involved in Social Innovation and design projects[16]);
→ Design Practitioners (those working professionally in the design industry).

These groups offered different experiences and opinions on the topic which was essential for gaining a well-rounded perspective. A small number of experts, known to the researcher, were contacted first and they were asked to nominate more experts, employing the 'snowball effect' (Skulmoski et al. 2007). The panellists were from a diverse range of international locations to reflect the international element of the project, and to provide a truly global definition of social sustainability in design.

4.3 ENSURING SUCCESS

The success of the study is dependent on a number of factors: choosing the correct experts with relevant expertise and who are willing to take part (see section 4.4 below); timing; communication and clarity of information. To ensure success the first round content was sent on the day the experts are asked to participate to ensure no time elapsed between agreement to participate and commencement of the study. The experts were also provided with a context for the study so they would know why and what the study was being conducted for and why they were asked to participate as experts.

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[16] To accommodate a co-design approach.

Gaining commitment from the experts required being up front about: the premise for the study, the time required from the panellists, recognising their efforts after and during the study. Wherever possible the experts were invited to participate following a face to face meeting or a telephone call (Hsu and Sandford 2007). In order to ensure participation from the highest number of invited experts a brief over-view of the project was presented and the commitment expected from them explained in detail (timings- length of the study, time between rounds, duration of the questionnaires etc.). Feedback was provided between each round of the study so the participants could revise their opinions and add more depending on the outcomes from the previous rounds. This ensured the experts were invested in every round of the study.

Prior to sending out the material for each round it was pre-tested on a small sample to try to eliminate any potential issues that may occur (e.g. misinterpreting the questions, not providing enough information or any syntax mistakes). Email was used as the communication tool for the process, as this allowed for quick feedback and instant contact with the panellists irrespective of their locations.

4.4 THE EXPERT PANEL

4.4.1 Knowledge Resource Nomination Worksheet (KRNW) [Appendix H]

The experts chosen to participate must have fulfilled as many of the four criteria as possible. A minimum of two criteria was expected.

1. Experience in design (professional practice and/or design education).
2. Understanding of sustainability.
3. Recognition in Design/ & Design Education/ & Education (validated their expertise).
4. Experience of collaborative work.

The expert panel comprised of a global geographical spread (from Asia, South and North America, Continental Europe, the UK and Ireland) to reflect the international nature of the project. The spread was as wide as possible taking into account language and the practical issues that may occur- such as access to experts and their willingness to participate.

Throughout the study, the identity of each of the experts was kept anonymous to the other participants. This was recommended to avoid 'competition' or conflict and to ensure the responses were impartial and based on the individual's opinion, without influence from others (Hsu and Sandford 2007).

4.5 ROUND 1

4.5.1 Structure for Round 1

The questionnaire comprised two sections. The first was a list of twenty-four factors, derived from the literature review. The experts were asked to:

1. **Rate the factors listed, as you deem them to be important to Social Sustainability in design.** This was subsequently changed to a Likert-type scaling system during the pre-test (see below).
2. **Rate your own degree of knowledge of the particular factor (high, medium or superficial).** The experts were asked to do this as a means of self-assessment, where their answers could be used to weight their responses to the perceived importance of the factor (Landeta 2006).
3. **Provide any other factors that you consider important (but are not on the original list).**

The second part of the questionnaire comprised an open ended question. The panel was asked to respond to the open-ended question, **'What do you think Social Sustainability means to design?'.** The original question was to be phrased as either '*Define Social Sustainability with respect to design practices*', '*What do you think Social Sustainability means to design?*' or '*What is social sustainability in design?'.* It was decided to use the '*What do you think Social Sustainability means to design?*' version, as it was the most open, whilst still being specific to the key issues.

The experts were asked to send their response two to three days after they have received the content. If a non-response was experienced, a reminder email was sent a number of days later. The follow-up email resulted in all of the experts (n=21) completing the questionnaire and promptly returning it.

4.5.2 Pre-Test

The questionnaire was compiled and three experts (outside the panel) were asked to complete the questionnaire with a view to highlighting any issues they had with it (Landeta 2006). Feedback was then given and the questionnaire was modified based on this. The feedback resulted in changes to the terminology used in the factors to avoid ambiguous interpretations. The revised questionnaire was then shown to three further independent individuals (one of whom had participated in the first pre-test). Consequently the format for the overall questionnaire was changed and the rating scale changed to a Likert-type rating to make the completion process easier for the respondents. Likert-type rating scales

allow for respondents to rate their attitude towards the specific factor (Algozzine 2002). The rating scale ranked from 1-4 (1: Essential, 2: Desirable but not essential, 3: Slightly useful, 4: Irrelevant). No mid-point was used, as the researcher felt it would yield better results if the experts had to decide how important the factor was, without having the option of a neutral point at the centre. The experts then rated their own level of familiarity on a similar Likert-type scale comprising 3 points (1: high, 2: medium, 3: superficial). The final version of the Round 1 questionnaire can be found in Appendix I.

4.5.3 Results of Round 1

A list of forty experts was compiled whom the researcher felt fulfilled the criteria outlined in the KRNW. The credentials of the potential experts were reviewed along with their geographical locations to ensure there was a wide a spread as possible. These were then rated as to their level of knowledge to the researcher. A number of the potential experts (with whom the researcher had a high or medium relationship), were asked to recommend experts who, they felt, would add to the study (Skulmoski et al. 2007). All of the potential panel were ranked against the KRNW and the top thirty three contacted to participate (in the hope of getting a positive response from a minimum of 16). Email was used as the communication tool for the process, this allowed for quick feedback and instant contact with the panellists irrespective of their locations. Twenty-one of the contacted list responded and completed the first round of questions; the 63% can be claimed as a highly successful response rate[17].

4.6 ANALYSIS OF ROUND 1

4.6.1 Question 1

The results from question 1 (closed question structure) were collated and analysed. The closed question answers were arranged according to the relevance of the factor (Figure 11) and the knowledge level of the expert (Figure 12). In Figure 11- Figure 13 below, the factors appear with the highest ranked factors receiving the lowest score and the lowest ranking factors receiving the highest score(1= high, 3/4= low). Figure 4.1 shows the level of relevance from 1-4 (1=highly relevant and 4= not relevant) of the twenty-four factors averaged over the twenty-one respondents (n=21). In Figure 12 the levels of knowledge of

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[17] 19 of the original experts completed the three rounds which afforded the study stability in its results.

the experts were averaged over the respondents. Where there was a non-response with a question, the product (Knowledge X Relevance) was averaged over the number of remaining respondents.
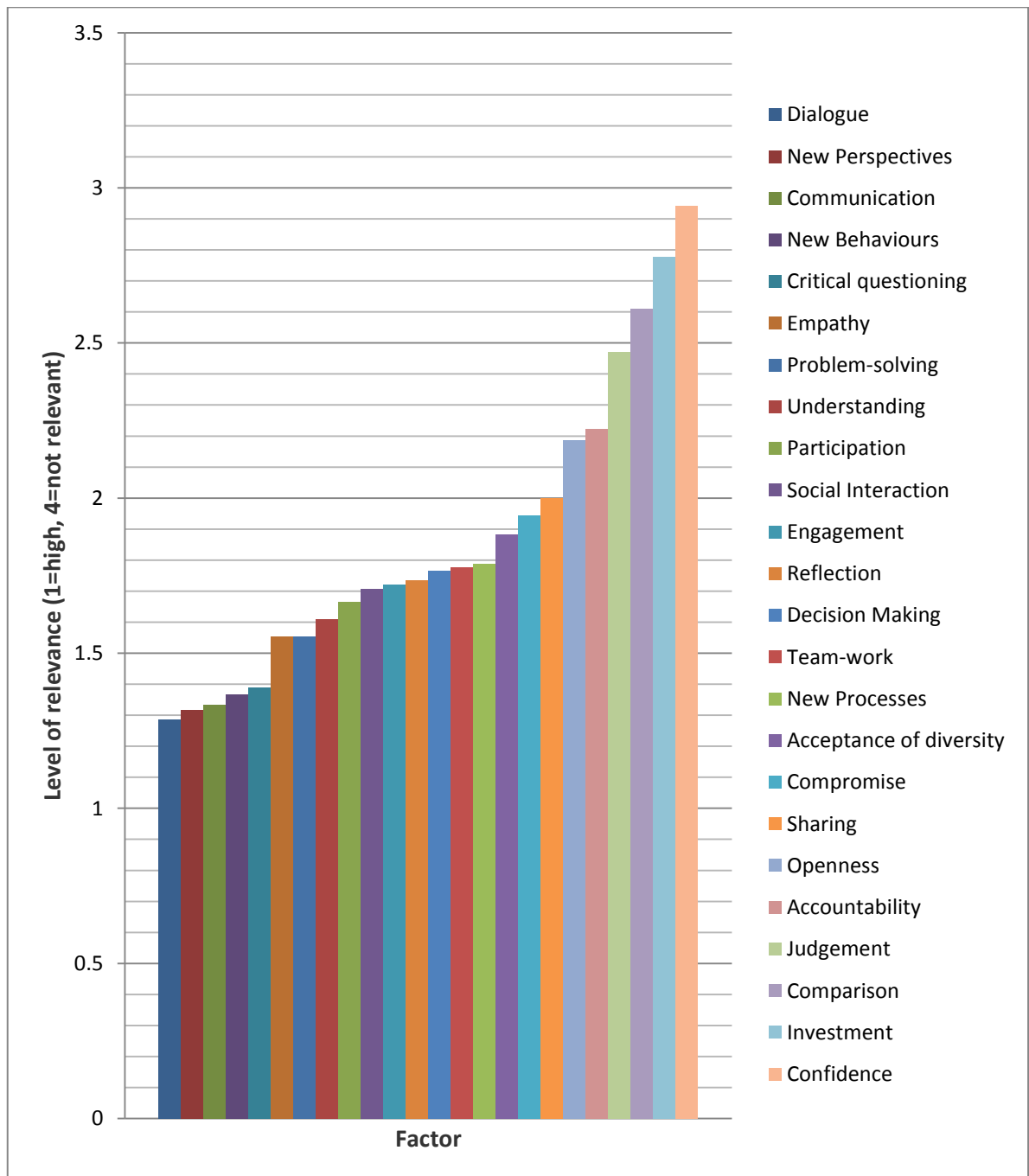
Figure 11: Level of relevance of competencies to social sustainability for design (1: Essential, 2: Desirable but not essential, 3: Slightly Useful, 4: Irrelevant).

In both Figure 11 and Figure 12 Judgement, Accountability, Comparison, Confidence and Investment appear in the highest six on the list of twenty-four. This means the experts not

only viewed them as 'not relevant' to Social Sustainability in design, but also rated their own level of knowledge as superficial in relation to the specific factors.
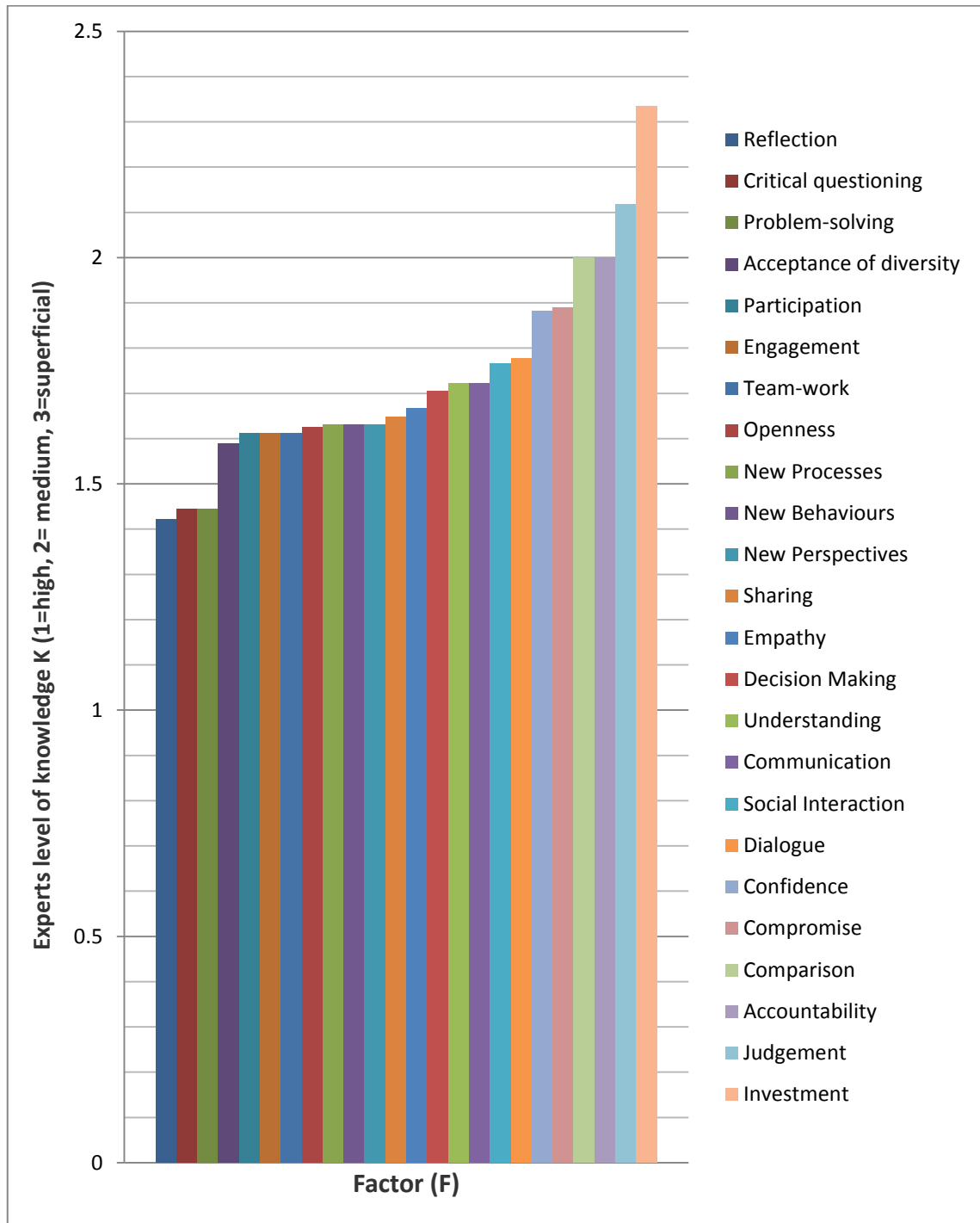
Figure 12: Experts level of knowledge of factor (1: High, 2: Medium, 3: Superficial)
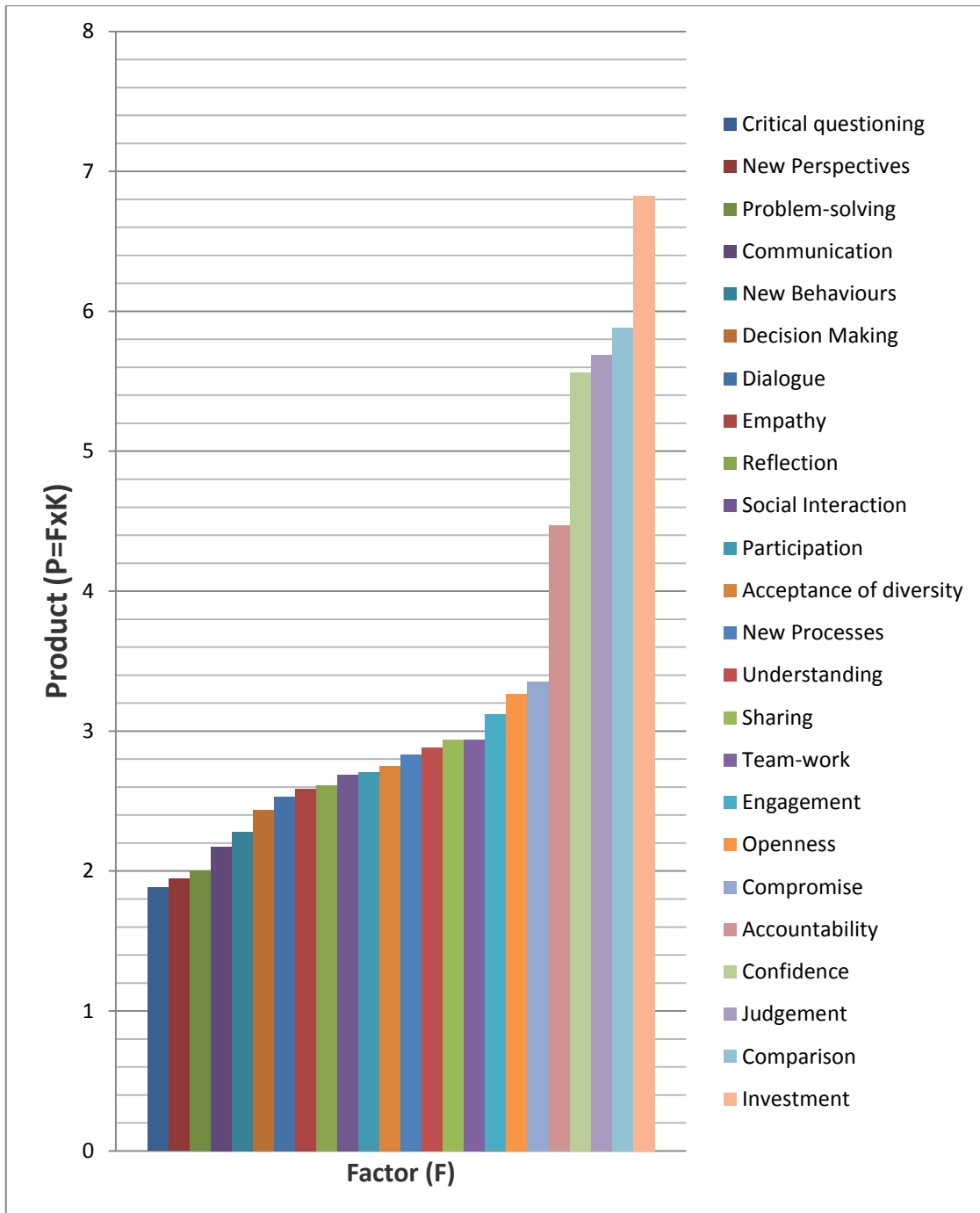
Figure 13: Product of relevance of factor X knowledge level

The knowledge level was converted to a scale **(1: High, 2: Medium, 3: Superficial).** The product (P) of the rating the experts applied to the relevance of each factor (F) **(1: Essential, 2: Desirable but not essential, 3: Slightly Useful 4: Irrelevant)** and their own level of knowledge (K) was calculated (F x K=P) [Appendix D]. These results can be seen in Figure 13. The product results were averaged across the number of respondents (n=21). The factors were then re-organised in order of importance-with any ideas over 1 above the mean

eliminated from the list (mean=3.26). This resulted in five factors being eliminated from the list (Accountability, Confidence, Judgement, Comparison and Investment).

The new factors given by the respondents were analysed and any answer appearing twice or more was added to the main list. The other factors were analysed for commonality (similar meanings and themes) and these were assessed against the existing factors. 'Humility' and 'Humour' were both added to the list of factors for Round 2.

Interpretation: On average the experts had a high to medium level of knowledge of the factors as can be seen in. Figure 12 Experts rated the factors they had high levels of knowledge with to be of the highest relevance. Definite trends emerged in the ranking of factors. Similar factors were marked as relevant and the majority of experts viewed the same factors as having little or no relevance. This meant that the irrelevant factors could be eliminated (Accountability, Confidence, Judgement, Comparison and Investment). The revised list of competencies was arranged into a diagram under the category headings of Capacities; Ideas and Skills (Figure 14).
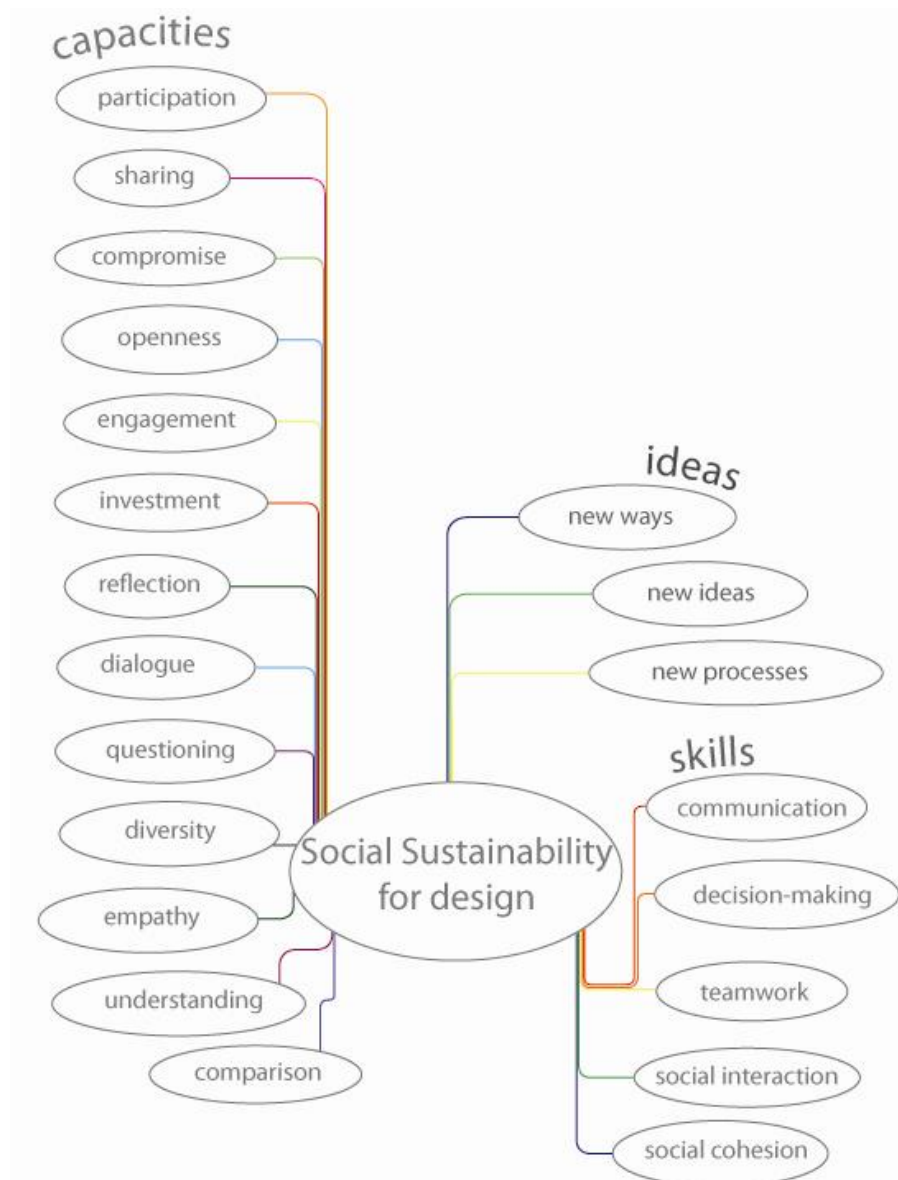
Figure 14: Social Sustainability Competencies [Revision 1]

4.6.2 Question 2: 'What does social sustainability mean to design?'

The aim of Question 2 (open structure) was to find a common definition for Social Sustainability for design that reflected the opinions and diversity of all of the experts. It was important that each expert would hear his/her own voice in the definition.

Coding: As introduced in the Chapter 3, the method for coding and analysing the answers followed the protocol outlined in section 3.7. All of the answers to the open-ended question were gathered and reviewed. Patterns and themes emerged as the data was analysed and these units of meaning were collated into a list of codes. The information in

the answers was then classified, categorised and ordered according to these codes and sub codes. The themes used for the codes are detailed in Table 9.

Table 9: Coding Framework for Delphi Round 1

Code	Sub Code
People	Micro Small Picture Individuals Individual Behaviour Human Context
Collective Group	Macro Big Picture, Group Behaviours Community Communal User
Designer's Role	Process Input Accessibility Universality Expand/Broaden
Holistic Approach	Systems Thinking Triple Bottom Line Connectivity
Multi-Disciplinary	Collaboration Co-design Stakeholders Collective Multi-Disciplinary Shared Ideas Cross-Disciplinary
Equity	Democratic Equal Rights Universal Inclusive (Gender, Class, Race, Ability) Culture With the natural planet
Social Change	Improvement Social Issues Social Innovations
Paradigm Change	Innovation Entrepreneurship Pragmatism
Complexity	Confusion Difficult Aspirational Idealistic

Analysis: From this coding exercise a definition was extracted. This was revised and refined a number of times and then sent for review by 2 independent experts.

Social Sustainability for design means:

'Social sustainability for design means an evolution for the practice of design that equally recognises the relationship between people, planet and economy. It must be holistic, pragmatic, purposeful, immersive and capable of fully understanding and responding to change on micro and macro levels.

Whilst it is accepted that designers have a vital role to play in advocacy, facilitation and execution, their impact as an individual discipline cannot be overestimated nor bear sole responsibility (the limitations must be considered along with the capabilities). Design, that considers the individual, the greater community and the planet must come from processes that are collaborative and multi-disciplinary. To achieve solutions that change and improve, designers will have to work across disciplines, cultural and geographical borders.

The impacts of the paradigm changes in design practice and the results must be measurable on people (not 'consumers') at local community, national and international levels.

Above all design must create fun, enjoyable and enriching experiences for PEOPLE'.

4.6.3 Issues arising from Round 1 that needed to be dealt with in Round 2

A number of issues were highlighted during the analysis phase along with some feedback from the panel experts in their email correspondence. The three main issues that would impact on the subsequent round were:

→ Did people **interpret** factors differently? It is very difficult to identify this but asking people to define what they meant, or understood, by the various factors in the subsequent round would help to overcome this issue.

→ What are the definitions for the most important factors? How would the experts define the factors?

→ Were the voices of the experts all audible in the 'definition' for Social Sustainability in design? Were they satisfied with the definition and could they advocate it in their profession? Have the experts any additional comments on the 'definition' in order to enrich and refine it?

These issues needed to be addressed in the preparation of the questionnaire for Round 2.

4.7 ROUND 2

4.7.1 Structure of Round 2

Round 2 served to clarify the issues arising from Round 1 and also to get feedback from the panel on the definition collated from their responses. A number of possible structures for Round 2 were explored. When the issues from Round 1 were considered, the most suitable structure emerged.

The Round 2 questionnaire (see Appendix J) comprised of a brief background to remind the participants of the purpose of the study and what their contribution had been in the first round. Providing anonymous feedback between rounds is a unique characteristic of the Delphi method and it serves to 'give back' to the panel. This allowed the panel to understand the process and as a result, understand where and why decisions were made and from where the definition came. The background information was included after feedback from the pilot testing. The pilot testing was carried out on four of the five same participants in the Round 1 piloting phase. This ensured consistency over the study. The pilot testing led to minor changes in the questionnaire.

The findings from Round 1 were explained, along with a short description of the methods used for collation and analysis of the responses. The input from the experts comprised two separate questions. Question 1 dealt with the definition for *'what social sustainability means to design'.*

The definition was provided for three distinct purposes. The first was to move closer to gaining consensus on what social sustainability means to design; this would begin the move towards an agreed definition. The second reason was to provide the expert panel with something 'real' that they could respond to, comment on and provide feedback. Following comments on the Round 1 questionnaire some experts noted that it was difficult to complete the questionnaire, because there could be ambiguity in interpreting the factors and the questions. Comments were also made on how it would be more productive to have statements on which the panel could respond. The change was implemented and this greatly reduced the drop-out rate during the remainder of the study (Hsu and Sandford 2007). Finally the definition was given to the panel to evoke debate, spark thoughts and as such discussion.

After they had reviewed and provided their feedback on the definition the experts were asked to answer a few simple questions to gauge their opinions of the definition. They were asked to answer '*Yes, No or Partially'* to the following 'opinion' questions:

→ Do you agree with this statement?

→ Is your voice recognisable in the statement?

→ Does the statement cover your views?

These responses provided a quick overview of the consensus on the definition. The experts were then asked for their comments on the definition, thus providing the opportunity to revise or change their own previous statements, based on the general findings (Martin et al. 2008, Hsu and Sandford 2007).

The second question related to list of factors (ideas, skills and competencies) the experts had ranked in the previous round. The list of factors was arranged according to the ranking from Round 1. Participants were asked to choose three. This choice was to be based on what the participant felt were the most important, relevant and realisable factors within the context of educating for social sustainability in design. Observations from Round 1 highlighted that the experts' interpretation of the factor could vary hugely and this needed to be addressed to ensure the findings could be somewhat consensual. The experts were asked to briefly describe what they understood by the factor. It was hoped that at least one definition would be offered for each factor. However there was no way of ensuring this as the questionnaire was not intended to force the experts to define specific factors, instead they had to choose the ones they felt were relevant and important.

4.7.2 ANALYSIS OF DATA FROM ROUND 2

The response rate from Round 2 was 18 out of 21, again this high response rate (86%) is indicative of the interest and enthusiasm of the expert panel. Feedback from the panel (through emails) stated that they found the approach, and the topic, both interesting and relevant.

4.7.2.1 Question 1

Coding: Responses to the three 'opinion' questions were collated. The open response statements were reviewed and analysed. Preliminary codes were developed by which the

information could be organised. These codes were revised four times and refined into four hierarchical codes, with subsets under the primary codes (Table 10). The feedback was analysed again and the key recommendations (based on the coding) were taken from each response. These were then used to revise the definition into one that best reflected the changes the experts recommended.

Table 10: Coding framework for Delphi construct Round 2, Question 1.

Code	Sub Code
Changes	Changes to existing definition
Action	Pragmatism
	Active
	Outcome driven (why, how, what)
	Doing language
Outcome	Positive
	Negative
Process	Emphasis on process

Analysis: With regard to the statement, there was a positive response on the whole. 50% of the experts agreed with the statement and 50% partially agreeing with it. No expert disagreed with the statement. Similarly 50% of the experts felt their voice was recognised in the statement, with only 1 respondent (5.5%) not recognising their voice; 44% felt theirs was partially recognisable. In the final part of Q1 (a) 'does the statement cover your views' 38.9% responded positively; 55.6% felt it did partially and 5.5% (1 respondent) felt their views were not covered.

Following this initial analysis (quantitative), it was decided to retain the main meaning and intent of the statement and to review the open-ended comments (and the email responses from the panel that also contained feedback) and to make changes based on these.

Interpretation: The feedback from the questionnaire, compiled with the email feedback the panel provided throughout the Round 2, served to highlight areas for change and improvement in the 'definition'.

The reason for gathering the collective opinions of the expert panel was reviewed and it was decided that the statement wasn't in fact a definition as it couldn't be taken as 'definitive', given the sample size. One expert suggested re-terming the statement as a *Construct,* on which to base the interpretation and understanding of social sustainability in design, for the purpose of the project. The construct not only framed the viewpoint, it also informed the subsequent structure of the AR projects. The feedback from the expert panel, together with the review of current theory helped to build the construct. As such it is no

longer called a definition, instead it is the construct that helped achieve the project aim and inform the methodology.

Some experts responded that the construct was pragmatic, others said it wasn't pragmatic enough (needs more action-oriented language) *'Design is not (only) characterised by a final result, but also by the process how to get there'* (Expert 9). It is important to note that agreement and disagreement are equally important at every stage of the feedback loop (O'Neill et al. 2009). So how do we find the correct balance? The language of the entire construct was re-focused to be more 'doing' and action-oriented, moving away from the 'woolly' non-committal language.

It is important to recognise that the construct (not definition) cannot solve every issue presented by the extremely complex and wicked problems associated with social sustainability. *'I think there is a danger of design by committee (remember the camel), that is the definition is trying to encompass everything. Maybe the questionnaire could be used not to define social sustainability but to inform your viewpoint'* (Expert 13)*.* Another expert noted that the definition might not be ambitious enough '*While designers are not solely responsible, they should overestimate the role they can play… (Designers are supposed to be mavericks, divergent thinkers, leaders, innovators and change makers)'* (Expert 14). A balance needs to be struck between being too ambitious and not recognising the important role the designer can play. The construct must go towards providing designers with a way to begin to change their own practices and help influence others to do the same.

The construct needed to differentiate between socially sustainable design (the outcomes) and socially sustainable designing (the process). The construct focused on the process of designing for social sustainability, as this is the area on which the aim of the thesis is focused.

The last line of the statement was cause for a lot of comment '*Above all design must create fun, enjoyable and enriching experiences for PEOPLE'.* One expert observed that this might be reducing the practice of sustainability to too playful a role and as such diminish the potential impact '*…design is more than an experiential tool and while social impact design does need to be user-centric, there are many functions and purposes it fulfils that may have to do with systems change that go beyond the relationship with people'* (Expert 9). Also this statement, according to one respondent, was too anthropocentric again continuing '*… to*

put HUMAN needs at the forefrom [sic]' (Expert 4). As a result the statement was revised to still include the 'humour' element, but to be less flippant.

The final construct was devised from the collation, analysis and interpretation of the expert panel responses.

Social Sustainability for design means: [revision 2]

'Sustainability for design is an evolution for the theory and practice of design that effectively addresses the relationship between people, planet and economy. The key aim of social sustainability for design (as a subset of sustainability) is about understanding these complex relationships and finding a satisfactory equilibrium between all elements of the system (human, natural). As the process of designing is fundamentally about solving problems, the process needs to move beyond people (users) and redress the balance between people and the planet. To do this, designers must be holistic, pragmatic, purposeful, immersive and capable of fully understanding and responding to change on micro and macro levels.

Designers have a vital role to play in both advocacy and in catalysing change. In order to be capable of considering the individual, the greater community and the planet, design processes must be collaborative and cross-functional. Here designers can act as facilitators, (working across disciplines, cultural and geographical boundaries) bringing together all stakeholders and working towards creative solutions that satisfy as many of their needs as is possible (and realistic). To do this effectively designer skills must move beyond creating objects and into creating positive experiences. The impacts of the changes in design processes, as well as the outcomes must be measurable on people and the planet at every level.

And in spite of the complexity and sometimes negativity- designers should retain their humour, humility and creativity'.

4.7.2.2 Question 2

Organising: The definitions were collated and the amount of times the factor was defined[18] was recorded (see Appendix J). The factors were grouped together. The frequency table

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[18] Green Text in R2 Question 2 Analysis.

(Table 11) also recorded when one factor was referred to in another definition[19], either explicitly or if the phrasing and meaning of the definition was very similar to another one.

Analysis:

Table 11: Frequency of responses to factors.

Competency	Number of Respondents ROUND 2
Critical Questioning	10
New Perspectives	6
Empathy	6
Engagement	5
Problem-Solving	4
Communication	3
Sharing	3
New Behaviours	2
Dialogue	2
Social Interaction	2
Participation	2
Understanding	2
Compromise	2
Decision- Making	1
Reflection	1
New Processes	1
Team-work	1
Openness	1
Accountability	1
Humility	1
Humour	1
Acceptance of Diversity	0

Coding: preliminary codes were applied to the text after patterns emerged during numerous reviews. These preliminary codes were: Action, Behaviours, and Cognition. Sub codes (secondary codes) emerged under these primary codes and the responses were reviewed again applying the primary and secondary codes (Table 12).

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[19] Orange Text in R2 Question 2 Analysis.

Table 12: Coding Framework for Delphi Study Round 2

Code	Sub Code
Action	Pragmatic Language
	Doing.
Behaviours	As Individuals
	Towards Others
Cognitive	Knowledge/ Perspectives/ Understanding
	Need to acquire
	Already acquired/displaying
	Tacit
Outcomes	Potential

Interpretation: The answers were then analysed and common themes emerged. A clear trend emerged that rather than just defining the factor, the expert panel gave real, practical and interesting ways to resolve the issues or to implement the factor. It was interesting to note that the factors the experts chose, while they did correlate to the ranking in Round 1, there were a couple of factors that had been ranked low in the previous round but were defined by over 25% of the experts. For example Empathy was ranked 7th in Round 1, yet over 33% of the experts defined it in Round 2 and Engagement was chosen and defined by 28% (5) of the experts but it has ranked 23rd in Round 1.

The definitions went beyond the rhetoric and the experts suggested action in their language and in the content. The question then arose of what to do with this information and how to apply it in a useful way in subsequent phases of AR (this is dealt with further in Section 4.10).

→ Use the suggestions to create a brief?

→ Use the concepts and interpretations of the skills and capacities to create a tool to evaluate the acquisition of the factors (ideas, skills and capacities) through the next AR phases? *I find the key themes (and sub words) very interesting and could build on those as a design language to shift the paradigm of the single bottom line'* (Respondent 8).

→ Use the factors to build a design language to shift the paradigm of the single bottom line approach to design?

→ Can the concepts for the skills and capacities be translated into a tangible tool to evaluate the acquisition of factors in all AR stages? (Reverse analysis).

$\rightarrow$ Build a framework of key competencies to be used to analyse the collaborative experience of the designer participants.

From both rounds of responses, the initial list of factors for social sustainability in design was revised. The initial list was derived from the literature review and exploration of current practice (Figure 14). This was used as the basis for the first round of the Delphi. Once the data from round 1 and 2 of the study was complete, this list was organised with the factors grouped under 3 primary headings: Critical Thinking (green in Figure 15); Team-work (pink in Figure 15) and Social Interaction (blue in Figure 15). Certain factors crossed over the three areas- these can be seen with two or three different outlines. New Processes and Humour don't fall specifically into any one category and, as such, are categorised as overarching factors that should be prevalent in all aspects.

framework rev2
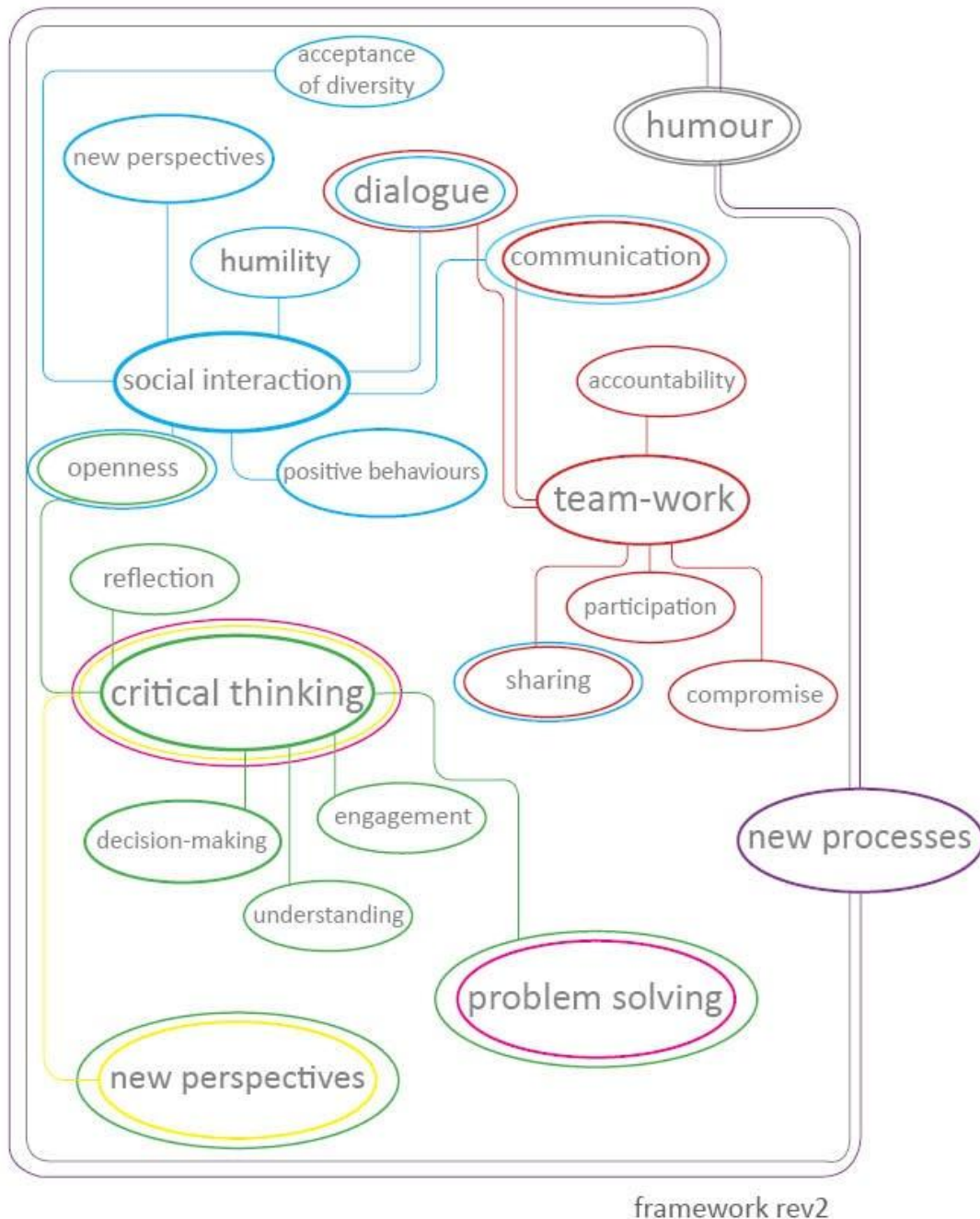
Figure 15: Social Sustainability Competencies [Revision 2]

4.8 ROUND 3

Following the analysis of the answers from the previous round the results were compiled into the final list of factors deemed relevant to the development of social sustainability skills and capacities in design as illustrated in Figure 15 above. The definition of social sustainability was re-categorised as a construct following comments from the panel and analysis of the feedback.

The final construct and list of competencies were sent to the panel one more time for comment and feedback. The entire expert panel responded to the final mail and in general the feedback was extremely positive in the final stage of the study. One expert noted that the dialogue and debate sparked amongst the panel might prove more valuable than the actual responses *'…that is do you need tidy definitions if you can get students and designers to consider the questions?'* [email from Expert 13, 22.05.2012]. In the previous two stages, these discussions (between the expert and the researcher), which were conducted via email, were included anecdotally when the responses were being analysed. This led to the interpretation of the data stemming, not just from the data itself, but from the comments and observations that accompanied the responses. Richer results emerged as a consequence of input from the expert panel.

4.9 DISCUSSION

4.9.1 The Delphi Technique

The Delphi technique proved to be an extremely useful tool in this instance because it allowed access to a wide variety of experts dispersed around the world. This ensured the information gathered spanned diverse perspectives and opinions. It proved challenging at times dealing with the diversity as explanations often got 'lost in translation' across email and distance. This was particularly evident when language differences came into play. Due to the very open communication channels this could be overcome quickly with follow-on emails and phone-calls where necessary. The ideal of course would be to meet face to face but this was not a possibility with such a distributed expert panel.

A number of other positives of employing the Delphi technique emerged during each round, these included:

→ Ability to overcome distance and time differences in the research.

→ 'Secrecy' the anonymity aspect allows the experts to be upfront and honest with their feedback.

→ The time between rounds allowed the participants to reflect and think about the topic and their opinions and perspectives on the issues being raised.

→ The feedback loops ensured the experts could see their ideas being built upon and integrated into collective constructs and ideas.

Perhaps the most interesting outcome of conducting the study was the enthusiasm with which the panel took part in the study and how open and generous they were in sharing both their knowledge and their experiences. This evidences that there is a huge wealth of knowledge on the area of Social Sustainability that needs to be drawn together; designers just need to be given the opportunity to formulate and offer their thoughts.

Despite the perspectives of the expert panel being diverse they tended to agree on the bigger elements e.g. that the construct needed to be pragmatic and action-oriented and that the definition for social sustainability in design couldn't be a definition. The experts often gave information above what was asked of them, this added to the richness of each round and informed the subsequent rounds. This indicates that the topic is relevant and necessary as the participants felt they had additional information to offer; which in turn enabled the discussion to go further and deeper than initially expected from the Delphi.

In order to build the data from the Delphi study into a usable format, both the construct for social sustainability and the constructs for the key competencies offered by the expert panel, required further analysis.

4.9.2 Social Sustainability Construct

Undertaking the Delphi study highlighted that it was too difficult (and perhaps unnecessary) to form a consensual 'definition' for Social Sustainability in Design. It is too complex an issue that one definition could not be sufficient. As such, a construct is far more useful for the purposes of this research. Instead of providing a definitive definition the construct allows for a particular perspective on an issue to be accepted as the one most relevant to the study.

Firstly the construct for Social sustainability needed to be built into a usable pragmatic foundation for AR1-4 and for future project briefs. This way the construct can help project planners to adopt a sustainability lens through which to view potential themes and briefs. In order to do this a set of codes or organisational themes were developed from Wiek et al.'s article (2011) and distilled into Table 13.

Table 13: Codes for Analysis of Social Sustainability in Design construct (devised from (Wiek et al. 2011).

	Code	Sub Code
1	Ability to Think	To think in the big picture, complex ideas, systems-thinking
2	Ability to Apply	To take the abstract ideas, navigate them, reconcile them, negotiate the complexity and to create visions for sustainable solutions.
3	Ability to understand/ interpret	To understand complicated ideas and to draw together disparate strands and perspectives. Intimate understanding of complex systems.
4	Ability to implement	To put the understanding of the issues into action. Crossover with 'Do', however, do is the real brass tacks of putting it into action. Implement is the broader sense of getting the preparation done and bringing about solutions.
5	Ability to Do	The time for talk is over! To put the rhetoric into action. To really 'do'-get stuck in and make an effort to solve some of the problems even if it isn't entirely successful.
6	Ability to work together	To collectively implement ideas, being able to marry the sophistication of collaboration with bringing about change. To be able to facilitate, participate, lead, have empathy, manage stakeholder collaboration.

Social Sustainability for design means: [coded]

'Sustainability for design is an evolution for the theory and practice of design that effectively addresses the relationship between people, planet and economy. The key aim of social sustainability for design (as a subset of sustainability) is about understanding[3] these complex relationships and finding a satisfactory equilibrium[4] between all elements of the system (human, natural). As the process of designing is fundamentally about solving problems[5], the process needs to move beyond people[3] (users) and redress the balance between people and the planet[1 & 3]. To do this, designers must be holistic[1], pragmatic[5], purposeful[2], immersive and capable of fully understanding[3] and responding to change[4] on micro and macro levels.

Designers have a vital role to play in both advocacy and in catalysing change. In order to be capable of considering the individual, the greater community and the planet, design processes must be collaborative and cross-functional[6]. Here designers can act as facilitators[6], (working across disciplines, cultural and geographical boundaries) bringing together all stakeholders[5] and working towards creative solutions that satisfy as many of their needs as is possible[2] (or realistic[3]) for this to be effective the designers skills must move beyond creating objects and into creating positive experiences[2]. The impacts of the changes in design processes, as well as the outcomes must be measurable on people and the planet at every level[5].

And in spite of the complexity and sometimes negativity- designers should retain their humour, humility and creativity[1 & 3].'

With the construct coded words and phrases can be selected and used as pragmatic words for the development and exploration of project briefs, under the various coded themes. In an educational context, learning outcomes can be linked to these words/phrases, in order to allow participants to explore and develop the core competencies associated with them. In a professional capacity, designers can use the phrases/words to affect decision-making and idea selection throughout the design process.

4.10 BUILDING THE FRAMEWORK OF KEY COMPETENCIES

In response to addressing Objective 4[20], the list of competencies and the descriptions emanating from the Delphi Study had to lead on to something practical and useful for future projects, similar to the construct. The competencies needed to be connected together as they are not stand alone skills and capacities. Connections between the competencies are embedded with both explicit and implicit links that involve personal and interpersonal behaviours (Wiek et al. 2011). Some cannot exist without others and some follow as consequence of others. From the collation of results from Round 1 and Round 2 we can see the initial interconnections between the competencies (see Figure 14). However, these connections need to be explored further and a practical Framework constructed. This theoretical framework can be used to both build the projects for the action phases and then to analyse the data gathered from the projects. On this premise, the competencies were analysed and refined using the process described below.

Stage 1: The results from the final Round of the Delphi study were reviewed and collated into a number of descriptions or constructs as seen in Framework revision 1 [Appendix K]. Keywords were highlighted in each description; these words had an action orientated focus, in-keeping with the pragmatic nature of the Social Sustainability construct. These words were combined and cross-over eliminated.

Stage 2: The combined definitions were collated and a series of questions were generated under each factor heading that would enable the researcher to evaluate the 'learning' and behaviour of the designers in the subsequent AR phases. In order to refine the framework,

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[20] To identify the key skills and capacities necessary to integrate social sustainability into third level design education to ascertain the aspects of Sustainability that could lead to critical, creative and systemic thinking in design.

various measures for evaluating similar and related competencies were reviewed. Clearer more defined questions were developed following a study of the Wilder Collaboration Factors (Mattessich et al. 2001); Watson Glaser Critical Thinking Appraisal; Critical Thinking Assessments (Ennis 1985, Sternberg and Baron 1985, Ennis 1994, Ennis 1993); Higher Order Learning Rubrics (Pierce 2006); Facione's Core Skills of Critical Thinking (Facione 2011); Sense-making (Dervin 1992, (University of Twente 2012); Valencia College Core Competencies (Valencia Community College 2011, Valencia Community College 2006); Blooms Taxonomy of Learning Domains (Clark 2011) and Hofstede's views on culture (Schadewitz 2009). These questions also formed the basis of the questions for the pre and post questionnaires in AR4 (see Section 3.6.2) and were used to build the questions for the Focus Groups and the Reflection Sessions after the AR4 projects were completed [see Appendix L Framework revision 2].

Stage 3: Upon completion of the two projects in AR4 (see Chapter 6) a number of preliminary codes were extracted from the Framework rev.2 and these codes were used to initially analyse two focus groups from AR4 to evaluate their relevance and appropriateness. The coding framework was reviewed again with modifications (additions and subtractions) made to the coding themes. Open codes were then developed from the preliminary codes for analysis of the AR4 data. Each code was assigned a definition; a method of description (how it was going to be identified through the analysis) and an occurrence node (where it happened in the process- which was then identified on the team timelines).

Stage 4: The codes were re-mapped over the framework to ensure validity and that they related back to the literature and Delphi results. As a result, some competencies/codes were redefined and renamed as appropriate- (e.g. 'Feedback' was renamed 'Dialogue'); moved into different categories- (Moved 'Getting to Know you' from Collaborative Interaction to Social Interaction) and merged into one another (e.g. 'Enjoyment' merged into 'Participation/ Engagement'). The Framework was then readjusted to reflect the changes [see Appendix M Framework revision 3].

Examining and refining the Framework and the coding system, re-iterated that all the competencies for social sustainability in design can't be developed or encouraged in isolation. Each competency impacts on others and cannot occur without interaction and dialogue between participants in the collaboration. Figure 16 below illustrates the connections between the competencies under the three umbrella competencies of

Communication, Interaction and Critical Questioning. Similar to the arrangement in Figure 15 a number of the competencies fall under one or more of the umbrella competencies with two way exchanges running between.
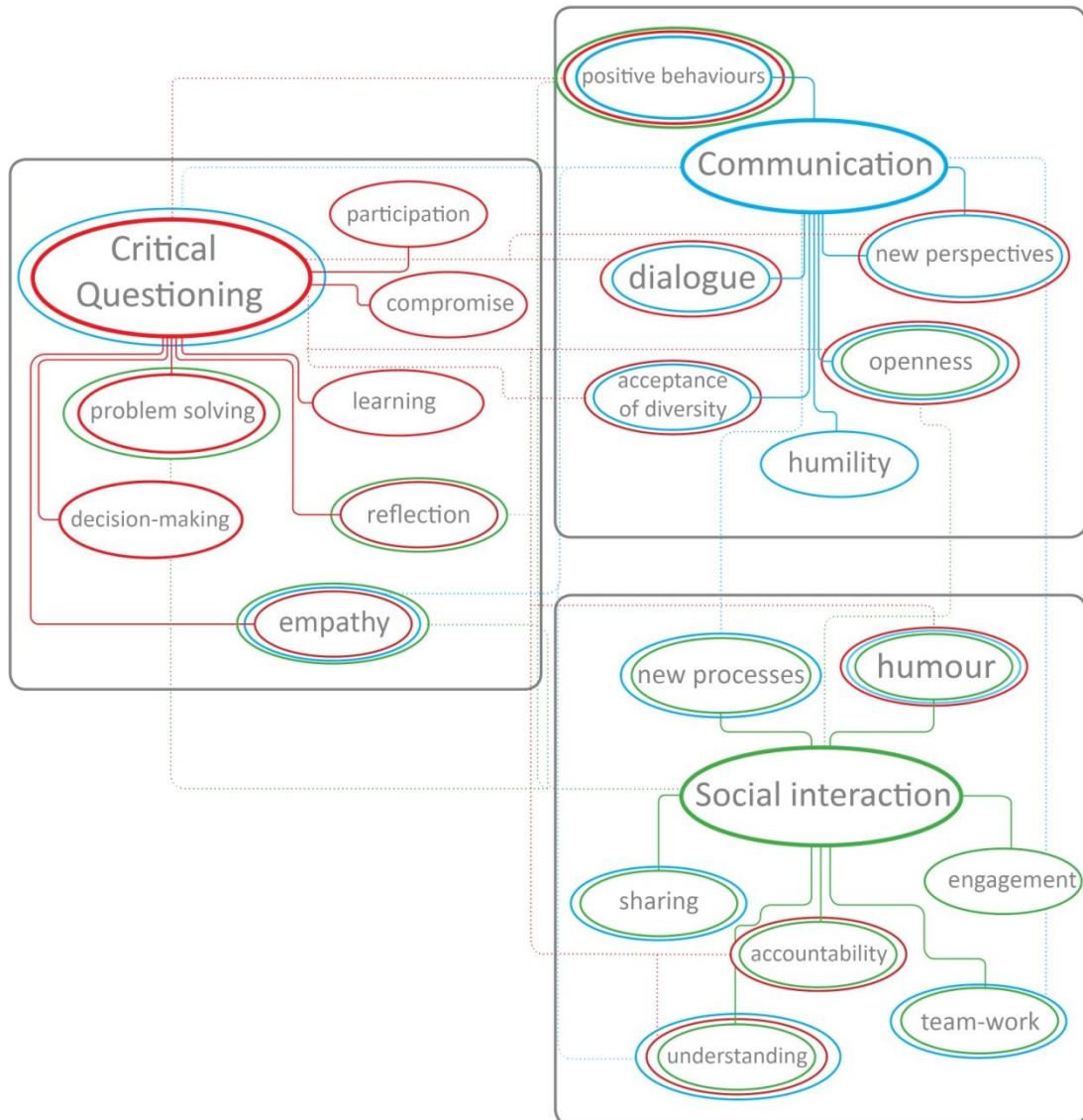
Figure 16: Social Sustainability Competencies [Revision 3]

4.11 CONCLUSION

The three rounds of the Delphi study and the subsequent iterative analysis and refinement of the outcomes have resulted in the successful meeting of Objectives 2 and 3. In fulfilment of Objective 2 '*To define what Social Sustainability means to Product Design'* a construct is offered as a lens through which social sustainability in design is viewed for the purposes of the Action Research phases. This research does not purport to present a definitive

description of social sustainability in design rather it is offering a working construct that could be applied practically in the generation of design projects and also in the evaluation of design solutions. It is a snapshot in time that can be adjusted, built upon and modified based on future activities and opinions. This could go some way towards easing the complexity surrounding social issues that combine with environmental and economic factors under the sustainable triple bottom line.

Through the answering of the key research questions linked with Objective 3, it has been possible *to identify the key skills and capacities necessary to integrate social sustainability into third level design education.* The resultant Framework outlines twenty-three key competencies for social sustainability in design and guiding constructs for each of these. This Framework will be used throughout the research to facilitate the development and implementation of design projects and also allows for the evaluation of these competencies during, and after, the projects.

4.12 NEXT STEPS

The Delphi Study has offered the researcher unique perspectives and opinions on social sustainability in design from a dispersed panel of experts. The findings have provided greater clarity as to what social sustainability means to design (within the context of this research), and what key competencies designers need to effectively address issues of social sustainability, through their design work. The following chapters will focus on the challenge of realistically incorporating these competencies into the collaborative project process (Chapter 6), whilst ensuring a well -planned and implemented project process (Chapter 5).

5

Action Research Phases 1-3

This chapter describes the design, planning and implementation of the first three phases of the action research which will be referred to as AR1, Ar2 and AR3. Following the ITDEM (Identify, Think, Do, Evaluate and Modify) model of the Action Research method, each phase is described individually with details of the planning and implementation specific to each project. The key learning from the three phases is then collated and evaluated collectively to highlight the barriers and benefits of collaborative projects from a pedagogical and logistical perspective. The chapter concludes by outlining how these findings will inform the final cycle in the action research model.

5.1 IDENTIFY

In higher education it is necessary to include projects that broaden designers' perspectives; ensure personal engagement; encourage students to develop a holistic perspective and to become critical thinkers, who question, analyse and reflexively form their own worldview (Warburton 2003). There is also an imperative, as highlighted through the Delphi Study (and identified in the Literature Review) to expand the Sustainable Design debate beyond environmental and economic issues and into the realm of social issues (Nagel et al. 2012). Ideally designers should have full knowledge and awareness of the impact their practice has on society as a whole, and the individuals who inhabit it. Relevant skills and capacities need to be honed to enable participants to successfully integrate the aspects of Social Sustainability into their practice (Wiek et al. 2011, Parker 2010, Barth et al. 2007).

Collaborations between groups who haven't had prior contact can bring a fresh and alternative approach to undertaking project work. Because 'strangers' can provide access to new information and draw on diverse experiences that those, who are familiar with each other can't offer (Hansen 1999). Knowledge sharing becomes more efficient and ideas can be stretched further as newly acquainted individuals seek to find common ground and an understanding of each other's motivations and practices (Lesser 2000).

The explication of these three phases of Action Research (AR1, AR2 and AR3) explored collaborative projects as vehicles by which to introduce and foster these skills and through this aimed to meet the fourth objective of the research (as outlined in Chapter 1):

Objective 4: To ascertain the success factors that contribute towards and the complications that detract, from planning and implementing successful collaborative projects. And to what effect the collaborative model used impacts on the project experience.

Each phase of Action Research comprised a practical design project, which followed the model of 'Guided Independent Projects' (Lee 2009) as the method of exploration. This model of project design centres on the process of investigation, leading to the development of 'products'[21] (ibid), where the participating students were given a project brief and asked to research the area and offer design solutions driven by research findings and user needs. All of the teams, in each AR phase, had self-directed control over their process within the defined thematic area. Input from the facilitation team took the form of focused skills workshops in the earlier stages of the projects and informal guidance and discussion throughout the latter. This ensured the teaching staff adopted an advisory, rather than an authoritarian role. Within the Guided Independent Project model the process of inquiry and investigation is emphasised over the specific project outcomes, allowing iterative and logical progression in parallel with rational decision-making to come to the fore (ibid).

While planning all of the projects across the four phases of Action Research (AR4 is described in Chapter 6), it was important that the goals were clearly aligned with the project process and the tasks undertaken by the participants. This 'alignment' allowed the participants to see an obvious link between their team's process and their design outcomes, whilst also enabling the individuals to construct meaning in and learning through the collaborative process.

Over the initial three phases of Action Research, the logistics and practicalities of planning, implementing and evaluating the impact of collaboration were reviewed (Figure 17). As discussed in Chapter 1 the subject matter covered in all of the design briefs across all the four phases of Action Research was not explicitly 'Sustainable Design'. This was a conscious decision on the part of the researcher and a key premise of this research to ensure that sustainability is not perceived as a choice in design projects but instead it is inherent in all design work. The design brief never mentioned social sustainability or sustainability as these issues should not be extracted as a 'novelty' but should be an inherent consideration in every stage of the design process.

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[21] Products for the purpose of this research can be either tangible or intangible user driven experiences.

AR1

mono disciplinary

NZ [n=40]

IRL [n=21]

distributed teams

Cultural Leanings

Identify — A lack of understanding & integration of social sustainability competencies in design. Can collaboration help?

Think — Collaborative project between Product Design students, logistics & brief decided upon.

Doing It — Local teams work on local brief, share ideas, discuss, critique via Blog. Digital Exhibition to close.

Evaluate — Blog analysis,, Observations, Field Notes, Post Project Survey & Focus Groups.

Modify — More diverse partners More integrated collaboration. More sharing of ideas. Variety of Technologies

AR2

mono disciplinary

NZ [n=17]

CHILE

IRL [n=32]

distributed teams

Food for Thought

Identify — Honing the collaborative experience.

Think — Collaborative project between Product Design students, logistics & brief decided upon.

Doing It — Designer/Client relationships. Ning forum, Twitter, Googletalk to share ideas, feedback & critique

Evaluate — Pre-project survey, Blog & Forum analysis, Observations, Video, Field Notes, Recordings.

Modify — Expect & accommodate change Alignment of goals/expectations. Finding synergy Project Charter

AR3

multi disciplinary

LSAD Limerick School of Art and Design [n=30]

UL University of Limerick [n=42]

co located teams

Domestic Space

Identify — The logistics& implementation of a co-located collaboration. Further identifying & refining competencies

Think — Collaborative project between product design & sculpture students. Brief & logistics decided on by planners.

Doing It — Local teams working together on a brief. Research, Design and Present as a cohesive group.

Evaluate — Post project survey, Diaries, Observations, Video & Field Notes.

Modify — Mimic local experience. Finding common language. Finding synergy. Group Dynamics

Figure 17: Action Research Phase 1-3

5.2 ACTION RESEARCH PHASE 1 'CULTURAL LEANINGS'

Figure 18: Action Research Phase 1 project map.

5.2.1 Think

Phase one of the Action Research [AR1] strategy comprised a collaborative project undertaken between the Year 2 undergraduate Product Design participants in Unitec, Auckland, New Zealand and the University of Limerick, Ireland (from February to April 2008). The idea for the project originated from a staff exchange between two design tutors from the Institutes. The project served to explore the concept of connectivity and interactivity, between two culturally different participant groups, divided by almost 18,000km's and twelve international time zones. It was not a problem with current practice per se that drove the project, instead it was an eagerness to encourage students to engage and collaborate with others in a similar discipline in an effort to develop a set of competencies appropriate to socially sustainable practice.

The primary research aim of the first AR phase was to explore the logistics and practicalities of implementing effective collaborative projects (Figure 18). The phase also served to identify the emergence of competencies for social sustainability in design and enabled examination of how these competencies were reflected in the participants' behaviours. These competencies have been selected from the identified list of skills and capacities necessary for designers to direct their practice towards social sustainability. They were chosen, because they were perceived as the higher level competencies that could lead to the emergence of lower level or dependent competencies (as seen in Figure 16 in the previous chapter).

→ *New Perspectives:* Promotion of cultural diversity and understanding; Development of holistic perspectives.

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→ *Team Work:* Development of Shared Skills*;* Active participation.

→ *Critical Thinking*: Reflection; Questioning.

→ *Communication:* Interaction & engagement.

→ Establishment of Communities of Practice; *Knowledge Sharing* & Networks.

5.2.2 Doing it

5.2.2.1 Project Brief

The participants, in groups of two[22] co-located, were asked to identify a tradition, a cultural phenomenon or a historical practice specific to their own country (Appendix N). They were asked to re-imagine their chosen topic in the present day, not to rebuild the past but instead to re-interpret it in a contemporary context.

5.2.2.2 Project Logistics

Planning for the project began two months before the start date. The two tutors/ planners 'met' over Skype and via email to plan the brief, the project logistics and the technologies to be used by the design teams. Due to the distances and time difference, the participants were required to make their work deliverable and communicable by specified available technologies. Research has shown that the success of collaboration is not due to technology, instead, it is due to the individual's willingness and motivation to creatively engage using whatever means available (Cheng and Kvan 2000). As such, the technology had to be user-friendly, easily assimilated and could not detract from the main aim of the project. Each group established a blog (using Vox), which was used as the primary communication tool for the duration of the project. The blog sites served as virtual exhibition spaces, a project management tool, reflective diaries and project journals. They were also key in providing a structured platform for giving and receiving feedback from the other participants and facilitators (Kvan 2001). The need to share work on an on-going basis

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[22] On the Irish side teams of two persons was decided upon given the class sizes and the fact that the students hadn't worked on any team based design project prior to this. The small group size also made the management of their team and transmission of information as easy as possible (Chiu, 2002). Each team in Ireland was then paired with a partner team of two/three in New Zealand to make the collaboration process more organised and manageable.

is essential in a field as visual as design, and the blog proved essential in facilitating these visual exchanges[23].

Quite early into the project the facilitators realised that expecting the local teams to keep track of the large number of teams in the partner country was wholly unmanageable. The large number of teams [n=16] between the two countries meant that each team would not be able to keep track of every blog or engage with every other team. To simplify the interactions each team was paired with a corresponding team in the partner country. Each team was encouraged to comment, share ideas and discuss its work with its partner team. The teams were not restricted from reviewing and commenting on any or all of the other teams as they wished. This slight realigning of the project process enabled deeper and better communication between the smaller groups instead of 'lighter' and shallower collaboration between larger numbers of teams. Each local team worked through their project and communicated frequently with its partner team located in the other country for feedback and help with decision-making.

5.2.2.3 Project Outcomes

The work resulting from the project was both interesting and innovative. Once the participants moved beyond the clichéd stereotypes of culture -e.g. Leprechauns and Lord of the Rings, they were able to delve deeper into the cultural nuances that made their own country unique. The diversity of 'products' ranged from tattooing tools to modern spins on traditional cooking methods and from DIY furniture pieces to whiskey decanters and overnight travel luggage (see Figure 19 and Figure 20). For the first time in their design education, some groups even explored the notion of replacing the physical object with an 'intangible' experience, with one team designing a storytelling 'game' that encouraged aural history retention and sharing.

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[23] See Appendix O for the AR1 post project questionnaire on Blogging and Project Experience.

Figure 19: Participants Project 'Kai Hangi cooker'.

Figure 20: Participants project 'Cocoon: Overnight travel bag'.

5.2.2.4 Assessing the Outcomes

As with all participant projects it was necessary to assess the outcomes, although it was hoped that the learning experience for the participants would go beyond the immediate need for grades and results. Anecdotally, and through subsequent interviews with participating participants, it was observed that the participants weren't as concerned with 'results' in the formal sense. As the outcomes of the work were so visible and tangible, the participants felt personal responsibility to perform to the highest standard. It was arranged between the facilitators that formal assessment would take place in the individual locations by independent tutors outside the research (in accordance with the academic regulations in each University). Also even though they weren't awarding grades, both facilitators felt they

could comment on the work presented though the online Vox blog and encourage the participants as they saw fit.

In order to give the work more visibility, a digital exhibition was arranged using web conferencing where the two groups of students presented their work visually and verbally via web conferencing to the other country (Figure 21 below). With only three minutes per group, the presentation had to be succinct, well prepared and clearly explained. Despite the fact that English was the first language for the majority of participants some information did get ' lost in translation' when accents and the use of colloquial language emerged during the presentations. However, the high quality marketing boards and display models conveyed both functionality and form of the final designs very efficiently.

Figure 21: Digital Exhibition AR1

5.2.3 Key Observations from AR1

Following the completion of the first phase of AR, some key observations emerged that impacted on the subsequent planning of phases AR2 and AR3. These are outlined briefly below:

→ The collaborative process was unclear regarding the depth/breadth and when and how the participants should function as a team.

→ Overly open-ended project theme- more guidance could be desirable or necessary.

→ Limitations of the specific technologies used, particularly the one-way platform of Vox and the underuse of the Video Conferencing method.

→ Boredom with project theme and technology.

5.3 ACTION RESEARCH PHASE 2 'FOOD FOR THOUGHT'
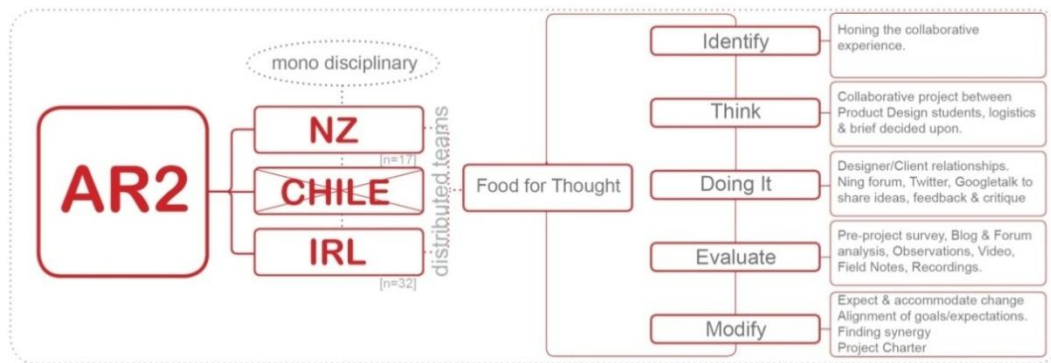
Figure 22: Action Research Phase 2 project map.

5.3.1 Doing it

The second phase of the action research project built on the lessons learned from the first phase (as discussed in Section 5.2.3). Again, the project addressed the practical logistics and implications of the collaborative experience (Figure 22). This time, however, the project endeavoured to include multiple partners from across a more diverse geographical and cultural spread. The project took place from the beginning of March until the end of April 2010 and initially involved three international partners: Unitec, Auckland, New Zealand; Universidad de Valparaiso, Chile and the University of Limerick, Ireland. Unfortunately, due to the Chilean Earthquake disaster which occurred two weeks before the start of the project, the Chilean participants were unable to participate. Such unintended contingencies often form a part of Action Research, as it is a continuously evolving process that is hinged on human and societal circumstances and behaviours and the availability of physical and technological resources to facilitate this. In the end, the participant groups comprised of Year 2 Product Design students from Unitec and the University of Limerick, both different groups from those who participated in AR1.

The main modifications to the second phase of the action research were in the area of the collaboration process, specifically the depth and breadth of the collaborative experience and the project theme.

This second design project expanded the skill set for collaboration from the first project to include the following, in addition to the competencies identified in 5.2.1:

→ Team work.

→ Compromise & negotiation.

→ Cultural and social diversity.

→ Participation & engagement.

→ Communication.

5.3.1.1 Project Brief

Food was chosen as the overarching theme (Appendix P). Not only is it an important issue (for very different reasons) in each of the countries, but each would have a very different perspective on the subject. Again the topic is not explicitly related to sustainability; instead the participants were expected to include social, environmental and economic issues in parallel with the other design considerations (e.g. human factors, functionality, aesthetics and design for manufacture). The theme was then divided into 7 sub categories including Packaging & Transport; Domestic Food Production; Community Production; Shared Dining. A longer list was initially generated by the project tutors based on trends in the areas of food and design. The list was discussed and negotiated into the list of 7 categories with which the participants worked. A finding from AR1 showed that participants struggled with the open-ended theme and precious time was wasted at the beginning trying to come to terms with what the brief meant. It was decided to provide the participants with clear direction through the more focused sub categories, while still allowing them to explore a specific area in depth.

Food for thought an international design collaboration project

① Step 1 Divide up into local teams. Set up an email address for the team.
Send the email address to your tutor who will invite you to the NING site

② Step 2 Create a 1 minute video introducing your team to the group.
Post it on the NING site. You will be assigned your client and design team.

③ Step 3 Each group is given the brief and their group topic.

④ Step 4 Analyse your topic thoroughly looking at social, historical, traditions, technological situations in your own country. Find out what makes your country unique.

⑤ Step 5 Gather your research findings to tell the story.

⑥ Step 6 Create a design brief for your design team. Identify Product Opportunity Gaps (POG's). Post all the research material on your NING.

⑦ Step 7 Take the design brief from your client team.
Generate design solutions that fulfil the brief and the POG's. Use sketches and models to experiment. Consult with your clients to ensure your ideas are valid and relevant.

⑧ Step 8 Choose the two most viable design concepts.
Present them clearly to show functionality and aesthetics

⑨ Step 9 Host a Skype meeting with your clients. Using Teamviewer explain the two concepts. Taking their input make any changes necessary. Decide on a final concept to develop.

⑩ Step 10 Take the final concept and develop it. Use sketches and test models to decide on functional and aesthetic features.

⑪ Step 11 Specify the materials and manufacturing processes.
Consult with your clients to ensure your manufacturing specification is realisable.

⑫ Step 12 Prepare the final model (either CAD or physical) and 2 presentation boards showing the key aspects of the product. What it is; What it does; Who it is for; How it works; Where it will be used.

⑬ Step 13 Prepare a short video showcasing your final design. Post it to NING.
Host a Skype meeting to present the final design to your client team.

Please note you also play a role as the Client for another team so you must also fulfill those duties.

Ⓑ Project Steps

Stage 1 Brief + Meet ▬▬▬▬
Stage 2 Research ▬▬▬▬
Stage 3 Conceptualisation ▬▬▬▬
Stage 4 Final Design ▬▬▬▬
Stage 5 Final Presentation ▬▬▬▬

Figure 23: Project Steps AR2

5.3.1.2 Project Logistics

Following on from AR1 the participants noted that the collaboration process was unclear to them at times, they weren't sure of when and how the collaboration should take place. Subsequently in AR2 a collaborative roadmap was compiled to make the collaboration as clear as possible, this signposted all the times when interaction was necessary between the groups (see Figure 23 and Figure 24). The support technology shifted from Vox in AR1 to a suite of technologies comprising Twitter[tm], Ning[tm] (this replaced the Vox platform, because it offered shared forums as well as individual blogs) and Teamviewer[tm] (desktop sharing software). These were introduced as the primary communication tools to facilitate the collaboration.
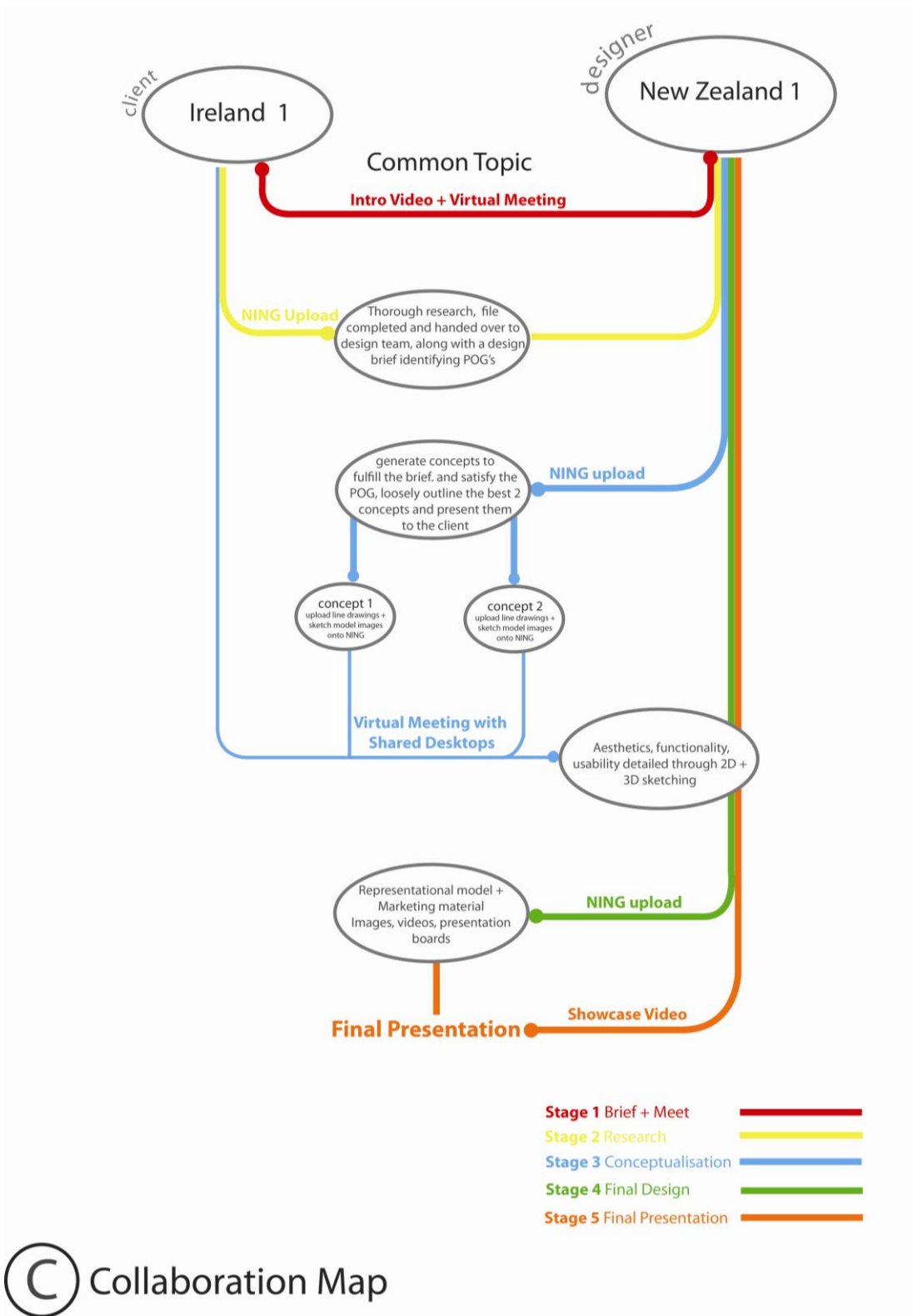
Figure 24: Collaboration road map for AR Phase 2

One recommended change, stemming from AR1, was that a video conference at the start of the project would be beneficial. Here the participants were introduced to each other, with the hope of building a greater degree of interaction throughout the remainder of the project. It was anticipated that the communication would happen outside the suggested times too, so that the sharing of ideas and information could go beyond the 'studio', and thus the broader academic environment. The ideal scenario was a move to a situation where participants converse, not because they '*have to',* but because they '*want to'.* The use of several forms of free and user-friendly technologies facilitated more 'spontaneous' and relaxed communication patterns to emerge (Cheng and Kvan 2000). The structure of the Ning platform allowed the facilitators to monitor the participant's use[24]. The facilitators prompted more or deeper communication on the live chat facility of Ning[tm], when they felt the groups weren't collaborating effectively, thus enabling speedy identification and resolution of issues.

Another significant difference between AR1 and AR2 was made in the project set-up to facilitate deeper interaction between individuals, small teams and larger groups. Instead of the participant teams working on their own project, as in AR1, it was decided that larger groups would be formed in AR2 containing one team from each partner country (as described in Figure 24). This team would be paired with a partner team to form each group. Each local team, comprising 3 to 4 individuals, researched their own group's sub category as it related to their country. They then handed over the research 'pack' to another team in their group, who took the research findings and acting as a 'Design team' developed innovative solutions for their 'Client' country (Cheng and Kvan 2000). The design team had to refer to their client regularly to ensure the concepts being developed were relevant and necessary. This co-generative approach allowed participants to see how others approach their work (reflection) and 'forced' them to develop a common language and hone their communication skills further. It also ensured the participants did not get bored with the project and the technology to the detriment of the project as reported by the participants in AR1 (Gross and Do 1999). This time the participant engagement with the technology directly affected the group effort.

5.3.1.3 Project Outcomes

Once again the design outcomes from the project were interesting and diverse. Participants designed a garden tool-sharing system for allotments, innovative food packaging and a

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[24] See www.intdesigncollaboration.ning.com

tracking and monitoring system for food transportation. The design results however were not as innovative or as detailed as the previous project and the participant grades reflected this. This could be attributed to the fact that the participants were designing for a client team and that time was required to understand the relevant aspects of the culture of this client. The interpretations of the 'clients' research was subjective and did not necessarily reflect the reality of practices within the particular client country. Conversely, the design teams often offered fresh eyes on the subject that the client might not have had.

At this stage, it is worth noting that the collaboration with this project wasn't as successful as the previous one, from initial analysis of the data and anecdotal conversations during and after the project. With action research projects, the failures inform the process as much as the successes so it is worthwhile noting the issues that occurred. These uneven results can be attributed to a number of factors, amongst them personality differences, lack of compromise, break-down in communication, lack of synergy and timing differences. These did not affect AR1 as much because the reliance on collaboration wasn't as deep as AR2 with participants acting as both clients and designers.

5.3.1.4 Data Collection Methods

In addition to field notes, observations, audio and video recordings and the online project blogs, a pre-project attitudinal questionnaire was completed by the participants (Appendix Q). This questionnaire served to explore the participant's attitudes toward social sustainability and collaboration and assess their level of knowledge of the area before the project began. This data was combined with the 'in-vivo' data in order to build the collective experience for AR2.

5.4 ACTION RESEARCH PHASE 3: 'ONE MAN'S MEAT IS ANOTHER MAN'S POISON'
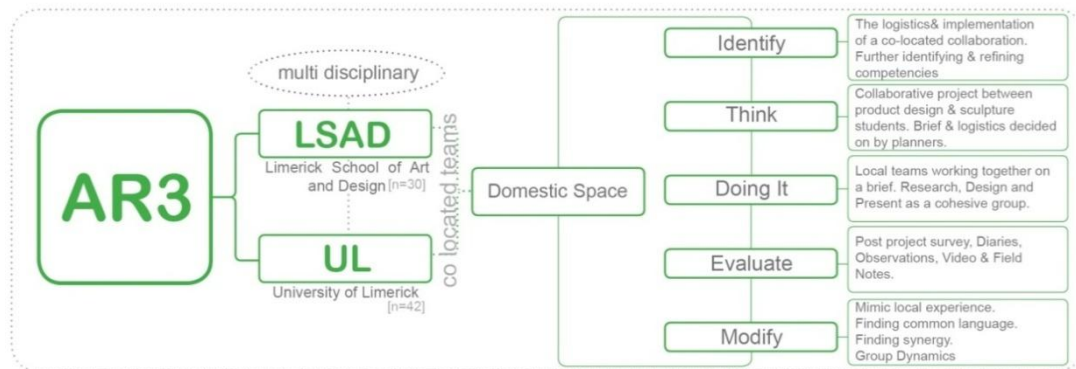
Figure 25: Action Research Phase 3 Project Map

5.4.1 Think

The structure of the 3rd phase of Action Research differed from the previous two in that the team members were co-located for the duration of the project. This AR phase comprised a project carried out between Sculpture and Combined Media (Limerick School of Art and Design) [LSAD] and Product Design + Technology (University of Limerick) [UL] undergraduate students. This section will describe how the project came to be and how the themes of 'Aesthetics and Interpretation' evolved into a coherent brief (Figure 25). Building on the findings from the previous two AR phases the project focused on a local 'face to face' collaboration instead of virtual team work. The emphasis in this instance was on understanding how the groups and individuals connected; how the conversations sparked between them, moving from initial introductions and efforts to find 'common ground', to task focussed dialogue and finally highly innovative and creative solutions. The research aims relevant to this phase were:

→ To explore the value of 'Face to Face' collaboration- co-located team members. Comparing the co-located experience to the distributed experience in terms of planning and implementation and of course outcomes.

→ To explore multi-disciplinary teams

→ To work with trans-disciplinary teams- where mixed groups were working collectively on a common brief. This differed from previous project with the mono-disciplinary team configurations.

→ To explore different methods of collecting data from the experience with particular focus on Storytelling as a mechanism of collating individual stories into a collective narrative of the project experience allowing us to build a clear overview/picture of the entire project.

Art and Design no longer divide neatly into distinct disciplines (Dykes et al. 2009). What we are seeing more and more is the professional artist and designer crossing boundaries and creating work that cannot be classified as simply as 'art' or 'design' objects/projects. The increasing interaction/overlap between the fields of product design and art means that there are no clear borders dividing them. Product/ Industrial Design is no longer only about mass producing functional objects, now being more about experiences that empathise with and enhance quality of life for individuals and societies (Moritz 2005). Similarly Sculpture and Combined Media practitioners see themselves building functionality into their work that creates meaning beyond the experience of the individual.

With this blurring of disciplines, professional practitioners are becoming more involved in collaborations with others from similar and diverse backgrounds. If creative projects are now expected to achieve a broad range of these aims then they must be created through a collaborative process of dialogue, sharing, negotiation and the pooling of collective intelligences (Chiu 2002). These changes highlight the need for participants from both disciplines to understand the processes and influences driving the other. Education must facilitate participants to acquire skills that can transfer to professional practice or provide an experience that will feed into subsequent project work. The complex problems associated with social sustainability call for multiple perspectives in their definition and resolution (Steiner and Laws 2006).

An additional benefit of multi-disciplinary project work is mutual learning, where designers learn about other disciplines and those from other disciplines learn about design (Design Council 2007). Within multi-disciplinary teams there exists a wealth of experience, worldviews and stories on which to be drawn. Also there is no denying the potential to create new knowledge when different disciplines share what they know (Yoshimura and Yoshikawa 1998). The benefits of expanding the participants' surroundings and influences cannot be undervalued (Lau 2007).

In addition to the points bulleted above the project outlined in this section was conducted in order to explore the blurring of these disciplinary lines and to understand how each

discipline deals (individually and collectively) with the challenges of collaboration. To this end the skills and capacities necessary for responsible design practice can be introduced to and encouraged in the participants.

5.4.2 Doing It

The participants were undergraduate students from Year 3 Sculpture and Combined Media (at Limerick School of Art and Design) and Year 2 Product Design + Technology participants (at the University of Limerick). Seventy students in total took part in the project which lasted for 2 weeks in February 2011.

5.4.2.1 Project Brief

The project brief focused on finding common ground between Art and Design and how they both interpret and manifest the notion of Aesthetics within the domestic environment (Appendix R). Design is about more than 'the object' and aesthetics is more than 'visual'. In groups of 6 (comprising equal sculpture and product design participants) the participants were asked to begin a conversation on what aesthetics meant to both disciplines, looking at the commonalities as well as the differences.

Considering 'The Kitchen' as the centre of the home, the groups were asked to explore the activities, people and objects that inhabit the space. Building on the collective interpretations of aesthetics and beauty, each team was asked to create an 'object' (either tangible or intangible) that provided an experience for or in the kitchen. Once again sustainability wasn't mentioned in the brief to discourage the participants from 'bolting it on' as a choice instead of an inherent part of their design practice.

5.4.2.2 Project Logistics

Following an introductory session on the first day the teams met and discussed the brief over a four hour time period. It was suggested to the teams that they should finish up the session with a clear direction and a list of assigned tasks for completion before their next meet-up. Each team met up on numerous occasions over the two week duration outside the scheduled times. This type of commitment demonstrates that the participants were engaged in the project beyond what was expected from them academically.

Similar to the previous two phases a final 'showcase' presentation was held at the end of the AR3 (Figure 26). During this presentation each team described/demonstrated its

designed solutions along with the process it undertook to develop it. It was clear from the presentations that the majority of teams had cohesive and effective collaborative processes; they presented their work as a unit with all of the team members' contributions evident in the work. Only one team stood out as being disjointed. Its final presentation, comprising of a tenuously connected number of objects, reflected the disconnected nature of their collaboration.

Figure 26: AR3 Participants presenting their final ideas

5.4.2.3 Project Outcomes

The 'design' outcomes from AR3 all revolved around re-engaging users with the other people and objects in the kitchen. One design from Group 7 used sensory experiences to explain the provenance of the food we consume and through this reconnect the user with nature. Another team created a 'living' Wax chair that deformed over time and could be remoulded again into different shapes. Other designs were a 'danger playground' modelled on kitchen implements; miniature natural water filtration system that highlights the need for water conservation; a composting table with embedded digestion habitats and an eco-fridge with reduced energy demand. It is worth noting that all of the solutions offered in response to the brief, considered social and environmental aspects of sustainability even though it was not mentioned explicitly in the brief.

5.4.2.4 Data Collection Methods

The overarching methodology of the project aimed to find a balance between art and design research processes in order to reflect the collaborative nature of the project. As such the research approach was qualitative and 'soft' in nature, whilst still being valid and reliable. Observations, field notes, participant diaries[25] and video pieces recorded the project 'in-process' while post project questionnaires gathered the participant stories (Appendix T). This data, along with that generated in the two earlier phases AR1 and AR2 will be explored in detail in the next section.

5.5 EVALUATION AND MODIFICATION [AR1, AR2 & AR3]

5.5.1 Data Analysis

This section outlines the collation and evaluation of the data across the three phases of action research. The data from the three phases is discussed collectively as it forms a more coherent picture of how each phase incorporated the modifications highlighted through the evaluation of the previous one. This presentation better reflects the iterative nature of both action research and the design process (Barbour 2008). The findings from AR1 (phase 1) drove the development of AR2 (phase 2) in continuous feedback loops, as AR2 did with AR3 (phase 3) and so gathering the information and interpreting it was a cyclical process.

5.5.2 Data Gathering

A mix of research methods were used to gather information and to build a holistic picture of what actually occurred during the projects as well as broaden the researchers' understanding of the extent to which project parameters were effective in cultivating competencies. The majority of these methods were qualitative in nature. Informal conversations and short-term observations provided anecdotal information, as well as face-to-face interviews, audio visual material, participant diaries, questionnaires and storytelling questionnaires were used to gather rich data (see Chapter 3). The information was triangulated using field notes and quantitative data gleaned from the questionnaires across all AR phases. The amalgamated data was analysed and built into a collective narrative of the three different project experiences. This is discussed in the section below. Quotes and

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[25] Appendix S provides an example of an AR3 participant diary.

comments from the interviews, diaries, questionnaire responses and anecdotal conversations are presented as evidence for the evaluation and modification discussion.

5.5.3 Analysing the Quantitative Data

All of the quantitative feedback came from the questionnaires[26] completed during the first three AR phases. The questionnaires served different purposes in each of the AR phases as detailed below (Table 14).

Table 14: Details of Questionnaires from AR1-3

Project Phase	Questionnaire type	No. of Respondents (n=)	Description
AR1	Post project evaluation.	35	To evaluate the experience of the participants in terms of project brief and logistics, technology, collaboration with another country.
AR2	Pre project attitudinal questionnaire	26	To gauge the participant understanding of Social Sustainability in Design and what skills they deemed relevant and necessary for responsible design practice
AR3	Post project evaluation	19	To allow the participants to tell their project stories in order to build a collective narrative of the experience.

The results from AR2 & 3 questionnaires were qualitative in nature and are discussed concurrently with the other qualitative data. The results from the questionnaire in AR1 offered initial insight into how the participants felt about the experience directly after the project was completed. The questionnaire was limited in both its depth and usefulness but the results gave insights into the logistics and practical implications of running distributed

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[26] The questionnaires in all 4 AR phases were compiled and delivered using Survey Monkey online tool.

collaborative projects and how this experience could be improved upon in the subsequent phases of AR. The results are outlined in brief below:

In the main the participants enjoyed working with partners in another country; they felt the collaboration was effective and that the experience will benefit their professional career (see Figure 27). The majority (77%) of participants believed the experience of working with another country to be *'excellent'* or *'very good'*.

Modification: Maintain the diversity of perspectives in the collaborative projects; expand the partners to accommodate additional geographical and disciplinary diversity.

42% of respondents (15 of 35) answered that the experience of sharing ideas and their work (showing your ideas to the other participant team) with another country team was an excellent experience. However only 11.4% (4 of 35) felt that discussing their ideas with the other country team was 'excellent' and almost half- 48% (17 of 35) felt it was 'ok'. It appears that while the teams enjoyed sharing their finished ideas they found discussing ideas to be less successful due to communication difficulties.

Modification: need to deepen the level of collaboration to enable greater sharing of ideas and work between participants.

On the communication side however only 3% (1 of 35) felt the communication between the two groups was 'excellent' with the majority of participants feeling the communication was 'ok' 63% (22 of 35). Conversely 14% (5 of 35) of respondents felt the communication was a 'bit of hassle' and 3% (1 of 35) perceived 'no benefit' in pursuing it during the project.

Modification: changes needed to be made in subsequent phases to facilitate easier and better communication between groups. Integrate the use of technology into the project process more seamlessly.
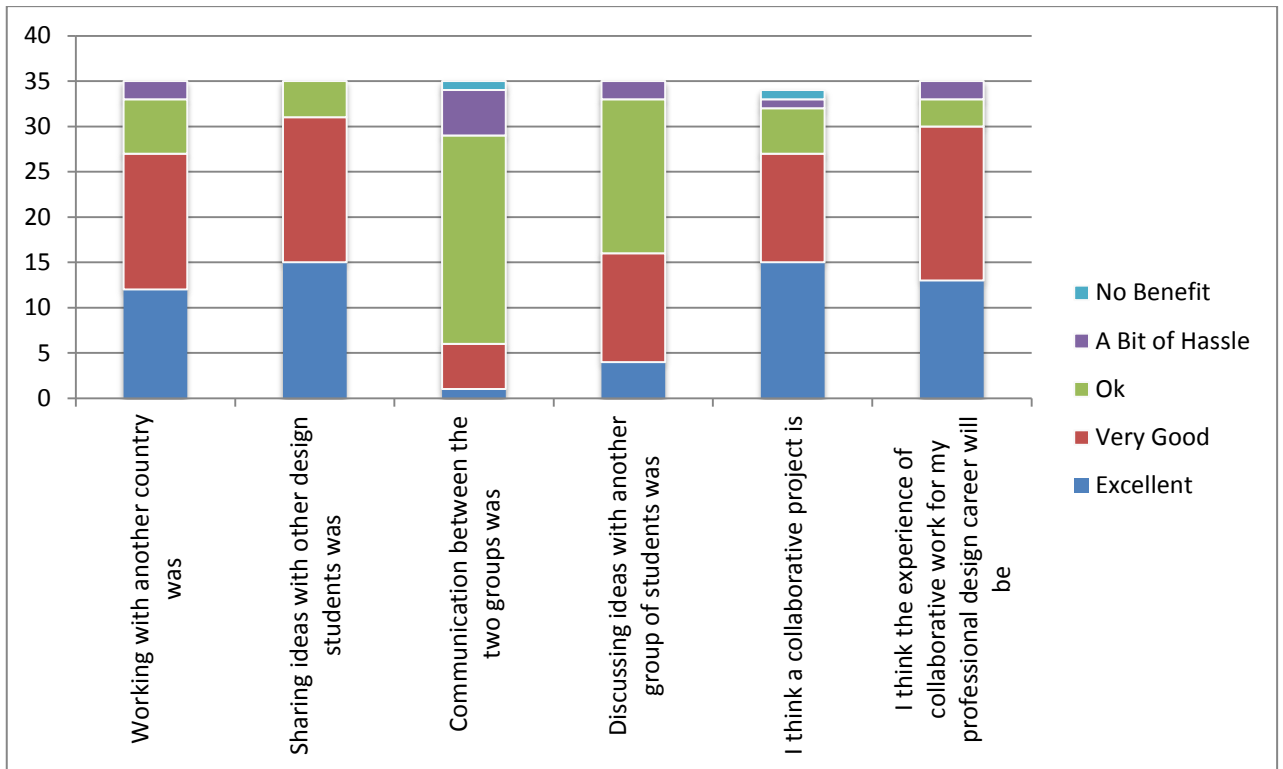
Figure 27: Opinions of the participants of AR1 on aspects of the collaboration process.

When it came to the subject matter the participants found that the subject interesting and relevant to their personal and professional design careers (see Figure 28).

The majority of participants, 88.5% (31 of 35), found the topic/ subject interesting whereas only 11% (4 of 35) did not find the topic interesting. All participants understood the purpose of the project with only 5.7% (2 of 35) not seeing the relevance of the project within the context of their degree.

Modification: Allow more time for reflection during and after the project is over to ensure the participants can see the benefit of the project within the context of their design career.
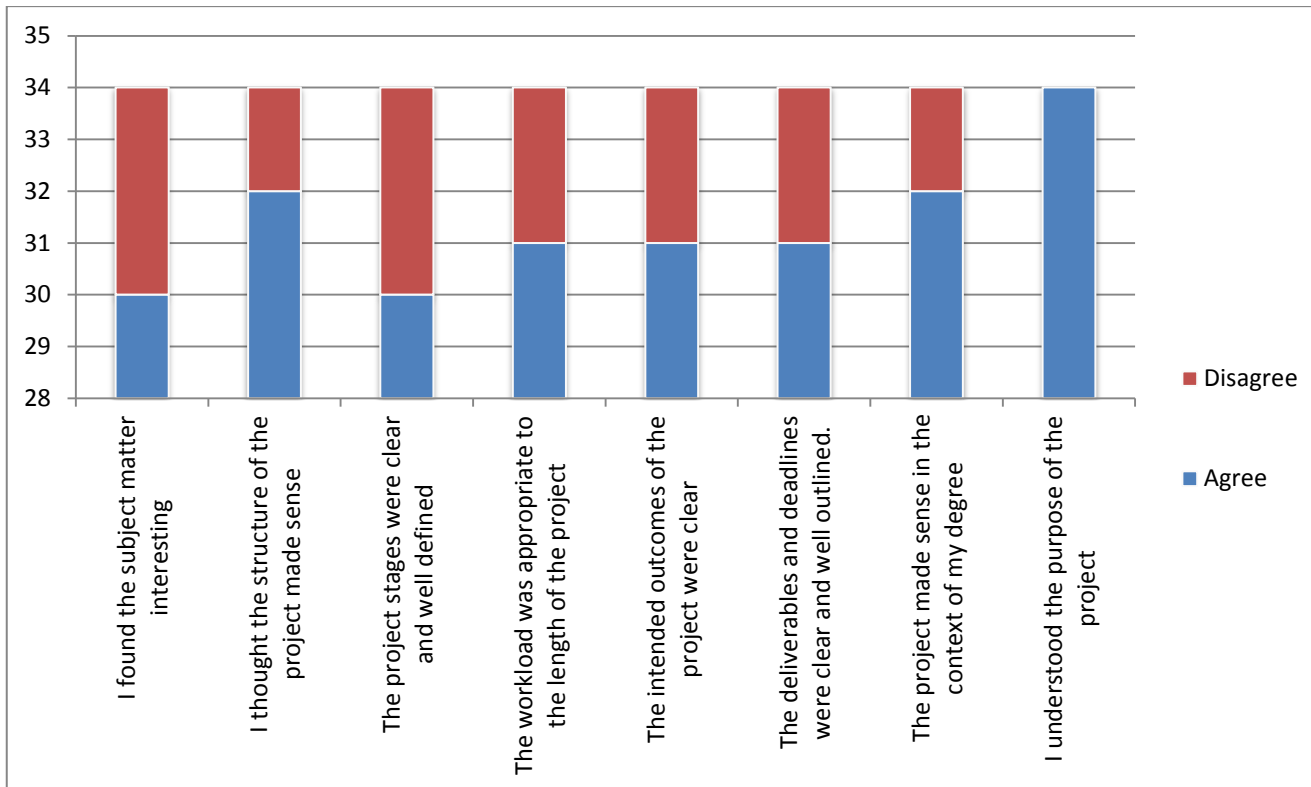
Figure 28: Participant responses on the subject matter and project logistics for AR1.

Participants found the use of blogs enhanced the project and acted as a reflective journal and a permanent record/ portfolio of their work. The Comment feature within the blogs also enabled comment and feedback- however this was not in real-time on the blogs.

Modification: more real-time conversations need to be facilitated using available software. Explore various types of software and their usability. The software must be free, user-friendly and functionally stable given differences in hardware provisions that might exist in the various partner institutes.
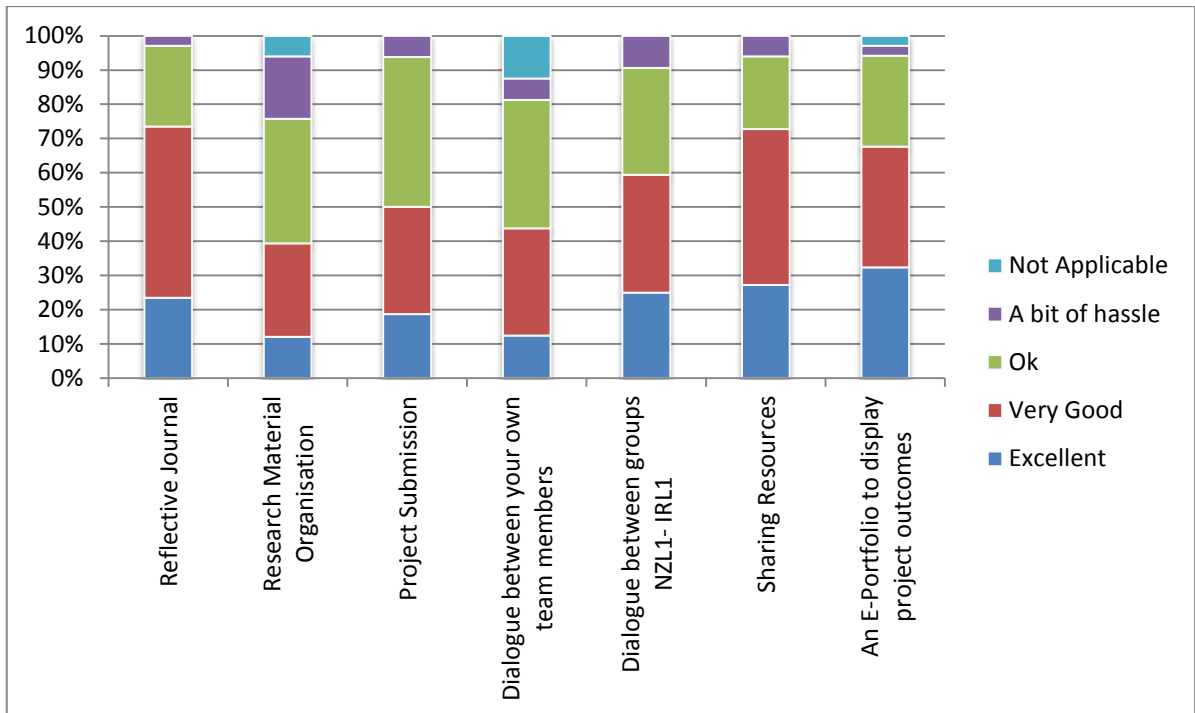
Figure 29: Functions of the Blog as a key component of the project [AR1].

The AR2 pre project questionnaire results evaluated the attitude of the project participants towards the key competencies/skills for social sustainability in design, emerging from the Framework detailed in Section 4.10. The competencies that emerged as the most important were Communication, Decision-making, Participation and Engagement. We can see from Figure 30 that the participants predominantly *'strongly agreed'* or '*agreed*' that all of the competencies were relevant to their practice.

One noticeable variation was that the respondents failed to see the importance of shared goals and dialogue- with 30.8% of the participants *'strongly disagreeing', 'disagreeing'* or remaining *'neutral'* with the importance of sharing goals in design practice.

Modification: Project structures need to emphasise shared goals and encourage more dialogue by deepening the collaboration required through the brief.
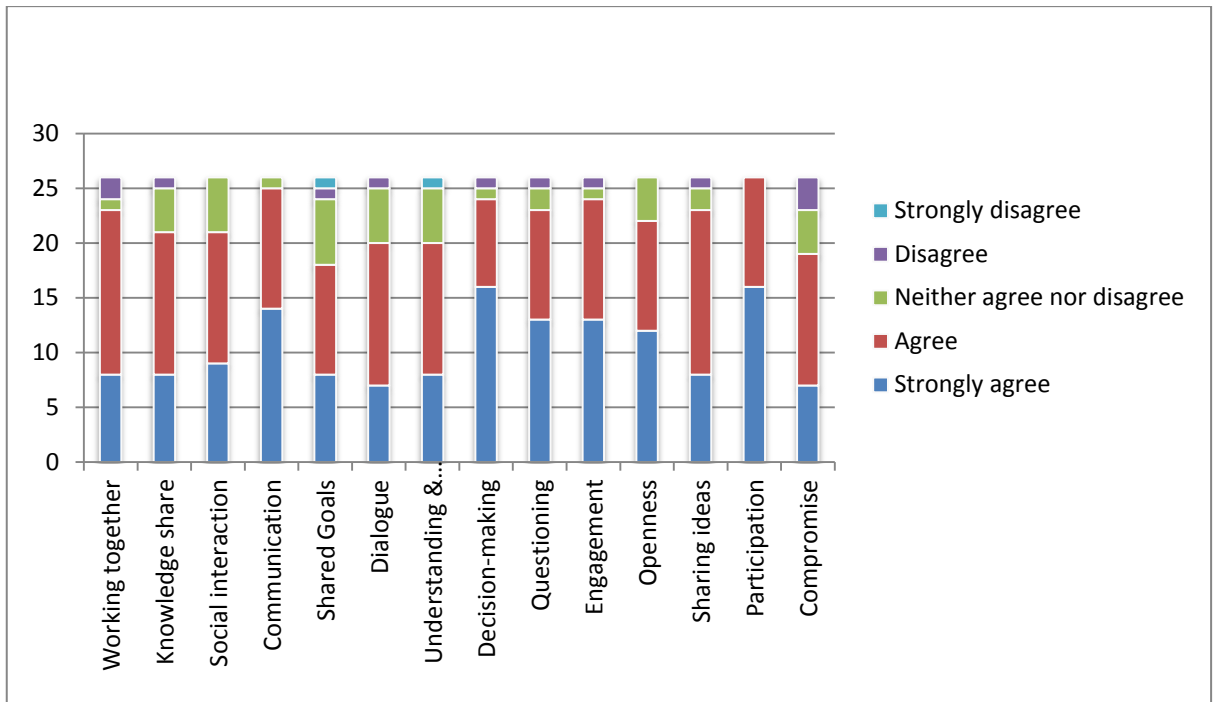
Figure 30: Participants responses to how relevant the specific competencies are to their design practice [AR2].

The questionnaire also evaluated how the designers felt they could engage with social issues through their project work (Figure 31) and how their projects in college enabled them to engage with these issues as designers (Figure 32). The responses indicate that even though designers are interested in engaging with social issues (46% rated their interest to be 6 [15.4%] or 5 [30.8%]) they felt their current project work didn't enable them to do so sufficiently (38.4% rated their level of agreement to be 1 [15.4%] and 2 [23%]). 30.8% of the respondents stated that they were only moderately enabled to engage through their project work.

Modification: The project structures must deal with social issues inherently in the brief. Participants should be encouraged to evaluate the impact their design solutions will have on the potential users as well as on the environment.
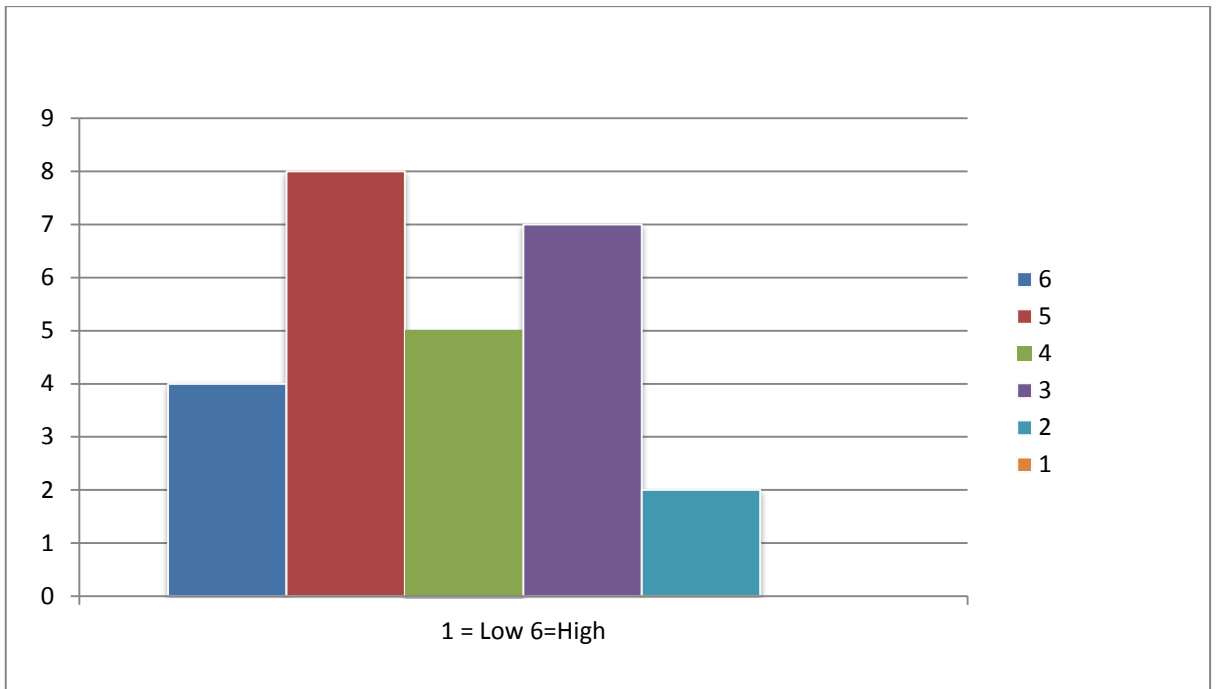
Figure 31: Participant response rate as to how they feel they can engage with social issues.
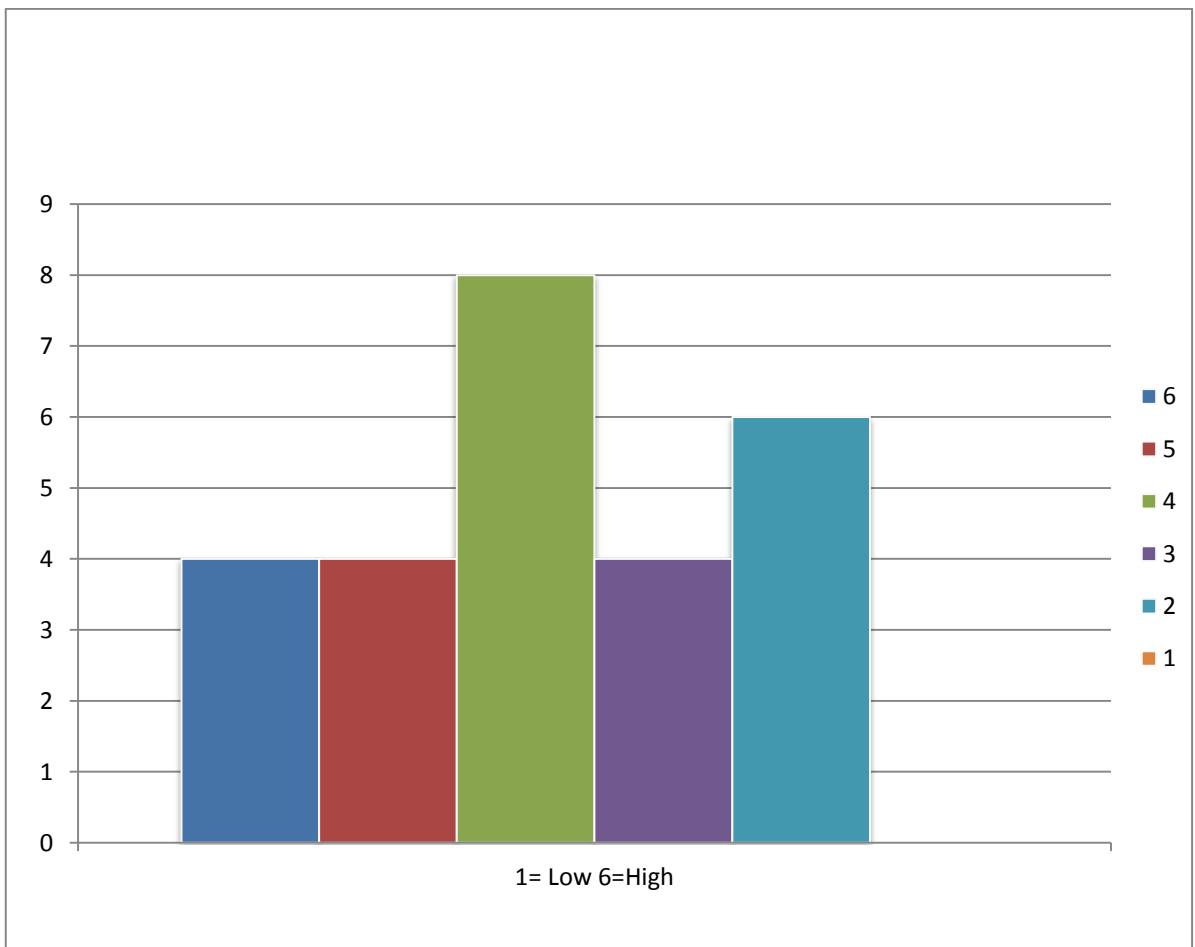
Figure 32: Participant response rate on how they feel their project work enables them to engage with social issues.

5.5.4 Analysing the qualitative data

The qualitative data gathered from each of the three AR phases was analysed directly after each phase. The data was initially coded into a number of preliminary categories (Table 15 and Table 16). These categories were determined on an 'a priori' basis from the skills and capacities relevant to social sustainability in design and also from a preliminary review of the data. These codes were then further categorised into sub codes. This method of organising the information allowed the researcher to ensure the data addressed the original research questions and the subsequent questions stemming from the theoretical review of literature. It was important when applying codes and categorising the data that the richness of words and their nuanced meanings did not get lost (Cohen et al. 2000). This is an essential part of the depth of qualitative data.

Through the process of story-telling a collective narrative of the three projects is drawn together to gain a rich understanding of what actually happened for the participants. Anecdotal conversations, observations, participant reflections and reactions gathered via blogs, diaries and interviews, along with the experiences of the tutors gathered via field notes all contributed towards exploring the reality and dynamics of cross-disciplinary projects. The research outcomes convey both the challenges and the unpredicted opportunities that stem from collaboration. It is hoped that the learning from this project can be built upon and incorporated into other creative projects that span disciplines.

Table 15: Codes used in analysis of AR1 Interviews.

Code	Sub Code
Participant Experience	Changes to existing definition
Interaction	Pragmatism
	Active
	Outcome driven (why? how? what?)
	Doing language
Cultural Exchange	Positive
	Negative
Improvements	Emphasis on process
Changes in Practice	

Table 16: Codes used for analysis of data from AR1, 2 & 3.

Code	Sub Code
Facilitator Experience	Planning
	Implementation
	Evaluation
Participant Experience	Building Cohesion
	Achieving the aims
	Decision making
	Reflection
Logistics	Technology
Dealing with Issues	
Synergy	Aligning Goals
	Managing Expectations

5.5.5 Interpreting the Data

The data across all three phases provided a wealth of information and observational insights. The feedback centred on the experience of the participants and the planners/facilitators which varied from extremely positive to negative. The novelty of the projects really interested and engaged the participants, however, contingencies often led to unplanned occurrences (both positive and negative) in all three phases. The sections below detail the key findings from the first three phases of AR and how the evaluation of each phase led to modifications in structuring and implementing the next.

5.5.5.1 Building cohesion

Time is required at the start of every collaborative project for the teams to get to know and become comfortable with each other (Denton 1997). Undoubtedly the distance impacted on the building of cohesion within the distributed teams in phases AR1 and AR2. Anecdotally, the participants in both phases explained that they didn't really 'get to know' their team mates in any depth because they were so busy working on their projects. This was not helped by the time differences which militated against too many virtual face-to-face meetings between group members. Particularly in AR2 where the project structure required more collaboration, the time difference impacted greatly on the collaborative effort. Following from findings of AR1, in AR2 the local teams were asked to make short introductory videos at the start of the project to introduce themselves to their distributed team mates. Despite this, unfortunately, there didn't appear to be any significant improvement in team cohesion.

In AR1 the participants informally shared small pieces of information about themselves in order to get to know each other. This was complemented with jokes and humour to break up the project. *'It was a fun way of doing it, we put up some comic relief, it was nice to mix work and a bit of play'* (AR1 Interview participant 8). This was even easier in AR3 with the co-located teams, where the face to face experience encouraged a fun 'lighter' approach which helped bonds to form and reduce initial anxiety (Gokhale 1995).*'Our ideas bounded back and forth along with plenty of laughter and jokes. It was a really good experience'* (AR3 Participant Diary 10). This was missing from AR2 and could possibly be attributed to personality differences (see section on 'Confusion and conflict' below).

Several participants in AR3 noted that once they dispelled their preconceived ideas about their new partners they got to know each other and the teams gelled together. *'Thankfully the first impression I had of the students was a good one… the impression I had previously… was a bit silly of me…There's nothing Arty Farty about them!!'* (AR3 Participant Diary 8). Once the initial awkwardness abated the teams formed cohesive units and evidenced constructive work patterns. *'I really enjoyed working with this team as I believe we gelled together extremely well once we got over the initial brief approach differences'* (AR3 Participant Diary 26). Participants attributed maintaining an open-minded attitude and remaining positive to helping them break the stereotypes. *'The way to work with other people that aren't in the same area of design as you and being open-minded to both types of design'* (AR3 Post Project Questionnaire respondent 4). *'There has to be no negativity in the group everybody needs to be level'* (AR3 Post Project Questionnaire respondent 17).

> *'But as soon as the nerves were gone… we finally started to let go and both of the colleges started to be themselves and the ideas from both sides started flying out…we started to feed off each other's ideas and one idea fed to another'* (AR3 Participant Diary 8).

One reason for this improvement in interaction between AR2 and AR3 could be ascribed to the teams spending an extended period of time (four hours) together in first stage of the project. During this time the team mates got to know each other and began to organise themselves as a team and consequently the project processes they would employ to work through the project stages. Obviously this face-to-face time is impossible to recreate virtually but effort should be made in collaborative projects to include initial 'getting to know you' time.

5.5.5.2 Achieving the aims

Not all the teams formed cohesive and successful units. In AR1 the segregated brief where each country concentrated on their individual problem solving exercise, wasn't conducive to working together. Each local team was so immersed in their own project that they didn't have time to fully engage with their partner team. '*This is a personal opinion. It doesn't seem that there was massive interaction between us and NZ, looking back on it now. There was good interaction with the work but not with the people, the designers themselves*' (AR1 Interview participant 7).

The client -designer relationship was incorporated into the AR2 brief to 'force' the teams to interact more frequently. However this wasn't as effective as intended and as a result the teams in both phases merely transferred knowledge instead of sharing knowledge (Denton 1997). The teams gave and received information about their work within the distributed teams but didn't actually share or explain their processes to each other. By just sharing the final design outcomes the team members found it difficult to learn about the processes their partners employed. '*I don't remember them explaining the process how they got there, what they did, what stage they did this and that compared to us explaining that either*' (AR1 Participant Interview 2).

In AR3 with the teams working together on a shared brief the participants could see for themselves in 'real-time' how the work was undertaken and the various processes played out. '*They were getting us to think differently about what we should be doing. Opening up new angles... I could see the difference in how we thought about our task and I'm sure they could see how different we saw it too. That is what I liked about the project, being able to show what we've learnt over the past years*' (AR3 Participant Diary 8). Genuine knowledge and skill sharing took place between the participants where there was a visible teaching-learning flow with skills unique to the disciplines being shared. '*It was also really nice to be able to explain the various cameras and filming equipment to the UL participants, especially as they were really enthusiastic about trying it out themselves*' (AR3 Post Project Questionnaire respondent 9).

The co-located participants in this AR phase had the advantage of being able to demonstrate practical skills to each other. They could share materials and physical spaces as they could travel to each other's work spaces. Through this the participants gained

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invaluable insights into their partners' disciplinary practices. These aspects are difficult, if not impossible, to replicate over distance.

We can see, as a result of the deeper immersion in AR3, that the team experience was positive in the main with only two teams expressing disappointment in their team processes. Several members of the same team expressed similar frustrations *'We never really got to know UL members of our team properly'* (AR3 Post Project Questionnaire respondent 5). *'But I think we didn't interact within the group as we should. The division of work was unbalanced,* [there] *were people that did nothing'* (AR3 Post Project Questionnaire respondent 6). *'I did not enjoy this project experience. The communication in the group was very poor. If we had had one talker it would have opened up things. We didn't gel at all as a group. If we had met more often this might have helped'* (AR3 Post Project Questionnaire respondent 13).

These breakdowns were attributed to a lack of interaction, uneven workloads, personality mismatches and incomplete communication. The reasons could also be applied to the previous two stages when the teams didn't work together as they could have. The participants themselves recognised this breakdown and offered ways in their diaries on how they could improve for future projects *'If I were to undertake the project again I would ensure that even if we all worked as individuals that there would be a more homogenous feel to the final design'* (AR3 Participant Diary 14).

5.5.5.3 Decision-making

Decision-making was not really an issue in AR1 where the teams worked on their own projects and merely validated their ideas and received comments from their partners. The decision-making processes frustrated the participants in AR2. Analysis of the Ning shows that the comment patterns[27] were not back and forth as much as they could potentially have been for effective collaboration[28]. This proved to be a challenge when the teams were designing solutions for their 'client' research problems and they weren't receiving sufficient feedback on which to base their decisions. *'We would like to hear feedback from ye to proceed further'* (AR2 Ning Comment IRL NZ4).

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[27] See activity patterns in http://intdesigncollaboration.ning.com/forum

[28] For effective collaboration communicating with the distributed team mates should ideally occur at least once a day and 2-3 times per day with the co-located team-mates Chiu, M.-L. (2002) 'An organizational view of design communication in design collaboration', *Design Studies,* 23(2), 187-210.

> *'And if you could make a decision on what POGs[29] we can move forward within the next 24 hours. If not we will move forward to the next stage of the project, keeping you informed of our progress'* (AR2 Ning Comment IRL NZ5).

Some also felt that if their interaction wasn't reciprocated they were less inclined to engage in conversations (via the blogs/ Ning) as the project progressed e.g. *'we tried but when we weren't receiving anything back we just gave up'* (AR1 Interview Participant 3, group 2). As with every project some participants will engage more, ask for more feedback and enjoy the overall experience more. '*Working with another country would be very good it just turned out that there was not much communication inputs and so on (as far as I experienced it)*' (ibid). This observation led to the deeper and perhaps more 'forced' interaction via the collaboration map (see Figure 24) between the participating countries in the AR2 project.

The most effective decision-making in AR3 was evidenced by the teams who questioned and challenged each other regularly (McDonnell 2012).

> *'The decision of how we would carry out the idea was made at our second meeting. team member A, team member B and myself explained the more conceptual reasons of it and why it was important and then team member C, team member D, team member E and team member F, took up the design side of the argument and we discussed the two concerns until we were satisfied that both would play an equally large role'* (AR3 Participant Diary 9).

In some situations the teams could differentiate good ideas from not so good which led to more cogent decisions *'We combined the best ideas to come up with our final design'* (AR3 Post Project Questionnaire respondent 2).

During the observations and confirmed in the post project questionnaire the 'successful' teams made great effort to create shared understanding *'All the art students were trying to think like us and us alike, like them'* (AR3 Participant Diary 10). This also ensured everyone had a voice in their decision-making *'let everyone decide as a group what the main piece might be just so no one feels left out for no one taking an interest in their idea'* (AR3 Post Project Questionnaire respondent 7).

5.5.5.4 Broader Perspectives

By participating in this type of project the participants gained an understanding of what drives design in other countries (both historical and contemporary influences) or disciplines. This diversity of perspectives not only expands the participants experience it

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[29] POG: Product Opportunity Gap.

also leads to richer outputs as they are formed from a combination of different voices (Denton 1997). One AR1 participant clearly saw that their partners were *'…quite similar to Irish; they have the same humour… get a new perspective on design and how other design courses are doing it. I suppose it's kind of reassuring that we are not too far off'* (AR1 Interview Participant 6, group 3). Also another noted that *'…it's very similar but they just had a different slant on things, a bit of a twist'* (AR1 Interview Participant 5, group 3). This gave the participants' an understanding that design does not occur in a vacuum and that society is both influenced by and influences design practice. This can be a difficult concept to relate to participants and is best learned by engagement with a diverse group of project partners.

While AR1 and AR2 offered cultural diversity, AR3 mixed disciplines. Finding a balance between these disciplinary voices proved to be a rewarding challenge for the teams. With these disciplinary differences, the teams needed to understand the other disciplines as well as the individual personalities involved. *'Discussing what our courses were about to understand how much we all knew in order to decide on how to approach the project aspects'* (AR3 Post Project Questionnaire respondent 12).Once the team members were comfortable with each other they could begin to explore the skills each of them could offer and how their various approaches could be combined to the betterment of the designed outcomes. *'We began to brainstorm, we spoke about the differences between our methods in general and how we could seek to amalgamate the two'* (AR3 Participant Diary 14). With the teams taking into account the different perspectives in their group they could also capitalise on the variety of skills unique to the disciplines. *'[We] got to know each other. Find out what kind of skills we each had. If there were any materials or media that anyone specialised with…We discussed what kind of an impact we wanted our project to make'* (AR3 post project questionnaire respondent 15).

Allowing the teams in AR3 to discover the differences and similarities for themselves proved to be the best way of understanding and making sense of their projects.

> *'It was cool that we thought in different ways, was nice to get to know how they thought and how they planned their work, we all worked very well as a team and we all put in an equal amount of work, research, drawings, ideas and all that stuff'* (AR3 Post Project Questionnaire respondent 7).

Despite the differences it wasn't far into the first project session that the participants began to create connections and understand the differences/similarities by asking questions and trying to draw parallels between familiar and unfamiliar knowledge. *'There was an obvious*

link with these students… I could really learn a lot from this experience' (AR3 Participant Diary 1). Clearly the teams worked hard at finding the middle ground between the disciplines and wanted their project outcomes to reflect the diversity within the group. *'You could see from the presentations that it was a collaborative project, you could see the mixture of ideas and the difference in the way we drew'* (AR3 Participant Diary 13).

> *'The result was to try to accommodate as much as possible from as many as possible in the group'* (AR3 Post Project Questionnaire respondent 11).

All three project briefs were designed to 'force' the participants to address the themes of culture, food and aesthetics from the different perspectives within the group. This journey of discovery at times did impact on the teams completing the project outcomes, particularly in AR2 when a number of the teams were distracted by the different perspectives that they didn't reach the potential of their design brief. In AR3 each discipline enjoyed explaining their discipline and learning about the idiosyncrasies of their team mates.

5.5.5.5 Working together, improving individually

Discussing the projects after they were completed revealed that the participants across all three phases found working with new people to be interesting and beneficial for a number of reasons. One being the novelty of working with new people *'that made the project interesting and that project really stands out but I don't think it really shaped our project. Our project, we would have come out with the same thing anyway but we were more enthusiastic and it was a bit more interesting to see what they were doing'* (AR1 Interview participant 5, Group 3). Although working with the partner country in AR1 might not have benefitted the project outcomes, the participants felt that it did improve the overall experience.

The ability to view the work of all the participants (both virtually and in reality) put pressure on the designers, in all 3 projects, to increase the standard of their work. Now direct and immediate comparisons could be drawn between the work of the various individuals, teams and groups. One participant stated that '[It]…*made me see the standard at which my projects need to* reach' (AR1 Questionnaire participant D). Another observed that *'it was beneficial in terms of getting advice from other participants, because our work was going to be seen by a lot of people it forced me to strive for a high standard of work*' (AR1 Questionnaire participant E). These views were confirmed by the participants during interview and from observations; they felt that because the comparisons were clear on the

blog/ Ning they tried harder to raise their work standard. In the AR1 questionnaire one participant noted that:

> *'Participant 1: we thought the standard of work compared to previous projects level just went way higher.*
>
> *Researcher: why do you think that was?*
>
> *Participant 1: I think its competition, because you have that other group and you know they have a long history of design and we are just very new, so we just wanted to make sure we matched their standard and were better.'*

<div align="right">(AR 1 Interview participant 1, Group 1)</div>

A recommendation for future projects should be that 'Competition' can be considered a motivating element for collaboration and should be encouraged in this type of project. Participants should be facilitated to look at the work of the other teams as much as possible to develop this type of peer reviewing.

From the AR3 diaries the participants commented that the quality of their project work had improved since the project ended *'my work has definitely been of a higher standard since. we learned alot from the days in the art college , even just in terms of the quality of work and sculptures and also the different materials that can be used'* (AR3 Post Project Questionnaire respondent 16). 'I have tried to do something different with my designs and not go for obvious and what's supposed to' (AR3 Post Project Questionnaire respondent 19). The learning is clear as the variety of skills and knowledge within the teams encouraged the participants to push themselves further through experimentation with new ideas and processes.

Sharing their work wasn't always easy for the participants, at times lack of confidence and the fear of being judged got in the way *'sometimes you are afraid of what someone will think of your design, if you put it up and they can see it. But after a while when they didn't criticise'* (AR1 Interview participant 2, Group 1). The participants soon found that the more they shared their work and ideas the easier it was to both give and receive feedback. They also soon recognised that in fact their work was of equally as high a standard as their team mates.

Beyond trying to impress each other and show the best side of their country/college, the participants also felt the responsibility that came from being part of a team. '*If you are working in a team you don't want to let them down but if they were getting ahead and*

getting excited to see what you post you feel you really have to turn it out' (AR1 Interview participant 2, Group 1). In all 3 phases it was decided to not appoint roles within the teams and allow roles to develop naturally. While this proved successful, in some cases appointing roles would have helped the participants negotiate through the process more fluidly. *'It may have helped if I had taken more of a lead or someone else but nobody did'* (AR3 Post Project Questionnaire respondent 5).

5.5.5.6 Reflection

The opportunity for reflection was provided in two ways across the three projects; local reflection on their work with the project and 'distant' reflection on the work and process of the partner country. Participants reflected not only on their work but on their individual practice and their learning experience. The overall depth of information appearing on the blogs and diaries in AR1 and AR3 particularly confirmed that participants reflected more and at greater length about their work. They were comfortable openly reflecting and commenting on their own work and enjoyed the freedom *'We weren't given guidelines so we just wrote what we thought. That was good that way'* (AR1 Interview participant 5, Group 3). Too much external influence from the facilitators at these points could have inhibited the reflective process.

> *'I think it was more interesting to see other peoples work. There was a lot of to-ing and fro-ing between us and New Zealand and it was really interesting to see their work and see new sketches and stuff. It was nice to compare because sometimes you just get lost in here [UL design studio] your own class and how you compare with them'* (AR1 Interview participant 6,Group 3).

The 'real-time' nature of the collaborative process ensured the participants reflected instantly and honestly on their design work, forcing them to question and justify the decisions they were making, as they were making them (Gardener 2005). This reflection in practice allowed the teams to iterate their ideas and concepts as they went through their process.

> *'I found talking to each other to be very easy… moving from stage to stage was achieved by commencing with brainstorming- then research- more brainstorming- thinking of practical use and functional use- everyone deciding to stick to an idea, execute the idea- practicality- function… our group had a great group interaction everyone worked well together and accommodated each other'* (AR3 Post Project Questionnaire respondent 1).

Reflection is a key part of design work, but it tends to come at the end of the project. This is something often missing from conventional projects as limited time and tight delivery requirements can be counter to continuous reflection on their own practice. In AR3, above

the other two phases, we can see evidence of individual reflection, in one instance a participant states that in future project he/she will *'… be more open minded and that function is just as importance and appearance'* (AR3 Post Project Questionnaire respondent 1). Another team underwent a clear journey of self-reflection *'Tell myself to lighten up. Talk and not be afraid of saying the wrong thing'* (AR3 Post Project Questionnaire respondent 5). Here we can see the participants learning from what they didn't do in the project indicating learning through the reflective process. Within the collaborative model participants must be encouraged to reflect on their team outputs as well as on their individual practice.

5.5.5.7 Developing Critical Thinking

Participants began to question their own practices and those of other cultures/disciplines through the projects. This type of 'critical' experience encourages deeper learning that can prove to be transformative in the participant's education. This was evidenced through the projects as the participants had begun to analyse, synthesise, and evaluate their own work (Ennis 1993, Gokhale 1995). They also felt encouraged to look closely at the work of the other teams and comment critically on it. *'It [the project] made you think more outwardly, if you have a project [you] don't just think on that particular one thing'* (AR1 Interview participant 8, Group 4). Here the participants have stepped outside their own perspectives to help them negotiate the complexity of multiple voices within their teams.

When asked, in the AR3 post project questionnaire, one participant replied that the most important thing they had learned was *'Working with a group of people. Social interaction, organisational and responsibility skills'* (AR3 Post Project Questionnaire respondent 3). Other participants were able to recognise the diversity of perspectives and opinions within their teams *'Different people that have learned to look at things in a different way are not always wrong'* (AR3 Post Project Questionnaire respondent 18). Another participant echoed this sentiment and added that *'working with design participants helped me to think in different ways'* (AR3 Post Project Questionnaire respondent 10). This self-awareness whilst maintaining an awareness of others perspectives, is indicative of emerging critical thinking skills (Gardener 2005, Gokhale 1995).

Self-awareness was complemented by critical questioning. We can see, particularly in AR3, where the participants are beginning to question the limits and pre-conceived notions about design and creativity. *'Do we as product designers have to design as people expect products to be like'* (AR3 Participant Diary 8). The participants were beginning to evidence critical thinking skills and capabilities. Critical thinking skills, however takes time to learn

and to manifest in project work (Ennis 1993). On this premise the same participants could potentially be used for the final stage of the action research process in order to explore the evolution of their Critical Thinking capacity.

5.5.6 Planning and Doing

From the design tutors perspectives, the whole experience of working closely with another design school allowed them to expand their personal and professional horizons. It also provided the opportunity to explore alternative methods for preparing and implementing participant projects. From the AR1 facilitators' perspective[30], the experience added greatly to the whole staff exchange as they both felt they were immersed quickly and deeply in the culture of their host country once the project commenced. These connections were explored again in AR2, while in AR3 new links were made between two local colleges that had not existed previously.

5.5.6.1 Technology

Online Blogs and Forums were used as the primary interaction tool in both AR1 and AR2. Despite an initial settling in period (as reflected in the questionnaire), the participants not only enjoyed the novelty and convenience of this new delivery method, but they also felt that the opportunity to get feedback from others really helped and encouraged them. Being able to post work on the blog allowed for external representations of the local teams work to be available for critique, comment and negotiation by the other members of their group (Gul and Maher 2009).The communication between the teams varied in depth across the stages of the projects. The participants felt that the richest and most pragmatic feedback came when they had ideas to discuss during the concept development and detailing stages. '*It wasn't until we got designs that we could communicate efficiently and effectively'* (AR1 Interview participant 1, Group 1)*.*

Working with the technology, in both AR1 and AR2 provided the participants with a *'better understanding of presenting digitally and also great for gaining techniques and sharing ideas with a different design course'* (AR1 Questionnaire Participant G). This experience, a number of participants noted mimicked professional life and introduced skills that would prove useful in the future.

Those, who did not engage fully with their team, regretted it once the project was complete and they could review the effort exerted by their peers on the blogs and at the final design

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[30] Exploring the role of the researcher is an important aspect of the Action Research model.

exhibitions. In the post project questionnaire one participant reflected that 'I think for me the problem was *being too set on designing the way I had previously, and did not interact enough with the blogging. This is something I regret as I really belief [sic] it could be used as a very useful tool*' (AR1 Questionnaire participant C). This atypical response from AR1 indicated that all participants would need to be encouraged and facilitated to collaborate more during the subsequent projects. In AR2 the facilitators sent prompt comments frequently when the teams weren't interacting. This was a reactive solution in both AR2 and AR3 where the facilitators used their discretion on when and how to structure the comments.

As a consequence of the communication issues in AR1 the blog platform was replaced with a Ning^tm network in AR2. Both blogging and real-time conversations were facilitated via the Forum feature on the Ning. Within this functionality the participants could converse in real-time. Unfortunately, due to the time difference between Ireland and New Zealand the real-time conversations didn't occur as the planners had intended.

A very positive by-product from using online project diaries/blogs is that a permanent record of the work is retained that can be accessed on an on-going basis. The video conferences allowed the participants to 'meet' each other and relate a face to the virtual relationship that had previously existed. Enjoyment from the video conferences was obvious at the time and the feedback afterwards confirmed as much *'Thoroughly enjoyed the conference and tasting a new culture'* (AR1 Post Project Questionnaire respondent 2). One participant suggested a preference to *'maybe meet at the start like we did at the end would be good to create a bond'* (AR 1 Interview participant 5, Group 3). This change was introduced in the AR2 and AR3 phases with a mix of scheduled formal and informal meetings at regular stages in the projects.

5.5.6.2 Co-Located Vs. Distributed

When comparing the co-located experience of AR3 with the distributed ones in AR1 and AR2, obvious advantages come to the fore. Issues can be resolved easily, firmer bonds can be formed in a shorter period of time and participants can react intuitively to situations as they happen. Contrarily, working over the distributed environments and the complexity of technology meant that the issues were not resolved immediately which often led to frustration on all sides of the partnerships. The key, and perhaps unanswerable, question arose as to whether we can we ever recreate the immediate and physical with the virtual over distances.

5.5.6.3 Managing Disagreement

The collaboration wasn't always successful, unfortunately, in spite of positive attitude and initial enthusiasm of all of the participants and planners. Success was uneven between the three phases given the contingencies in running such projects. In spite of all the paths being clearly laid out the situations did not always play out as predicted. Human behaviour is such that it cannot be controlled on every level, nor indeed should it be as the spontaneous outcomes often prove the most interesting. A number of teams in each phase failed to function effectively and as such their collaborative effort could be deemed as 'less successful'. This was clear from the parallel project paths of the co-located teams in AR1 and AR2 and the disciplinary teams in AR3 that didn't converge over the duration of the projects.

The downside to collaboration became apparent in the AR2 as the project faltered and resistance increased in the latter stages. This can be attributed to cultural differences and a mismatch of goals and methods (Lozano 2006). The differences in cultures between team members meant trust wasn't established as quickly as it needed to be for the project to work within the limited timeframe (McDonough et al. 2001). From a more practical level, the incompatible academic calendars made the physical communication difficult at times throughout the three projects. Although more time had been given to planning and working out logistics in AR2, the lack of clear shared goals, distributed responsibilities, conflicting agendas and equal involvement of stakeholders (Fadeeva 2004) led to less successful project outcomes and experience.

These conflicts should not always be viewed as a negative thing however, as they were beneficial in allowing different views to be aired and compared. Negotiating these conflicts and dealing with uncertainties helped the designer participants to develop key skills of compromise and effective communication and encouraged them to find innovative ways to resolve the issues that arose (Fadeeva 2004, McDonnell 2012, Denton 1997). The process of managing the conflicts and the negotiation of expectations was given particular attention in AR3. Here the researcher and facilitators from the partner college explored the notions of synergy (working towards an agreed common goal) and commitment (or 'buy-in') with the agendas negotiated and agreed on, prior to the project.

Collaborative work brings the best outcomes when each partner can mutually benefit from sharing his/her knowledge (Yoshimura and Yoshikawa 1998). Following the analysis of AR1

and AR2 the lack of synergy was identified as one of the contributory factors why the projects didn't reach their potential. On this basis, synergy (or working towards common goals) was considered from the beginning of the planning for AR3; the more coherence and consensus reached at the start, the easier the project would be to run and the more successful the outcomes. Establishing synergy and common goals can ensure a more successful collaborative experience (Gardener 2005). From the outset of the AR3 the project facilitator group, comprising two tutors from sculpture and two from product design, met regularly to discuss the expectations, desired outcomes and to identify any potential pitfalls that could arise and how these might be subsequently overcome.

5.6 MODIFICATION

Exploring and evaluating the data from the first three phases of action research demonstrates that there is not one single method that ensures success in a collaborative project. The outcomes are mixed, particularly when the focus is on the participant experience and not the final outcomes. So why did some 'fail'? Reasons for the struggles and challenges could be separation; juxtaposition of concepts; misunderstanding of language/ lack of common language; personality differences; mismatch of goals; struggle for coherence in united design etc.

Contrarily, why were some teams' collaborative efforts more 'successful'? The factors for 'success' were identified as: seamless blending of disciplines and cultures through establishing common language; effective decision making; compatible personality mixes; collective understanding of areas; willingness/ open-mindedness to learn about others processes; overall approach; skills used and interaction within the group.

From exploring the factors of 'success' and 'failure' we can draw some frequent occurrences/ contingencies that can be planned for within collaborative projects:

Planning and Implementation:
→ Broaden the partners to include participants from different disciplines, socio-economic backgrounds and varied cultural models.
→ Plan a path of convergence for all the different disciplines participating. Define how the different disciplines can contribute to a collective brief.

→ Continuous feedback loops between team members and teams and planners need to maintain throughout and after the project. This feedback needs to encourage not discourage- constructive and positive.

Synergy:

→ Aligned and clear goals decided upon that reflect everyone's expectations. All partners should be clear about expectations before the project begins.

→ Get to know the personalities in the team, create atmosphere of respect and understanding.

→ Facilitate discussion at every stage through formal meetings and informal reviewing sessions.

→ Group reviews to encourage a culture of peer -learning and reviewing.

Project Schedule:

→ Timescale: enough to get to a level of familiarity that enables effective work but not too much as to get bored.

→ Allow contingency time for the re-shifting of goals if necessary throughout the project.

Project Brief:

→ The project structures must deal with sustainability issues inherently in the brief, including all three tenets- social, economic and environmental.

→ Participants should be encouraged to evaluate the impact their design solutions will have on the potential users, as well as on the environment.

→ Project structures need to emphasise shared goals and encourage more dialogue by deepening the collaboration required through the brief.

Communication Technologies:

→ Accessible user friendly technologies.

→ Software should be free where possible.

→ Software and hardware should be uniform across all partners where possible- ensure equity and continuity of communication over the project duration.

Building Cohesion:

→ Allow time early in the project for participants to get to know each other and build cohesion within their teams.

→ Give the individuals time to 'audit' the range of skills within the team.

→ Explore different levels of collaboration from 'light' to 'full partnerships'. The depth should enable effective sharing of ideas and work between participants.

Team Dynamics

→ Need to encourage the breaking of preconceived stereotypes that could limit the project experience.

→ Allow for fluid team structures where roles will emerge and shift as the project progresses.

→ Initiate conversation starters. Encourage humour at the start to reduce anxiety and nerves.

→ Encourage questions within teams.

→ 'Force' collisions between the participants to help in getting to know each other and in building positive relationships.

Reflection:

→ **During:** to assess overall progress and readjust if necessary, build time for reflection into the project schedule.

→ **After:** to evaluate the learning, the experience, where they can see the benefit of the project within the context of their design career and the potential impact on future work.

Data Gathering

→ Data collection methods need to be more probing during and after the projects.

→ Gather evidence and record behaviours through the project as well as at the start and end. This would build a more holistic story of the experience.

Role of Planners and tutors

→ Facilitation not instruction- to create a meaningful learning experience that stimulates the participants to think critically in the definition and resolution of the problems posed by the brief.

→ Encourage not discourage.

→ Be flexible and comfortable with uncertainty- Acknowledge and accept that contingencies will occur.

5.7 CONCLUSIONS

Phases 1-3 of the Action Research process explored the practical implications of planning and implementing collaborative projects. The iterative analysis and development of the projects allowed for improvements and changes to be tested in subsequent phases. Through the three cycles a strong case emerged for how collaborative projects can be implemented to ensure success- in as much as this is reasonable. The taxonomy of guidelines allows for the planners/ facilitators to prepare for what contingencies may arise, while also creating an environment for the participants that is conducive to effective team work and individual development.

5.8 NEXT STEPS

While this chapter has outlined the key guidance for *how* to plan, implement and subsequently evaluate collaborative projects, the next step of the research was to map the framework of key competencies for social sustainability in design over this collaborative project experience. In terms of meeting the overall research aim, the final phase of the Action Research process [AR4] required the identification of specific behaviours evidenced by the participants of the collaborative projects. The following chapter embeds the competencies for social sustainability deeper into the collaborative project model in order to capitalise on the experience for both participants and planners.

6 Action Research Phase 4

This chapter outlines the projects conducted for phase four of the Action Research Process [AR4] building on the previous three phases. Following a broad description of the project planning and implementation the project outcomes are discussed briefly. The data gathered through these projects is then analysed and mapped over the framework developed through the Delphi Study (see Chapter 4) in order to relate the process of collaboration to the emergence or absence of key competencies for Social Sustainability in design.

6.1 BACKGROUND

The final phase of the Action Research [AR4] process consisted of two parallel projects conducted over a four week duration in September 2011 (Figure 33). The first project was conducted between multi-disciplinary students from Hogeschool Utrecht [HU], in the Netherlands and Product Design + Technology from The University of Limerick [UL], Ireland. The second project teams comprised of students from a mix of disciplines at Virginia Commonwealth University [VCU], in the US and the remaining students from the UL Product Design Year 3 group.
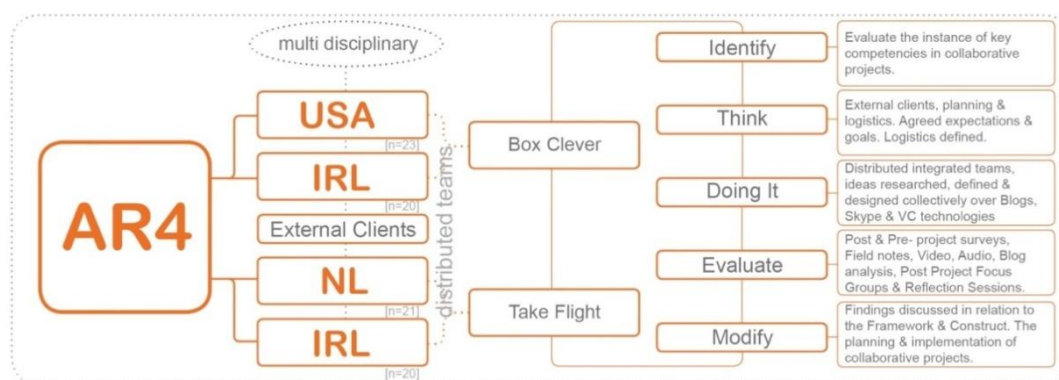
Figure 33: Action Research Phase 4 Project Map

The structure of both projects explored distributed collaborative teams where the participants worked together to deliver the various stages of the project brief. The projects adopted the 'full partnership model' or 'intense collaboration' where participants work together to fulfil a brief and create a shared outcome (Mamykina et al. 2002, Lahti 2007). This model was chosen for this phase of the AR process in order to explore the depth to

which teams, based in distributed locations, could collaborate and which competencies would emerge as a result of the immersive collaborative experience. The AR phase was designed to address the fulfilment of the final two research objectives:

Objective 5: To explore the pathways to, and barriers against, the adoption of Social Sustainability competencies into design practice.

Objective 6: To understand *how* and *when* the competencies emerge through the collaborative process.

The open and 'real-world' briefs in both projects builds on the hypotheses proposed by Lahti (2007) which suggests that the starting point of a successful collaboration is *'open-ended and authentic design tasks or problems that force students to confront the multi-disciplinary character of designing practice'.* Both briefs involved participation by industrial partners with the themes addressing real world problems proposed with these partners. The inclusion of a real industrial partner echoes professional design practice where economic factors impact on the Sustainability of a project in parallel with environmental and social issues. Research has also shown that these real world problems, when posed by real stakeholders, engage students in ways that 'artificial' projects often do not (Mulder et al. 2012).

6.2 PROJECT 1

6.2.1 Project Brief 'Take Flight' [31]

Table 17: IRL NL4 Project Brief

Project Brief
The role of the designer is changing; it is no longer to give shape to products, instead it is to shape experiences for the users and to use the creative spark to change behaviour for positive impact. With these considerations in mind look at the brief you have been given and together in a team (comprising members from Hogeschool Utrecht [HU], The Netherlands and The University of Limerick [UL], Ireland) you must research, ideate and design innovative solutions that go towards tackling the issues. A study has been performed for Driessen Aerospace, a Dutch supplier for Boeing and Airbus. This study explored the resting experience of flight attendants (FA) during intercontinental flights and produced quite a number of interesting user insights on the resting experience and the Crewrest Cabin. This exploration was completed quite recently by the Research Centre of the University of Applied sciences Utrecht. These insights are clustered around several themes. As the Crewrest Cabin is an immensely complex design project your team will be given a specific theme or perspective that will help you narrow the scope of your assignment. Your assignment is to create an improved resting experience by designing a completely new Crewrest from the user perspective. You will build on the research generated from the previous project and generate new ideas and concepts for the Crewrest area that have a certain degree of realism but also extensively provoke the imagination of the client! The focus of this assignment will be on innovative concepts, rather than technical engineering. The level of innovation is described as: should be realistic in 5 years. Driessen Aerospace will use your ideas and concepts as input for further future development of their Crewrest. It is underlined that this assignment is therefore not fictional. It is part of a real research and design project!

Each team was tasked with creating an improved resting experience for long haul flight crew by redesigning the Crew rest from the user's perspective (Table 17). Prior research at Hogeschool Utrecht [HU], for Driessen[32], had produced in-depth studies into the user experience of the Flight Attendants (FA) within the Cabin Crew-rest area during intercontinental flights. The insights were clustered around several themes: *Transitions* (moving between work and rest), *Nurturing*, *Look & Feel*, *Flexibility*, *Closing Off* and *Service.* Each team was given a theme on which to focus their project. Learning from previous AR phases highlighted that students struggled with themes that were too broad, particularly in terms of complexity and reaching well resolved outcomes in the short 4 week duration.

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[31] The Project Pack for AR4 can be found in Appendix U

[32] Driessen (part of Zodiac Aerospace) is an international company specialising in a variety of products and services for Cabin Interiors, Aircraft Systems, Aero safety & Technology, and is world market leader in all its activities (www.driessen.com).

6.2.2 Project Logistics

The table below (Table 18) provides an overview of the key logistics involved in planning project 1 of AR4.

Table 18: IRL NL4 Project Logistics

Planners	(HU) Jens Gijbels, (UL) Muireann McMahon
Facilitators	(HU) Fred Montijn, Jens Gijbels. (UL) Muireann McMahon, Louise Kiernan.
Participants	(HU) Co-Design Module Students (n=21); (UL) Product Design + Technology (BSc.) students (n=20)
Teams	IRL NL4- 1-6 (6-8 students per team with 3-4 from each country)
Duration	4 weeks
Client	Driessen Aerospace

6.2.3 Planning

The first contact between the partners began almost 6 months prior to commencement of the project. In April of 2011 the initial scoping emails were exchanged, after which phone-calls were made. These calls and emails established the relationship between the partners and began the discussion of what shape the project would take. The topics progressed onto more specific planning and decisions were made about student groups, project outlines and structure. For the final two months before the start date detailed planning conversations[33] were held between the two tutor groups. Initially, the two key project planners were involved in these Skype based phone-calls, but as the logistical details became firmer the other two project facilitators were introduced to the project. This allowed for objective peer auditing throughout the process and ensured the avoidance of reflexivity. As the conversations progressed issues and 'conflicts' were resolved- e.g. unease as to how the students could deliver quality work together and that their grade could be too dependent on successful collaborations and that, if the collaborative element didn't work, their grade would suffer.

The main issues to be resolved in the planning stages were:

→ *Project Logistics:* tools, interactions, team numbers and compositions, communication tools.

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[33] The notes from these meetings can be found in the project diary.

> → *Project Schedule:* Project deliverables, key dates, presentation times.
> → *Project Diaries*: Software, learning curves and accessibility.
> → *Expectations of both partners*; managing these expectations to avoid conflict of agendas.
> → Achieving Synergy/ defining common goals; identifying goals.
> → Language differences.
> → Differences in processes, teaching methods, disciplinary differences.
> → How to orchestrate the participants effectively and efficiently throughout the process.
> → Student experience, learning outcomes, assessment.
> → *Team Interactions*: individuals, roles and profiles.

Team Structures: Students were allowed to choose their own co-located team members. It was decided to not to be divisive in determining the group make-up, as research has shown that there is increased intrinsic motivation and engagement when teams are self-determined (Ciani et al. 2008). In addition, professional situations are such, that teams cannot always be purposely arranged to accommodate a variety of personality types. The planners then randomly paired each co-located group with a distributed group making a complete team.

Role of the facilitators: The role of the tutors in this project was not to transmit information - although a number of workshops were delivered over the duration of the project that involved core skills development such as presentation skills and ideation techniques. In this instance the tutors adopted the roles of facilitators and animators who stimulated and assisted the participants through their project paths which involved *'creating and managing meaningful learning experiences and stimulating students' thinking through real world problems'* (Gokhale 1995).

Project Roles: When discussing project management, the planners decided that assigning roles would help the participants to organise their process and deliver the project outcomes. Each team member would assume one of three roles for the project – to be chosen by the teams; Co-Ordinator; Presentations expert; Collaboration expert. Each role would be matched by another team member in the partner country, and these pairs would work together to fulfil the aims of their role. The project began with the Dutch students assuming roles and sticking to them fairly rigidly throughout the project. The Irish participants however decided in the main to not take on the roles and to allow the management of the project to take a more democratic direction.

Project Meetings: It was agreed between the planners that there would be structured bi-weekly meetings, once as a group and once (minimum) as a team with the project facilitators.

6.2.4 Doing it

At the beginning of the project each team was presented with a project pack outlining all of the key details of the project (Appendix U). The project was divided into four key stages: Research, Ideation, Concept Development and Synthesis and Presentation (see Figure 34). Over the four week duration, the participants used Blogs through Wordpress^{tm}, Skype^{tm}, Dropbox^{tm} and other communication tools to share ideas, work together and deliver their work at the four different stages of the project. All of these technologies were introduced to them in class and the teams then decided which tools to employ at the appropriate times over the duration of their projects. Each team was required to establish a project blog, which then pivoted around a central project blog where general project information was posted and notifications were announced to keep all participants abreast of project details.

NL
Hogeschool Utrecht

IRE
University of Limerick

x 3 students

project teams
getting to know you

x 3 students

05.09.11

**Introductory meeting + Briefing
12 -2 (dutch time NL)
11-1 (irish time Ire)**

Begin: 05.09.11
Complete: 09.09.11

Research techniques
Team meetings:
Thursday 8th: 3-5 (NL),2-4 (Ire)
Friday 9th: 10-12 (NL),9-11 (Ire)
Diary Review

1.Research

1.
. Pick apart the brief.
. What does it mean (individual, team)?
. Understand the clients, users +
situations of use.
. Identify stakeholders + their needs

Deliverable: visual presentation of key
research findings + stakeholder needs, research
pack containing details of research methods
employed + results

Begin: 12.09.11
Complete: 16.09.11

Group meeting:
Monday 12th: 12 -2 (NL)11-1 (Ire)
Team meetings:
Thursday 15th: 3-5 (NL),2-4 (Ire)
Friday 16th: 10-12 (NL),9-11 (Ire)
Diary review

2.Ideation

2.
. Generate solutions to the research needs
identified in stage 1
. Explore ideas from the most realistic to the
most ridiculous! Be wild + crazy!
. Communicate of your ideas through
diagrams, sketches + models.

Deliverable: visual presentation containing
evidence of extensive idea generation +
exploration.

Begin: 19.09.11
Complete: 23.09.11

Group meeting:
Monday 19th: 12 -2 (NL)11-1 (Ire)
Team meetings:
Thursday 22nd: 3-5 (NL),2-4 (Ire)
Friday 23rd: 10-12 (NL),9-11 (Ire)
Diary review

**3.Concept
Generation**

3.
. Filter your ideas from stage 2 (refer to your
research)
. Develop 10 of the most viable +
interesting ideas (work on functional +
aesthetic details).
. Test designs amongst the users (using
prototypes

Deliverable: visual presentation explaining
the details of the 10 chosen concepts.

Begin: 26.09.11
Complete: 30.09.11

Group meeting:
Monday 26th: 12 -2 (NL),11-1 (Ire)

**4.Synthesis +
Presenation**

4.
. Filter your ideas from stage 3 (use your
testing to guide you)
. Develop 5 concepts (individual concepts
or combinations of features). Filter the ideas
again into 1 clear innovative design
. Specify the features of the design
(materials, technical detail, functionality etc.)
. Communicate your ideas using
storyboards, visualisations, video, models +
marketing material.

Deliverable: Visual presentation detailing the
final design concept.

30.09.11

Final presentation to clients
Friday 30th: 10-12 (NL), 9-11 (Ire)

.....Project Details....

Figure 34: IRL NL4 Project Details, (the same plan was used for the IRL US project).

6.2.5 Project Outcomes[34]

The design process for the Ireland-Netherlands [IRL NL4] project was deemed to be a successful and enjoyable experience by the participants and planners. Very few contingencies occurred during the process as the aims and goals of the planners, facilitators and participants were aligned for the majority of the project. The few issues that did arise between the planners, the participants and the participants and planners, were quickly and satisfactorily resolved. The industrial partners (Driessen) gave excellent positive feedback to the participants, and subsequently went on to present a number of the teams ideas to their international R&D team.

Similar to all the previous phases of Action Research the design ideas presented by the students were highly innovative and creative, as confirmed by the peer tutors and industry partners during the final presentation (see Figure 35 and Figure 36 below). Also, even though the teams were working with what appeared to be a restrictive brief, the conceptual ideas ranged from flexible, personalisable futuristic crew rest areas to detailed interior refurbishment for improved user experience and from individual sleeping 'pods' to holistic services that considered the Flight Attendants entire work day.
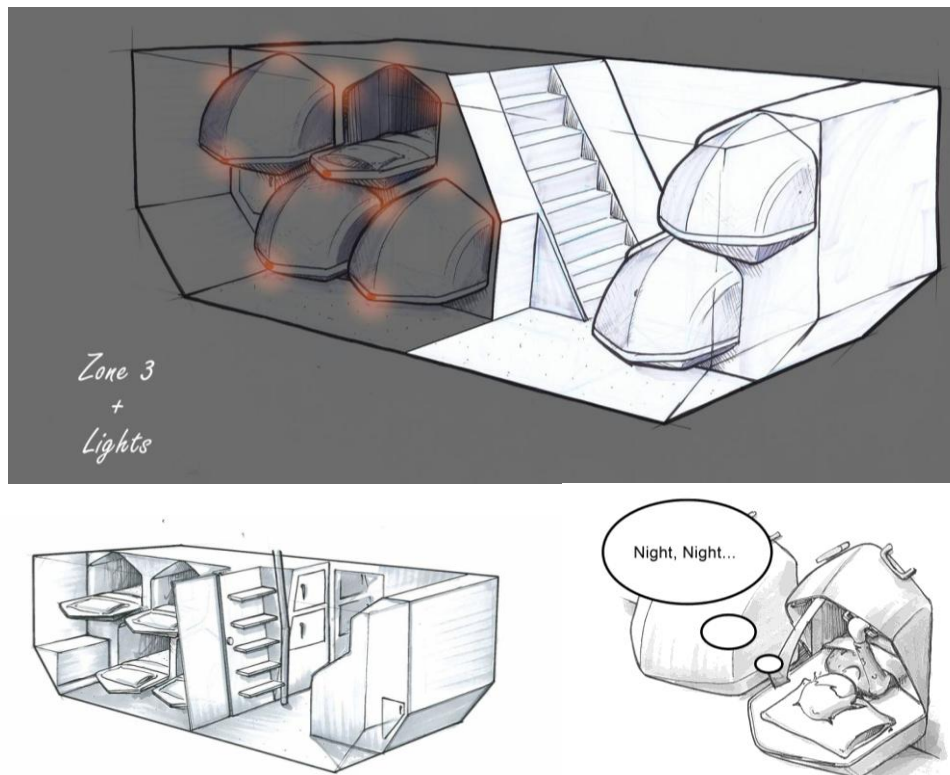
Figure 35: IRL NL4-5 Crew Rest Final Design Concept images.

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[34] For more see project blogs www.designcollaboration2011.wordpress.com
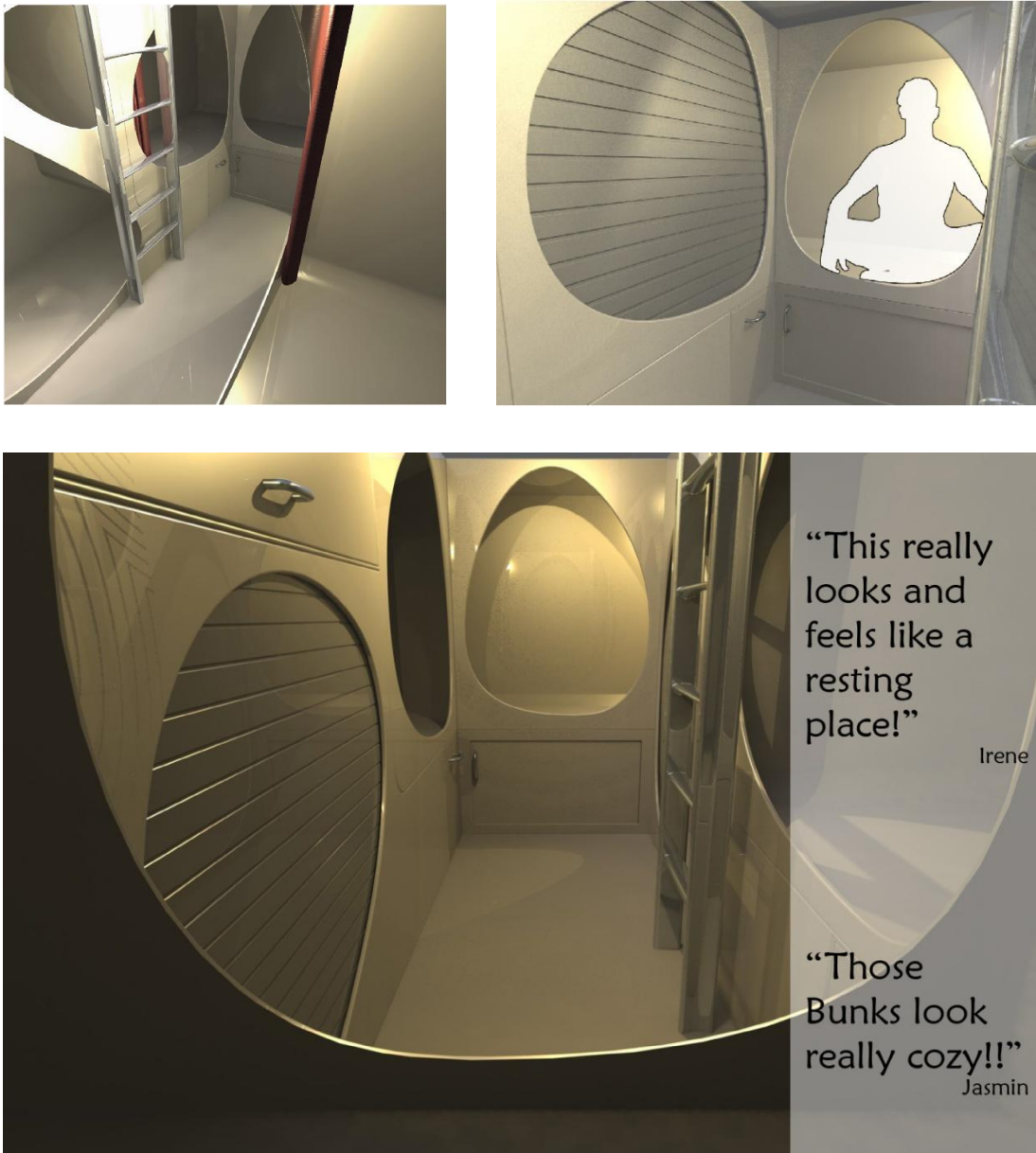
Figure 36: IRL NL4-3 Final Design Concept images

6.3 PROJECT 2

6.3.1 Project Brief 'Box Clever'

Table 19: IRL US4 Project Brief

Project Brief
In a world dogged by economic crises and natural disasters, we are often so inundated with negative news that we forget the joy and happiness that can still be found. In your teams, comprising members from each country explore design ideas within the client brief that bring back a sense of fun for both the individual and the collective. Your client MWV (www.meadwestvaco.com) have asked your team to consider the statement above and to explore design solutions for food packaging in order to improve the user experience and guarantee safety, as well as reducing environmental burden. Your assignment is to explore the broad area of food packaging and to identify areas of opportunity across any sector or user group. You must then translate these opportunities into innovative design concepts. Your designs should go beyond the current paradigm of packaging and begin to tell the story (a fun story!) of what is 'contained' within it.

The main aim of the project between Virginia Commonwealth University [VCU] and University of Limerick [UL] (see project brief in Appendix U) was to explore the broad area of food packaging and to identify areas of opportunity across any sector or user group. Contrasting with the closed brief of Project 1 [IRL NL4], the undefined and open structure of the Project 2 brief (Table 19), aimed to evaluate how the participants would deal with breaking down the problem, finding needs and exploiting opportunities stemming from 'real-world' research. The designers were asked to go beyond the current paradigm of packaging and begin to tell the story (a fun story!) of what is 'contained' within it through innovative design concepts. As with all design projects, the participants were asked to take cognisance of function, aesthetics, materials & manufacturing, human factors and sustainability issues in their design solutions.

6.3.2 Project Logistics

Table 20 below provides outlines the key logistics involved in planning the second project comprising AR4.

Table 20: IRL US4 Project Logistics

Planners	(VCU) Prof. Kenneth Kahn, (UL) Muireann McMahon
Facilitators	(VCU) Prof. Kenneth Kahn, (UL) Muireann McMahon, Participant 2 Kiernan.
Participants	(VCU) Multi-Disciplinary students (Art, Humanities & Social Sciences, Engineering, Business and Marketing) (n=24) (UL) Product Design + Technology (BSc.) students (n=20)
Teams	IRL NL4- A-E (6-8 students per team with 3-4 from each country)
Duration	4 weeks
Client	MeadWestVaco

6.3.3 Doing it

Planning began for this part of the project at the same time as the Dutch project. The primary researcher/planner was contacted by a University in the USA, which was keen to explore the idea of 'virtual studios' for idea generation and problem solving. The discussions progressed from the initial 'meeting' where many of the same planning and logistical issues arose as with the Dutch project.

Similar to the IRL NL4 project, the IRL US4 students used Blogs (Wordpress), Skype, Dropbox and other communication tools to share ideas, work together and deliver their work at the 4 different stages of the project. Again, the co-located Irish team members self- selected their team mates, whereas the US team members were deliberately chosen   to reflect a minimum of three different disciplines across arts, business, engineering, or humanities.

The main issues to be resolved in the planning stages (in addition to the planning issues for Project 1) were:

→ *Project Logistics:* tools, interactions, team composition and disciplinary spread.
→ *Scheduling:* Availability of time, Time Zones, Aligning schedules.

6.3.4 Project Outcomes

The planners and participants were in agreement that the collaboration element of the Irish US project was not entirely 'successful'. A number of factors combined to make the process more complicated and challenging, these are described in more detail in the Evaluation section. However upon reflection, all of the teams conceded that they did learn new skills and that the experience gained through the project would benefit them in future work.

The open brief while it caused difficulty for the teams in narrowing down their directions also afforded the opportunity to explore a wide range of ideas. The teams explored the notion of food packaging for a variety of user groups (from children to elderly), food stuffs (e.g. liquids, dry goods and dairy products) and use scenarios (on the go, space saving, single and multiple use). Various teams employed design principles that were new to them, such as, Universal Design, Design for Waste Minimisation, Cradle to Cradle and Design Cascading (also known as Second life). A sample of the final design concepts can be seen in Figure 37 and Figure 38.

Similar to the Driessen, the client MWV were impressed with the professional quality of work presented by the teams. In one case they thought the ideas were so novel that they worked with the team members to protect their design idea for an environmentally responsible reusable beer crate, with a view to taking it further down the developmental process.
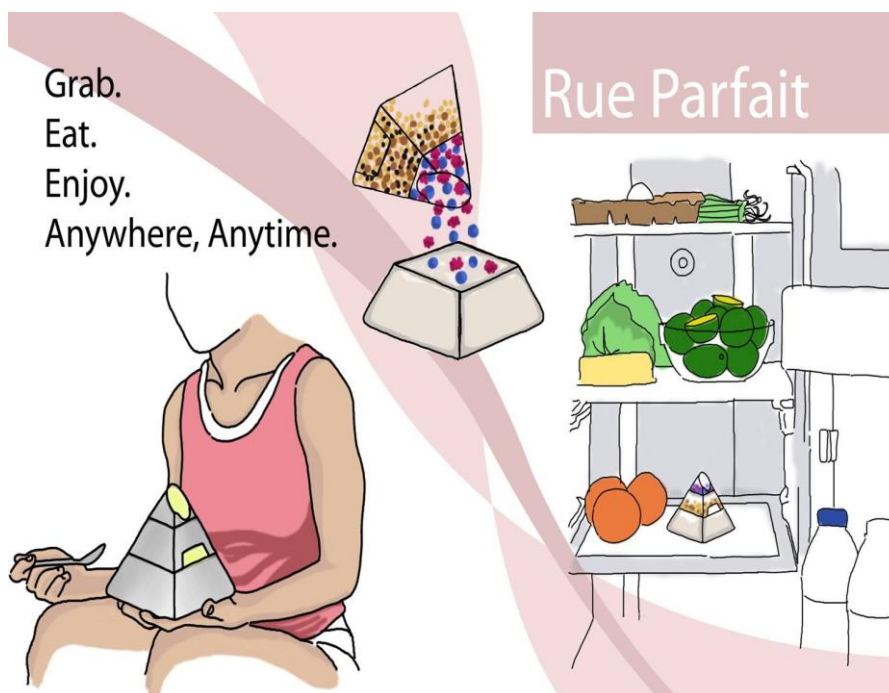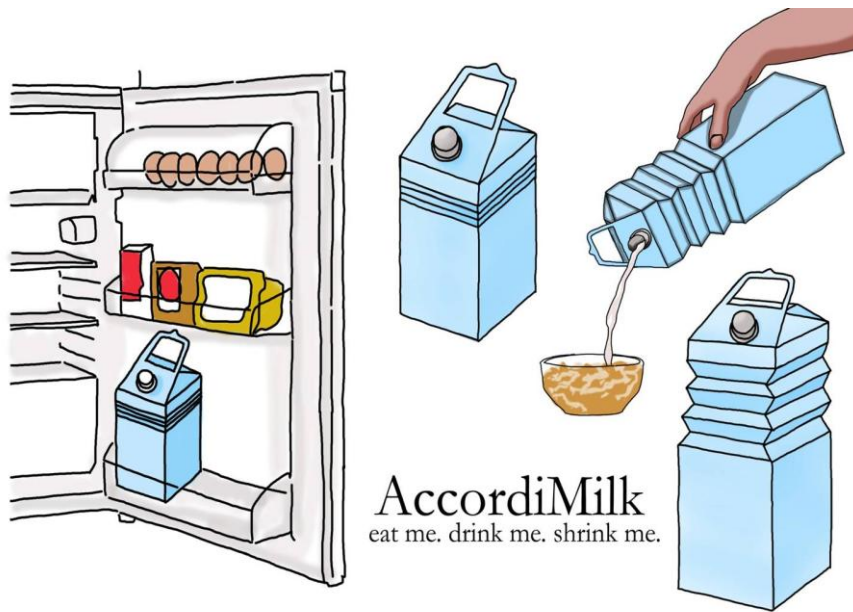
Figure 37: IRL US4-C Final Design Concept images

Figure 38: IRL US4-F Final Design Concept images

6.4 ANALYSIS

6.4.1 Analysis Method

The data from the two projects was gathered using a number of different methods as described in Chapter 3. Project diaries were compiled by each team throughout the project using Wordpress blogging software. Video and audio recordings were made at all of the presentations and at a sample of the individual group meetings. Pre and post questionnaires (Appendix V) were completed by a number of participants in both projects (S1 n=72; S2 n=54). Post project Reflection Sessions and team focus group sessions were

held to gather individual stories about the experience[35]. A visual timeline was created for each team; this collated the data from each of the data sources (Figure 40 and Figure 41). By mapping out the project timelines and the subsequent project paths, a collective narrative of the overall project experience, through the eyes of the participants and planners was built. These experiences were analysed using the framework developed from Delphi Study, which allowed for the evaluation of instances, emergence or development of the core competencies for social sustainability in design.

The analysis process is described in detail in Chapter 3 (section 3.10), visualised in Figure 39 below and detailed in Appendix X. The final consolidated codes from the analysis of the AR4 data comprised three distinct paths into which the project process was divided:

→ Communication Path[36]

→ Interaction Path[37]

→ Critical Thinking Path[38]

This consolidated coding structure is reflected in the central section of the conceptual model in Figure 39 and the three levels of coding- Open Codes, Axial Codes and Consolidated codes are summarised in Table 21 below.

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[35] Appendix W provides an example of coded transcriptions from the Reflection Sessions and Focus Groups.
[36] Blue on the visual timeline indicates the Communication path and the related critical junctions.
[37] Green on the visual timeline indicates the Interaction path and the related critical junctions.
[38] Red on the visual timelines indicates the Critical Thinking path and the related critical junctions.

Outcomes

Explicit

How did they manifest/ emerge

Collective

Individual

How did they manifest/ emerge

Implicit

Critical Junctions

Points along the project paths where barriers & opportunities presented themselves.

What competencies did the participants use/employ/explore to navigate through the critical junctions

Compare all 12 team experiences finding commonality & differences. Identify Critical Junctions on the 3 different paths.

Communication

Building Relationships
Talking
Finding Common Language
Lost in Translation
Explanation & Questioning
Different Voices
Feedback
Listening
Communication tools

Interaction

Synergy
Understanding
Responsibility
Sharing
Participation/ Engagement
Humility
External Influences

Critical Behaviour

Doing it
Synthesis
Negotiation
Compromise
Reflection
Decision- making
Learning
Confidence
Empathy
Enjoyment

Team Experiences

Open Code

Axial Code

Consolidated Codes

1

2

3

Framework

Delphi

Literature

Figure 39: Research Analysis Map

Table 21: Coding Framework for AR4

Coding Level	Code	Sub Code
Open Codes Level 1	Collaboration Process	
	Collaborative Interaction	
	Communication Process	
	Individual Behaviours	
	Interaction Process	
	New Opportunities	
	Project Planning	
	Researcher Learning	
	Social Interaction	
	Stories	
	The Lighter Side	
	Unexpected Occurrences	
Axial Coding Level 2	Collaboration Process	
	Collaborative Interaction	Achieving the Aims Compromise Decision-making Dialogue Division of work Negotiation Responsibility Sharing Ideas
	Communication Process	
	Individual Behaviours	Comparison Participations/Engagement Reflections Understanding/ Empathy Humility Enjoyments
	Interaction Process	
	New Opportunities	New Processes New Thinking
	Problem Solving	
	Project Planning	Dealing with issues Finding Synergy Managing Expectations Reaching Goals
	Social Interaction	
	Stories	
	The Lighter Side	Break from the project Humour

		Communication Path	Building Relationships
Consolidated Coding Level 3			Listening
			Talking
			Communication Tools
		Interaction Path	Synergy
			Understanding
			Responsibility
			Sharing
			Participation
			Humility
		Critical Thinking Path	Problem-solving
			Reflection
			Decision-making
			Learning
			Comparison
			Empathy
			Enjoyment

6.5 EVALUATION

When the project timelines were examined and the corresponding data analysed definite patterns emerged. The project processes clearly divided into three distinct but parallel paths: the Communication Path; the Interaction Path and the Critical Thinking Path. Along these paths, certain decisions were made and behaviours or actions evidenced, these points or 'critical junctions' caused a resultant shift in the project path. The critical junctions are significant due to the emergence of specific competencies that the participants employed (as individuals or as teams) to help navigate through them. A sample of these 'visual time-lines' are displayed in Figure 40 and Figure 41 below[39]. Figure 40 shows the IRL NL3 timeline along with an exploded version of the story and data behind a critical junction.

The following sections will discuss how the critical junctions describe the project experience and allow us to explore what competencies the participants employed to work through the collaborative process. By identifying the significant points and their impact on the project process we can identify what behaviours enabled, or prevented, effective collaboration.

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[39] Appendix Y contains all of the AR4 team's visual timelines.
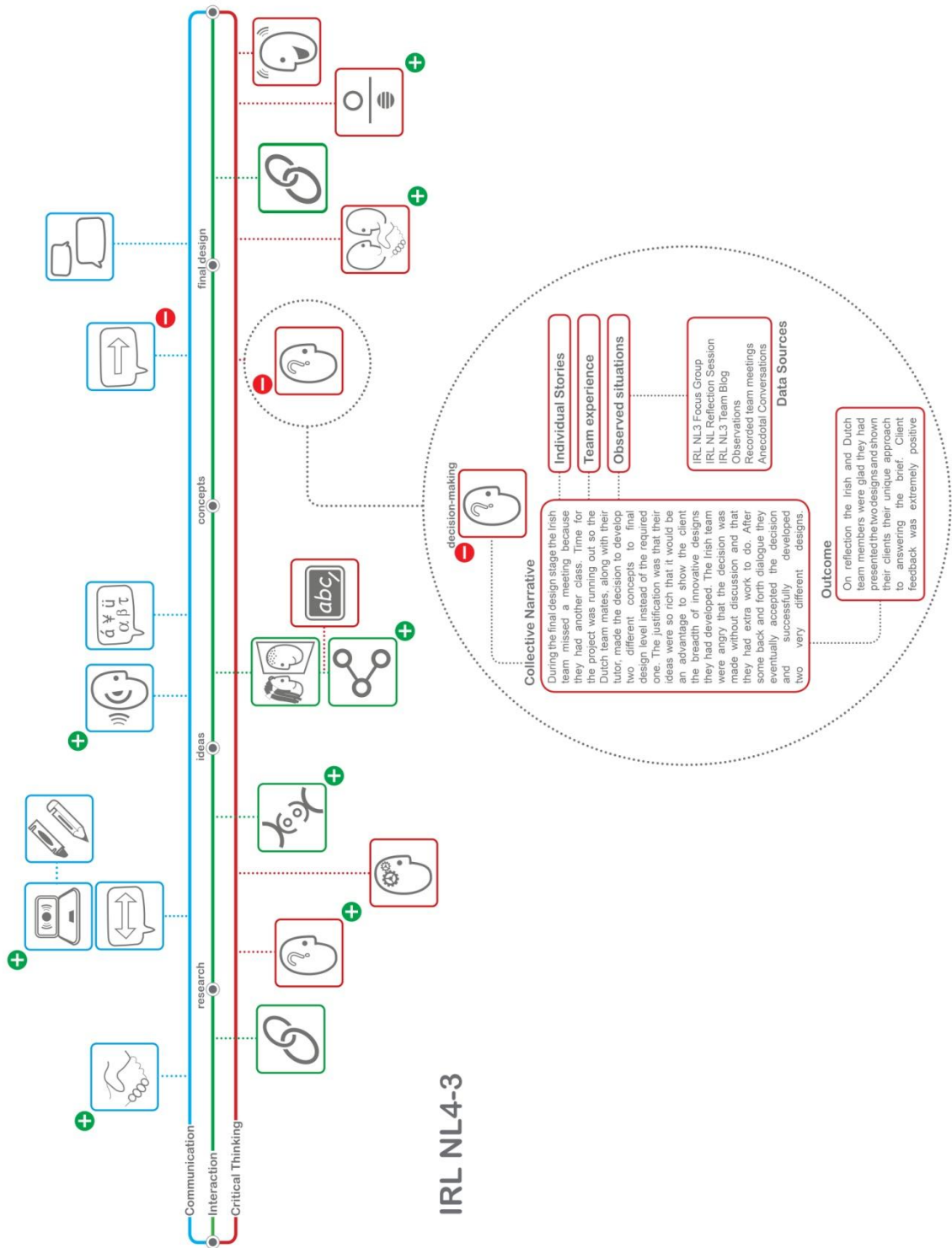
Figure 40: IRL NL4 Project Timelines Team 3 with critical junction explained

Communication

Building Relationships

Listening

Talking

Two-way Dialogue

One-way Dialogue

Common Language

Offline Dialogue

Offline Dialogue

Interaction

Participation

Synergy

Responsibility

Humility

Differences

Understanding

Sharing

Critical Thinking

Reflection

Decision-Making

Problem-Solving

Enjoyment

Learning

Empathy

Comparison

Negotiation

Figure 41: Icon Key for Project Timelines

6.5.1 Critical Junctions

The critical junctions pinpoint instances of interest or note along the project process path. By pinpointing these instances, or junctions, we can explore where the project was successful/ unsuccessful in order to learn what behaviours were present, what tools/techniques/ competencies were employed or emerged when the participants needed to navigate through the process.

For the purpose of this chapter the focus groups, project blogs and reflection sessions were used as the primary data sources as they provided the richest data. The findings were validated and triangulated between the project field notes, observations, conversations recordings of in-project sessions and the quantitative data from the questionnaire.

The following sections discuss:

- → What key competencies emerged?
- → Equally what key competencies didn't emerge?
- → Can the emergence of key competencies be identified when participants reached the critical junctions?
- → Did the participants employ or explore specific competencies to navigate through the critical junctions and move forward in their projects?
- → What competencies were explicit?
- → What competencies were implicit?

Obviously some overlap occurred between the critical junctions along the different paths. Occurrences that impacted on a number of paths are discussed in detail at the first critical junction at which they occurred. These are then referred to briefly in the subsequent section to avoid repetition.

6.6 PROJECT PATHS

While each team's path differed slightly, there was commonality amongst them (see timelines) and for ease of discussion certain teams with similar paths are discussed together.

The *Communication Path* deals with the communication process of the teams through the project beginning with the act of getting to know their team mates through to the final presentation. The Communication path took place 'locally' with co-located participants and also in distributed environments, where teams worked over various technologies to complete the work. Both offline and online communication are considered equally

important within the context of the distributed collaboration, although the former is considerably more complex.

How the teams interacted with each other to achieve the aims and fulfil the project brief, form the basis of the *Interaction Paths*. The individual engagement as well as the collective engagement is explored. Where the individuals within the team overlapped, where they diverged and converged and what critical junctions occurred at these points of divergence and convergence are explored in detail. The interaction path focuses on how the individuals within the teams worked collectively to achieve the aims set out by themselves and the project brief. Both the process of interaction and the outcomes of the critical junctions are explored in order to understand the contexts for 'successful' collaboration.

The *Critical Thinking Path* describes the 'culturally produced and socially supported' ways of seeing which shaped and guided the actions of the individuals and the teams (Carr and Kemmis 1986). The critical junctions along this path comprise of the instances where the participants re-evaluated their existing habits to create new understanding and knowledge. This path also explores how the participants took a journey of exploration to acquire this new knowledge, while also looking anew at existing knowledge. *"Thinking critically is a shift in perspective, even if it is just a small shift. It is about increasing our own awareness of how we think, letting go of strongly held beliefs and creating a new mental model, a new mind-set"* (Sofo 2004).

6.7 COMMUNICATION PATH

The following section will deal with the communication path that the teams employed or followed throughout their projects. Various types of communication took place throughout the project depending on the stage. The critical junctions highlighted in this section were selected based on the frequency of their occurrence, the relevance to the analytical framework and the novelty of the specific instances.

The following section describes the main types of communication paths displayed and the various critical junctions along the path. These are detailed initially in Table 22.

Table 22: Communication Path Critical Junctions and key for Visual Timeline

	Critical Junction	Competency
Building Relationships	Getting to Know you	*Openness, Empathy, Understanding*
	Maintaining Relationships	*Teamwork, Positive Behaviours*
Talking	Finding Common Language	*Dialogue, Humour*
	Explanation & Questioning	*Openness, Reflection*
	Different Voices	*New Perspectives, New Processes*
	Feedback	*Dialogue*
Listening		*Dialogue, Understanding*
Communication Tools	Online	Logistics, Planning
	Offline	
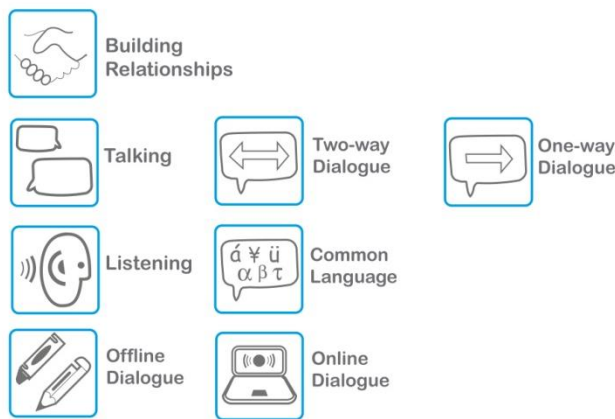
6.7.1 Building Relationships

6.7.1.1 Critical Junction Getting to know you

A good start is half the battle! Collaboration is most important in the early phase of the design process as this is where some of the most important decisions are made (Chiu 2002). Within collaboration establishing a good initial relationship between participants is essential in order to build trust and progress positively through the project (Schadewitz 2009). The getting to know you phase of the project varied from team to team. Some moved swiftly from introductions to building a professional relationship (IRL NL4-1,3&4, IRL US4- B&C), while others concentrated on a personal connection first and then progressed onto the professional (IRL NL4-2, 5&6, IRL US4-A).

> *'We got in touch with the Dutch in the first week, we got pretty friendly with them straight away basically, the best idea was to get to know them straight away the*

more you know them the better you can work with them, ya so we were comfortable with them the first week' (IRL NL4-1 Focus Group)[40].

Being positive and open proved to be of benefit at the early stages of getting to know each other. All of the teams were extremely positive at the start of the project, observed at the introduction meetings and reflected in the project blogs.

> *'[Intro Posts from US team] I am really excited to be working on this project, it is going to be a fun and interesting challenge to work on a virtual team* [US Participant].
>
> *I'm excited to be able to work with the different majors here at VCU and to add on to it, international students from Ireland* [US Participant].
>
> *[Intro Posts from Irish team] I spent the Summer in America and had such a good time, so I'm really excited to be working with Americans on this Project'* [Irish Participant] (Blog Post IRL US4-A, 27.09.11).

The participants were excited about working with new people and an industrial partner. This was validated by the questionnaire responses with the average response rate for the question 'I am looking forward to this project' being 4.5[41] (n=44).

> *'This was our first project that we were working for Industry so it was a good experience. Meeting new people, it was challenging you know, we work well under pressure'* (IRL NL4-3 Focus Group).

In order to facilitate the 'getting to know you phase' and to maximise the creative effort in the early stages of the project, each participant was asked to compile a profile sharing some of their personal and professional information. '*There you have also something to talk about when you are not fully focusing on the project so I think that was also a good'* (IRL NL4-3 Focus Group).Getting to know personal details fleshed out the virtual persona and made the distributed team mate a real person, thus enriching the distributed experience.

These profiles were very useful for the majority of teams. Only one team considered them to be a waste of time, *'I think having profiles to put up makes no difference at all, it was a waste of time I think. I don't know, you'd look at it and you'd see interesting stuff but you're not going to bring it up with them'* (IRL NL4-6 Focus Group). The emergence of a real person allowed the participants to build a sense of identity for themselves within the team and to identify and empathise with each other as people and not just professionals.

---

[40] The positive relationship in this particular instance unfortunately wasn't sustained but it did facilitate a good start.
[41] Using a 1-5 Likert Scale rating where 1=Strongly Disagree and 5=Strongly Agree.

Previous research highlighted that people are more aware of their communication when they interact with strangers, than when they are communicating with familiar people (Gudykunst and Young 1996). This was evidenced at the early stages of the project through the observations and corroborated by the focus groups. Some teams admitted they were embarrassed and nervous to begin with, as they found it '*weird'* or '*uncomfortable*' to be collaborating with people they didn't know, people who were essentially strangers and located on the other side of the world. '*We were slightly intimidated though'* (IRL NL4-4 Focus Group).

> '*First meeting – a bit awkward at the start because obviously we didn't know them or what they were like, but we soon got into it because we had to get done what we had to do, all working to a common goal'* (IRL NL4-4, Reflection Session NL).

As a result, some teams found it difficult initially to share ideas and to begin working together effectively. The majority however overcame this and began, at differing stages in the project, to capitalise on the 'strangeness'. The main 'techniques' used to overcome the 'strangeness' were:

→ Sharing personal information (All teams) '*…we saw what they were studying, what their interests are and even the small things like one of them likes to play soccer'* (IRL NL4-3 Focus Group).

→ Using humour to break down the barriers e.g. sharing jokes, cultural idiosyncrasies, videos etc. (IRL NL4-2,3,4 &6). '*Like having a sense of humour in the Skype meeting too like kind of bunny ears in the back, like just make them laugh it's just slightly easier to get along'* (IRL NL4-4 Focus Group).

→ Arranging visits to each other's colleges (IRL NL4-1&2).

→ Defining the common goal (see Synergy Section).

→ Getting down to business- beginning to work on the project straight away (IRL NL4-1) '*because we had been working all the time when we started putting our ideas together and started working together we got to know them better as well'* (IRL NL4-1 Focus Group).

→ Getting away from business during the meetings and just chatting and laughing (IRL NL4-2,3,4,5 &6, IRL US4-A&C). '*You kind of got more comfortable it was more kind of laid back it wasn't just work it was just like having a bit of a laugh after working'*(IRL NL4-4 Focus Group).

> '*One team pointed to the importance of communicating interpersonally, not only about the project, but about each other's lives, majors, experiences etc.'* (IRL US4 Reflection Session VCU).

The lack of 'face to face' at the start and the distance did inhibit some of the teams, however and they never reached the comfortable stage with their team mates (this was particularly evident with the IRL US project).With these teams effort was made by the

planners and facilitators to initiate 'meetings' through emails and group meetings. These interventions worked with some teams (IRL US4-A&C) but in several cases the team members never developed personal relationships and as a result the professional one was never optimised (IRL US B, D&E).

In an effort to overcome this in future projects, some participants suggested in the reflection sessions, that being introduced to their team mates a week or so before the project began would be of immense benefit. This would give a lead in time to build up personal relationships resulting in more effective professional ones, thus ensuring less time would be wasted at the start of the project settling into the collaboration; time that could be better spent on fulfilling the project brief.

6.7.1.2 Critical Junction Maintaining Relationships

One of the main challenges of working with strangers is that you have to make sense of their way of thinking and working, as well as negotiate through the project successfully. *'It was good to work with people you didn't know …when you introduce people that you don't know and you've got to kind of warm to their way of doing things as well then'* (IRL NL4-4 Focus Group). This added an extra level of complexity to the project but it also developed core competencies that may not be evident in a localised project.

Once the positive relationships were established, the teams had to work hard at maintaining them. In general as the projects progressed the majority of teams developed a deeper relationship with their team mates. There was banter and 'asides' happening as the team members became more comfortable with each other *'I'd say we went into depth more, because we felt comfortable with the people and we got to know them'* (IRL NL4-2 Focus Group). The observations indicated that once the intimidation levels decreased communication was smoother and the two way dialogue flowed more easily. *'At the start it was really awkward there would be a pause and we could generally talk, or talk about the project and by the end, half way through we were just throwing on Skype it would be natural we just talk to each other, it was easy'* (IRL NL4-6 Focus Group).This resulted from regular team meetings and being diligent about maintaining frequent contact.

As these relationships formed a number of benefits emerged. The teams were more cohesive; they enjoyed the project more; participants developed greater confidence in their work; feedback was richer as they felt comfortable to comment on each other's work and offering more honest opinions. The participants found that the more they talked to each

other, the easier the communication got. *'The more we talked the more our ideas came out as a team'* (IRL NL4-4, Reflection Session NL).

It proved to extremely important, for maintaining positive relationships, that the team members on both sides liked each other as people, '*I feel like we're friends almost and I've never even met them'* (IRL NL4-6 Focus Group)*.* The teams who expressed a liking for their team mates were those with positive and open attitudes from the offset. The positivity was observed in their behaviours at the various project stages and reflected in the language used during meetings and in the focus groups. These friendships had knock-on benefits in terms of individual accountability, team responsibility and resultant positive dependencies (Wang 2009).

With an open attitude and a willingness to break with their preconceived assumptions (Scollon and Scollon 2001) the participants could capitalise on the benefits of their team. Familiarity, openness and positive behaviours were seen as the key influencing factors in both establishing and maintaining relationships and also in creating open communication channels.

6.7.2 Talking

6.7.2.1 Critical Junction Finding Common Language

Finding common language in an interdisciplinary and culturally diverse group can be difficult and can impair the effectiveness of collaboration. Not only do disciplines have specific understanding of concepts and vocabulary, but also cultural meanings attached to language can lead to misunderstanding and misinterpretation (Mamykina et al. 2002). Simply put, different disciplines often have difficulty understanding each other (Buchanan 1992). Developing a common language however is necessary in collaboration to ensure common meanings are attached to terminology and drawn from concepts (Vyas et al. 2009). In both projects it was noted that language was discipline, and at times, culture specific. This had more of an impact on some teams, at times holding the projects back. For example, in IRL US4-C, the use of product design discipline specific language led to one team interpreting 'rendering' from a discipline specific perspective. The 'confusion' led to that team member spending hours working on a 'rendering', that the other team mates didn't consider appropriate or useful. However, due to the individual's willingness to 'get it right', another series of renderings were generated that were used very successfully in the

final presentation. Similar situations arose with other teams in the research and idea generation phases of IRL US4-A, B&D.

On another occasion, a similar issue arose with the interpretation of 'idea' and 'concept'. In this situation, though the confusion was between the planners who had assumed a shared meaning for what an 'idea' and a 'concept' were within the design process. The participants noticed this disconnect about one week into the project and quickly made the planners aware. The Irish planners agreed that the Dutch interpretation of what an idea and a concept are were the most logical and so these were integrated into the project. *'Maybe get the lecturers to agree on what a concept is. Have some things worked out beforehand so that everyone is on the same page'* (IRL NL4 Reflection Session, Team 2)*.* This incident highlights the need for a shared definition or construct to be agreed upon before the project starts to avoid any potential misunderstandings.

Some participants didn't make enough effort to find common language and gave up early in the project (IRL US-E&F). As such their team communication path was very divergent, with little or no communication happening as the project progressed. Not only did they have difficulty expressing their ideas, they also found it difficult to understand their team mates' ideas and opinions. This led to an imbalance of contribution to the key decisions and the final design ideas, particularly with the US project. This was noted by the industrial partner at the final presentation where he questioned what contribution had been made by some of the disciplines in certain teams (IRL US4 Final Presentation, 03.10.11). This, he continued, was to the detriment of the projects by failing to capitalise on the disciplinary expertise available within the teams.

Those teams who recognised the difference in language and made provisions to move beyond it saw the benefit in their subsequent stages, *'when they are not from the same discipline as you, they are not going to understand the language that you use'* (IRL US 4-A Focus Group). When teams made a concerted effort to find common language (beyond discipline and culture) they employed tools such as analogies, metaphors and storytelling (Mamykina et al. 2002, Casakin and Goldschmidt 1999). The use of analogies related to existing solutions or scenarios, allowed the participants to build on their prior knowledge to generate an understanding of the new concept or idea. This technique proved very successful for the teams as they were able to relate quite complex and novel design features to their team mates over Skype.

'IRL3[1]: even in those old big hotels where they also have those service lifts where you have to pull them with a handle or those windows on ropes. You know a hand crank or something.

IRL3[3]: you know the fire man what they do

IRL3[1] & IRL3[2]: the pole?'

'NL3 [1]: maybe the stairs could be just some handles vertically above each other.

IRL3[3]: Oh ya like in a boat, Or a submarine' (IRL NL4-3, Stage 3 Team Meeting).

Telling stories and scenario building enabled the participants to attach meaning to the concepts and through this gain a clearer understanding of the potential user experience.

Moving beyond disciplinary language held two benefits. Firstly, by having to find common language the teams made sense and synthesised their collective ideas which allowed them to move on in their projects. Secondly, the skills developed in finding and speaking in a common language leads to an understanding of, and empathy for, the different individuals and disciplines within their team.

6.7.2.2 Critical Junction Explaining and Questioning

6.7.2.2.1 Explaining

When working collaboratively it is essential to making yourself understood, explaining what you are doing and verbalising your thoughts to the rest of the team. Creating a shared understanding ensures the integration of knowledge amongst team members and leads to a successful design outcome (Kleinsmann and Valkenburg 2008). Finding a common language is part of this (as discussed in the previous section), but other influencing factors come into play when creating this shared understanding. When the participants explained their ideas to their team mates they began to develop a shared awareness and understanding unique to their team. It was noted during the observations, that the teams with effective and convergent communication paths explained and clarified their ideas in the group setting.

It can be difficult to explain and share ideas over the distance, sometimes the complexity and subtlety of an idea would get lost. It is easier to point to a picture or 'walk' someone through a physical prototype in a face to face scenario. Unfortunately this interactive, intuitive and dynamic conversation proved difficult for some teams to replicate virtually. For example, one team (IRL NL4-4), during their ideation meetings, while explaining an idea held up images and pointed to 'mind maps'. The images and text were ambiguous and

illegible with their distributed team mates often misunderstanding the meaning and misinterpreting the design idea. '*You would be trying to say 'see that line here' and then you kind of realise they can't see it and just stuff like that, that you can't notice'* (IRL NL4-4 Focus Group)*.* As a result some teams (e.g. IRL US4-C), after a number of failed attempts, gave up and reverted to written or visual descriptions on the blog or through Dropbox. This misses out on an excellent opportunity to capitalise on the visual quality of design where prototypes and drawings play an important role in communicating design intent (Kleinsmann and Valkenburg 2008).

The majority of teams quickly recognised the need to explain themselves clearly and logically to their team mates (IRL NL4-2,3,4,5&6, IRL US4-A).

> *'We need to be able to make our ideas known, it also makes our ideas very straightforward, simple and get them across to anyone who can just open a document and read and say "I understand that bit and that bit" and very clear and well laid out so it helps on presentation as well doing projects like this'* (IRL NL4-4 Focus Group).

While other teams also developed 'ad hoc' methods to find a way of communicating their ideas effectively. IRL NL4-3 talked through their ideas through scenarios, assuming the role of the user in the situations and playing out how the concept would unfold 'okay so I am walking down the stairs…'. This 'playing out of scenarios' verbally and using contextual models ensured both sides were 'seeing' the same concept play out before them and as such they could all identify the potential issues. This worked very effectively at the concept development stage when there were ideas to discuss. It might not have worked as well at the earlier stages when teams were generating ideas.

Other techniques employed that helped explain and work through ideas were:

→ References to their own previous experiences.

→ Constantly referring to the work- having it in front of them, ensuring the other side had access to the work as well so they could discuss it collectively.

→ Made parallels with similar ideas or designs (e.g. Like a hotel)

→ Explained and clarified their ideas continuously to their team mates. Asked for explanation by using clarifying questions like, 'so by this you meant?'

→ Pushing or breaking conventions (it doesn't have to be like it always was e.g. stand up sleeping).

Another team (IRL NL4-4), built replica scale models in both locations, working from the same blueprints. This enabled them to talk through their ideas while both teams were looking at, and referring to, the same 3D model.

Some participants found the need to explain themselves clearly to be a novel experience. In previous project they only had to justify decisions to themselves and their tutor (and often didn't do this as they were caught up in the project and the deliverables). They found this to be a cathartic experience having to externally verbalise their process, but it also brought nerves and anxiety about what other people would say about their work

> *'It was putting up your own thoughts and ideas on it whereas before you were just thinking them in your head or whatever but you are writing them down for the public'* (IRL NL4-3 Focus Group).

From the team experiences above, those who found effective means to explain and understand each other found it easier to navigate through the process. The teams who struggled and didn't find a shared understanding, struggled for their entire process, which led to a less effective collaborative process (IRL NL4-1, IRL US4- B, D, E& F).

6.7.2.2.2 Questioning

Similarly, asking for explanations from, and questioning, team mates in order to clarify ideas and decisions was an essential step in reaching a shared understanding. Some of the participants found it difficult to make themselves understood or to understand the decisions made by others. For example one team (IRL NL4-1) recalled not asking for clarification from their team mates when they were at the end of a meeting. They took one meaning from the meeting and then on reflection, once the call had ended, they questioned whether their interpretation was correct and were too nervous to move on in case they were going in the wrong direction.

> *'We would say alright "yeah ok" and we would say "good luck" and go back out and kind of think of it "actually that didn't make much sense" I don't know maybe we shouldn't be doing that and then you would be confused for the rest of the day'* (IRL NL4-1 Focus Group).

Some participants took different meanings from collective discussions, which meant that the ideas were being worked on in often divergent directions. This confusion and wasting of time demotivated the participants and slowed the progress of work. We could potentially attribute the reluctance to ask questions on the uncertainty of working with strangers over a distance and language difficulties, two factors, which once the majority of teams got used to, ceased to have a major impact on their progress.

The questioning process served a number of other functions as well as clarifying ideas. During the mid- project meetings, teams used questions to understand more and to see things from other people's perspectives.

→ Searching for new information from their team mates that is culturally unique or specific e.g. *what do you have similar to this in America?* (IRL US4-A &C).

→ Positive questions (Volpentesta et al. 2008)- searching for the benefit of ideas and the value to the user e.g. team discussions on what benefits particular ideas and concepts afford the user and how they answer key research questions (IRL NL-1,2,3,4,5&6, IRL US-A&F).

→ Negative questioning (Volpentesta et al. 2008)- looking for potential faults, problems or dangers that might arise with an idea or concept e.g. questioning space issues within the crew rest or user issues with certain design features (IRL NL4- 3 &4).

→ Creative questions - e.g. research and brief brainstorming sessions and during ideation meetings to explore radical, innovative design directions.

→ Deciding on project logistics e.g. next meeting time, work to be completed by the next meeting.

→ Re-state decisions amongst their team mates or clarify deliverable details with the planners/facilitators, 'is this what we need to do for Monday?' (e.g. IRL NL4-3,6).

Both positive and negative questioning helped to define the design details of the concepts for the participants (McDonnell 2012) which then allowed the team to move forward with their development process.

6.7.2.3 Critical Junction Different Voices

Having a variety of voices was both a positive and a negative influence when the teams reached critical junctions in the project. Some teams saw it as an advantage using the different voices to enrich the ideas and their process, *'… you have a lot of different opinions and you have to work together but you can get a good result out of it as well because there are a lot of different opinions and insights and ideas'* (IRL NL4-3 Focus Group). The variety of perspectives offered diversity to the process where, *'There were more personalities to bounce ideas off'* (IRL NL4-6 Focus Group). The design outcomes, the participants believed, were richer as a result.

Other participants found it confusing and difficult to negotiate through the conflicting opinions of their team mates and the project planners. Multiple voices add complication to communications (Chiu 2002) and dealing with whom and what way to go, proved to be an issue for certain teams (IRL NL4-1,2 &3, IRL US4-B). Here, participants felt key decisions

were being taken out of their hands when the facilitators dictated the direction they should go '*the lecturer decided what we were going to do and that was it'* (IRL NL4-3 Focus Group). Until then, IRL NL4-3 felt their decision-making process had been very positive and democratic but when the external voices of the planners interfered the balance shifted and they were 'forced' down a direction they weren't immediately happy with '*just talking about what we have to decide and getting opinions and criticisms went pretty good but the teacher was, yeah he interfered with a lot of decisions'* (IRL NL4-3 Focus Group). They noted that they should be allowed to '*Make our own mistakes'* and to learn as a result (IRL NL4-6 Focus Group). This was evidenced with a number of other teams also (IRL NL4-1,2,4&5). The planners however, felt that at times the teams needed guidance as to what direction they should pursue in order to move forward (Project planning meetings).

External 'interference' is necessary at times during a student project when decision making is difficult; when the teams are not making progress, or when the balance of control is uneven. Conversely too much external influence can leave the participants feeling like they have little control over their own process. A balance needs to be found between the planners exerting enough influence to move the project forward and not create tensions within the team. Perhaps if the participants and the planners discussed the junction, the various options open to the team and made collective decisions it would be a more suitable approach.

6.7.2.3.1 Uneven Voices

Some teams struggled when the loudest voices fell more heavily on one side of the team (IRL NL4-1). Participants in Team 1 felt that decisions were being made by the other half of their team and they were simply 'doing as they were told' '*They felt that because they were working on it all the time they had more entitlement to say what was going on… I think they wanted everything their way'* (IRL NL4-1 Focus Group). Conversely, with the IRL US project, the Irish team mates were clearly the key decision makers (see decision-making section for further discussion on this).

The teams which demonstrated the ability to negotiate through these different voices did so by working together as a team and discussing their decision-making collectively (IRL NL4-3). These teams were the ones which had confidence in their team's work and tended not to get as distracted by the voices that were pulling them in different directions.

> '*But I think any confusion that exists is due to communication or miscommunication, but I think we all know where people come from, we all have the same idea and we*

want the project to go ahead it's just if people have different ideas and put them in a different way I think if you just stop for a second and just talk them through' (IRL NL4 Reflection Session, Team 1).

One solution to overcoming the imbalance of voices within and between the teams and facilitators could be to use feedback loops with continuous dialogue (explanation and listening). If necessary these could be incorporated into the team meetings in a structured way, where at the end of the meeting the participants restate all the key decisions, ensuring everyone is happy with the directions and that the balance of voices is even.

6.7.2.4 Critical Junction Feedback

Collaboration offers an ideal platform to practice and develop skills in 'constructive dialogue', as participants work through ideas collectively, develop deep understanding and deal with differing opinions (Barron 2000). The feedback critical junctions diverged in two distinct directions for all the teams. The first 'cluster' of teams experienced difficulty in engaging in a two-way dialogue where feedback and constructive criticism were key (IRL NL4-1, IRL US4-B, C, D,E &F). The second cluster found constructive criticism difficult at the start, but once they began to give feedback in a positive manner a productive two-way dialogue emerged (IRL NL4-2,3,4,5&6, IRL US4-A).

On exploring the communication paths of the first cluster of teams we can identify a number of factors which led to their difficulties:

→ Not being able to give feedback to strangers, feeling uncomfortable and feeling inhibited to give honest opinions on their own work or criticising the work of people they didn't know.

> *'I remember providing criticism, but I felt that I couldn't be 100% honest with my criticism'* (IRL US4 Reflection Session VCU).

→ The participants were too polite, nervous or shy to criticise the work of their team mates. *'I'd say they were just being polite more than anything. Like one of them came up with an idea then someone in America would be like "that's shite* [sic] *just do it again" or something but they didn't want to do it to us'* (IRL US4-C Focus Group).

→ A negative reaction when criticism was given *'our group didn't like criticism. If we picked out a flaw they were kind of like… they picked an idea and liked to stick with it'* (IRL NL4 Reflection Session Team 1).

The conversations observed were safe and the feedback positive even though participants didn't always agree with the opinions being voiced by their team mates (as discussed in the Reflection Sessions). This was stemming from the fact that they didn't want to insult or offend them. *'It felt like when you pointed out something it was unappreciated… I don't know what it was, it was hard to get across that pointing out a flaw was constructive because we were all on the same team. They thought we were being negative'* (IRL NL4 Reflection Session Team 6). The teams tended to 'talk nice' (Hogan 2007) to the strangers and some recognised that their team mates were behaving similarly with them *'you don't want to say it to anyone because you don't want to hurt their feelings and that like they think something is wrong with what they are doing'* (IRL US4 Reflection Session VCU, Team A). This resulted in a cyclical response as the participants felt if their team mates weren't criticising their work then they couldn't comment on theirs.

When team mates didn't give constructive feedback on each other's work, teams found it difficult to move on. If the participants weren't getting acknowledgment on their work or being kept abreast of what their team mates were working on, they felt isolated and often disengaged from the project process. '*I think we ended up making a lot of decisions without all of their input, it could have been nicer to have had all of their thing I think sometimes you need more people even if its negative things, sometimes it narrows things down'* (IRL US4-A Focus Group). This begs the question as to whether negative feedback is better than no feedback, because, at the very least participants have something to build on in order to move forward.

Conversely, with the second 'cluster' the teams found that being constructive in their feedback encouraged constructive feedback in return as demonstrated by IRL NL4-3. Many of these teams noted that a positive approach to the feedback was best and that they needed to be conscious of how they expressed their opinions so as not to appear too harsh or negative, *'It depends on the way you say it. The way you express it'* (IRL NL4 Reflection Session, Team 1). If the participants recognised the positive actions and good work of their team mates the 'negative' feedback was easier to give. *'As long as you are open-minded and the both of you say what you think, you are both improving the project. You should be honest like when someone was doing a really good job when you say that as well, it is much easier to criticise'* (IRL NL4 Reflection Session, Team 3)*.

As the project progressed this politeness developed into a healthy and more reflective inquiry within some of the teams. Here the participants would question the opinions and

ideas of their team mates in order to understand the nuances and details of their concepts (see Explaining and Questioning section above). *'I know for the final when Kate put up her jar and they* [US team mates] *were just "well why don't you do this" like it was a simple change in putting grooves on the lid and it made a huge difference, their input was great, the blog helped to do that'* (IRL US4-A Focus Group)*.* IRL NL4-4 felt the direct and immediate approach to dealing with issues was the best approach, '*we kind of said it to them there and then'* (IRL NL4-4 Focus Group). Teams who used these continuous, honest feedback loops found the deliverables/ milestones easier to reach, thus enabling them to resolve design detail to a higher level that both sides were happy with.

6.7.2.4.1 Feedback Type

The type of feedback also depended on what stage the project was at. At the earlier stages some teams felt it was easier to give feedback and constructive criticism than in the later stages of the project. *'It depends on how far you are down the development process, if it's a concept then it's better to have a better way to go, but if it's just brainstorming and you know the idea just popped into their heads and they threw it down then it's fine'* (IRL NL4 Reflection Session, Team 6). This was evidenced in the communication paths of a number of other teams, as the timelines indicate, and was re-iterated in the reflection session. When ideas were in the formative stage the participants felt they could highlight potential issues and recommend changes more readily than when the designs were more concrete however, '*As long as what you've said is valid. It's constructive. It's all valid. You're criticising a concept rather than a finished product and you are trying to see where you can change it. It's not going to hurt that much'* (IRL NL4 Reflection Session).

The time difference between countries had influence in this instance as it was difficult to 'step back' with work after a relatively long period of time had passed. This often prevented the participants criticising their team mates work, especially towards the end of the project, as deadlines were looming as they didn't want to set the project work back.

> *'Say we had a Skype conversation in the morning and then again in the evening and you're looking to progress through the day. Say if they spent the day doing work then maybe if you criticise theirs and they criticise yours, you are all working to a strict deadline and you are trying to push forward, it was hard to take that step back after a period, cause we are not all in the same room working together you could go back and look at each other's stuff every 10 minutes'* (IRL NL4-1 Focus Group).

This was also evidenced in comments from other teams during the reflection sessions who felt they could comment and criticise early ideas, but once more defined concepts emerged, they weren't inclined to give 'significant' feedback.

The external feedback from the Industry Partners at the final stage of the project however was extremely useful for the participants. In some instances, despite it being sobering and relatively 'harsh' (particularly in the case of IRL US4-A), they found it very informative and beneficial from a professional stand point as it reflected industry practice. A large number of teams noted that it added an element of professionalism to the project and the feedback at the final presentation was representative of what they believed would happen in industry. *'We were presenting to Driessen. And even though they are never going to use it, it felt like our idea was being considered as an option to do. It was nice we went into the room and it felt official and real and it was nice to have that'* (IRL NL4-6 Focus Group)[42]. Not only is this an added motivating force it also demonstrates to the participants that their input is relevant and important.

As evidenced by the teams' communication paths, a rich two way dialogue proved to be the most beneficial in progressing through the project. This dialogue doesn't always have to be positive and disagreements are a useful component in making sense of the complex real world problems on which they are working. Designers must learn to accommodate multiple and often conflicting opinions or positions as long as they *'are expressed with a shared understanding that everyone is focused on a common goal'* (Sobol 2012). There is no 'right' way to resolve a design brief and negative and constructive criticism adds to the richness of the debate as they help the participants to deal with uncertainties and contradictions that arise in socially driven design projects (McDonnell 2012).

6.7.3 Listening

Hogan (2007) notes that **Listening** is important to effective dialogue.as **talking**. Listening to the ideas of other participants was essential to keeping all members of the team motivated, engaged and participating. When participants felt their ideas weren't being listened to and taken into consideration in the decision making process, they quickly became defensive and disengaged. IRL US4-A observed that after one participant's idea (pizza packaging) wasn't taken into account he extricated himself from the process and didn't take part *'we came up*

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[42] Since the project was completed the industry partners have presented the project work internally within their companies for R&D sections (email feedback from Industry Representatives).

with the 50 ideas for our half of the 100, and we had ideas that were extremely innovative. But none of them were used, and I was slightly offended by this' (IRL US4 Reflection Session VCU).

The observations during project meetings evidenced a number of different types of listening as Hogan (2007) outlines:

→ Deep listening during team meetings; when the participants really took on the perspectives of their team mates and where they worked hard at finding synergy and recognition that they are all working towards a common goal (IRL NL4-4 Stage 3 Meeting).

→ Half Listening- where teams listened to the opinions of their team mates during meetings but then once the meeting had ended suited themselves with the choices they made (IRL US4-B Ideation Stage meeting).

→ Win-lose Listening - essentially arguments where participants were defensive if their views were attacked, IRL NL4-1 team had a very confrontational meeting at the concept development stage where the Irish participants felt their team mates were controlling the key decisions '*We were learning their experience and they weren't interested in learning our experience'* (IRL NL4-1 Focus Group)*.* One of the Irish participants initiated a Skype call in an effort to resolve the issues and make their opinions heard, this call lasted 45 minutes and involved a lot of debate and authentic talk (Hogan 2007). This wasn't a successful debate from the perspective of the Irish participants as they felt their point of view was not considered and no positive outcomes emerged from the effort. '*And we talked for about 45 minutes, and basically most of the things I said got slapped back'* (IRL NL4-1 Focus Group).

Throughout the project the facilitators acted as key agents in getting the teams to listen to each other and stimulate constructive, positive conversations. While this guidance proved more successful in some instances e.g. when IRL NL4-2 had issues with design decisions prior to the final design presentation and discussed them rationally as a team eventually reaching an amicable consensus. Other instances, like the one described above with IRL-NL4-1, failed to reach a satisfactory conclusion. In future projects the facilitators should work hard during the project to offer constructive guidance and intervene in a team's process before the situation escalates. These interventions must encourage the participants to take on board the opinions of their team mates and to look at the debate holistically.

6.7.4 Communication Tools

The use of information and communication technologies with little or no face-to-face interactions has long been shown to present both opportunities and challenges for virtual teams (Powell et al. 2004). While they can never replace face to face conversations, multiple communication technologies can provide better interfaces for conversations, both online and offline. The added complexity of the technologies however, can also hinder the free flow of conversation between the team mates. The findings on the use of the tools have been divided into two distinct sections: Synchronous- live and real-time communication between team members and Asynchronous Communication - the communication that took place when the team members were not 'talking' in real-time.

6.7.4.1 Critical Junction Synchronous (Online) Communication

The most popular tools for synchronous communication were Skype, instant chat- through Facebook and video conferencing. Teams used a mix of these technologies to facilitate this constant communication. Some used the blogs very efficiently (IRL NL4-3), while others used Facebook instant chat to share short messages throughout the day (IRL NL4-5). Others used Dropbox to continuously upload work and review it regularly.

The video conferencing was used in the bi- weekly meetings between each project group. These were semi-formal meetings, held in a professional video conferencing suite, where each team presented its project work to date and was given guidance and feedback by the project facilitators.

Some technical issues arose with Skype that were attributable to available bandwidths, intermittent internet access and inadequate hardware tools (low resolution webcams and poor audio tools). These limitations sometimes made the online conversations difficult and disjointed '*When you're on Skype you're talking to the laptop you just can't interact properly, you say something and there's a bit of a delay and then you have a tiny bit of a pause*' (IRL NL4-6 Focus Group). The majority of teams initially found the conversation didn't flow as a natural conversation should '*Skype was a bit awkward at times*' (IRL NL4-5 Focus Group). Skype is time dependent, can be unreliable and isn't always the easiest platform through which to have a constructive conversation. Design details were lost as the participants found it difficult to convey ideas visually through the webcams.

> '*It's not really that good either for showing ideas you just have to use the blog anyway if you're going to draw something you can't seem to put it up on the blog you can't really hold it up so coz it's not good quality you use the blog anyway for*

> *that so it's just not really the best way to get ideas across besides talking but a lot of what we do is drawing'* (IRL NL4-5 Focus Group).

Contrarily Skype is freeware and user friendly, which removes any technical or financial barriers with distributed collaboration.

To overcome the technical limitations of Skype, the teams used complementary tools to enrich the problem solving process. The majority of teams on the IRL NL project used Dropbox very effectively to upload their work prior to the Skype discussions. This allowed all the team members to view the work, familiarise themselves with it and ask targeted questions during the meetings. In these cases the virtual discussions were far more productive.

One team noted that they didn't actually design during the meetings; instead they discussed what they had been working on and made decisions as to how to move forward[43]. *'We'd never do work on Skype but after Skype, we always knew what to do and so you could kind of take it to the next level'* (IRL NL4-6 Focus Group). Fortunately for the majority of teams, the initial discomfort with the team 'meetings' abated as the participants became more familiar and comfortable with the tools.

6.7.4.2 Critical Junction Asynchronous (Offline) Communication

Digital project diaries (Blogs), emails and Dropbox were all used to maintain the contact outside the planned meetings. Additional effort was needed to sustain constant communication over the distance for all of the teams.

When the blogs were analysed the level of engagement in offline communication was clear. Participants updated work, posted comments and provided feedback to varying levels. All teams posted sketches, videos, written text, slideshows and photographs on the blogs[44] *'You can put up images and slides and videos and websites, everything, so you can store the whole process and communicate as well so it's one helpful thing as a whole'* (IRL NL4-3 Focus Group). The blogs and Dropbox allowed all team members (as well as the project facilitators) to track the progress of the work and to capture the work to allow for revisiting ideas during or after the project by creating a permanent record of the work (Mamykina et al. 2002). Maintaining a record of the process meant participants were able to review their team mates' work and draw meaning from it outside 'scheduled' team meeting times.

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[43] This occurrence is discussed in more detail in the Sharing (Interaction Path) and Decision-making (Critical Thinking Path) sections.

[44] See www.designcollaboration2011.wordpress.com for full blog activity.

> *'I think the most helpful thing about the blog is anyone can put up posts at any time and it's very easy to see how the process is going, because it is just one long page and you can just scroll through the whole thing and just see what everybody else has put up last week and you can easily get feedback and give feedback as well because you just comment on the person and you can see how much comments on the person'* (IRL NL4-3 Focus Group).

While certain teams engaged thoroughly with the blogs, for others it was merely a place to upload their work for record (IRL NL4-5&6, IRL US4- D, E&F). Some participants complained during the project, that information tended to get lost when the team was 'offline' *'there was these big gaps where you didn't exactly know'* (IRL NL4-1 Focus Group). One team noted that the blog became more useful as the project progressed beyond the idea generation stage and the design concepts were more visual and defined. This work could be easily posted on the blog for the participants to comment on. *'Then after a couple of weeks went on it started to be through blog more and more because we had more and more stuff to put up so we were like talking to each other'* (IRL NL4-5 Focus Group).

For other teams however, the blog became the virtual design studio around which their process pivoted. IRL NL4-3 had the richest blog which mirrored their dynamic process and the rich standard of their work. *'Blog very good, main source people referred to…Everyone could put up info, see what everyone was doing, comment and generate ideas'* (IRL NL4 Reflection Session Team 3). On reviewing the team's blog, clear evidence was presented of continuous dialogue and feedback, with all team members commenting regularly on the work posted. In this case the participants found the blog encouraged them to be more reflective and open with their individual processes.

> *'The Blog… putting up your own thoughts and ideas on it whereas before you were just thinking them in your head or whatever but you are writing them down for the public. I know it was just the teams but anyone could just log to the internet and see this and read it, so that was a learning experience for definite'* (IRL NL4-3 Focus Group).

The whole notion of asynchronous communication was something the participants noted had never been an issue in previous collaborative projects (from AR3). When a team is co-located, decisions can be made instantly and dialogue is informal and organic. Some participants felt they were wasting time waiting for replies, rather than just moving on with the project work. They were anxious about making decisions without input and consensus from their team mates which slowed down the entire process (IRL US4-A).

'With the 5/6 hour time difference it was a pain to try and we would have our stuff done and we would send it to them. They wouldn't be awake yet and we would have to wait 5/6 hours because for them to even wake up and then it's another 2/3 hours for them to actually see it and do something so we could have lost on a whole day just waiting for a response if they had got in contact with us' (IRL US4-B Focus Group)*.*

While we cannot overcome the time differences, accommodations should be made in the design brief where the team members can divide the tasks, in order to capitalise on the time difference and effectively have a productive twenty hour day (Kolarevic et al. 2004). Keeping everyone up to date with what was going on, once the team had split, was a key component in maintaining engagement in the collaborative process. While all of the tools facilitate this continuous updating, the participants needed to be individually engaged with them to keep them relevant and useful.

6.8 INTERACTION PATH

Table 23: Interaction Path Critical Junctions and key for Visual Timeline

	Critical Junction	**Competency**
Synergy	Finding common ground	*Openness, Positive Behaviours, Team-work*
	Aligning Goals	
Understanding		*Understanding, Openness*
Responsibility	Accountability	*Accountability*
	Division of Work	*Responsibility, Accountability*
	Equality	*Empathy*
Sharing	Sharing	*Sharing*
	Different Perspectives	*New Perspectives*
Participation	Engagement	*Engagement, Dialogue, Team-work*
	Relationships	*Positive Behaviours, Acceptance of diversity*
Humility		*Humility*
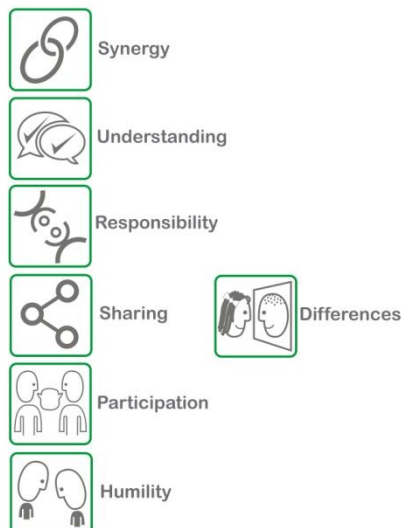
6.8.1 Synergy
6.8.1.1 Critical Junction Synergy

In order for collaboration to be successful the team members must be working towards a common goal (Barron 2000, Lasker et al. 2001, Zhang et al. 2009). Finding synergy can be difficult as team members bring different disciplinary and cultural perspectives with them. While the brief in each of the projects outlined clear goals and deliverables, the teams still had to make efforts at working together. '*By asking learners to make sense of a problem together, they are faced with challenges of establishing common frames of reference, resolving discrepancies in understanding, negotiating issues of individual and collective action, and coming to joint understanding*' (Miyake 1986, Roschelle 1992).

Different teams displayed varying levels of ability in finding synergy. In response to the question in the post project questionnaire, 53% of the participants agreed and strongly agreed with the statement that 'Members of our team shared the same vision' (28 of n=53 participants who completed S2). For some teams it proved easier to find synergy and as a result their collaboration was what they termed as successful. The teams that recognised that they were all working towards a common goal and made an effort to ensure the same found it easier to navigate through some of the junctions when they arose.

Teams which supported each other, recognised the differences and leveraged the diversity of skills found that working towards a common goal was a free-flowing process. Where the success of the team was dependent on the collective, rather than on one or two individuals, the project process was more 'successful' (Zhang et al. 2009). The members of these teams shared responsibility; established effective working processes to complete the practical tasks and worked hard at facilitating positive team dynamics.

IRL NL4-4 realised early in the process that working towards a common goal was the only way in which they could move forward '*We had to get done what we had to do, all working to a common goal*' (IRL NL4-4, Reflection Session NL).'*It's a team thing at the end of the day so it's trying to work together*' (IRL NL4-4 Focus Group). Observing this team working it was seen that the meetings were well organised and regular (at least twice a day), they worked to a strict schedule and focused their effort on fulfilling the brief. They didn't however leverage the skills of the team mates to the same effect as the participants of IRL NL4-3. This team identified early on where the strengths of the individuals lay and capitalised on them in order to build synergy and co-ordinate their team's efforts (Wang 2010). This will be discussed further in the section on Different Perspectives below.

6.8.1.1.1 Aligning Goals

The teams used a number of tools to help them collectively identify and decide on their goals. One tool a number of teams (IRL NL4-2, 4& 6) employed very effectively was mind-maps, which helped organise the variety of opinions within the team in order to distil their key goals. Another was a timeline that IRL US4-C created and posted on the blog. The timeline identified the short and long term goals of the team and guaranteed that each team member knew what was needed to achieve them.

> *'The Skype meetings were good to set out guidelines for each person so we would have to have this done by a certain date so and then we set up a timeline on the blogs so even if you weren't at the Skype meeting you'd know day by day what was going on'* (IRL US4-C Focus Group).

A third team (IRL NL4-2) had a very interesting method of overcoming any issues with mismatched goals they called 'Frustration logs'. The team members would post any issues or concerns they had with the project and the other team members on these logs for all the team to review. They would then work out a way of collectively resolving the issues that had arisen.

> *'They'd have their conflicts or whatever, but at the end of the day they would write out what happened and they worked through it, they had their frustration logs, and they used to type them out and have them up on the Dropbox… but they didn't fight and not sort it out they went through it and figured it out, so each of them was happy with what was going on'* (IRL NL4-2 Focus Group).

While having clear expectations and aligned goals was vital for the team collaborations the goals of the planners and the industrial partners also emerged as a very important issue. Building on the experience in the previous AR phases, the planners spent time before the project discussing goals and expectations in an effort to align them, thus avoiding any potential mismatches. Once these goals and expectations were made explicit in the planning stages it was much easier to accommodate them in the preparation of the brief and schedule. Despite this planning some disconnect did occur between the goals as the projects played out.

One particular mismatch that caused a significant rift within the teams on the IRL US project was that the US participants were not being graded on their work, which resulted in the majority of the workload being handled by the Irish students '*But it wasn't like it was a team, it was like we were the leaders and they were the helpers'* (IRL US Reflection Session Team B). The Irish participants understood that if their US team mates weren't being assessed there was less incentive for them to engage. They still, however, expressed

disappointment that the collaboration didn't live up to its potential or wasn't as successful as they perceived the IRL NL project to be '...*you could see from the Dutch groups that they were every bit as motivated as us to do it they were both working and they were both pushing each other to get work done'* (IRL US4-B Focus Group). This sentiment was echoed by the rest of the IRL US teams, whereas, the IRL NL participants were extremely positive about the synergy and felt they had met the goals of the project together as a team. Clearly Synergy is easier to attain if the balance of 'reward' is equal on both sides.

As well as ensuring the logistical goals are aligned, we can see that certain individual competencies need to be evident in order for synergy to be attained within a collaborative environment. The team members needed to display *Open* and *Positive Behaviours,* as well as the willingness to *Share* skills and ideas for the collective good.

6.8.2 Critical Junction Understanding

Developing a shared understanding of the project, of the directions being taken and of the decisions being made at the critical junctions are all essentials in collaborative projects (Kleinsmann and Valkenburg 2008). As discussed in the Explanations and Questioning section, there wasn't always a shared understanding amongst all the teams. This is inevitable, as individuals will interpret representations (images, models, written text, spoken words) and conversations according to their own experiences, interests and backgrounds (Lahti 2007).

6.8.3 Responsibility
6.8.3.1 Critical Junction Accountability

In collaborative projects, it is essential that the participants understand and share the responsibility for establishing project procedures, assigning tasks and ensuring team dynamics are positive (Zhang et al. 2009). This responsibility extends to generating ideas, working through concepts and delivering well resolved design solutions in order to fulfil the design brief.

Where the responsibility was shared evenly the teams found it easier to move forward. *'They were the exact same as us as well but every time we Skyped we felt we had to put a little bit extra in to make ourselves look good and to make Ireland look good. So I suppose that was a good thing'* (IRL NL4-6 Focus Group). Recognising that they had a job to do enabled the participants to assume responsibility for completion of tasks within their

teams. *'Yeah and everybody was responsible for themselves'* (IRL NL4-4). Everyone taking responsibility for his/her own actions worked very effectively towards the collective goals. *'We all knew we had a job to do and got it done'* (IRL NL4 Reflection Session, Team 3).

Participants commented that they felt increased responsibility in this project because they were part of a team and the other half of their team were 'strangers'. *'Also because we were with a team… so we were pushed to do more work, working up to the same scale because we didn't want to let them down'* (IRL NL4-5 Focus Group).With these strangers looking at their work, the participants felt they had to increase the quality of their outputs. *'It makes you raise your game as well because you are looking at the stuff they are doing and going, right I have to do this. It makes you step it up'* (IRL US4-B Focus Group). This peer pressure and added motivation is an central component for gaining full participation in collaboration (Cheng and Kvan 2000).

Conversely, when the responsibility for delivering outcomes fell more heavily on one side these participants (IRL US4-B,D&E) felt individual responsibility to try and make the collaboration work as well as delivering on the project brief. This was an unnecessary distraction, with the 'chasing' of their team mates deemed to be a waste of valuable time that could be better spent on design tasks. As a result of some participants not accepting responsibility or contributing to the team outcome their remaining team mates felt obliged to double their own workload.

> *'Because it was a collaborate project you were trying to get them to do stuff and even if they did it you had to go back and redo it because they didn't really try and it was worth a fair section of the mark so it was going to reflect badly on us so we ended up having to do two sides of the work'* (IRL US4-B Focus Group).

Not all of the 'unsuccessful' teams exhibited as negative an attitude. By exploring the language we can also see that the participants are expressing regret that it didn't work out or live up to the potential.

> *'It was frustrating because it was good in theory but it didn't play out it was nobody's fault in particular cause it wasn't any one persons on that sides fault either it's just that they couldn't pull it all together…to work as a team and that affected us as well because we spent too much time trying to chase all them down so everyone knew what they were doing'* (IRL US Reflection Session Team D).

Here they are not laying blame; instead they are accepting that although it was nobody's fault in particular they would have been happier with a different outcome from the project. The language in the focus groups was more accepting of responsibility, with participants willing to take the blame when mistakes were made. *'I didn't realise how important it was*

to communicate everything in detail. Like I always thought "oh sure they'd get what I was saying" but clearly they didn't and that wasted a lot of times and that was my fault' (IRL US 4-A Focus Group).

The willingness or lack of willingness, to take responsibility for failures as well as successes is reflected in the S2 questionnaire responses. The responses to the questions 'I felt individual responsibility when the decisions the team made didn't work as well as intended' saw 23% of respondents agreeing/strongly agreeing with the statement and 23% disagreeing/strongly disagreeing, the remaining 44% of respondents maintained a neutral stance. This result was surprising because in the focus groups the majority of teams indicated that they were all willing to take responsibility for the outcomes of their team. Taking responsibility for the mistakes made is a real learning emerging from the qualitative data. The ability to take responsibility for both success and failure displays maturity of the participants.

6.8.3.2 Critical Junction Division of work

From the previous section on Synergy (Section 6.8.1) it is clear that how tasks are divided amongst the team and how the goals are achieved is important in successful collaboration. The division of tasks and roles was left entirely to the discretion of the team in the IRL US project, whereas participants on the IRL NL project were asked to assign specific roles within their team. The US participants in the reflection sessions stated that the assignation of roles, or at the very least designating a leader, would have made the process easier particularly given the short duration of the project (IRL US Reflection Session US). They felt they didn't have sufficient time to allow the team members to naturally find their roles and so some support scaffolding from the planners would have been useful to allow the teams to build their roles as the project progressed.

Within the IRL NL project although the team members were asked to assign roles some teams didn't feel this was necessary or useful. Teams 2,3,5&6 all felt it was unnecessary as they were all working well with the same level of effort from all team members. IRL NL4-3 felt a more democratic approach was to allow people to play to their strengths at different stages on the project, instead of assuming specific project long roles. If the team was working towards a common goal, they noted, then there was no need for specific roles within the team, '*but I mean, if we were all working towards the same goal at the end then we didn't need to do this, we were all working well'* (IRL NL4-3 Focus Group). Instead they

capitalised on the skills, divided out tasks and worked on them individually. *'We broke it down to little pieces… what the Dutch people would do, what every person can do and then we put them up on the blog and people would say well that's either 'good or not''* (IRL NL4-5 Focus Group). They did admit that if the project hadn't been going well they would have assigned roles to ensure the work was completed. *'If maybe things were going wrong we would have started designating roles then'* (Ibid).

A couple of the Irish team members in IRL NL4-2&3 observed that the roles caused tension amongst their Dutch team mates. Individuals felt that their role was being encroached upon by their team mates, which led to some conflict within the team. In all cases this tension was very short lived as the teams made efforts to resolve the issues as they arose. Most notably IRL NL4-2 used their 'frustration logs' (as discussed in Synergy section above) to resolve any issues with roles arising in their team.

> *'It ended up being a bit of a conflict between the other side of the team, one of the guys was the co-ordinator and the other was the presenter and the other was the planner…they all seemed to be crossing over with each other and waiting for each other to do different things, whereas us together we just said this is what we are doing is that alright?'* (IRL NL4-2 Focus Group).

The assignment of roles in some instances acted as a barrier to moving forward, the participants were getting distracted by the roles and concentrated less on the project aims and deliverables (IRL-NL4-4). A number of other issues with the division of tasks arose such as:

→ The doubling of work- where team members would unknowingly work on the same tasks.

→ Lack of experience in how work should be divided in a team.

→ *Role of the Individual:* 'What is my role in this project' the confusion of the different disciplines as to what their role was in the project. Most obviously, the US participants felt lost at various stages in the process as to what their contribution should and could be within the project because they felt the project was clearly a 'design' project. They were unclear as to how they could contribute within their disciplinary field.

→ *Imbalanced workload* Lack of effort by some participants frustrated their team mates.

The last of these issues proved the most significant with the IRL US project. As previously mentioned in the Synergy section, the US participants weren't being assessed on their participation and so their effort was diminished in the main. In spite of the lack of

involvement from their US partners, IRL US4-B,D,E&F still made an effort to involve them in the process. *'We tried to keep them involved all the way to the end, even on the last day, seeing as it was a collaboration project'* (IRL US4-C Focus Group). Interestingly the US participants noted that they weren't encouraged to engage and when they did they felt their ideas weren't being listened to or taken on board in the decision-making process. Here we can see two contrasting perspectives on the same experience which brings forth issues of individuals' interpretations and framing of an experience.

The lack of academic reward didn't hold all the US students back and a number of them on teams IRL US4-A&C contributed significantly to the project process and design outcomes. They stated that the experience of working with a different country and the impact it might have on a CV was incentive enough. These US participants also attributed positive communication as the main reason why they found it easier than others to engage with their Irish team mates (IRL US Reflection Session US).

While we can see the division of work was not always an even process within the teams we can see that the roles, while they may have caused tension, also enabled a number of teams to navigate successfully through the process. If every individual within the team is prepared to assume responsibility for the completion of small tasks then the larger ones are easier to surmount. It is important for the participants to feel they are contributing to the outcomes. This was difficult when the participants found themselves in situations with which they were unfamiliar and with people they don't know. Fortunately, as evidenced in numerous focus groups once, the participants could see the value of their contribution to the team they tended to be more willing to step up and make extra effort to see it was successfully completed.

6.8.4 Sharing
6.8.4.1 Critical Junction Sharing

A mix of disciplines working collectively on a project presents great opportunities for the sharing of skills, knowledge and perspectives (Cheng and Kvan 2000, Volpentesta et al. 2008). Not only does collaboration bring a diversity of professional experience, it also presents diversity of cultures particularly when team members are located in different countries. With the breadth of experiences in each team, the participants were encouraged throughout the process to capitalise on them to the advantage of their output.

Some teams found it easier to share ideas than others and found that they were able to address issues that would have proven difficult in mono-disciplinary projects. For example, IRL NL4-6 found that having team members from Communication Management and Integrated Product Development helped them fill in their knowledge gap when it came to designing a Service System. *'They definitely had a different way of looking at things and that helped…all our services were even product based things at the start. But that wasn't an issue with them because they weren't all in Product design they were from all different mediums'* (IRL NL4-6 Focus Group)*.* In this instance, the disciplinary differences had a unique advantage in terms of moving through the critical junction with participants bringing a broader range of methods and processes.

Those who found sharing difficult observed that their apprehension stemmed from a mix of nerves and embarrassment about the quality of their own work. They were worried that their contribution wouldn't measure up to the standard of their team mates. This abated however as the participants began to share work and recognise that the standard didn't differ too much between team mates. '*At the end it wasn't too much of a difference but at the start we were kind of like "wow"'* (IRL NL4-5 Focus Group). IRL NL4-2 had a different experience as they felt their initial interaction was so positive that they *'weren't afraid to share our ideas with each other. Some of the groups were saying they felt kind of nervous putting their ideas up in front of the others in case it wasn't up to their standard. But we didn't feel any of that because we had got so comfortable with them at an early stage'* (IRL NL4-2 Focus Group).

6.8.4.1.1 The reality of sharing

While all of the teams recognised the value in sharing (echoed in the Reflection Sessions), it was noted that the majority of teams didn't share ideas as much as they potentially could have. This was particularly true with the US project where the sharing was one directional in a lot of the teams (See Timelines). The US participants confirmed as much and discussed the fact that their expertise across a number of disciplines wasn't utilised *'I felt that the potential of the project wasn't really met, because we didn't utilize the human resources available'* (IRL US Reflection Session US).

Prior to the project kick-off, the planners had discussed how the teams would design collectively in their individual locations. This would be facilitated through desktop sharing software (in this case Teamviewer^{tm}). Unfortunately, this didn't occur and the sharing of processes and skills didn't play out as anticipated. In fact, the participants saw the

technology as limiting the creative process '*Another problem I had with Skype was that you had to do your work separately and you had to come back and show what you had done rather than working together to reach something…Well it was just hard to generate ideas with them, we couldn't really, we couldn't really we could only swap ideas*' (IRL NL4-5 Focus Group).

It was generally conceded by all teams that the face-to-face experience essential to free-flowing sharing processes could never be fully recreated virtually. The participants found themselves swapping ideas more than developing them collectively '*So whenever we did the concepts it was always separate-our group and their groups, it was always gonna come together in the end. It wasn't too bad for just concepts but it would have been much nicer if we had everyone around the same table doing it*' (IRL NL4-5 Focus Group). Instead of working through ideas together the teams tended to divide out work according to the skills and not really share their knowledge. In some cases the skills weren't shared because the participants didn't perceive their disciplines as complementary and couldn't see how they could contribute to what they saw as essentially a design project.

> '*With members of at least two teams noting that they felt that their role was simply to support the projects as filters…A few pointed to the uncertainty that prevailed with regards to the roles of the Business and Engineering students in a project that appeared to be primarily design-focused*' (IRL US4 Reflection Session US).

The interactions between participants in a collaborative environment create learning possibilities for one another as they interact (Barron 2000). There are a number of ways in which teams should interact in order to share ideas and processes effectively. Amongst these are: having productive relationships between team mates; having a clear understanding of other people's ideas (see section on Explaining and Questioning on the Communication Path) and working in an 'environment' that is conducive to two-way sharing. As evidenced through the, data the last of these conditions is the most difficult to recreate over distributed environments. However, the facilitators in this instance clearly failed to cultivate the necessary '*atmosphere of trust, encouragement and risk free exploration*' (Mamykina et al. 2002).

6.8.4.2 Critical Junction Different Perspectives

Within multi-disciplinary teams there is a diversity of perspectives (disciplinary and culturally), domain specific knowledge and expertise. Facilitating the variety of perspectives and different working styles is where the challenges arise. All of the teams found it difficult to do this at various times over their project journeys. The key reasons emerging from the

data were a lack of understanding of diversity and ineffective communication. *"I felt that the potential of the project wasn't really met, because we didn't utilize the human resources available"* (IRL US4 Reflection Session VCU).

All of the teams recognised the different approaches and working methods of their team mates *'Also the difference between our way to work and theirs'* (IRL NL4-3 Focus Group). However only some teams capitalised on them by trying something new. For example IRL NL4-6 generated ideas by employing the method the Dutch participants used. As a result one team member noted '*the amount of ideas we had was more than usual I thought anyway. There was more personalities to bounce ideas off'* (IRL NL4-6 Focus Group).There was a clear benefit in their design work as a result of the diversity of methods employed.

Other teams however, reverted very quickly to how they had always done things, which meant their experience and learning were limited. Even when the teams who experimented weren't as successful they still felt they had gained valuable non-assessed skills.

Interdisciplinary work, whilst it often caused problems in the interactions also offered a diversity of ideas and views on the problems/issues thrown up by the brief. Where teams drew on the strength of 'weaker ties' (Hansen 1999) to capitalise on creativity and disciplinary expertise, they were able to break away from obvious solutions by combining these diverse perspectives. The diversity also helped when detailing the concepts as specific domain knowledge helped to validate concepts. For example the engineering participant in team IRL US4-A added technical expertise to one of IRL US4-A's concepts:

> *'One of the guys* [X] *was doing engineering, so he was thinking of all the stuff we weren't thinking of, as in all of the technical stuff'* (IRL US4-A Focus Group).

> [The comments from X] *'Hey, This design looks great, but as it's drawn to use the 'easy open' features you'd have to use your finger tips to twist it, which may not be as helpful. Another idea might be to have the ledges extend a bit past the edge of the top, or something like that, so that someone could use their full hand behind to open it, not just the finger tips. Does that make sense?*
> (Excerpt from IRL US4-A Blog September 28, 2011 at 5:43 pm)

Where the teams didn't make the most of the diversity of skills and ideas within the disciplines the projects were not as rich in answering the brief. One of the key reasons that emerged across a number of teams (particularly in the US project) for not capitalising on the diversity of disciplinary experience was a lack of knowledge. Not knowing what each

discipline could bring to the project meant that the variety of skills didn't bring the diversity of expertise expected.

> *'It was such a waste we had 4 different people from 4 different disciplines and we could have definitely utilised that properly if they had communicated with us, it was frustrating knowing that we had a graphic designer and a marketing person and all that…there are 4 tools that could have been really useful to our team'* (IRL US Reflection Session Team D).

In order to overcome this, one participant suggested that the teams learn about the skills of its team members and the particulars of their discipline at the start of the project so they could be capitalised upon throughout the process. This would be beneficial for all collaborative projects irrespective of whether the teams are mono or multi-disciplinary.

6.8.5 Participation

6.8.5.1 Critical Junction Engagement

There is little evidence to refute that collaborative work requires participation and engagement in order to attain a level of 'success'. Like the other critical junctions, the level of participation and engagement varied amongst the teams and even varied across the project process within teams. The results from the post project questionnaire [S2] question *'I enjoyed working with individuals from other countries & backgrounds'* garnered an average response of 4.02 from 5 (where 5 was strongly agree) indicates that the level of engagement with the project was high. When exploring the qualitative data from the interaction path, we can see a number of factors contributed to positive engagement within the teams. *'Oh I don't know I thought the project went well from start to finish to be honest I loved every aspect of it, even the fact that we were able to go over there was very good'* (IRL NL4-2, Focus Group).

> '*Well I think it was a really good learning experience for us… it was a worthwhile project to* do' (IRL NL4-4 Focus Group).

→ New People, New Ways: *'Meeting new people and having a bit of a laugh when we were doing it. It was fun'* (IRL NL4-6 Focus Group). Seeing and experiencing new ways of doing and approaching a project. *'I thought it was really god to get a bit of an insight into a different designer method'* (IRL NL4-1 Focus Group).

→ Ownership: In a positive way if participants took ownership over the work then they engaged more readily. When the participants felt engaged in the project they found it easier to move the work forward and made the decisions a lot more easily.

→ Novelty: *'It was very very different from any other project, we have never had a project like that'* (IRL NL4-5 Focus Group) *'We had a client and we were working with different people in a different country which was completely different to anything'* (IRL NL4-4 Focus Group). The novelty of the 'new' engaged the participants. Using novelty as a tool of engagement begs the questions how long can this newness be sustained and after something becomes 'old' does the engagement wane.

→ Obligation: Many teams felt a sense of responsibility towards their team and this served to engage them in the process '*We were all on the same team working for the same goal so we wanted to show that we were capable, that we were a good asset to anyone'* (IRL NL4-6 Focus Group).

→ External client: The industry partners added an extra level of 'professionalism' and encouraged the participants to work harder to impress them. *'It was nice to work for a client as well because I think it gave you more of a feeling that it's a real thing, like a proper job and the feedback actually means something'* (IRL NL4-5 Focus Group).

→ Continuous feedback loops- getting regular feedback through formal and informal team meetings motivated the participants *'It kind of spurs you on so you'd be going well in concepts you can keep it going in the presentation'* (IRL US4-E Focus Group). A number of the groups commented on the facilitator feedback mechanism put in place where after each presentation the facilitators would award a score from the Table 24 below. The participants agreed that this pushed them to achieve a higher score in subsequent stages and '*it made you competitive'* (IRL NL4-6 Focus Group).

'It was good to try and reach to the 5, now I don't know if we had been getting 1 and 2's would we have cared as much then would our enthusiasm have slacked off if our scores were lower' (IRL NL4-3 Focus Group).

Table 24: Team performance rating scale AR4

*	Come on put in some effort here (poor effort)
**	It's ok but it's never going to be amazing if you stay at this pace (some effort but more needed)
***	It's going ok but go on push yourselves further (satisfactory).
****	Going well but it could be amazing with a little more effort (good)
*****	Brilliant keep it up now!

→ 'Sense of Ceremony': Creating a sense of ceremony helped build a professional attitude and engage the participants. They felt that the project was more *'official'* and *'real'* as a result. The sense of ceremony in this instance was garnered through the weekly video conferences, where the teams presented their work in progress to the other teams and the facilitators for feedback, as well as the final 'official' presentation to the client.

→ 'Payback' or added value - offer an experience beyond the academic. *'Well I thought it was a good experience overall to work with people from a different*

country and to work on a different design field… we can actually learn from them and they can learn from you also as you progress. It was a good experience' (IRL NL4-4 Focus Group). *'Ya I was talking to Moira and she liked the idea of working with people in another country – great thing to have on your CV'* (IRL US4-C Focus Group).

→ Personal Engagement: Choosing a direction or theme with which the collective team could engage e.g. IRL US4-F using personal experience to design packaging solutions for the drinks industry.

When engagement was poor with some participants we can see a resultant impact on participation and interaction. Similar to Feedback and Synergy the reasons for lack of engagement were mainly due to the complexity presented by distributed environments; working with 'strangers' and misaligned goals and expectations within the team. The misalignment of goals had perhaps the biggest impact on the interactions between teams IRL US B,D,E&F. *'At first ya but when we were the ones making all the effort, then it was kind of hard to stay positive about it'* (IRL US4-C Focus Group).

In the majority of cases individual engagement fostered collective engagement within the project teams (IRL US4-A,C,F, IRL NL4-2,3,4,5&6). The positive approaches of these teams built momentum, with positive experiences spurring positive experiences. Where the engagement wasn't sustained, then perhaps more regular interventions and trouble-shooting during the project should be implemented by the facilitators.

6.8.5.2 Critical Junction Relationships

Collaboration requires the building of different types of relationships more than working individually on a project (Lasker et al. 2001). Building these relationships required time and effort with the added complexity of working in distributed environments. Due to the limited duration of the project, the participants either escalated their 'friendship' forming journeys or skipped this stage and went straight to a professional relationship (this is discussed further in the Getting to Know You section on the Communication Path). The act of making friends, forming bonds in tandem with liking the people with whom the participants were working, built respect and collegiality.

Many participants commented on the clear differences between local collaboration with 'friends' Vs. distributed collaboration with 'strangers' (Reflection sessions and Focus Groups). All of the teams stated that they found the co-located relationships easier to negotiate compared to the distributed interactions. Not only were they more comfortable with their team mates, they preferred having interactions that were real and engaged. They

did however recognise the need for participants to gel locally as well as with their distributed team mates. IRL US4-A noted that their team mates in the US didn't seem to be forming any relationship and had little or no interaction with each other.

> *'I think they weren't getting together amongst themselves and talking about the work so they didn't really know, we tried to keep them up to date as much as possible but sometimes you need to bounce ideas off someone… I think they were missing that'* (IRL US4-A Reflection Session US).

This could be attributed to the fact that the team members in the US had just met for the first time and structured interaction between them was limited, whereas the Irish participants had been studying with the same group for over two years.

All of the participants on both sides acknowledged that local collaboration needs to be nurtured to ensure successful distributed collaboration.

It must also be recognised that the relationships formed through collaboration will not always be wholly positive. While it isn't the ideal outcome, it must be acknowledged as a potential outcome where different people are interacting and there is a mix of diverse personalities at play.

6.8.6 Humility

6.8.6.1 Critical Junction Humility

Along the interaction path we can identify a number of junctions where the participants were willing to ask for help and accepted that they didn't have all the answers. Many of the teams noted during the reflection sessions and focus groups that they couldn't have achieved the same outcome if they had been working on their own.

> *'You have to take on board their ideas and you have to acknowledge it, acknowledge the fact that they are designing as well, they will see things that you won't see and the product turned out way better than any of us could have done individually'* (IRL US4-F Reflection Session US).

Humility within the collaborations proved useful for developing productive communication paths and enabled the participants to learn from their team mates. This also displays a level of maturity that indicates learning and development of higher level competencies.

6.9 CRITICAL THINKING PATH

Research has shown that collaborative work promotes the acquisition of Critical Thinking skills (Gokhale 1995). Team work provides more perspectives by which to synthesise, analyse and evaluate ideas and so make more informed decisions. The critical junctions along this path are organised in relation to the relevant competencies in **Error! Reference source not found.**.

Table 25: Critical Thinking Path Critical Junctions and key for Visual Timeline

	Critical Junction	**Competency**
Problem-Solving	Synthesis	*Decision-making*
	Negotiation	
	Compromise	
Reflecting	During	*Reflection, New Perspectives*
	Post	
Decision making	Empathy	*Decision-making*
Learning	Openness	*New processes, new ideas*
Comparison	Comparison	
Empathy	Empathy	*Empathy, Positive Behaviours*
Enjoyment		

Problem-Solving

Negotiation

Reflection

Decision-Making

Learning

Comparison

Enjoyment

Empathy
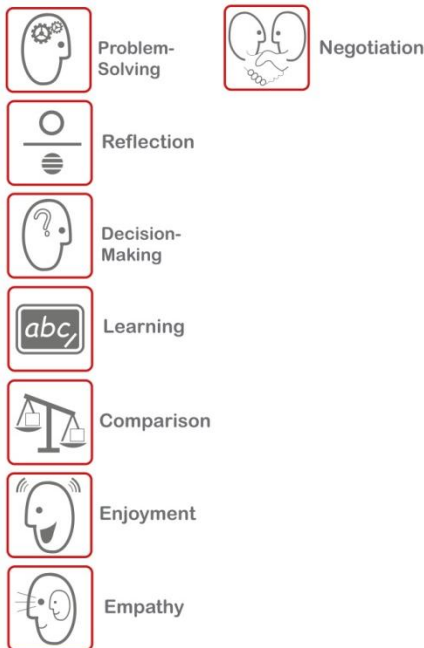
6.9.1 Problem-Solving

6.9.1.1 Critical Junction Synthesis

Participants agreed that richer ideas come from the wider range of people within their team *'I think it is better the result because you have a wider idea...our final idea it was ideas*

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from everyone… if you look at the sketches and the concepts it's a little bit from everyone. It makes it richer' (IRL NL4 Reflection Session, Team 3). Synthesising a variety of different ideas and opinions that cross disciplines and cultures proved to be a complex task for all the teams. Given this complexity, the teams managed the completion of their goals to varying levels of collaborative success:

→ High level collaboration: Working together to co-construct understanding (Schadewitz 2009)- where the teams worked together through the majority of the process and where design outputs reflect input from all team members - No teams can be said to have engaged in this depth of collaboration.

→ Mid-level collaboration: Worked in their co-located groups, assigned tasks, regrouped for discussion and decisions as a distributed team - IRL NL4-2,4,3&6.

> *'We'd list out whatever jobs had to be done and we'd say Oh I'll do this and Participant 1 will do that and Participant 3 will do that, and Participant will do that. And we would come back a couple of hours later and either have it on the blog or on Dropbox, we'd just discuss it find what our problems and go away again in our own little separate place to work on them'*(IRL NL4-3 Focus Group)*.*

→ Intermediate level collaboration: Worked on their own as individuals, came back together for discussion .The paths were parallel with some communal connections (Barron 2000). IRL NL4-1&5, IRL US4-A&C.

→ Low level collaboration Worked separately with little or no synthesis of ideas and processes. We could have done this on our own '*Its good we like it, happy enough to show it to them but if I was to if we had done it ourselves and not bothered with them we would have actually had the time to do it and we've have been fine and it was that kind of thing that really got us'* (IRL US4-B Focus Group)*.* Separate paths IRL US4-B,D,E&F.

When the timelines were explored along the critical thinking paths, we can see that the teams were doing very little designing together. As discussed, in the previous section on Sharing, the technology didn't facilitate the teams designing collectively. Limitations such as time, delay, gaps in knowledge in software operation, married with the inability to convey rich information across distances, made high level collaboration almost impossible.

All the participants noted that there was a steep learning curve when it came to working with new people. *'And learning how to work with new people, because the last two years you were doing projects with your friends or whatever, but it's a good experience to see what it's like to be doing projects with people you've never met'* (IRL NL4-5, Focus Group). This might have impacted on the participants' ability to synthesise ideas.

As the paths progressed, we could see a number of teams developing deeper relationships and with that comes a more cohesive synthesis of ideas. *'By the end we were Skyping every day, long Skypes, we were getting information, we were giving information…but if we had any issues with the stuff it's a lot easier to explain by actually talking to them instead of trying to come up with some solution and give it back to them and let them try to do something with it'* (IRL NL4-6 Focus Group).

If the project was longer and if the teams were to continue along the same interaction paths then we can assume that the deeper connections would have developed and better synthesised ideas would have emerged; ideas that offered holistic perspectives mirroring the diversity of experiences within the team.

6.9.1.2 Critical Junction Negotiating

The fine balance of negotiation involves both listening and talking. The listening serves to build an understanding of your team mates' perspectives and talking helps you to verbalise your ideas in a way that is understandable and to allow others to hear your contribution. The teams which had open channels of dialogue found the negotiation process to be more democratic and easier overall (IRL US4- A & C, IRL NL4-2,3,4,5 &6). Those whose communication was limited found the negotiation to be a frustrating process that didn't yield results which considered everyone's perspectives (IRL US4- B, D & E).

When exploring for evidence of negotiation, either positive or negative examples, we found that there were two distinct paths for negotiation even within each team; **Co-Located negotiation** and **Distributed negotiation**. When working locally, the teams could negotiate by discussing and working through broad ideas face to face. In the distributed negotiations, the team members brought their ideas from the co-located sessions and worked through specific details and problems. The face to face negotiation process was swifter, more fluid and in-depth. There was an unspoken understanding of each other's opinions that was missing from the distributed sessions *'we can figure it out amongst ourselves…if there was* [a conflict] *we'd just chat it out… because we were friends anyway'* (IRL NL4-2 Focus Group).

The distributed negotiation was hampered by the communication tools and the participants' unease with working over Skype. So the meetings between the distributed team members took the form of decision-making sessions where individuals would give opinions on the ideas, details would be worked through and further tasks divided up amongst the team members.

'Just giving our opinions on it like "I don't think that would work" or "that would look better there" and then going back and re-tweaking what had been presented' (IRL NL4 Reflection Session Team 3).

As such, the majority of the key negotiations took place locally with shorter discussions taking place at team meetings. The process of finding a balance that everyone was happy with was easier for the teams with effective communication and who had established two-way feedback mechanisms. Those who communicated frequently, shared ideas openly and gave constructive feedback found it easiest to negotiate through the critical junctions e.g. IRL NL4-2,3,4&6.

The types of negotiations can be grouped as follows:

→ Back and Forth Negotiation: the iterative process of explanation-feedback-change. This method was observed in most local Irish teams particularly when they were working through concept selection. *'No we all worked together, kept questioning each other, someone would come up with the start of an idea and then someone would go off and do the Solidworks and someone else did the model-making… we all kept meeting back up and discussing it and debating it we just kept questioning each other how to go forward'* (IRL US Reflection Session, Team F).

→ Constant Questioning: Continually asking each other for more detail on the concepts so they could understand them better. Used by IRL NL4-3 during Skype meetings during the concept detailing phase where they were refining the design features on three concepts. *'Just talking about what we have to decide and getting opinions and criticisms went pretty good'* ((IRL NL4-3 Focus Group).

→ Argue your point: Participants argued their points to convince their team mates of the validity of their ideas- both IRL NL4-2 & 4 used this continuously during their processes.

> *'Participant "We negotiated…so we just stood our ground and got it back".*
>
> *Facilitator: "How did they react?"*
>
> *Participant "They had their bit to do as well. We didn't change things too much and they were happy once the overall design wasn't changed just the bunks moved to the other side'* (IRL NL4-4 Reflection Session NL).

→ Demonstrating your point: This was employed very successfully in the local part of IRL US4-F where they used physical prototypes to demonstrate ideas and identify flaws in concepts. This was also evidenced in other teams, with an emphasis being placed on 3D prototyping to test and refine ideas.

One unique benefit with the project diaries (blogs) was that having a permanent record of the work made the negotiation process easier as the participants could refer back to their

previous work to convince their team mates of their arguments. This chronological record facilitated the continuous loops of negotiation and as a result the iterative design process.

6.9.1.3 Critical Junction Compromise

Side by side with **negotiation** in developing critical thinking ability is **compromise**. The key to effective compromise within the teams was the ability to be flexible along with an openness to other people's approaches and opinions. Combining these with an ability to logically explain your ideas to your team mates proved most effective in helping reach a collective compromise that all the team members were 'happy' with.

When an issue arose within IRL NL4-4, the Irish team mates felt a design decision made by the Dutch raised concerns about space allocations and user experience, they referred back to earlier drawings and prototypes. They used these to explain their anxieties and once the Dutch side could see the issues they were more than willing to compromise.

> '*They had no problem in changing it because we explained why it didn't work because they hadn't looked at the usability as I said earlier and when we said it they said "yeah it makes perfect sense" and they kept the overall design just changed it*' (IRL NL4-4 Focus Group).

Some of the participants recognised that their team had compromised in order to explore new processes and as such learn new skills. *'I'd say we compromised our process as well to suit them a bit more than a lot of groups, we kind of met them half way and did it their way'* (IRL NL4-6 Focus Group)*.* The skill, in this instance was a different approach to distilling and filtering ideas generated during the ideation phase.

Another participant noted that he acquired the skill of compromise when a difference in personalities emerged. *'I learned to compromise a little bit more and to maybe hold back a bit more. I didn't get on with one of their tutors, there was a bit of tension between us, but again I sort of accommodated him and respected him, even though he annoyed me but that was good, it was a little bit frustrating'* (IRL NL4-3, Focus Group). This evidences a maturity and an ability to step back and assess the project from a holistic perspective, because the participant was willing to compromise in an effort to avoid unnecessary conflict.

From the findings above we can see that a willingness to bend and adjust both individual and collective goals was essential to move through the critical junction. Whilst the participants might not have always been 100% happy (this is the art of compromise!) with the choices made, if they accepted them and moved forward in a positive way the project path was smoother. If they resisted the compromises then the collaboration tended to

diverge with the team members separating and the overall collaborative experience lacking cohesion.

6.9.2 Critical Junction Reflection

Similar to the negotiation junctions the data indicated that there were two phases to the reflection process: In Project Reflection and Post Project Reflection.

6.9.2.1 Critical Junction In-Project Reflection

In-Project reflection was useful to confirm decisions in order to move forward in the project (Chiu 2002, McNiff and Whitehead 2006). During meetings it was observed that team members reflected on what had been discussed both during the meeting and the work that had been done previous to the meeting. Through this they could identify what has been done, assess whether they are on the right track and ascertain what needs to be changed and to ensure common understanding (Wang 2010, Loughran 2002). This was evident in conversations and observed during reviews. Where this step was skipped at a critical junction then the projects floundered for a time with making decisions and moving through the project stages (e.g. IRL NL4-1, IRL US4-A & B).

6.9.2.2 Critical Junction Post Project Reflections

Post-Project Reflection was addressed thoroughly in the Reflection Sessions and Focus Groups. This type of 'Reflection on Action' allowed the participants to consider their decisions and actions after the fact, thus leading to learning that can be applied to future projects (Schön 1983). The reflection critical junctions pivoted around issues such as:

→ 'If we had done this… it would have been better': a lot of the teams, particularly on the US side, were regrettably reflective; they weren't happy with the way the project went and the lack of engagement and effort from both themselves and some of their team mates. They expressed disappointment with some of their team's decisions and reflected that they didn't behave as they should have (humility); that they could have made more of an effort (participation) and taken more responsibility for the decisions made (accountability). Some participants however recognised that there was still a lot of learning from the project despite the fact that it 'failed', *'we learned what not to do the next time, it couldn't have been any worse so anything else will be better!'* (IRL US4-B&E). Most importantly perhaps was that they felt disappointment that the potential of the project wasn't met *'It could have worked really well but it didn't'* (IRL US4-A, Focus Group).

→ 'At the time we didn't like it but now we see the value in it': In some instances the teams were too immersed in their projects that they failed to see the bigger picture (lack of holistic perspectives). Retrospectively, they acknowledged that they were being 'pushed' in a certain direction to the betterment of the project. *'Ya it was a great experience to be honest, it really did make us learn a lot if you think about it'* (IRL NL4-5 Focus Group). Taking a step back allowed the participants to appreciate the learning. This opportunity for reflection isn't always available in academic settings as restricted timetables militate against it.

→ Laying blame: 'They didn't engage'; blaming others for the way the project played out and ended- the language used, highlights or indicates that they weren't taking responsibility retrospectively for the apparent failure of the project. When some teams discussed the apparent failures in their project they used external language 'they, them' and when they were discussing the positive aspects they used internal language 'us, I, we'

→ Project benefits: *'It was just nice to make different kind of friends especially with a different culture it was kind of nice'* (IRL NL4-1).

The process of reflection forced the participants to recognise that collaboration is not always going to be smooth.

> *'There were ups and downs, I liked how we could go away and do our own thing, we could go away and fully do our own concepts we were on our own, and then we'd bring it and present it to them. It wasn't like we were always synced or always together it was a nice gap or a break. But obviously face to face would be handy because you can meet up at any time'* (IRL NL4-6 Focus Group).

Similar to the evaluations of AR1-3, what is perceived as failure at the time often is a positive experience in retrospect. For example, when IRL NL4-3 were 'forced' to develop two distinct concepts for the final presentation they were frustrated at the time, stating that *'it sort of went downhill a little bit after that'* (IRL NL4-3 Focus Group). Upon reflection, they agreed that it had been the right decision and that presenting two very different concepts allowed them to showcase their abilities to the external client in a way other teams didn't.

> *'In hindsight it was probably a good idea but it was just sort of lumped on us and there was no, no discussion, it was just like sort of "you're doing it and that's it" you know…in the end it was probably not a bad decision I think but at that time it seemed that the decision was taken out of our hands'* (IRL NL4-3 Focus Group).

There is learning even from a bad experience *'even a bad experience can be a good experience too'* (IRL US4-E Focus Group). The participants need to be facilitated in seeing the bigger picture when they are immersed in a project, the facilitators need to encourage them to take a step back and be objective. Post project, they need to be given the time and

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space to reflect on what core competencies they developed and how the experience could potentially benefit them in their future work.

6.9.3 Critical Junction Decision-Making

Decision-making in a collaborative environment is inherently more robust than making decisions as an individual. Groups can pick up on issues that individuals might overlook which enhance the decision-making process (Schmidt et al. 2001). With thorough negotiation and willingness to compromise collaborating teams can make decisions with which everyone can work. Where a team displayed a continuous negotiation, compromise and feedback loop (Chiu 2002), the decision-making process was deemed a success for them (IRL NL4-2, 3, 4 &6). These actions of negotiation, compromise and feedback cannot be separated from each other as they are interdependent with each feeding into the other.

Positive attitudes are critical to decision-making (Chiu 2002). Where participants were engaged and had open, positive attitudes the decision-making process was flowing and democratic (IRL NL4-2,3,4,5&6) *'The decision-making between their team and our team was pretty good I think …it was democratic'* (IRL NL4-3 Focus Group). If a participant had a negative attitude and failed to engage the decision-making process became confrontational and difficult (IRL NL4-1, IRL US4-B) *'It was a train wreck, absolute train wreck of a project'* (IRL US4-B Focus Group). The different attitudes can be evaluated through the use of positive and negative language when referring to their team mates and describing incidences that occurred at the critical junctions.

IRL NL2-2 attributed their successful decision-making processes to the fact that they had built good relationships between the individuals (see Building Relationships section).The individuals were more comfortable '*because at the beginning, with all the teambuilding once the team was going good we didn't say ok this is what you have to do, we kind of worked together on it and compromised'* (IRL NL4-2 Focus Group). Again we can see the benefit of getting to know the individuals on the team in a professional and personal capacity.

How information was shared between the team impacted on the collaborative decision-making. Where teams used highly quality visuals and prototypes to convey their ideas the decisions were easier to make. This was because the other team mates had sufficient

information to understand the ideas and so the decisions were based on both knowledge and understanding.

Participants found that the key to effective decision-making was focusing on what's important and not getting side-tracked by irrelevant 'distractions'. For example, when the Irish participants on the IRL NL4-2 team travelled to the Netherlands they got distracted by the novelty of meeting their team mates. Their decision-making became disjointed and their progress slowed as a result. Fortunately, they recognised this and put structures in place to overcome it when the Dutch team mates travelled to Ireland. Timely decisions were also instrumental; when the teams could make the 'right' decisions at the various critical junctions on the path the teams progressed well and the teams moved forward without conflict.

From the qualitative data we can identify some common techniques used by teams to make decisions collectively. These techniques were not necessarily dependent on the stage in the process:

→ Asking their team mates to verbalise their ideas, backing up the ideas that are presented visually on paper with verbal descriptions. 'Talk me through it'
→ Repeating the ideas at the end of conversations; re-clarify to make sure everyone takes away the same interpretation.
→ Going back over the work to validate the ideas against the research findings.
→ Having a constructive 'back and forth' dialogue, avoiding one-sided conversations.
→ Elections: Decisions made by voting '*At the time we kind of did a vote between us and the US that was the time they were talking to us. But ah so we decided well all of us decided just go with the bottle design and that was it like we had three options we had the bottle design, the hospital design'* (IRL US4-E Focus Group)*.
→ Focusing on the positive: *'We just picked out the best of things, we just kind of stayed away from negatives and focused on the positive ones'* (IRL US4-C Focus Group).
→ Collective Decisions: *'The way they did it, they had eight directions, and they filtered their ideas through those directions, and our ideas fit into all their directions as well. So once we put our ideas in the directions we had we knew which direction we wanted to go with. So we decided as a group which was our best and which was our favourite'* (IRL NL4-6 Focus Group)*. This is an example of the decision making process employed by team 6 when they tried the Dutch method. Proved very useful for them to navigate through the decision-making when their specific brief was open and 'intangible'.

Decision-making amongst the IRL US teams was a more one-sided process in the main. When their other team mates didn't engage the remaining participants had to move on

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without them, even though they expressed that this wasn't how they wanted to make decisions.

> *'We were always kind of held back in a way kind of deciding. I always felt like that if they weren't there we would have been able to push on a lot faster, I suppose'* (IRL US4-E Focus Group).

These teams felt that the outcomes did not live up to the potential because they were based on input from only one half of the team, which was mono-disciplinary instead of being driven by multi-disciplinary perspectives.

> *'I think we ended up making a lot of decisions without all of their input, it could have been nicer to have had all of their thing, I think sometimes you need more people even if it's negative things, sometimes it narrows things down… I think that's what we lacked, around the concepts we were lacking people telling us "no don't do this, don't do that" we just needed extra feedback'* (IRL US4-A Focus Group).

Their language conveys that they viewed this as a negative experience and would have welcomed greater input from their team mates to help them make decisions.

Although the decision-making was inhibited by the lack of participation from the US team mates, the US team members felt their voices weren't being listened to when they did contribute *'We came up with the 50 ideas for our half of the 100, and we had ideas that were extremely innovative. But none of them were used, and I was slightly offended by this'* (IRL US Reflection Session US). And so they didn't feel involved in the decision-making process *'we felt like we didn't have a say; like we were just a backdrop'* (Ibid). This experience was typical of the US project and as a result the overall feedback from the teams indicated that the decision-making wasn't a two-way process.

From the findings above we can see that decision-making isn't a stand-alone activity, instead it is a cyclical process of explanation/demonstration, feedback, negotiation and compromise.

6.9.4 Critical Junction Learning

Whenever there is a mix of perspectives and experience within a team there will inevitably be learning. Whether this learning is explicit or implicit depends on the individual's ability to objectively reflect on the experience as a whole. In this project all of the participants conceded that there was learning and displayed a willingness to avail of new opportunities in order to acquire new skills and processes. As the previous sections have evidenced, it can

be seen that a range of skills and competencies emerged as the participants progressed through their projects.

Beyond the technical skills of using new communication tools the participants felt that taking part in the project would have benefits in professional life *'It was a good project it was a good experience, I mean these are the problems that you come across when you know so the experience if for just to do it the next time I will know how to go about it and how not to go about it'* (IRL NL4-1 Focus Group). Some of them described situations where they had already discussed the project in interviews with potential employers for internship positions.

> *'Two of us had an interview with Logitech up in Cork … [it was] really good to be able to say look we have worked with another team in another country and we made it work and we came out with a good product in the end. They were really happy to see that, that you can work in different countries and that it is easy to communicate between us'* (IRL NL4 Reflection session).

Even two weeks after the project ended the participants could see how the skills acquired could benefit them into the future.

Learning can come from negative experiences as well. A number of the US project teams observed that, while their projects might not have been successful in terms of the collaboration, they learned valuable skills in what not to do when they take part in a similar project in the future. '*I think we experienced the worst possible way….so at least you'd know it that once you go into work experience at some stage or a work environment that you have kind of experienced the worst side so it can be used to make it better'* (IRL US4-E Focus Group)*.

The benefit of the face to face element with IRL NL4-2's experience[45] was most evident in their learning where both sides got to 'physically' experience their partners design process. *'They said they had never even been introduced to the way we work and they said that they could understand the way the Irish team were working a lot more now that they had worked with them that bit'* (IRL NL4-2 Focus Group). Both the participants and the planners recognised the inherent benefit of working with others in order to learn and an immersive learning approach where they work collectively is conducive to this outcome.

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[45] The members of IRL NL4-2 travelled to both The Netherlands and Ireland to work together during the project.

6.9.5 Critical Junction Comparisons

Knowing how your actions input into the team is important in building confidence in the work of both the collective and the individual. When a team member recognised that his/her individual contribution could make a difference to the outcome of the team s/he was more engaged and grew in confidence. Through the project blogs and presentations we could trace the development of the participants' confidence in their own ability as the project progressed. At the beginning, they lacked confidence and perceived their team mates work to be of a higher standard but as the project progressed they realised that their skills were on a par with their distributed team mates. *'It kind of made us realise, I always think that design abroad is levels above us and people are much better than us but I realised that we were good enough and that our standard was good enough and that we were on a par with them'* (IRL NL4-6 Focus Group).

The ability to critically assess their own and their team mates' work and make rational judgements on it, is an essential action of Critical Thinking. Participants found comparing their own work and behaviours with those of other teams to be a useful exercise. A number of teams made comments that their work was as good, better or worse than other teams. The comparisons gave the participants confidence in their own work, processes and behaviours.

→ Comparing work: *'I saw the other sides work and it's really impressive. It kind of depresses you more with the shit* [sic] *we were after churning out because we couldn't have done any better with what we had, do you know that kind of thing with time constraints and this and that and even then somewhere that's not so difficult to get in contact with the time zone'* (IRL US 4-B Focus Group). The comparisons allowed this team to abdicate responsibility and lay blame for their perceived lack of success on external forces that they thought were beyond their control. The teams which took responsibility were happier with the outcomes and the overall experience (IRL US4-F, IRL US4-C, IRL NL4-2,3,4&6).

→ Comparing behaviours: *'Some of the other teams were arguing a lot like one of the other teams one group missed out on a Skype call and the other team took over and said this is what we are doing, whereas at least we got to work together as a proper team'* (IRL NL4-2 Focus Group). Comparing their own behaviours to those of other teams allowed the participants to step outside the project for a while and objectively compare their behaviours to others.

Comparing themselves with other teams is an important aspect of building confidence in their own work as participants can benchmark themselves against other projects. This stresses the importance of working in 'communities' or networks where knowledge can be

shared amongst the collective and people learn by seeing how other people tackle similar problems.

6.9.6 Critical Junction Empathy

Empathy was a very difficult occurrence to identify with and between the participants. During the observations however, some instances did arise where participants' behaviours were modified in order to make their team mates feel more comfortable. When IRL NL4-6 modified their way of generating concepts they admitted that, although they might not have been comfortable with the method, they adapted their process to accommodate their team mates. *'At the very least they felt more comfortable doing it that way; it didn't really affect us much'* (IRL NL4-6 Focus Group). The willingness to change your approach and behaviours so that others feel more comfortable displays maturity and a real ability to empathise with other people's perspectives.

6.9.7 Critical Junction Enjoyment

Enjoying thinking critically is highlighted by Sofo as one of the key steps to becoming an effective critical thinker (2004). Judging the reactions of the participants in all of the post project explorations we can see that the majority of the participants clearly enjoyed the experience.

The positive attitude discussed in the Building Relationships section, while it was not maintained in all cases, the majority of teams evidenced a positive attitude and high level of enjoyment of the project once it had ended. Results from the pre and post project questionnaires, Table 26, indicated that there was little variation in engagement from the before and after (n=44[46]). The respondents were optimistic and positive about the potential of the experience before it began and this positivity remained once the project had ended.

Table 26: **Comparison between pre/post questionnaire responses.**

Pre Project Questionnaire [S1]	
I am happy to work with individuals from other countries and backgrounds	4.43
I am looking forward to this project	4.50
Post Project Questionnaire [S2]	
I enjoyed working with individuals from other countries & backgrounds	4.02
I had fun working on this team project	3.84
I would look forward to continuing to work on this team	3.57

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[46] Number of participants who completed both pre and post surveys.

Based on a 1-5 Likert Scale (1 =Strongly Disagree   2=Disagree   3= Neutral   4=Agree   5=Strongly Agree)

The qualitative data corroborates these findings with all of the teams in the focus groups stating that they enjoyed the experience.

> *'Yeah I loved working with them, but I think I don't know, we got lucky with our group because they seemed like genuinely nice people, they were a really nice bunch of people'* (IRL NL4-6 Focus Group).

> *'Oh I don't know I thought the project went well from start to finish to be honest, I loved every aspect of it even the fact that we were able to go over there was very good… It was definitely a good experience'* (IRL NL4-2 Focus Group).

> *'I think overall it's positive'* (IRL NL4-3 Focus Group).

> *'Well I think it was a really good learning experience for us'* (IRL NL4-4 Focus Group).

> *'I enjoyed it, good experience. It was very good to be honest. Yeah'* (IRL NL4-5 Focus Group).

> *'I felt it was a good experience in fairness'* (IRL US4-A Focus Group).

> *'I was quite happy with the overall project I couldn't have picked better guys for the project'* [with reference to co-located team mates] (IRL US4-F Focus Group).

Again we can see the respect for the people in their team as both people and professionals. Gaining a positive experience is perhaps the most important aspect of the project.

6.10 CONCLUSION

While each individual and team experience was unique, conclusions can be drawn from the analysis and evaluation of the data across the two projects comprising AR4. This evaluation identified a multitude of ways in which the teams negotiated through the critical junctions along their project paths. Mapping the evaluation over the competency framework (see Chapter 4) has allowed us to ascertain what competencies emerged and when, at these critical junctions.

Whilst some of the competencies were explicit in participant behaviours (such as *Dialogue*, *Negotiation*, *Compromise, Participation* and *Decision- Making*), others were implicit and dependent on the explicit competencies to emerge (e.g. *Openness* required that participants are open to diverse, *New Perspectives* and willing to find common language and processes to work effectively; *Empathy* required *Understanding, Humility* and *Equality* while *Team-work* required effective *Sharing, Synergy* as well as *Responsibility*). The final

cluster of competencies were either difficult to evaluate or did not emerge at all over the duration of the project e.g. *Positive Behaviours, Humility* and *Humour*. So even though collaborative projects facilitate the exploration of the majority of the identified competencies for social sustainability in design, it does not develop them all. Through this exploration the research has addressed Objective 5 which was *to understand how and when the competencies emerge through the collaborative process*.

At the key critical junctions the research has shown that the teams employed a variety of tools and techniques to help them navigate through and move forward in their process. Objective 6 necessitated the exploration of the *pathways to and barriers against the adoption of Social Sustainability competencies into design practice,* by identifying how and when these competencies emerge through the collaborative process*.* From the evaluation of the participants and planners experiences in AR4, as well as the previous three AR phases, this objective has been met as the enablers for effective collaboration as well as the potential barriers have been established. The fulfilment of these objectives will be discussed further in Chapters 7 and 8.

6.11 NEXT STEPS

Following the completion of the four phases of Action Research and the Delphi Study, the next step in the research path was to draw together all of the evaluations, identify parallels with current thinking and fully explore the interesting and novel issues that arose during this process. The following chapter will discuss *why* the development of competencies that facilitate responsible practice are necessary for the integration of social sustainability into the design process.

7 Discussion

Having previously established the gaps in current research and practice (Chapter 2) this chapter will discuss how the new research conducted through the Delphi Study (Chapter 4) and over the four phases of Action Research (Chapters 5 and 6) advances the previous work in the areas of design, sustainability and collaboration. The chapter begins by unpacking the experiences of the participants across all four phases of Action Research and makes parallels with existing work in the area in order to identify the unique and novel aspects of the research. The sections that follow draw together the findings into key discussion topics, which deal with how the research findings can add to the progression of sustainable design.

7.1 INTRODUCTION

The previous three chapters have examined how designers can develop competencies for social sustainability through collaborative projects. More specifically they explore how design students in cross-disciplinary teams interacted with and between each other to develop a set of core competencies that would enable them to participate in responsible design practice.

The research did not serve to examine the design outcomes from the projects but rather the behaviours and processes employed by the participant teams as they navigated through their projects. The first three phases of Action Research (Chapter 5) have illustrated a path to developing and implementing collaborative projects, highlighting both the barriers and enablers involved. AR4 (Chapter 6) further refined the structure of collaborative projects as well as exploring how, when, why and what key competencies are attained throughout the process. These competencies, that enable designers to address the complex challenges presented by sustainability, were determined through the literature review and revised by the panel of expert respondents in the Delphi Study. The three rounds of the Delphi Study (Chapter 4) also presented working constructs and a framework for these competencies as well as a construct for what social sustainability means to design. Building on the findings from the primary research we can now move on to discuss their wider implications within the context of current sustainable design education and practice.

7.2 DRAWING THE ACTION RESEARCH PHASES TOGETHER

There is very little literature drawing together the three strands of design education, collaboration and sustainable design. Unpacking the experiences through the evaluations in the previous chapters (Sections 5.5 and 6.7-6.9) has identified a number of interesting issues and insights, which demonstrate why collaboration is important in the development of sustainable practice in design. Implementing Sustainable Development is a complex and extremely difficult process. Given the wicked nature of the problems associated with it, this research has identified why collaboration can help work towards sustainability in design.

The evaluation of AR4 (Chapter 6) in particular, revealed that collaboration isn't a single linear path. It is a series of co-linear paths that diverge and converge along the project process as participants attempt to deal with the complexity of conflicting voices (Figure 42). By establishing and illustrating the project timelines, it has allowed us to visualise these paths. The timelines have captured how the smaller instances, or critical junctions, combine to provide a holistic story of each teams experience. These critical junctions provided insights, identified relationships, trends and generalisations that occurred across all four phases of AR. The outcomes of the projects have highlighted how real-world learning helps in the understanding of sustainability because it encourages designers to create the link between theory and practice (Brundiers et al. 2010).
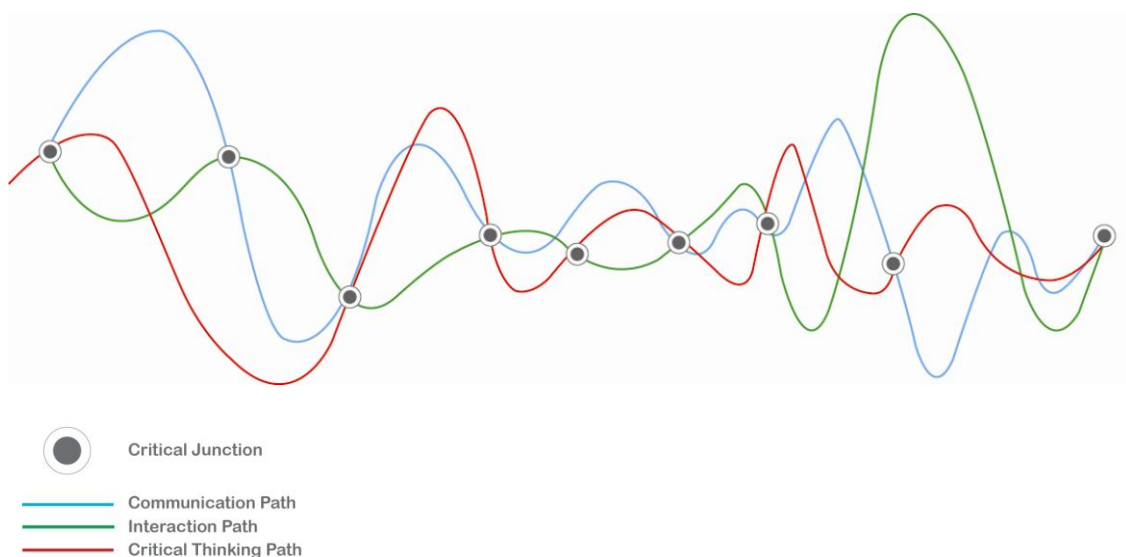
Figure 42: Visual Representation of the complexity and interdependencies of the project paths.

The four phases of AR comprised three different combinations of the following collaborative models: co-located, distributed, mono and multi-disciplinary. All of these

required a mix of synchronous and asynchronous communication. Mixing the type of collaboration highlighted how the competencies for sustainability could be acquired. The depth of collaboration, while it would be the ideal for a fully immersive and 'close-coupled' process, the data evaluation has highlighted that, unfortunately, this is not the reality. In the majority of cases the depth of collaboration reached a 'loose-coupled' level where individuals within the teams worked in the areas they most were comfortable with, e.g. discipline or culturally specific (Kvan 2000). The small number of cases across all of the projects where the teams reached a deeper level of collaboration, sharing skills and knowledge across domains intimate that the benefits can be further reaching. These cases occurred primarily in AR3 where the teams found an even balance between disciplines so no one discipline dominated (Dykes et al. 2009). This raises the question as to whether the face to face experience can be recreated virtually. New software and hardware developments, however present opportunities to find a satisfactory mix of technologies and resources that create effective environments for distributed collaborations (Seitamaa-Hakkarainen et al. 2005).

While the depth of collaboration may appear to be a limitation, it in fact forces educators to recognise the contribution these collaborations could make to the overall sustainable design education agenda. Instead of relying solely on collaboration, it can reasonably be expected to act as a support for the acquisition of sustainability competencies and not the only vehicle by which to build the capacity required. We cannot reply on one single method to solve the 'wicked' problems presented by sustainability.

7.3 ONE SIZE DOES NOT FIT ALL

Very few authors in the literature go beyond listing the competencies necessary for sustainable practice or suggest practical ways of *how* the competencies can be realised through education (Sterling 2001). What the literature focuses on is what they would like the learner to be capable of after they have undergone the learning experience, but offers little in concrete ways of attaining these (Podger et al. 2010). This research offers a tangible route for designers to develop competencies not evident in the literature. The methodology employed has allowed for the planning and implementation of the collaborative projects and subsequently the analysis of the behaviours of both participants and facilitators throughout the entire process. From the findings reported in Chapters 5 and 6, it was apparent that the challenges vary, because even over the duration of the 'project' the

parameters shifted and evolved. As a result we cannot have a one size fits all solution to sustainability issues. Similarly we cannot have a one size fits all design to the projects in education.

In spite of the project parameters being the same for every team (e.g. project brief, schedule and deliverables), each team experienced the project uniquely, worked through their process in a variety of ways and organised and interacted with their team mates differently. Through the project evaluations it was clear that irrespective of how the projects were planned and how the planners perceived they would 'play out', the experience was entirely dependent on the individuals involved. Over the almost 200 participants across all four AR phases, we can see that each individuals' and teams experience differed from the others. Even if the same project was to be repeated under similar conditions, it would bring entirely different results every time. In this case it should be acknowledged that where people are involved situations are 'uncontrollable' and 'variable'. Individuals have different experiences, bring different worldviews and frames through which they perceive and experience situations. The evidence purports that there was a great deal of personalisation during the experience and even, through recall, each individual viewed the experience through a unique lens. These variables lead to the individual acquiring and displaying the competencies at different times and to various degrees during and after the project.

Barth et al. (2007) state that complexity is necessary for developing the competencies for Sustainability, however the reality of dealing with these complexities is different. Learning for Sustainability isn't easy either even if, as DeEyto (2010) states, the designers are engaged and interested. The findings of the research clearly agree with Barth et al. (2007), in that developing the competencies is only controllable to a degree and beyond that the learner's individual motivation and interest is key. Observing and subsequently analysing the teams' experiences in the four phases of AR highlighted that all of the participants struggled with the complexity at different times when they were in the 'thick of it'. However, on reflection post-project, the participants realised the benefits of dealing with situations and concepts that pushed them beyond their pre-conceived limits. Much of the literature converges on the topic that design as a discipline is comfortable with ambiguity, uncertainty and incompleteness (Denton 1997, McDonnell 2012, Kelley 2000). The key to sustainable design education therefore, must be about facilitating the development of

competencies within the designer to cope with this complexity. In essence, designers need to be flexible to function within a system that is in a constant state of flux.

Designers, as a result, should be comfortable with uncertainty, incompleteness and change (McDonnell 2012), and Design education, must inculcate the confidence to deal with these conditions. The learning that has been evidenced in the evaluations of the projects (section 5.5 and sections 6.7-6.9) reports that the designers are beginning to build this confidence, as well as the capacity for dealing with uncertainty. This clearly identifies the need for *flexibility* of all of the stakeholders involved. Flexibility therefore can be included as an essential competence as it ensures that individuals are better prepared to deal with an unknown and uncertain future (Solomonides and Reid 2009, Barnett 2004). Being flexible in both attitude and process was shown to lead to the ability to compromise and negotiate with the variety of stakeholders involved in the process.

It became clear that the designers couldn't or should not be forced to behave in a specific way; this would clearly be counter to their development. Rather, facilitating their learning, (both formally and informally) is the best approach to engaging them in projects. What the facilitators should do is set up suitable contexts and environments for this learning to happen. This way the designers take responsibility for their learning, which leads to the subsequent development of the inter-connected competencies. While openness and adaptability are essential designers also need to be cognisant of employing action-oriented and pragmatic responses so as to make a real impact in moving beyond the rhetoric.

7.4 DEVELOPING THE COMPETENCIES

Discussion around the field of socially motivated design, confirms that the work is of immense value and lasting consequence (Jegou and Manzini 2008, DESIS 2010, Amatullo and Clark 2005). There is to date very little evidence of what skills designers will need to address the challenges presented by these new socially focused (wicked) design problems. While there has been literature describing the type of competencies that are necessary for sustainable practice, it offers little in the way of practical methods to develop them within design. This research has begun to fill the gap by identifying the competencies necessary and building a framework of what these competencies specifically mean to design (section 4.10, Figure 16). This is not a comprehensive (nor is it intended to be a complete) list; generating a definitive list of the competencies is an impossibility (Barth et al. 2007). Given the complexity and the ever-changing nature of social issues, the framework is constantly

evolving. Thus, the most relevant and realisable competencies, within the context of current design practice, have been identified (Figure 43).
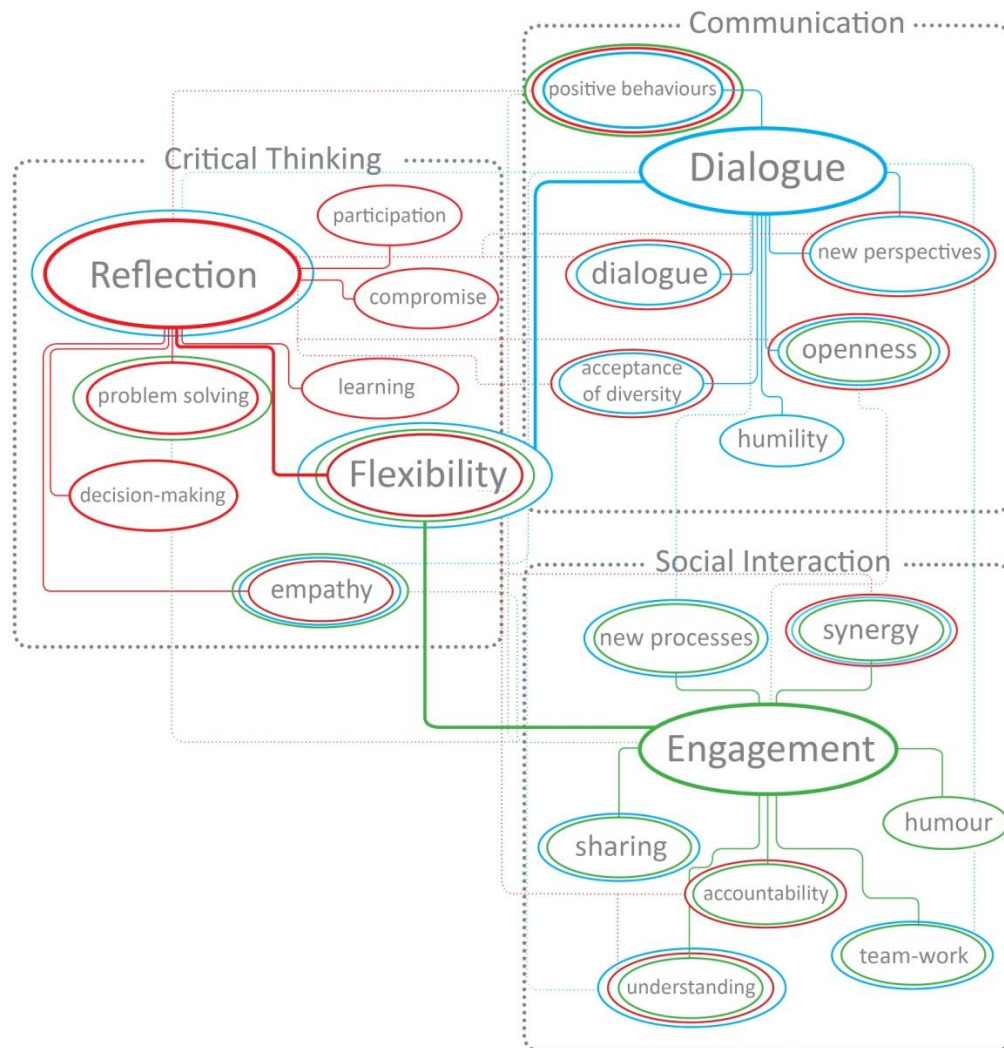
Figure 43: Framework of competencies for social sustainability in design [Revision 4]

Moving from the general broad based competencies outlined in the literature (Mochizuki and Fadeeva 2012, Parker 2010), the evaluations from this research intimate that focusing on a smaller range of competencies could be more valuable. This allows the participants to break down large complex problems into manageable 'chunks' and attain success on a smaller scale, whilst ensuring that they are engaged and develop the competencies to a greater level of depth. In interpreting the results we can see that a number of the competencies were evidenced more frequently at the critical junctions along the project paths. The evaluation of AR4, in particular, has demonstrated how interlinked and inter-dependent the competencies are. Some are explicit and others are implicit and highly reliant on the over-arching competencies to emerge; thus creating a web of competencies that are closely linked and multi-layered.

The reality of developing the competencies is demonstrably more complex than 'doing' a design project, fulfilling a brief or listing a set of desired learner characteristics. For all, or some, of the competencies to be attained to any level, the rounds of AR has shown, that designers must be given the correct contexts and opportunities for restructuring old, and acquiring new, knowledge. The competencies emerged when the designers were exposed to new and different perspectives, and were challenged to navigate through the diverse opinions and processes that these perspectives presented.

As discussed by Barth et al. (2007) the competencies cannot be taught instead they are learned. The findings from AR3 and AR4, in particular, indicate how this learning can happen through real-life experiences that offer exposure to certain conditions such as diverse environments, industrial practice, people and cultures etc. (Brundiers et al. 2010). The introduction of an industry partner in AR4 gave the designers the added voice in their process, but also added a professional lens through which to view both their processes and design outcomes. Many of the findings highlight how beneficial these experiences are in terms of broadening designers' understanding of others' perspectives and dealing with the complexity of working through a brief in a trans-disciplinary situation.

This research has shown that certain competencies are more central than others. These key competencies underpin the development of others and through them other competencies can emerge. The overarching competencies are discussed in detail below.

7.4.1 Shared understanding

How the teams formed a *shared understanding* was a prominent issue at the critical junctions and along all three paths (Communication, Interaction and Critical Thinking). The multi-disciplinary and culturally diverse contexts across all the AR phases facilitated the teams in working towards their unique shared understandings. In doing this, the findings show how, the teams strove to find synergy through the development of a common language; the forming of positive relationships; continuous questioning; critically analysing individual processes and opinions and by employing ad hoc strategies to deal with the incongruity of voices (sections 5.5 and 6.7-6.9). The varied participants within the teams proved to be one of the key factors to developing the specific competencies of *communication, negotiation*, *compromise*, *understanding*, *empathy* and *openness*. These

findings build on those of Stempfle and Badke-Schaub (2002), but move beyond controlled laboratory based settings, so the evidence here relates to real and evolving scenarios.

The evaluations of AR2 and AR4, in particular, highlight that this shared understanding must extend to the relationship between participant and planner in order to avoid misunderstandings and the misalignment of goals. Getting the balance right between the facilitator's voice, and the participants' proved to be a contentious issue. Through the modification stages of all four AR phases, this balance became more even, clarifying where the effort for the facilitators should be based. Preparation post project, as well as adaptive and guided ownership through the project process and creating the opportunity for reflection post project, was seen to provide the most positive participant experience. Giving the participants a clear voice in their process not only ensures engagement and continued participation, it also offers them a *sense of identity and being'* (Podger et al. 2010, Solomonides and Reid 2009). According to findings, participants need to feel useful and be recognised both internally within their team, and externally by the facilitators, in order to see the value of their individual contribution (Barth et al. 2007). While it is difficult to ensure equity in how each individual within a team perceives their contribution, each individual will experience the situation uniquely; it was pertinent that the facilitators and participants develop empathy and awareness of how their behaviour impacts on others. Both self-awareness and selflessness (Taylor 2000) are seen as necessary characteristics for sustainability and for a move towards shared understanding.

7.4.2 Engagement

Engagement, leading to motivation, also emerged as a core competency as the individuals within the teams worked towards a goal they all shared. The real-world industry projects of AR4 and face-to-face collaboration of AR3 particularly motivated the participants and demonstrated that they were actively involved in their own learning (Solomonides and Reid 2009). Here the designers worked to impress the industry partners or fulfil their obligations towards the 'real people' in their teams. This raised the question as to whether the same engagement could be present within the distributed collaboration model. With the distributed models employed in AR1, AR2 and AR4, the findings demonstrate that additional factors came into play for engaging and motivating students. Both competition and 'keeping face' with the 'strangers' on their teams acted as motivating forces for the

designers to engage. This engagement is linked to how the individuals perceive themselves within the situation and resultantly how they see others and learn from them (ibid).

Very little evidence exists in the literature dealing with competition and impressing team mates as motivating factors in collaboration. They both, however, offer valuable opportunities to build *positivity* within teams that will, ideally, lead to positive action and the attainment of synergy. To fully capitalise on this positivity designers need to exhibit the competencies of *openness, positive behaviours* and *acceptance of diversity.* During the post project sessions in AR4 (Chapter 6), the designers tended to focus on what went wrong and not on the myriad of positive outcomes. Designers must be encouraged to look at the positive learning and outcomes by being solution-oriented, as this instils both pride and positivity. It is important to recognise the learning that can be gleaned from perceived failures as much as the perceived successes.

7.4.3 Reflection

The benefits of *reflection* as a core competency should not be ignored; given the role it played in helping the designers understand the benefit of their experiences. The act and impact of reflection can be discussed from two angles: as 'reflection-in-action' and as 'reflection-on-action' (McNiff and Whitehead 2006). Reflection-in-action proved most useful when the teams were making decisions throughout the project process. It enabled the participants to step back and reappraise their actions as individuals and as a collective team, in order to re-frame their processes as they work (Valkenburg and Dorst 1998). The evaluations have shown that the reflection in action, in the main, took the form of constant questioning which forced the teams to revaluate the details of their design work, the ideas they are generating, as well as the processes they were employing. Chapter 6, section 6.9.2, shows that reflection can also focus the designers on appreciating others within the experience and understand the value they add and the knowledge they bring (Podger et al. 2010).

As Schön (1983) argues reflecting-in -action, offers the designer the opportunity to redress their problem-solving process through reflective conversations. This research builds on Schön's theory, opening up the reflective conversation between the Master and Student, to include the peer designers within the team. The widened conversation introduces a collection of voices, bringing in different worldviews and opinions. This in turn allows the

designers involved to construct their individual worldview based on more than their own experiences (Valkenburg and Dorst 1998). As the findings from this research report, these broadened worldviews help deal with the ambiguity of working on complex sustainability problems while fostering the curiosity for learning new approaches.

Reflection-on-action, as a formal process through the reflection sessions and focus groups, gave the designers the platform to share stories of their experiences. Through the resultant analysis of the findings from these sessions, it was clear that individuals found stories extremely useful to voice their opinions, learn from each other, but also to make sense of their own role within the collaborative effort. In essence *who* they are and *how* they relate to other people (Podger et al. 2010). By making sense of their own role, the designers began to see the links between their personal actions and the social and environmental impacts. The evaluations, in both Chapter 5 and Chapter 6, have clearly shown that reflecting on an experience not only recalls the event, but also creates an objective understanding of it and the other people within the event. This creates greater awareness and capacity for dealing with complexity in ways that perhaps, individual work cannot.

7.4.4 Communication and Dialogue

From both the formal and anecdotal data gathered, it was clear that *communication* between the designers during the projects was a dynamic and complex process. Complexity existed as the number of individuals involved increased. Information flows became more complicated and the conversations become more than the transmission of information back and forth between individuals (Chiu 2002). Through both collaboration types, co-located and distributed, the type of communication shifted and evolved throughout the process; from casual initial meetings to get to know each other; in-depth back and forth dialogue to work through design concepts and confrontational dialogues. While it is not always a desirable situation, the notion of disagreement in collaboration has advantages (McDonnell 2012). When disagreement arose questions were provoked, back and forth conversations occurred, individuals were required to explain their opinions all in an effort to gain consensus amongst the team mates. This creates a rich and lively team communication flow.

An interesting comparison between the communication from face-to-face and distributed teams is worth discussing here, as it became apparent throughout the four phases that

fundamental differences exist between the two. The key purpose to communication within collaborative teams is for effective information and resource sharing, the generation and development of ideas and the making of decisions. The findings from the projects indicate, however, that this was not always the case, particularly with the distributed teams as they struggled at times, with the opening of dialogical channels and the use of effective feedback loops.

Within the face-to-face experience of AR3 the communication was natural and flowing as the individuals could use more than verbal skills to discuss ideas and work through any issues that arose. This was not always possible for the distributed teams as the technology isn't sufficiently advanced to pick-up on the nuances of aural and visual cues. As a result the distributed teams tended to share work digitally prior to meetings and then discuss it during their synchronous meetings. The teams weren't designing together per se; instead they were designing as individual co-located groups and discussing ideas and details as the distributed collective. On the few occasions that the distributed teams were designing together they tended to use prototypes and visual representations (either sketches or computer generated images) to talk through the design features and functionality. Here we see the pragmatic, visual nature of design adding richness to the collaborative process.

Stempfle and Badke-Schaub (2002) identify four phases to communication in teams: generation, exploration, comparison and selection. However they overlook the vital stages of getting to know each other and establishing relationships which are perhaps the most important components in an effective collaborative effort. The distributed experience, it could be argued, misses out on the social interaction that is essential in building relationships and understanding personalities (Chiu 2002). The team dynamic established within a large number of the teams in AR4 in particular, refutes this argument as the teams formed bonds and developed friendships with their team mates that have extended beyond their project. These situations were attributable to *openness* on the part of the participants, as well as a willingness to spend time building the relationships from the beginning of the project and capitalising on the diversity of the individuals within their teams. This was married with the teams maintaining rich synchronous and asynchronous communication channels throughout the entire project.

7.5 DO WE TAKE SMALL STEPS OR MAKE GIANT LEAPS?

The findings from the research agree with Dilnots (2009) theory that sustainability does not have to be immediate. In fact, due to the complexity involved and the drastic changes required to achieve it, allowing time for evolution and development seems like a logical move. Counter arguments in the literature discuss how drastic systems changes and large scale shifts need to happen in order to deal with the potentially catastrophic future that lies before us (Wiek et al. 2011). Even deHaan's (2006) 'Gestaltungskompetenz' call for wide reaching strategies, asking learners to work towards large scale systems change. This is undeniably the ideal or utopian situation, but it is not always attainable as both practitioners and 'lay people' struggle to deal with the paradigm changes required by sustainable design.

There are strong arguments for deep learning and 'second order' change as a necessity (Sterling 2001). Learners do need to be holistic thinkers with the ability to explore and analyse complex scenarios and then conceptualise and realise solutions for systems change (Wiek et al. 2011). This thesis proposes that a middle ground or pathway between 'first order' and 'second order' learning be established, facilitating designers to acquire competencies that enable the shift in approaches from 'hang on to the present' to 'radical transformations' of the future (Toynbee and Somervell 1988).

While this thesis does not argue against awareness of the holistic picture for sustainable design education, the findings suggest that designers need to begin with smaller projects that introduce the competencies inherently through the brief and project structures. The competencies can then take the necessary time required to evolve and develop without too much confusion or complication. These smaller projects should be 'bricked' together and increase in complexity so the development of the competencies happens over a longer period of time, leading to a more lasting and transformative impact. Accumulating these small scale projects and interventions can contribute to larger global change over time. The earlier in a learner's education that these projects take place the better, creating a bedrock for future openness as practitioners (Denton 1997).

This building block approach aligns with Barth et al.'s (2007) argument of education moving, over time, from guided to self-directed learning in order to encourage independence and responsibility. The findings here differ somewhat, suggesting the approach should not be funnel shaped with guided learning expanding out to self-direction.

Instead, it should be a more continuous mix of guided facilitation and self-direction throughout the entire process. The relative proportionality between these two strategies can shift depending on a number of factors like the project stage, the individual and/or team engagement and the necessary transfer of skills. The guidance can be either formal- e.g. lectures, structured reviews to share design work and provide feedback, or more casual 'interventions' that facilitate the participants in building and maintaining relationships, optimising communication and capitalising on skills and experience (Schadewitz 2009). The inclusion of these types of formal and informal facilitations, as seen in all four AR phases, re-enforces the reflection-in action approach Schön (1983) recognises as necessary for effective learning and decision-making throughout the design process.

7.6 ACTION RESEARCH FOR DESIGN PRACTICE

This research has recounted the steps taken through the Action Research [AR] process over four phases of study as they moved from project to project through the cycles of Identification, Thinking, Doing it, Evaluation and Modification (McDowell et al. 2008). These consecutive phases have allowed for the iteration and the development of both a framework and a project structure that is based on levels of modification and improvement. The iterative nature of Action Research has facilitated a robust research process in which the iterative tweaking, development and refinement of the project process has added rigour to the outcomes developed.

From the reviews of the primary research it is reasonable to suggest that AR is an appropriate methodology for design projects. Its suitability in this instance lay in the cyclical nature where each potential solution was implemented and tested with real users (participants, planners and facilitators), areas for improvement were identified and changes made to the subsequent versions of the projects. The approach also allowed for the 'mistakes' to inform the changes in tandem with the 'successes' intimating that there is no right answer to any problem. This echoes a design approach where deep user understanding, thorough primary research alongside continuous testing and iteration, drive the process and inform the final design outputs. Both AR and socially focused design strive to improve situations for the 'person' who rests at the centre of the dialogue. It could be argued therefore, that Action Research and the design process hold the same epistemological base.

Sharing stories between peers and the project facilitators has brought about key learning and subsequent changes in practice on the part of the Action Researcher. Working with designers who offered diverse and often conflicting perspective has built an awareness, understanding and knowledge of how to doing things differently. The analysis and evaluations of the projects and participant experience have ensured the impact on sustainable design education goes beyond daily curriculum development. The most significant learning is that the emphasis for the design 'teacher' must be on facilitation, planning and ensuring synergy throughout the project. The role of the design tutor has been demonstrated to be that of facilitator (Lee 2009) who guides and encourages the learners to engage and contribute to the project while also critically questioning their own and their team mates' contributions.

In spite of careful planning the projects 'played' out as the design teams wished, leading to a variety of experiences, some of which are undoubtedly more positive than others (section 5.5.6.3). In spite of this variance the situations cannot be, nor should they be, controlled by the facilitators. Interestingly compromise, negotiation and the ability to change and alter course in response to participant issues or to counter misalignment, were found to be important competencies that facilitators can bring to the collaborative experience. These competencies align conveniently with those of the designer within the projects.

The independent project model (Lee 2009) adopted through the four phases of AR has allowed participants to acquire tacit knowledge and understanding that might not be possible through lectures or other transmissive educational models. In contrast, Kolko (2012) has argued that this tacit knowledge and understanding does not become explicit over short projects, as designers are not given the opportunity to reflect on the intricacies of their learning. To counter this potential outcome the four projects, particularly AR4, included a number of additional processes that facilitate designers to reflect on their experiences during and post project. The post project focus groups and Reflection sessions (section 6.9.2) enabled students to construct meaning through their projects and reflect their actions in the other participant's eyes (see 7.5.3). Similarly the project diaries (used in all four AR phases) afforded the designers the opportunity of seeing their ideas, interactions, relationships, and dialogues evolve 'live' through the project process. These modifications to the project structure, from one AR phase to the next, facilitated the designers to build on their projects and deal more readily with the complexity sustainable design brings.

7.7 THE IMPACT OF CULTURE

With the advent of globalisation designers must learn how to effectively work with culturally and geographically diverse partners (Schadewitz 2009). The notion of cultural differences was observed to impact on the overall experience within each project, particularly in how the participants and planners interacted with each other. Most notably these disparities played out in the language differences when, in AR4 for example one of the partner countries did not have English as a first language. Even with English speaking partners, nuanced variations in how language was used impacted on how decisions were made and dialogue was exchanged. The evaluations (sections 5.5.5.1 and 6.7.1) demonstrate how the teams strove to get to know each other and build relationships (Scollon and Scollon 2001) in order to agree on a common language and reduce misunderstanding (Gudykunst and Young 1996).

In AR1 particularly section 5.3, because the researcher was in the partner country at the time of the project, anecdotal comparisons could be made between the two cultures (Irish and New Zealand). It is impossible to say whether these differences were due entirely to culture or whether other influencing factors came into play; namely the collection of individuals within the class or the academic approach within the college/course. However, without the researcher being immersed in all of the participants countries cultures, it would be a superficial exploration of exactly how much culture impacted on the experiences in AR2-4. Beyond planting seeds of respect for and curiosity about other processes and perspectives, it is impossible to offer evidence based arguments on the influence of culture within the collaborations, and while this is an interesting topic it falls outside the scope of the project.

7.8 NEXT STEPS

This chapter has discussed the key findings to emerge from the primary research. Comparisons were then drawn with current literature in order to identify the unique aspects of the research. The final chapter concludes the thesis and identifies the way in which the aims and objectives were met.

8 Conclusion

This chapter concludes the thesis by outlining how the preceding chapters served to fulfil the aim and meet the objective detailed in Chapter 1. The contribution to knowledge along with the limitations and the opportunity for further research complete the chapter.

8.1 INTRODUCTION

Returning to the key theme underpinning this thesis requires redressing the reasons why it was chosen initially. The overarching reason was that Sustainable Development is complex. Within this space lays sustainable design; and the social factors embedded in both are more complex still. This presents new challenges for design and designer's practices. Changing paradigms in design and sustainability have led to the impetus, in recent years, on designers widening their scope of practice to include social issues. Education, however has offered little in the way of skills and competencies for dealing with these complex issues. On this premise this thesis strove to explore how collaboration could be employed as a vehicle to develop the necessary competencies and in unravelling the interwoven threads of sustainable design. Through collaborative work designers are presented with a diversity of perspectives and voices as well as being exposed to new ideas and processes. It is in the navigation through these voices to form cohesive processes and deliver innovative design solutions that the competencies are given the opportunity to develop. And, by participation in these collaborative projects, which encourage Knowledge Share; Collaboration; Cross Cultural and Active Participation, a more responsible and globally conscious design approach can be cultivated.

8.2 MEETING THE AIM AND OBJECTIVES

The primary aim of the research was to investigate collaborative projects as a means to support the acquisition of key competencies for social sustainability in design. The aim was met by fulfilling a number of key objectives, which were initially outlined in Chapter 1, and then threaded through the subsequent chapters.

Objective 1: To understand the literature and current practice in the fields of *sustainable design*, *education for change* and *collaborative practice* and identify how these can converge to develop new pathways in sustainable design practice.

The first objective was met by examining current literature and practice in the areas of design, sustainability, education for change and collaboration. The findings from this study not only created a context in which to place this research, it also identified the gaps in current research and practice. The most apparent gaps were in 'defining' social sustainability for design and in offering clear, pragmatic ways of identifying and developing core competencies necessary for social sustainability practice in design.

Objective 2: To define what social sustainability means to Design.

When the contextual review of current literature and practice did not offer a coherent 'definition' for the role of social sustainability in design there was a clear need to fulfil Objective 2 through other means in order to move the research forward. On this basis a Delphi Study was carried out where a panel of twenty-one sustainable design experts, across academia, business and NGO's, participated in three rounds of study. Questionnaires were sent to the panel and the responses collated and analysed between rounds. Feedback was provided between each phase on which the experts could comment. Through this rigorous process the panel offered a robust working construct for designers to use when planning project briefs, during ideation and when evaluating designed solutions.

Objective 3: To identify the key competencies necessary to integrate social sustainability into design practice.

The questionnaires in the Delphi Study also presented the panel with a tentative list of competencies, distilled from the literature. This list was refined, added to and definitions presented on what each competency meant in relation to design practice. A framework of these key competencies was constructed. These were then derived into analytical codes for subsequent evaluation of the data gathered during AR4. This created a clear path between the Delphi Study, the framework and the interpretation of the project experiences.

Objective 4: To ascertain the success factors that contribute towards, and the complications that detract, from planning and implementing successful collaborative projects. And to what extent the collaborative model used impacts on the project experience.

Three phases of Action Research were conducted in order to meet Objective 4. These three projects comprised a variety of collaboration models; AR1-Distributed, mono-disciplinary with a 'light' partnership (the project brief was common but the work was carried out separately in the co-located teams); AR2-Distributed, mono-disciplinary, 'Client/Designer' partnership (a combination of shared and individual deliverables) and AR3: Co-located, trans-disciplinary, fully immersive partnership (shared brief, shared outcomes). After each project was complete the data was analysed and the findings fed into development of the next phase. Following three phases, the factors that contributed to successful collaborations and those that lead to project breakdowns were identified through a thorough analysis of the data, comprising interviews, field notes, video and questionnaires. These modifications went towards the planning of the final AR phase.

Objective 5: To explore the pathways to, and barriers against, the adoption of Social Sustainability competencies into design practice.

The final phase in the Action Research cycle AR4, constituted two parallel projects which followed a distributed, trans-disciplinary and fully immersive collaborative model (all project components were delivered as one team). Both project briefs were industry supported, which expanded the sustainability agenda to include economic factors. This provided the design teams with a better reflection of professional practice. Through the two four week projects a large quantity of data was gathered through observations, field notes, focus groups and reflection sessions. The data was collated and analysed using the coding structure derived from the framework. By this, the behaviours and actions of the participant designers, working as individuals and in their teams, could be thoroughly explored.

Objective 6: To understand *how* and *when* the competencies emerge through the collaborative process.

The AR4 project experiences were interpreted and visual timelines created (Figure 39). These timelines were divided into three parallel paths of Communication, Interaction and Critical Thinking. Critical junctions along these paths were pinpointed and then explored in order to identify how, which and when the competencies were, or were not, successfully employed to navigate through these junctions. Gathering the individual team experiences and stories allowed for a collective picture of the entire experience to be created, from which the conclusions could be drawn.

8.3 CONCLUSIONS

Given that the research approach adopted in reaching the aim and fulfilling the objectives was one of pragmatism, iteration and multiple cycles of testing; it is reasonable to assume that the resultant impact on designer learning followed a similar route. The findings clearly suggest that changes in design education must continue in a holistic, open and action-oriented manner. Here we can see stirrings of the rhetoric that surrounds sustainability and sustainable design being transformed into action. The collaborative projects, undertaken in the four phases of Action Research, offer a realistic and attainable way to begin the move toward socially responsible design. The project model demonstrates how design education can do this by cultivating a set of competencies that will enable designers to deal with complex and uncertain issues they may face in their future practice. While the findings do not offer a single way of attaining sustainable design outcomes, they suggest that a collaborative approach can be married with other strategies in developing a robust and future-proofed design industry.

Conclusions were drawn at the end of each chapter, as each cycle of AR was completed, and when the Delphi study findings led to a construct and framework to underpin the AR projects implementation and analysis. These conclusions are further drawn out below in an effort to knit the key findings together thus providing a cohesive picture of the research conclusions.

From the literature review it became clear that the debate and discussion around social sustainability is in its nascency, so there is little agreement yet as to what it means in the context of design. Social innovation, design for social capital and other such approaches are beginning to gain prominence amongst the design community. Given the lack of definitional direction the Delphi Study created a dialogical platform for a rich discussion around what social sustainability means theoretically to design, and the competencies that designers need to implement the theory.

Through the Delphi Study a list of twenty-three competencies were identified and described. These descriptors are similar to the construct for social sustainability being action driven. They are rich in positive design language and challenge designers to address system-level issues, whilst still being realistic as to what is attainable in the short term.

Given the ambiguity, and ever changing nature of social sustainability issues, offering a definition would be misguided. Rather, the outcome from the Delphi is a living construct

that can evolve and grow as the debate around social sustainability in design matures. This living construct can be used to underpin design briefs and in the evaluation of design solutions.

The literature also identified that intervention in the earliest stages of the design process leads to the greatest impact in terms of reduced environmental impact, economic payback and social advantage. In order to make this understanding inherent in design practice the behaviours and actions must be embedded as early as possible in a designer's education. Re-orientating educational practices requires the integration of open, reflective, cross-disciplinary and flexible structures that takes cognisance of the evolving nature of sustainability. Given the challenge these changes presents to design, married with the wicked nature of social issues, compound the clear need for multiple voices in the generation of ideas and the making of decisions.

Through undertaking five projects over the four phases of AR the opportunities and difficulties that exist in planning and implementing collaborative projects became clear. In preparation for collaborative projects the planners need to ensure that goals and expectations are aligned between all partners.

Goal-oriented and systematic action is required to implement inter- and trans-disciplinary projects in design education. The collaborative process is complex as all participating parties (planners, facilitators and designers) struggle with the diversity of voices, the development of common language and the negotiation of solutions that reflect the variety of disciplines involved. Aligning the goals and managing expectations from the beginning of a project makes maintaining synergy less complicated as this project progresses. In spite of these issues being 'resolved' the behaviours and processes of the participating teams and individuals are unpredictable and variable between every project.

To counter this unpredictability several other conditions are conducive to effective collaborations. These include: *positivity*, *flexibility*, *adaptability* and being *responsive* to constantly changing circumstances throughout the entire process (planning, implementation and post-project). Coupling these with a pragmatic approach from the planners/facilitators serves to engage and maintain the interest of the design participants. With this engagement comes a more productive relationship between the facilitators and designers where issues can be worked through conversationally and decisions made equitably and consensually.

The research has also concluded that learning is not the sole territory of the design participant. Learning happens for the planners and facilitators too as they display a number of the competencies in the development and implementation of the projects. Being exposed to a variety of processes, teaching styles and design cultures provides a rich melting pot of ideas, knowledge and skills.

The complexity of Sustainability often serves to confuse and leave designers feeling that they have made little positive contribution. The research has concluded that perhaps a slower approach may be more appropriate where project briefs include Sustainability as an inherent consideration so the practice becomes normative over time. This way, Sustainability, as a holistic concept, is introduced in stages and the capacity for understanding and critical thinking evolves slowly. The learning is more lasting and transformative as a result.

Creating visual timelines of each project experience pinpoints the stages along the project process where specific competencies emerge and helps build a story around *how, why* and to *what* outcome the design teams deal with them collectively or as individuals. The analysis of these timelines concluded that the competencies form a hierarchical, inter-dependent web where links exist between different competencies. Not all of the competencies are acquired to the same level through the collaborative process. Simply put collaboration is more conducive to the development of certain competencies above others. *Communication, Reflection, Openness, Engagement, Flexibility* and *Shared Understanding* were concluded to be the higher level competencies, with the lower order competencies being acquired as a consequence of these developing.

Similarly, individuals acquire the competencies at different speeds and to varying degrees. So projects need to build on top of each other to allow designers the time to acquire the competencies at their own pace. By this 'bricking' approach the complexity of the design challenge can increase over time and the input in terms of facilitation can adjust as the skill level of the designer progresses. Development of the competencies however, is only controllable to a certain degree and facilitators must create environments and contexts that are conducive to independent, informal learning. In parallel the designer's individual responsibility is of great importance as it leads to the maximum potential for the acquisition of competencies. This way learning is encouraged to go beyond the project and create an impact in subsequent projects, as students mature to professional practitioners.

The results of the four AR phase's evaluations have clearly shown that projects pivoting around human behaviour are almost impossible to control. In -vivo Action Research studies, because they are unique (in that the participants and environmental conditions are different every time), has meant that repetition under similar constraints cannot be identical. From a research perspective, therefore it can be difficult to draw too many generalisations across the phases. However, the variety of collaborative models across the projects and the reliable data gathering methods have ensured that we can draw general conclusions that can be applied in a design context. Validity was ensured and reflexivity avoided by repeating the projects, peer auditing the project processes, triangulating the data and rigorous multi-levelled coding and analysis of data.

Given the flexible nature of human behaviour Action Research as a methodology for design projects presents a highly responsive and open approach that deals with ambiguity and change through iterative development, testing and questioning. Action Research, throughout this thesis, has been shown to map neatly over the design process, in that the acquisition of knowledge and the resultant changes in behaviour, come from a deep understanding and questioning of human behaviour and actions as well as the contexts in which these behaviours occur.

8.4 LIMITATIONS OF THIS RESEARCH

Whilst this thesis has covered a significant amount of work, there were limitations in scope and what the research could achieve within the timeframe. These are explained in the following sections.

8.4.1 Academic and Time Limitations

Given that the sample groups under study were design students, certain academic limitations impacted on the research. Restrictions of academic calendars and schedules resulted in the project duration being limited to between two and six weeks. Misalignment of calendars and conflicting individual class timetables impacted on the amount of time the teams could spend working together. This invariably led to the levels of collaboration not being deep enough in some instances. The majority of interventions from the facilitators took place in formal learning settings due to logistical issues. Some informal learning opportunities did present themselves for analysis through the blogs and participant diaries.

Given longer project durations, it would have been interesting to explore the informal learning that occurred outside the studio to a deeper level.

The short duration of the projects and the skill level of the participants also meant that the depth to which design solutions could be developed was limited. On this basis the designs generated through the projects only reached the conceptual level. Further testing, refinement, specification and development would be necessary in all cases to assess whether the design concepts are viable solutions and would have an impact in terms of sustainability. The emphasis of the research however, was not on the design outcomes but rather the project process undertaken by the design teams.

Academic requirements in terms of assessments and course structures also impacted on the preparation of design briefs and the subject matter that could be dealt with over the duration of the projects. The correct balance between the project brief from an academic perspective and the 'ideal' direction of the project needed to be found in order to reach a workable compromise and meet the expectations of all the partners. In some cases this led to the design brief not covering the 'perfect' theme in terms of research outcomes. The project however, had to be representative of 'real world' education in order for the implemented changes to have an impact on behaviour and attitude to bring about significant learning.

8.4.2 Methodological Limitations

While four phases of Action Research, comprising five projects, were undertaken over the duration of the research project, additional phases could both improve the collaborative project model and refine the competency framework.

Another methodological limitation was that of the access to sample groups under study. Due to the distance and time zone differences the researcher was unable to gather the same amount of qualitative data from the participants in the partner countries. Given the depth to which the data was analysed it was not realistic to explore the participation of all of the participants in the same way. On this premise, the primary sample size was limited to the numbers in the local groups (Irish) and to what the researcher could realistically deal with over the project duration. The majority of the data gathered from the distributed participants was in the form of questionnaires which are limited in the richness of

information offered by those who completed them. With additional time and resources, the project could have included the gathering of rich qualitative data from all participants.

The limitations of the Delphi Study, as a technique for this research, predominantly lay in the fact that the experts didn't meet face-to-face and that their input was written. The disadvantage being that a natural dialogue couldn't be developed or the opinions of the panel shared in an organic manner. It fell to the researcher to collate, analyse and synthesise the views of the experts which could have potentially led to the misinterpretation of written ideas and opinions. Where there was ambiguity in interpretation the experts were emailed and asked for clarification. The lack of face-to-face could also be seen as an advantage in that the ideas offered by the experts were subjective and the collation of these subjective opinions led to an objective construct.

8.4.3 Longitudinal Impact

The final limitation of the research was that the longitudinal impact of the project work was not assessed. The majority of the designers who participated in the projects had not completed their undergraduate study at the time of this thesis being written. The participants of the first AR phase (AR1) had completed their study but it was decided that, given the timeframe from participation in the project to their settling into professional practice, assessing the impact of the project would have not yielded sufficient results from which to draw conclusions.

8.5 CONTRIBUTION TO KNOWLEDGE

The notion of developing design competency for social sustainability is a relatively underexplored area and so this gap further reinforced the need for this research to be undertaken. The new understanding and knowledge generated through the Delphi Study and the four phases of Action Research have contributed to original knowledge in three distinct contexts: Sustainable Design Education, Sustainable Design Practice and Design Research Methodologies.

Firstly, in the area of Sustainable Design Education, the research has shown the clear role collaboration can play in the acquisition of specific competencies. By exploring a variety of collaborative models the research has identified the opportunities and limitations of each

and presented a useful structure by which to plan and implement collaborative projects. These collaborative projects have shown that a multitude of partners working together can cultivate an environment of critical questioning, dynamic dialogue, openness, capitalising on diversity, sharing ideas and reflective practice. This is the type of experience and learning that lends itself to the resolution of wicked, complex issues such as those associated with social sustainability. The research has also developed a *Framework,* which further defines the competencies that enable designers to deal with these complex social issues. The framework moves beyond a list by visually representing the competencies and the complex interconnected web that show their interdependency and hierarchical nature (Figure 44).
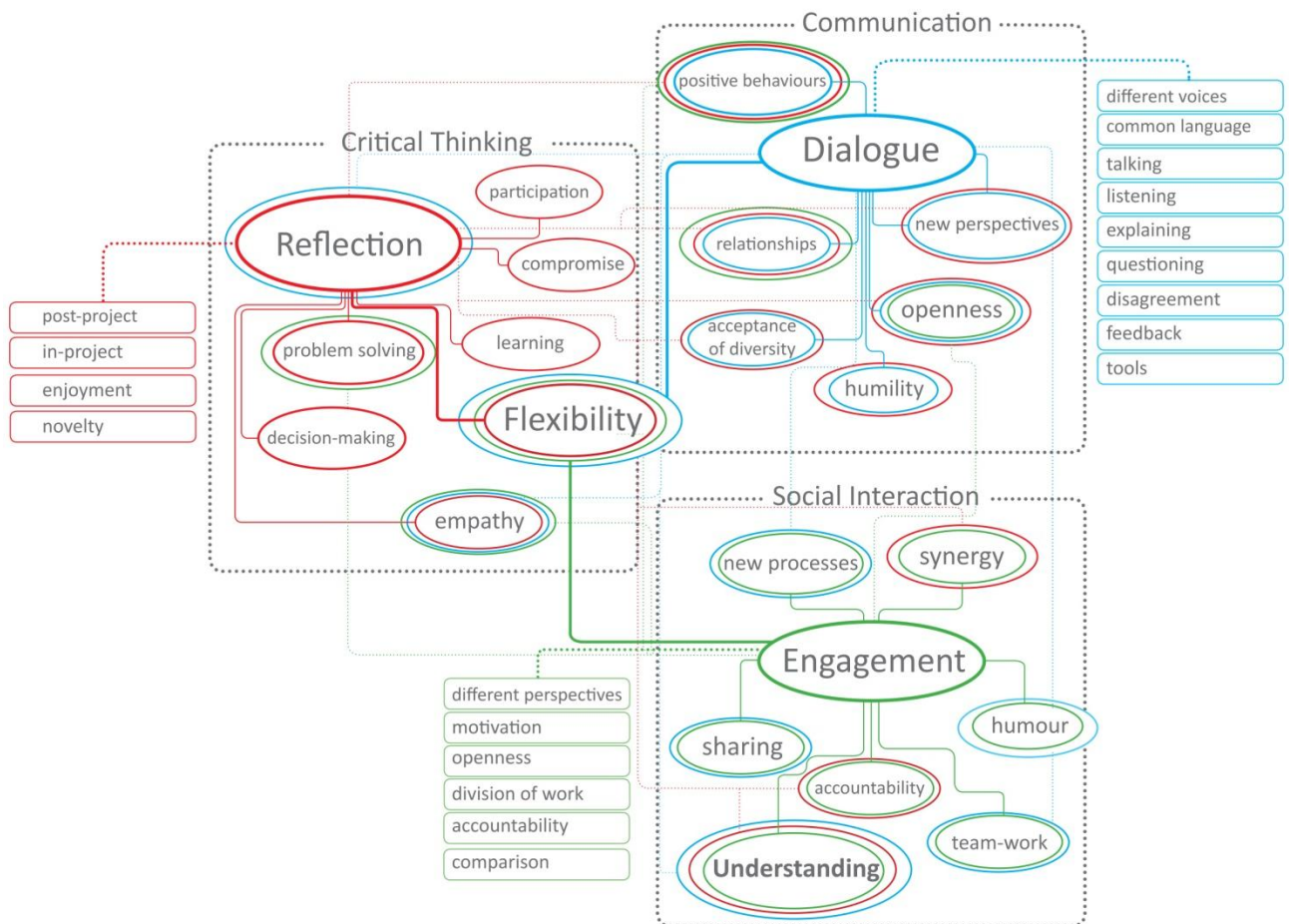
Figure 44: Framework of competencies for social sustainability in design [Revision 5] including hierarchical relationships

In order to evaluate the collaborative experience a second novel visual tool was developed through this research. The *Visual Timelines* allow design tutors to trace the acquisition of the competencies across the project process. Stories can be built around the emergence of these competencies and by this, pinpoint the conditions that are conducive or prohibitive

to effective collaboration. This unique instrument acts as both a learning tool and a means of evaluating the impact collaborative projects can have on a particular group of participants under particular conditions. By creating these timelines design educators and practitioners can explore the emergence of the competencies over time and consecutive projects.

Finally, the research methodology employed through this thesis also contributes to area of Design Research. By mapping an Action Research paradigm over the design projects the research has shown that a pragmatic research model aligns neatly with the design process. From this, the epistemological similarities that exist between AR and the design process are evident. The human focus, emphasis on iteration and testing for continuous improvement of both, demonstrate that research in the area of human behaviour can be both flexible and adaptive. By merging the two approaches the thesis offers a robust, rigorous and dynamic approach to research that is responsive to change and comfortable with uncertainty.

8.6 FUTURE RESEARCH

Although the research had its limitations and certain aspects fell outside the defined scope, these present opportunities for further research and future progression of this research topic beyond this thesis. The most apparent of these is the opportunity to expand the collaborative project to include a wider variety of partners. These partners could include community partners, industry collaborators and users, in addition to designers from a broader spectrum of geographical and socio-economic contexts. Given this broader stakeholder platform a variety of briefs and project themes could be explored that would be mutually beneficial.

Another clear opportunity for further exploration would be to conduct projects using professional designers, in order to ascertain the variance in how and what competencies were acquired or indeed what competencies they already possessed. The visual timelines would prove useful in these situations in order to map the competency development and to understand the stories that build around these competencies. Even the visual timelines themselves could be explored further as a potential design tool and or a tool for design research.

Distributing the construct amongst the wider design community e.g. not limiting it specifically to sustainability experts would also be an interesting way of building on this research. Potentially, a larger debate around the topic of social sustainability in design could be opened, leading to the construct moving closer towards a definition or even a policy. This would also allow designers to modify and evolve the competency framework to include and /or remove additional competencies as the sustainable agenda moves forward.

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A Thesis Structure Map

Thesis Structure

Background — Chapter 1
- Context
- Aim
- Objectives
- Research Q's

Research Method — Chapter 3
- Qualtiative
- Real-world
- Pragmatic
- Design-Led

Literature Review — Chapter 2

Sustainable Development
Education for Sustainable Development
What is Design
Sustainable design & the role of the designer
New design methods
Design education
Collaboration

Framework
- Collaboration
- Interaction
- Communication
- Project Process
- New Opportunities
- Critical Thinking
- Social Interaction
- Project Planning
- The Lighter Side
- Researcher Learning

Delphi Study — Chapter 4

Expert panel
Capture expertise
Gain consensus

Round 1, analysis
Round 2, analysis
Round 3

Feedback
Develop construct
Develop framework

Action Research

Research Cycle

Action Cycle

research cycle

action cycle

Chapter 6 / Chapter 5

Phase 4	**Phase 3**	**Phase 2**	**Phase 1**

Planning

Phase 4: Background / UL & VCU / 'Box Clever'
(Phase 4b): Background / UL & HU / 'Take Flight'
Phase 3: Background / UL & LSAD / 'One mans meat..'
Phase 2: Background / IRE, NZ & CHILE / 'Food for thought'
Phase 1: Background / IRE & NZ / 'Cultural Leanings'

Implementation

Project Brief
Project Logistics
Participants
Project Outcomes

(repeated across Phase 4, Phase 4b, Phase 3, Phase 2, Phase 1)

Evaluation

Phase 4 / Phase 4b:
Observations
Video Recordings
Blogs [6]
Field Diary
Pre-survey [72]
Post-survey [52]
Reflection Session
Focus Groups [6]
Conversations
(tutors)

Phase 3:
Process:
Observations
Video Recordings
Experience:
Storytelling [26]

Phase 2:
Process:
Observations
Ning
Twitter
Video Recordings
Experience:
Ning
Diaries
Pre-survey [26]
Post-survey
Interviews
(students)

Phase 1:
Process:
Observations
Video Recordings
Experience:
Vox
Diaries
Post-survey [35]
Interviews [4]
Conversations

Analysis

Phase 4 / Phase 4b:
Story building
Coding
Data analysis
Key findings
Recommendations

Phase 3 / Phase 2 / Phase 1:
Story building
Coding
Data analysis
Key findings
Recommendations
Changes

Evaluation
- Qualitative
- Quantiative

Quantitative
Analyse data
- Delphi
- Survey
[P1,P2,P3,P4]

Qualitative
Use framework to analyse
Coding
- Project Process
- Reflection Sessions
- Focus Groups

Discussion — Chapter 8

Key results
Experience
Planner
Participant
Construct
Action Research
Implementation

Conclusion — Chapter 9

Meeting of aims
New Knowledge
Limitations
Lessons learned
Future work

B

Social Innovation Case Studies

B.1 Kaospilots

Social Innovation defined by Kaospilots (from (Broberg 2008)

Projects undertaken for social innovation are becoming more commonplace and so successful that the model is now being used a driver for sustainable technology and production (Meroni 2007). Indeed the Dutch 'Business and Management' College Kaospilots use social innovation strategies to educate people in becoming social entrepreneurs (Broberg 2008). The process and strategies delivered at Kaospilots teach students to '*navigate challenges*' and qualify them *'…vocationally as well as personally to thrive interdependently by developing their knowledge, skills and attitudes as pro-active learners, value-based leaders and sustainable entrepreneurs, for the benefit of themselves and society as a whole'* (Kaospilots 2010). Kaospilots envision social innovation as a business strategy where sustainability and cultural diversity result in positive action. Project management, leadership and communication skills are married with creative and design

thinking to enable students to engage/involve partners and generate innovative solutions that improve people's lives (Broberg 2008).

A non-traditional and non-academic educational model is practised at Kaospilots. This reflects the current challenges higher education face in adopting a more direct role in society and economic activity. The Kaospilots' program is based on a practical entrepreneurial approach and a commitment to doing all of their projects for external clients who are public, private or NGO based (Crane 2005). The educational toolkit places explicit emphasis on Sustainability, Social innovation and cultural diversity. The end result being a dynamist, a generalist and an agent of change '*…with an eye for alternatives within social systems, organizations and networks in order to solve defined assignments and create new opportunities"* (Kaospilots 2010).

The dogmas forming the Kaospilot strategy pivot around knowledge share, co-creation, rituals, leadership that 'walks the talk' as well as inquisition, inquiry, dreaming, risk taking and dealing with tension and ambiguity. These are all firmly anchored in a pragmatic and real world foundation; Kaospilots learn for entrepreneurship and not about it (Christensen and Kirketerp 2008). Projects are always realised in a practical way and not as a mere conceptual solution that is never tested in the field (ibid). The focus is on building the individual' s capacity to take the initiative to begin new activities, projects and businesses (Krull 2009).
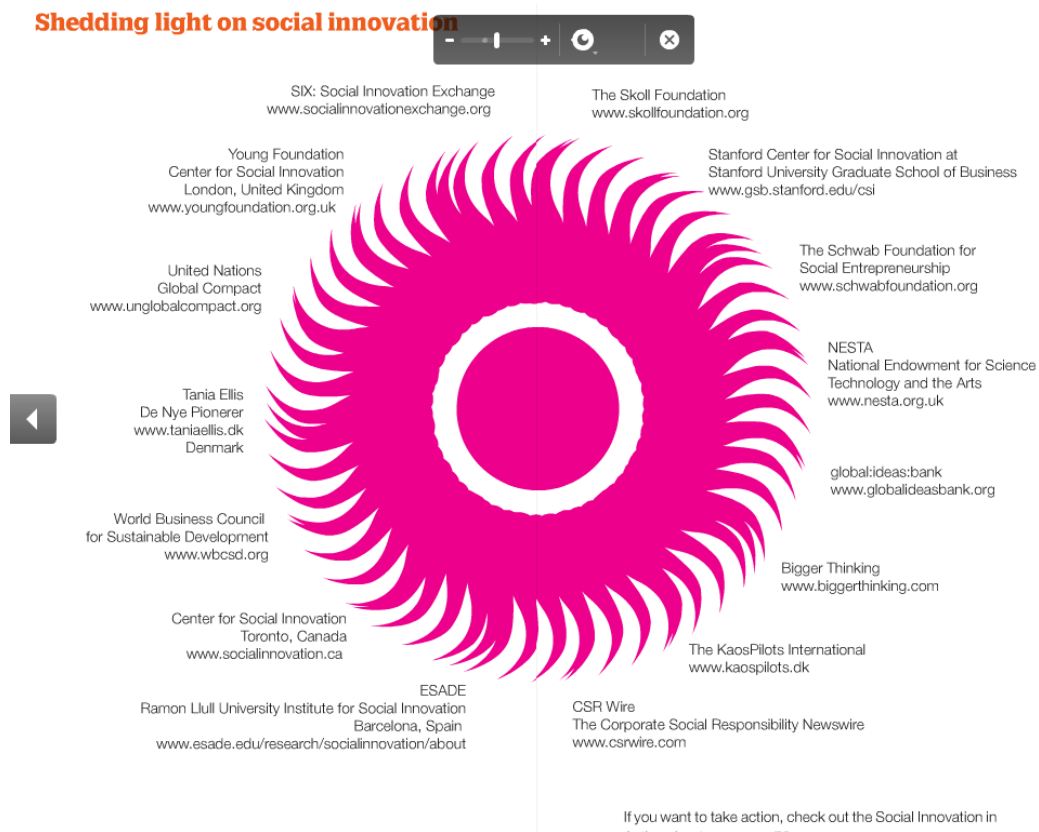
Social Innovation (from (Edwall and Hessellund-Beanland 2007)

B.2 EMUDE

Another project that is firmly grounded in social innovation is EMUDE (Emerging User Demands for Sustainable Solutions). Established following the Johannesburg World Summit in 2003, the project aimed to explore the potential of social innovation as a driver for innovation and sustainability (Jegou and Manzini 2008). A group of higher level institutes studied existing projects and implemented new ones to highlight how local communities can become models of new welfare and innovative development. The reports emerging from the project present several case studies where individuals and communities use existing resources in a creative, original way to bring about system innovation. These creative communities, by adopting a design perspective have generated solutions that not only have a reduced impact on the environment, they also draw together communities, increase well-being and add social value (social and economic) (Meroni 2007).

Whilst bearing in mind the diversity that exists between the projects the commonalities are also highlighted in that they all that they challenge traditional perceptions of how to do things and introduce new 'lighter' ways of living more sustainably.

The EMUDE project aims to demonstrate the extra-ordinary in ordinary projects; these illustrate what has been achieved and serve to plant seeds of what could be done. With these types of projects our everyday lives could be re-organised to become more aligned with the requirements of Sustainable Development. Ezio Manzini (co-founder of the EMUDE project) suggests that we should look at community as a laboratory of ideas and innovations. The designer is tasked with extracting and formalising these ideas and creating connections between networks and individual people. Every member of the community (either local or global community) can be instrumental in conceiving and implementing innovative solutions. Examples of this can be found in contemporary society including: Co-housing projects where spaces/ services are designed to be shared and to improve the quality of life; local resilience schemes where productive activities (fair and direct trade) based on local resources and skills provide for local needs and can become part of larger national and global networks. types; health and safe food supplies (from slow food movements to local farmers markets); locally managed care facilities for the young and elderly; local economies based on the well-established LETS and time bank systems; novel mobility systems that integrate public transport, zero energy systems (bicycles) with car sharing schemes (Manzini in Meroni 2007). What these projects have in common is that they turn things upside down, think differently and debunk preconceived ideas about products and services. Limits are interpreted as opportunities. These projects demonstrate how to organise life and generate new solutions from common everyday problems and show how macro-transformations begin with micro-transformations in order to achieve systemic change (Meroni 2007).

EMUDE Project Car Sharing Scheme and Neighbourhood Library

EMUDE Projects Product Sharing Scheme, Foot Bus (walking bus).

The projects discussed and initiated by EMUDE illustrate that alongside creativity being used as a means to generate social innovations, it is not the sole domain of the professional. This can be achieved through design where *'Design is seen as an activity that aims to make innovation (social, technical, production or relational) practical and desirable'*. Design is an ideal vehicle to facilitate social innovations as it can balance demands arising from different stakeholder needs and living standards (Jegou and Manzini 2006a). The iterative and constantly evolving nature of design can accommodate shifts in expectations and trends. With the new models of innovation emerging the participants in the project recognise that it presents a challenge for designers as it opens up new fields of activity. These fields don't work contrary to the existing role of the designer instead they expand the horizons as the designer learns to work on a systems level (as discussed previously) and with a variety of stakeholders. Designers will work not on designing single products but instead context driven solutions that enable communities and facilitate communication. More importantly designers will have to consider themselves part of complex interconnected networks comprising individuals, local and global communities, business

and enterprises, NGO's and governments all of whom are moving towards a more sustainable future (ibid).

The designer should not only be viewed as a facilitator, to do this would undermine his/her professional ability and the skills and creativity s/he can offer in imagining, realising new visions and in positively influencing behaviour (Meroni in Jegou and Manzini 2008). A practical 3 step process is offered so designers can make these collaborative services more effective and accessible. The first step in the process, which has direct parallels with the conventional design process, is to assess strengths and weaknesses of the community. This is followed by generating solutions that build on the strengths and overcome weaknesses. These solutions draw on existing products, services, relationships and communications in a novel way. Finally the process is finished with developing these solutions by employing new and specifically designed technologies (Jegou and Manzini 2008).

Behind all the projects lies a team of people who have dreamed up the ideas, planned, managed and implemented them. These management skills are key for social innovators as the ideas generated need to be realised practically otherwise success will be compromised (Jegou and Manzini 2008). The benefit of successful social innovations is that these localised production and services that can be spread and scaled up to larger networks of collaborative services. '*If and when creative communities become diffused social enterprises, the new organisations they generate evolve into a new kind of social services (collaborative services); micro-enterprises (collaborative enterprises); and networks of active people (collaborative citizens) and local institutions (participative institutions)'* (Jegou and Manzini 2008). A change in governance needs to occur if this is to be possible. Governments and legal systems need to become more tolerant of the 'grey areas' that come with radical new ventures and they also need to provide infrastructures to support the establishment and maintenance of these creative communities (ibid).

B.3 DESIS

The DESIS (Design for social innovation and sustainability) project differs from the previous two, although it deals with Social Innovation projects its primary premise is to make connections between different global projects. The projects are chosen as they demonstrate that, in spite of the complexity of contemporary society, it is possible to innovate both socially and technically. They demonstrate solutions to current problems and

identify a path towards sustainability. DESIS promotes and participates in projects that aim to reinforce the design community's role in the social innovation processes. A key aim of the network is to exemplify successful case studies and to employ design skills to make them more effective and ultimately replicable in different global locations (DESIS 2010).

The DESIS network comprises of educational institutes, design schools, not for profit organisations and companies with interests in socially responsible and sustainable projects. A variety of stakeholders are involved In an effort to build a strong network that draws the key ideas from each project together so we may learn from each other both locally and globally (Mendoza 2010). The projects are undertaken by participants around the world in fields as diverse as Collective Food (Brazil), Mobility projects (Sweden), Mutual help collectives (India), Urban Dynamization (Colombia) and Community based tourism (Africa).The themes are widely diverse but what they have in common is that they all recognise community members as key stakeholders with designers facilitating the connections. So in this case design has a potential role to play as a catalyser. The DESIS network aims to be *small and light initiative,* open and connected*.* But again, as everything in this network, it is therefore, potentially, strong and meaningful.

Map of DESIS Network locations www.desis-network.org

C Action Research Project Overview

Action Research Project Overview

Identify
Research & Problem Abstraction

The principles of Social Sustainability have been predominantly neglected in design; as a result there isn't enough interaction, dialogue and collaboration in design education in order to prepare students/practising designers for the profound changes that may occur during their professional lives. There is a need to integrate Social Sustainability into the design process so the principles and behaviours become normative in professional practice.

Think
Ideation & Concept Generation

Encourage students to become more responsible, open, aware, creative and innovative in their design thinking and the solutions they generate to design projects. Collaborative projects amongst groups of design students are explored as a means of achiving this shift in behaviours and attitudes.

Doing It
Design Development

Conducting cyclical phases of action research to explore and examine how effective (or ineffective) these projects will be in integrating social principles into design practice. Conduct the projects with groups of students in a variety of global locations.

Role of the Researcher: Observing, Participating, Facilitating,

Evaluate
Testing & Prototyping

Reflection on what all the participants have been doing, the outcomes from the case studies and the information gathered using the various research tools (as outlined in the table above). Looking in particular at areas of success and any deficiencies, as well as any issues or problems that may have arisen.

Modify

Synthesise the information from the evaluation process; critically analyse it and use the discoveries to inform change in the next project phase. This information can also be used to tell the story of the action research process and the experience and learning on the part of the researcher.

AR1

mono disciplinary

NZ [n=40]

IRL [n=21]

distributed teams

Cultural Leanings

Identify — A lack of understanding & integration of social sustainability competencies in design. Can collaboration help?

Think — Collaborative project between Product Design students, logistics & brief decided upon.

Doing It — Local teams work on local brief, share ideas, discuss, critique via Blog. Digital Exhibition to close.

Evaluate — Blog analysis,, Observations, Field Notes, Post Project Survey & Focus Groups.

More diverse partners More integrated collaboration. More sharing of ideas. Variety of Technologies

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AR2

mono disciplinary

NZ [n=17]

CHILE

IRL [n=32]

distributed teams

Food for Thought

Identify — Honing the collaborative experience.

Think — Collaborative project between Product Design students, logistics & brief decided upon.

Doing It — Designer/Client relationships. Ning forum, Twitter, Googletalk to share ideas, feedback & critique

Evaluate — Pre-project survey, Blog & Forum analysis, Observations, Video, Field Notes, Recordings.

Modify — Expect & accommodate change Alignment of goals/expectations. Finding synergy Project Charter

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AR3

multi disciplinary

LSAD Limerick School of Art and Design [n=30]

UL University of Limerick [n=42]

co located teams

Domestic Space

Identify — The logistics& implementation of a co-located collaboration. Further identifying & refining competencies

Think — Collaborative project between product design & sculpture students. Brief & logistics decided on by planners.

Doing It — Local teams working together on a brief. Research, Design and Present as a cohesive group.

Evaluate — Post project survey, Diaries, Observations, Video & Field Notes.

Modify — Mimic local experience. Finding common language. Finding synergy. Group Dynamics

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AR4

multi disciplinary

USA [n=23]

IRL [n=20]

External Clients

NL [n=21]

IRL [n=20]

distributed teams

Box Clever

Take Flight

Identify — Evaluate the instance of key competencies in collaborative projects.

Think — External clients, planning & logistics. Agreed expectations & goals. Logistics defined.

Doing It — Distributed integrated teams, ideas researched, defined & designed collectively over Blogs, Skype & VC technologies

Evaluate — Post & Pre- project surveys, Field notes, Video, Audio, Blog analysis, Post Project Focus Groups & Reflection Sessions.

Modify — Findings discussed in relation to the Framework & Construct. The planning & implementation of collaborative projects.

D AR1 Interview Questions and Coded response

AR1 Semi-Structured Interview Questions for participants of NZ Ireland project

Storytelling:
Relate the narrative
How did it happen for you? (given the time that has passed)

General Project Questions
→ *Theme:*
What was your understanding of the theme when you began?
What was your understanding of the theme once you finished?

What did you learn about your own country? (culture, history, work methods, anything else)
What did you learn about the partner country? (culture, history, work methods, anything else)

What were the similarities?
What were the differences?

Did you get a clear idea of the process?

→ *Interaction:*
How did you feel the collaboration worked?
        What were the barriers?
        What were the enablers?
Was the project undermined because you weren't face to face?
What tools did you use?
        Did they help?
        Did they hinder the flow of the project in any way?
Did it make the project easier or more difficult?

Was it easy to share ideas? How did you feel about sharing your ideas to 'strangers'?

→ *Future*
How has the project informed your practice since?
How will it inform your future practice?

→ *Suggestions:*
Improve the project?
How would you change the project for your own benefit if you were to do it again?
How would you change the overall project if it were to run again?

AR1 Interview with Group 3 Participant 5 and Participant 6 26.02.10 (extract)

🟨 Student Experience

🟥 Interaction ⓐ relationship/dialogue,

　　　　　　　ⓑ sharing ideas,

　　　　　　　ⓒ compromise,

　　　　　　　ⓓ feedback,

　　　　　　　ⓔ competition,

　　　　　　　ⓕ peer-learning

🟥 Cultural Exchange

　　　　　　　ⓐ self awareness

　　　　　　　ⓑ awareness of others

🟦 Improvements

🟩 Changes in practice

Researcher: Could you just tell me the story of the project, as you remember it?

🟨**Participant 6:** As it in total the whole 6 week project?

Participant 5: the way I remember when Martin came over and he told us that we were doing a project with his college. We were divided up into groups, did we get to pick?

Participant 6: no it was decided for us.

Participant 5: We were paired with another group in NZ and we were given a brief, a very broad brief actually. We had to explore the culture of our own country and NZ had to do theirs and we had to think of some way that could revive that culture.

🟥 ⓐ **Participant 6:** take a different aspect of our culture and explain to another that wouldn't know anything about it. And NZ are on other side of the world, I think it was explore the differences between them really. It was left up to ourselves it was really what the students picked to explain their culture. The projects that came out in the end were very different.

🟥 ⓑ **Participant 5:** we had to explain our culture to the NZ crowd, the Vox was great for that, we were able to put up snapshots and clips and videos of what we thought reflected our own culture.

Researcher: So Participant 6 what was your experience of the whole project? Not necessarily how it happened but the actual experience.

🟨 **Participant 6:** first off I thought it was a really unique thing for us to do, we were all really excited when we heard about it, it was a chance to do a project with people on the other side of the world and we didn't really know what that meant. And the fact that we had to explain what Irish culture was interesting too. It was a really good project. It wasn't like anything we had done before. All the projects before we were given a brief and asked to design a certain product but this could have been anything to reflect our culture.

Participant 5: it was very different from the project we had just done: the lighting project and this was really different because we got to explore the Irish Culture from our heritage point of

view and that obviously influenced our designs then. The lighting project was looking at totally different designers in the space that we had. When we got to the see the other cultures coming through from the NZ side that was really different. It was something we had never done before looking at it from our own roots instead of looking at Spanish or Italian designers. So it was really different that way.

Researcher: So that leads into some other questions, what was your understanding of the theme before you began, when you started? When you were given the statement what did you interpret it as?

(a) **Participant 5:** For me it was going back to your own culture, understanding it and things that made us Irish, and what way those things could be interpreted and reflected in some sort of product. For us it was the idea of families getting together for meals. So this idea of spending ages at dinner and conversations and that, we tried to put that back into our concepts.

Participant 6: I suppose it was taking an aspect of our lives and making it into a marketable product. And that would explain that aspect of the life. As Participant 5 said it was meal times and the Irish idea of having a big long meal and sitting down with the family and catching up.

Researcher: do you think as the project evolved did your understanding of the theme change?

Participant 6: I think at the start we were being very broad, we didn't narrow it down to one specific thing. We were trying to take all aspects and make an all in one product but that was taking from what the project.

Researcher So you think the theme may have been a bit too broad?

Participant 5: yeah, all the projects turned out very different, everyone else's interpretation of what Irishness represented. For us it was meal-times for others it was the weather (surfing).

Researcher: But that's surely a good thing, getting a broad range of ideas? Did it just take you too long to get there?

Participant 6: if it was to be done again, the theme could be divided up into smaller themes like meal-times or recreation and have the same themes on the other side.

Elaine: you could see the differences more clearly between the two countries then.

Researcher: What did you learn about your own country in terms of history, work etc.?

(a) **Participant 5:** well because we were so focused on meal-times we looked at how other people eat together with their families. It was pretty much the same with everyone, they all have one time or a few times a week where they all sit down together. For me it's Sunday morning regardless of whoever is home, there is always a big fry-up cooked up and if more people are there its cooked for everyone. That whole idea of all the family getting together it was interesting to see that this is done in other families too.

Researcher: do you think you would have seen that if you didn't have to analyse it for the project?

E AR4 Focus Group Facilitator notes

Context for the Focus Group:

The reason for structuring the session as a focus groups will also allow us to see the dynamic between the members of the local team too, the different methods of communicating that they use in their interactions, including jokes, anecdotes, teasing and arguing[147]. We also want to see how the participants share and compare their thoughts on the project.

Arguments and critical comments can be encouraged, from the very good to the very bad. The arguments can be used to encourage participants to clarify their point of view and why they think the way they do.

Each team had a completely different experience with the project and we want the students to give specific examples of exactly what happened when they are discussing these experiences, so probing questions to get them to explain things in more details would be great.

Things we need discussed:

- COMMUNICATION
  How did the team communicated. What were the discussions like between the team? What kind of things did you talk about *(specific examples)*? How did the conversations progress? Negotiation, argument, critical, complimenting each other. How did they develop a common language/ common ground?
  The different strategies used to overcome difficulties with the collaboration *(specific examples)*. Did they consider each other's feelings?

- PROBLEM SOLVING
  The different strategies used to overcome difficulties in the design process (with the project and meeting the deliverables).
  How were decisions made? Compromises and negotiations that took place *(specific examples)*.
  Were you able to recognise how well the project was going (both collaboration and design work)? When things were working how was it? Why did it work? When things weren't working what did you do to get back on track?
  How did you evaluate/ judge your work *(specific examples)*? What criteria did you judge your work on (e.g. intuition, social impacts, feasibility, environmental impacts etc.)?
  Did everyone take responsibility in getting the work completed?

- CRITICAL THINKING ABILITY:
  Did the participants take different perspectives into account when making decisions? Did they look outside their own experiences? Were they able to look at alternative points of view, can interpret, evaluate and appreciate the validity of other perspectives? How did they combine different perspectives (cultural, disciplinary) into their processes? How did the teams link together different ideas?

- SOCIAL IMPACTS
  How will the project benefit others? Will the results improve the lives of people?
  Were they aware of the impacts their designs would have on society (users etc.)
  Has your attitude to working with others changed since the project?
  Has your attitude to what is important in a project changed?

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[47] Kitzinger, J, 1995 'Qualitative Research: Introducing focus groups', BMJ, 311, 700.

Project 1:
Team 1-6
Collaboration with Hogeschool Utrecht (HU), The Netherlands.
Client: Driessen

Brief:
Create an improved resting experience by redesigning the Crewrest from the user perspective.

Context for project:
Researchers at HU have conducted in-depth study into the experience of the Flight Attendants (FA) during intercontinental flights. This study produced a number of interesting user insights on the resting experience and the Crewrest Cabin for the FA's. The insights are clustered around several themes: *Transitions* (moving between work and rest), *Nurturing*, *Look & Feel*, *Flexibility*, *Closing Off* and *Service.* Each team was given a theme to focus their project on, this was done because the area itself was so broad and big that the students would struggle with the complexity and they needed to get real outcomes in the short 4 week duration.
The students used Blogs, Skype, Dropbox and other communication tools to share ideas, work together and deliver their work at the 4 different stages of the project.

Project 2:
Teams A-F
Collaboration with Virginia Commonwealth University, USA.
Mixes of disciplines from the US partners from Art, Business, Engineering and Marketing.
Client: MeadWestVaco

Brief:
Design solutions for food packaging in order to improve user experience (bring back some fun!) and guarantee safety, as well as reducing environmental burden.

Context for project:
This project was very open and wide for the students. We purposely left the brief very open as we wanted to see how the students would deal with breaking down the problem, finding needs and exploiting opportunities stemming from their 'real-world' research.
The students used Blogs, Skype, Dropbox and other communication tools to share ideas, work together and deliver their work at the 4 different stages of the project.

The Focus Group
Duration: 30 minutes per team
Location: Meeting room with square table,
Equipment: Recording equipment (video and audio). Design Project visualization tool & Post-it notes.
Running order:
1. Introduction Explain the aim of the session *'To gain an insight into the experiences of the individual teams through the project.* The facilitator explains that the aim of the session is to talk to each other and not the facilitator.
2. Ask group to complete the timeline, using post-it notes.

3. Probe into their timeline visualisation.
4. Ask specific questions. Allow them to tell their stories.
5. If you were to do the project again would you do anything different? *Your Design Process, communication, the tools you used to move ideas forward (testing, decision-making).*
6. Wrap up. At the end you can offer the individuals the opportunity to talk one-to one to the researcher if they have any additional comments.

Design Collaboration Timeline:

Visually represent your collaboration process? *Use timeline to pinpoint when the process was going well and when it wasn't going well (Use .*
Cues: Why was it going well at this point?
Why was it not going well at this point?
Why did it change, what happened to make it change?
How did you move forward? Where did it go from here?
Where were the critical points for dialogue and discussion amongst the team?

General Advice and proposed structure for a focus group session

1. Before the session: rehearse the ground rules
→ Aim for equal participation
→ Display respect for others (let them finish what they're saying, no put downs)
→ Reflect on potential political or personal conflicts before starting the group
→ Devise advance strategies for dealing with these; e.g. seating arrangements; pre-group requests
→ Keep focused
→ Maintain momentum (don't get bogged down in particular issues)
→ Get closure on particular questions so far as possible
→ Allow space for both the 'sacred' and the 'profane'

2. Introduction: starting off

→ Record location, time, date
→ Welcome participants
→ Appreciate their time
→ Review the goal of the focus group
→ Introductions – around the table

3. Establish agenda: why are we here and what will we do?
→ Review of agenda
→ Review of purpose: why are we here?
→ To elicit views on the topic
→ There is no right answer to the questions
→ Review of activity: what will we do?
→ Questions will be introduced and responses encouraged
→ Explain the means you will use to record the session (tape? scribe?)

4. During the process, 1: formulate your questions carefully and slowly
- → Speak clearly and slowly
- → Phrase your questions (if different from the prompts given) in a way that is neutral
- → Do not favour one group over another

5. During the process, 2: monitor and control the politics
- → Promote even participation
- → Be sensitive to conflicts as they develop during the session
- → Make sure you can refer to a ground rule that says 'respect'
- → Or cut off when issues get too hot
- → But do not stifle political comments because they are at the heart of this exercise

6. Closing the session: wrap up and thanks
- → Record duration of the session
- → Let people know their comments will be taken seriously and that they will be written up and communicated back to them in the course of the project
- → Carefully reflect back a brief summary of what was said and be explicit about what will be formally recorded
- → Thank participants for their time and valuable expertise
- → Close the meeting

7. After the session: tidying up
- → If needed, add any notes to the ones already made during the session
- → Write down any observations you can make about the nature of participation, problems, surprises
- → Make sure you sift your own opinions from those given by others, and that you summarise not just those that you find important

F AR4 Reflection Session Facilitator notes

AR4 Post Project Reflection Session

Reasons for the session

'Appreciative Inquiry (AI) suggests that we look for, and focus on, "what works well" in a group, or organization. When we look for problems we find them. When we look for successes, we can find those, too. By studying the problems, we learn what "not to do." By building on successes, we already know what works; and we need to learn how to build upon those successes for the future'.

Key to a good AI session:

Keep the mood positive

Continue to probe and ask 'why', this encourages the group to focus.

Ask the participants to relate their experiences through stories as much as possible. *The very act of asking and answering questions begins to shift the system in the direction of the questions being asked – our questions are "fateful" (Msukwa et al. 2003).*

REFLECTION SESSION

1. The Experience (Discover): *'The identification of organizational processes that work well'.* Begin the session with recalling some positive experiences from the project. Ask the participants to tell the story with specific examples. *Add additional "probing" questions that help get more detail – such as who, what, when, why, and how related to the story.*

- What strengths, assets, or resources made the achievements/best moments possible?
- What made it a good experience?
- What did you achieve?
- Did you change the way you normally do things to achieve it?

Recall some negative experiences

- How could these negative experiences be overcome by building on the positives?

Did you enjoy the experience? Did you have fun?

- Was the project what you expected?

- Were your team's outcomes what you expected? Why, why not?

How did your local team work with the international team?

2. Communication:

How did your team members make the 'first contact'?

How did the team contact evolve?

How did you communicate during the project?

What were the conversations like?

- Were they focused on the project all the time?
- What side-line conversations took place? And when?

What medium worked best to share ideas?

What technology worked best?

Has there been any communication since? Will there be any?

3. Learning:

What new skills have you acquired?

What did you learn?

How can this project be useful for your future career? Short-term, long-term

4. Processes/ Strategies/ Methods:

What processes did you use to overcome problems?

What processes did you use to achieve the results they needed?

How did you move ideas and project stages forward?

Who did what, when? *Different disciplines influences*

Planning, Monitoring, Evaluation.

5. Different Perspectives:

How did you find hearing different voices from tutors and other team members?

What cultural differences were apparent?

What disciplinary differences were apparent?

- How did you work around/ with them?

6. The Future (Dream): '*The envisioning of processes that would work well in the future.*'

What would you do differently if you were to do the project again?

What would the ideal tool/ technology for virtual collaboration be and look like?

G AR Participant consent form

Participant Consent form

Title of study:

    A. International collaborative design projects as a mechanism to integrate social sustainability.

Principle researcher for project A: Muireann McMahon

Institute: University of Limerick

Purpose of this research study:

    A. To investigate the use of international collaborative design projects as a mechanism to equip students with the skills and capacities necessary to integrate social sustainability into their daily design practice.

Participant Selection: You are being invited to take part in this research because your projects can contribute much to our understanding and knowledge of collaborative practices and social sustainability and the strategies and methods used in problem solving during the design process.

Voluntary Participation: Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may withdraw from being part of this research at any time and this will not affect your status within the project either now or in the future.

Procedures: The research methods will involve the use of questionnaires, interviews, observations, and digital recordings.

Confidentiality: The data from the research will be held confidentially, in a secure place in a pass-word protected computer in the form of hard and electronic copies of surveys and digital recordings. This data will be accessible to the researcher only. Your name and identity will not be disclosed at any time. However the data may be seen by the ethical review committee and may be published in a journal and elsewhere without giving your name or disclosing your identity.

Who to Contact: If you have any questions about this research, you can contact:

Muireann McMahon: muireann.Mcmahon@ul.ie telephone: 061 233686

Participant 2 Kiernan Email: Participant 2.kiernan@ul.ie   telephone: 061 233686

Authorization: I have read and understand this consent form, and I volunteer to participate in this research study. I voluntarily choose to participate, but I understand that my consent does not take away any legal rights in the case of negligence or other legal fault of anyone who is involved in this study.

Signature of Researcher A _____

Date _____

Print Name of Participant	Signature of Participant	Date

H Delphi Study KRNW

	Institution/ Company	Country	Level of Familiarity	Experience in Design	Understanding of Sustainability	Recognition in Design Field	Experience of Collaborative Work
1	Loughborough Design School	UK	***	X	X	X	X
2	Loughborough Design School	UK	****	X	X		X
3	Kaospilots	Aarhus, Denmark	***	X		X	X
4	Unitec, New Zealand	New Zealand	****	X	X	X	X
5	NCAD	Dublin, Ireland	****	X	X		X
6	DesignMatters, Art Centre College	California, USA	*	X	X	X	X
7	TUDelft	The Netherlands	***	X	X	X	
8	ITCarlow	Carlow, Ireland	****	X	X	X	X
9	NTNU	Norway	***	X	X	X	X
10	Open University	UK	***	X	X	X	
11	Nottingham Trent University	UK	**		X	X	X
12	Brunel University	UK	***	X	X	X	
13	University of Hertfordshire	UK	***	X	X		X
14	Parsons The New School for Design	USA	*	X	X	X	X
15	University of New South Wales	Australia	**	X	X	X	X
16	University of New South Wales	Australia	*	X	X		X
17	DESIS	Italy/Global	****	X	X	X	X
18	Eco-Design Centre	Wales	****	X	X		X
19	Lotus	New Zealand	***	X		X	X
20	Universidad de Los Andes	Colombia	**	X	X		X
21	TUDelft	India	*	X		X	X

Delphi Study R1 questionnaire, responses and analysis [sample]
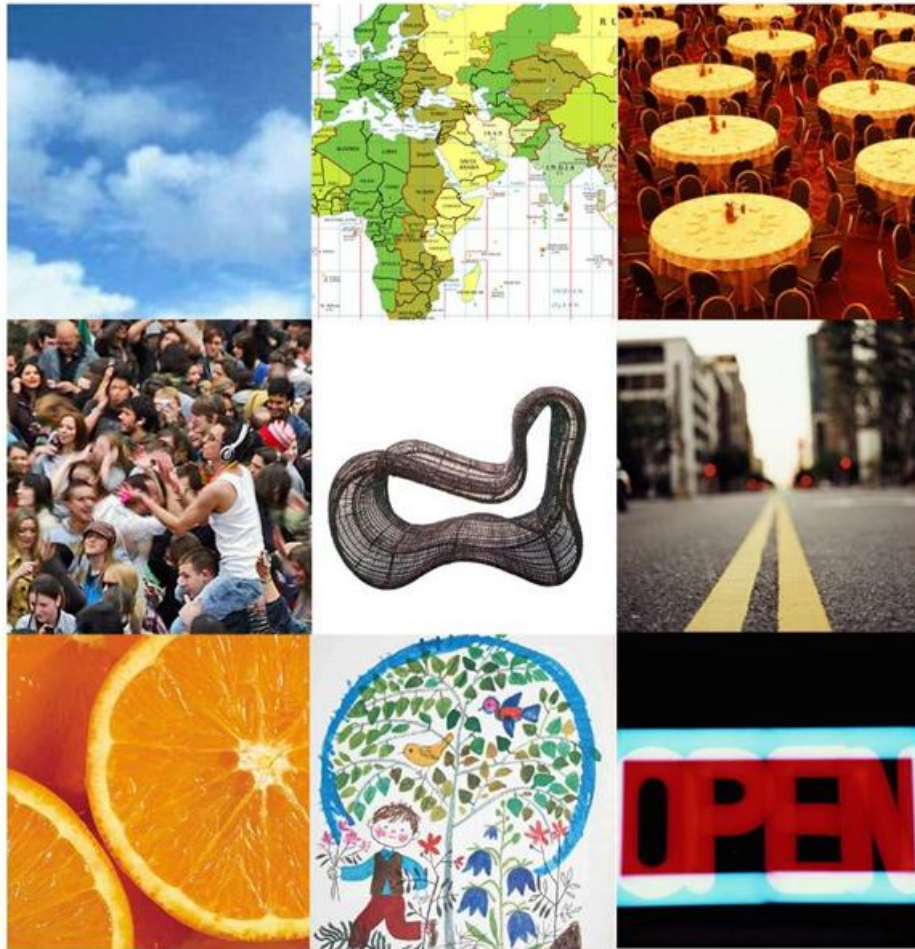
DESIGN BEYOND BORDERS

Social sustainability in design through international collaborations

Background

Designers need to be equipped with the skills to enable them to participate in a global move towards a sustainable future. When it comes to Sustainable Design the tenets of economy and environment are being dealt with extensively, in both practice and theory, while the social elements are proving more of a challenge. Social sustainability, unfortunately is difficult to define and even more difficult to implement as it involves 'softer' issues as diverse (and unquantifiable) as ethics, values, active citizenship, cultural diversity, holistic perspectives, accountability and personal responsibility.

The paradigm of design is changing; moving away from materials led solutions to more user-led experiences. These future solutions will have to be generated

through a process of collaboration, collective knowledge, multi-disciplinarity, holistic perspectives and diverse cultural backgrounds. The skills and capacities needed for this type of practice are based in the realm of Social Sustainability and require a shift in how designers are taught as students and subsequently practice as professionals. If they are to be responsible, innovative and pragmatic, design students must develop the ability to think critically, tie together disparate strands of information, apply systems thinking, co-operate in co-design projects and also imagine and realise new ideas. The broader the diversity of information, practices and cultures the students are exposed to the more open their perspectives will be and the more efficient they will become at participating in and facilitating the creation of innovative solutions.

This project aims to investigate how, by participating in collaborative projects across international platforms; designers can foster and develop the skills and capacities necessary for social sustainability. This is where you come in; I need to develop a definition for social sustainability and to compile the list of skills and capacities that are pivotal in implementing it successfully into designer's practice. I am asking for your expertise to help me achieve this by taking part in a Delphi study.

The Delphi Study

This study will comprise 3 rounds, during which you will be asked (via email) to respond to a number of statements and open-ended questions. I have made the rounds as simple as possible to save time.

Round 1: You will be given a list of factors to rank and an open-ended question to answer. There will also be an opportunity to provide any additional relevant factors you feel may have been omitted (max 20 minutes).

The factors are divided into three areas:

IDEAS: Overarching structures or processes on which projects are framed.

CAPACITIES: Intangible 'softer' skills built around understanding, competencies and behaviours.

SKILLS: Tangible skills that can be acquired and honed through demonstration and practice.

Round 2: After collating and analysing the responses from round 1, I will send you the results and ask for your feedback and opinion (max 20 minutes).

Round 3: Once again I will compile the responses from the previous round and generate a list of final factors and a statement defining social sustainability. You will be asked to consider these and provide your feedback (max 30 minutes).

Following this final round I will synthesise the responses and feedback into a cohesive statement and definitive list of skills and capacities. These will form the foundation for subsequent phases of the PhD study.

Your input would prove invaluable in this study and any help would be greatly appreciated.

Thank you

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1 Please rate the ideas, capacities and skills below in relation to Social Sustainability in design (simply change the text colour)

(1: Essential   2: Desirable but not essential

3: Slightly Useful   4: Irrelevant)

Rate your own degree of knowledge of each factor

(h: High   m: Medium   s: Superficial)

Write any additional factors you deem necessary below (add as many as you want)

ideas

New processes	1	2	3	4	h	m	s
New behaviours	1	2	3	4	h	m	s
New perspectives	1	2	3	4	h	m	s

capacities

Participation	1	2	3	4	h	m	s
Sharing	1	2	3	4	h	m	s
Compromise	1	2	3	4	h	m	s
Openness	1	2	3	4	h	m	s
Engagement	1	2	3	4	h	m	s
Investment	1	2	3	4	h	m	s
Reflection	1	2	3	4	h	m	s
Confidence	1	2	3	4	h	m	s
Critical questioning	1	2	3	4	h	m	s
Acceptance of diversity	1	2	3	4	h	m	s
Empathy	1	2	3	4	h	m	s
Understanding	1	2	3	4	h	m	s
Comparison	1	2	3	4	h	m	s
Accountability	1	2	3	4	h	m	s

Judgement	1	2	3	4	h	m	s

skills

Decision-making	1	2	3	4	h	m	s
Communication	1	2	3	4	h	m	s
Team-work	1	2	3	4	h	m	s
Social interaction	1	2	3	4	h	m	s
Problem-solving	1	2	3	4	h	m	s
Dialogue	1	2	3	4	h	m	s

Additional factors

1

2

3

4

5

6

7

8

9

10

11

12

13

14

2   What do you think Social Sustainability means to design?

Delphi Study Round 1 Question 1 Responses Analysed

		MEAN F	TOTAL F
1	Dialogue	1.285714	23
2	New Perspectives	1.315789	24
3	Communication	1.333333	24
4	New Behaviours	1.368421	25
5	Critical questioning	1.388889	26
6	Empathy	1.555556	26
7	Problem-solving	1.555556	27
8	Understanding	1.611111	28
9	Participation	1.666667	28
10	Social Interaction	1.705882	28
11	Engagement	1.722222	28
12	Reflection	1.736842	30
13	Decision Making	1.764706	31
14	Team-work	1.777778	31
15	New Processes	1.789474	32
16	Acceptance of diversity	1.882353	32
17	Compromise	1.944444	32
18	Sharing	2	33
19	Openness	2.1875	34
20	Accountability	2.222222	38
21	Judgement	2.470588	41
22	Comparison	2.611111	46
23	Investment	2.777778	48
24	Confidence	2.941176	48
		1.858963	31.79167

	MEAN P	TOTAL P
Critical questioning	1.882353	32
New Perspectives	1.944444	35
Problem-solving	2	34
Communication	2.176471	37
New Behaviours	2.277778	41
Decision Making	2.4375	39
Dialogue	2.529412	43
Empathy	2.588235	44
Reflection	2.611111	47
Social Interaction	2.6875	43
Participation	2.705882	46
Acceptance of diversity	2.75	44
New Processes	2.833333	51
Understanding	2.882353	49
Sharing	2.9375	47
Team-work	2.941176	50
Engagement	3.117647	53
Openness	3.266667	49
Compromise	3.352941	57
Accountability	4.470588	76
Confidence	5.5625	89
Judgement	5.6875	91
Comparison	5.882353	100
Investment	6.823529	116
	3.264532	54.70833

	MEAN K	TOTAL KNOWLEDGE
Reflection	1.421053	27
Critical questioning	1.444444	26
Problem-solving	1.444444	26
Acceptance of diversity	1.588235	27
Participation	1.611111	29
Engagement	1.611111	29
Team-work	1.611111	29
Openness	1.625	26
New Processes	1.631579	31
New Behaviours	1.631579	31
New Perspectives	1.631579	31
Sharing	1.647059	28
Empathy	1.666667	30
Decision Making	1.705882	29
Understanding	1.722222	31
Communication	1.722222	31
Social Interaction	1.764706	30
Dialogue	1.777778	32
Confidence	1.882353	32
Compromise	1.888889	34
Comparison	2	36
Accountability	2	36
Judgement	2.117647	36
Investment	2.333333	42
	1.728334	30.79166667

Delphi Round 1 Question 2 (Open Ended Question) [sample]

People Micro, small picture, individuals, individual behaviour, human context.
Collective group Macro, big picture, group behaviours community, communal user,
Designer's role process, input, accessibility, universality, expand/broaden
Holistic approach systems thinking, triple bottom line, connectivity,
Multi-disciplinary collaboration, co-design, stakeholders, collective multi-disciplinary, shared ideas, cross-disciplinary.
Equity democratic, equal rights, universal, inclusive, (gender, class, race, ability), culture, with the natural planet.
Social change improvement, social issues, social innovations
Paradigm change innovation, entrepreneurship, pragmatism.
Complexity confusion, difficult, aspirational, idealistic.

EXPERT 1: Social sustainability is an attempt or an aspiration by design intervention to improve on the social norms and circumstances of the day. It attempts to marry environmental; personal and economic considerations to achieve social cohesion It should ideally build community as well as serve and enhance community at a local and a global level. It is a re-focus of design on the 'communal users' and of the 'individual user' rather than the 'consumer' or 'customer'.
Social sustainability should attempt to better the lot of all the stakeholders- i.e. the producer, worker, skilled labourer, the local community, the primary and secondary users and the unintentional users (affectees?- the individuals that are affected by a product or system unintentionally) etc. etc.
Social sustainability as an ideal should pluralize and democratize some design and at other levels just make good design accessible to those who need it most. It should be an enabler for innovation and entrepreneurship and a driver for small enterprise. It has the opportunity to be both a counterpoint to globalisation of trade and services, big brands and homogenization of design, On the other hand it can also work within the global culture and the large brand environment.

EXPERT 2: It's a whole change of paradigm which, if accomplished, leads the designer to re-think his/her role and, in a certain way, makes him/her reflect on the pertinence of designing more. But beyond the social, I consider that a first look has to be given to the individual, the one from which the "social" starts... individual sustainability and thus related behavioural change in the macro, to then, yes, spread.

EXPERT 3: Although I understand the practical need of using the term 'social sustainability' to make sure that people, or students, understand that the focus is the social dimension (and not the environmental for example), I am not sure I agree with separating 'social' from sustainability. From this perspective then, I think that 'social sustainability' means to design the radical need for design to be and include by default issues such as the ones mentioned in your background introduction (i.e. ethics, values, active citizenship, cultural diversity, holistic perspectives, accountability and personal responsibility) that embody multidisciplinary design approaches and systemic experiences. In this way, social sustainability design

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processes would result in designs where the overarching goal is to contribute in building a fairer, happier, sustainable society for the collective good and holistic progress of its citizens, other societies, the planet, etc., etc.

EXPERT 4: It implies sustainability achieved or worked towards via socially-driven changes rather than necessarily just by technological or political measures (although it may include these too). Social sustainability is sustainability brought about by people acting differently, together. For design, then, this means understanding each other and our collective impacts on the systems we live in, and designing to encourage interaction, empathy and changing the way people act. A lot of this is about bringing together ideas and concepts from other disciplines or other areas of people's lives and making them salient and relevant in the sustainability context.

EXPERT 5: I'm concerned with the splitting up of sustainability into separate components [like social, environmental, industrial]; for me this evokes a mindset that emphasises a reductionist viewpoint and again makes it tricky for folk to think about sustainability in a systems oriented and relational way.
But, that said, if I'm to state my understanding of 'social sustainability' I would say it is about deeply knowing the relationship between people and their environment and, in so knowing this, developing ways in which all peoples' needs can be equitably met. The role of the designer in this process is to facilitate useful dialogues and perspectives in achieving the meeting of needs in hopeful, inspiring and resilient ways.

J Delphi Study Round 2 questionnaire and analysed responses [sample]

① Question 1: 'What does social sustainability mean to design?'

'Social sustainability for design means an evolution for the practice of design that equally recognises the relationship between people, planet and economy. It must be holistic, pragmatic, purposeful immersive and capable of fully understanding and responding to change on micro and macro levels.

Whilst it is accepted that designers have a vital role to play in advocacy, facilitation and execution, their impact as an individual discipline cannot be overestimated nor bear sole responsibility (the limitations must be considered along with the capabilities). Design that considers the individual, the greater community and the planet must come from processes that are collaborative and multi-disciplinary. To achieve solutions that change and improve designers will have to work across disciplines, cultural and geographical borders.

The impacts of the paradigm changes in design practice and the results must be measurable on people (not 'consumers') at local community, national and international levels.

Above all design must create fun, enjoyable and enriching experiences for PEOPLE'.

Do you agree with this statement?	Y	N	Partially
Is your voice recognisable in the statement?	Y	N	Partially
Does the statement cover your views?	Y	N	Partially

Do you have any comments on this statement?

② Question 2

Pick the three most important and realisable factors from the list below.
Choose the ones you feel are the most important or most relevant to the context of educating for social sustainability in design.
Explain what you understand by the factor.

> Critical questioning
> New Perspectives
> Problem-solving
> Communication
> New Behaviours

Decision Making

Dialogue

Empathy

Reflection

Social Interaction

Participation

Acceptance of diversity

New Processes

Understanding

Sharing

Team-work

Engagement

Openness

Compromise

Accountability

Humility

Humour

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Delphi Study Round 2
Question 1 Responses

Expert	Do you Agree	Is your voice Recognisable	Does the statement cover your views
1	1	2	1
2	1	1	2
3	2	3	3
4	2	2	2
5	2	2	2
6	1	2	2
7	1	1	1
8	2	1	2
9	1	1	2
10	1	1	1
11	2	2	2
12	2	2	2
13	2	1	2
14	1	2	1
15	2	2	2
16	1	1	1
17	1	1	1
18	2	1	1
	27	28	30
	1.5	1.56	1.67

1= Yes
2=Partially
3= no

Delphi Study Round 2 Question 2 Analysis (Frequency of Response)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Critical Questioning	1	1	1	1							1	1		1	1	1	1	10
New Perspectives			1	1		1		1			1						1	6
Problem-Solving				1	1							1	1					4
Communication			1		1									1				3
New Behaviours								1		1								2
Decision- Making															1			1
Dialogue				1			1											2
Empathy						1			1				1	1	1	1		6
Reflection	1																	1
Social Interaction				1				1										2
Participation				1			1											2
Acceptance of Diversity																		0
New Processes				1														1
Understanding					1							1						2
Sharing				1						1	1							3
Team-work				1														1
Engagement	1								1	1						1	1	5
Openness						1												1
Compromise					1							1						2
Accountability				1														1
Humility									1									1
Humour		1																1

Delphi Study Round 2 Question 2 Coded [sample]

CODES

==Action== pragmatic language, doing.

==Behaviours== as individuals[a]

       Towards others[b]

==Cognitive== Knowledge/ Perspectives/ Understanding

need to acquire[a]

already acquired/displaying[b]

       tacit[c]

==Outcomes== potential

1 CRITICAL QUESTIONING

(Adam) The ability and developed skill of a designer or a global citizen to be able to ==look holistically== at issues, philosophies, beliefs, problems, challenges and their own solutions and to see them from other perspectives. More importantly the ==ability to probe== and ==critically evaluate== with a view to ==finding meaning and balance== in order to see behind the accepted spin or common consensus.

(Andrea) educating students as well as consumers to ==reflect== on the issue, of sustainability upon their own lives and behaviours ==without indulgency==[a]

(Cameron) Heremeneutics of suspicion it used to be called. Bourdieu's reflexive sociology.

(Carolina) Learning the skills to ==analyse==, ==reflect and question ideas==, ==other people's work==, ==perspectives==, etc. with an ==open mind== and a ==holistic perspective== (i.e. consider all issues involved).

(Martin) This is a lost skill that should be taught as part of every foundation course in design. Essential before one can ==visualise new perspectives==, ==problem-solve==, ==communicate== or ==indicate new behaviours==.

(Miles) This is recognised by many in design ed. and by design employers as a key student attribute. Industry want ==thinkers== as much as they want good design skills. This is proving to be ==challenging with international students from some counties where their education systems and culture does not encourage such critical enquiry==.

(Sam) Encouraging and facilitating ==critical analysis of culture==, ==society, status quo== etc

(Simon O'R) I think this is important because it is partly problem solving but can also be a reflective process. In innovation it is important to ==challenge perspective and 'frames'==, to be able to ==step outside norms and critically examine==.

(Simon K) ==Open explorative==. Being clear when you are in ==the process of explorative lateral (convergent) thinking==, and ==when in decision mode (divergent==)

(Sivakumar) This is key to ==understanding social processes== that are crucial to sustainability.

(Tim) There is a tendency in sustainability circles to accept the social norms of leftist liberalism. Education must always be ==reflective and critical==.

Combined definition: *Look holistically, it is a reflective process, reflect, step outside your norms, challenge, be open-minded to other ways of doing things. It is a key attribute and an essential skill.*

Question: *has the designer looked at the bigger picture?*

    Have they reflected on the exercise?

    Did they not just accept the 'norm'?

Have they explored other ways of doing things?

2 NEW PERSPECTIVES

(Cameron) Antihumansim (more than posthumansim) – the worry that humanism (empathy, dialogue, etc) is not humanist enough. Social sustainability design must not = making susatinable the existing social by more sensitive design. It must = redesigning the social (Latour), a different kind of sociality.

(Carolina) Breaking paradigms, paradigm shifts. Learning the skills to consider, understand new perspectives out there but also to generate your own.

(Dan) In the education context, 'new perspectives' means helping designers to see problems and possible solutions from multiple points of view. This can be about multidisciplinarity – helping students to learn from other disciplines and not to stereotype[a] themselves as X designers or Y designers or whatever – but also (particularly in the social sustainability context) helping students to understand and appreciate the views and priorities of different stakeholders[a] (some overlap with empathy) and groups. And realising[a] that situations arise where what's best for the group or community may not be best for each person individually[b]; or where short-term needs (of users) and long-term needs (of the planet) don't necessarily coincide[a].

(Julian) Ultimately we are creating a shift in thinking in both need and assessment[b] (triple rather than single bottom line as an example) – this demands a new approach or New perspective.

(Simon K) Are created and shared, it's important that they are celebrated and supported with positive input[b] in order to grow. Then one could revisit the project with these lenses.

(Martin) Because we need a complete re-thinking of design and design education the concept of 'New Perspectives' is critical in creating any kind of paradigm shift.

(Tim) This is important because there is a need to ensure that in the debate on sustainability the social dimension is understood alongside the environmental and economic and this demands a new 'world view'[b] which is not only altruistic, raising issues of posterity, but rooted in an ethical framework.[b]

Combined Definition/ interpretation: *creating and sharing**,** fresh eyes, openness to learn from others, a re-thinking of design and education – paradigm shift. Bring and appreciate new views, understandings and approaches (positive) that are not inward looking or simply altruistic for the sake of it. Recognising that satisfying yourself (as a designer) or individuals or even humans might not be enough, find the balance between three elements of TBL.*

Questions:

Have the designers looked outside themselves? Investigated other views and maybe created their own?

Does the work output and the process reflect an openness?

Does the work output and the process take into account the whole picture?

K Delphi Framework [revision 1]

FACTOR	CONSTRUCT	QUESTIONS	
Critical Questioning	Look holistically, it is a reflective process, reflect, step outside your norms, challenge, be open-minded to other ways of doing things. It is a key attribute and an essential skill.	Has the designer looked at the bigger picture have they reflected on the exercise (with help or on their own) Have they just accepted the 'norm'? Have they explored other ways of doing things	
New Perspectives	creating and sharing, fresh eyes, openness to learn from others, are-thinking of design and education – paradigm shift. Bring and appreciate new views, understandings and approaches (positive) that are not inward looking or simply altruistic for the sake of it. Recognising that satisfying yourself (as a designer) or individuals or even humans might not be enough, find the balance between three elements of TBL.	Have they asked questions have the designers looked outside themselves: Have they investigated other views and maybe created their own? Does the work output and the process reflect an opneess? Does the work output and the process take into account the whole picture (as much as is realistic)?	
Problem Solving	A mind-set where designers understand the full complexity of issues they are tasked with finding resolution for (but they must be cautious and not be over ambitious to not expect holism from the start). This mind-set must be open, aware of the impacts on people and planet, and must not include personal agenda because the issues involved are non-linear, evolving and open-ended.	Have the designers been outward looking? Is the language external (us, we wider context) or internal (I, me, design)? How have the designers gone about their process? Linear/ non-linear/ organsied/systematice/chaotic. Which process(es) work best in what scenario or with what issue?	
Communication	Acknowledge that true/full communication is not possible. In recognising the limitation and the diversity (of politics, cultures and places etc.), however we can develop a middle ground or accepted language to connect with people across all social and geographical boundaries	how have the designers built a common language? Can we move beyond linguistic barriers? Do we need to move beyond linguistic barriers? How was the communication facilitated? What was the story of the communication? What is the designer's own background (behaviour, norms, beliefs, rules, language)? How 'far apart' are the participants backgrounds? How do the designers make sense of the difference/similiarities in order to ensure effective communication (if at all)?	
Positive Behaviours	Positive behaviours are necessary for education for social sustainability, they create the context for new solutions that can move the entire community (people and planet) forward towards a common improved situation	Have the designers displayed new/ positive behaviours? Have the designers communicated these new behaviours? If so how? Did the teams establish common goals to manifest their new/positive behaviours? How were these common goals established?	
Decision Making	Decisions must be made through the entire process. This ensures responsibility is borne by the designers and the other participants and that there is accountability and visibility. Good decision making stems from understanding the goals, the other participants and the process.	What decisions have been made? Have decisions been made individually? Have decisions been made collectively? What is the difference between collective and individual decisions? How can we map the decision making process? Where in the process were decisions made? Who made the decisions? Who were there key people in every decision What were the results of these decisions? How did the decisions made impact (positively/ negatively) on the outcomes?	
Dialogue	Having effective dialogue means designers need to know how to initiate and maintain communication with a broad range of stakeholders as well as drawing on their own experiences to create meaningful and powerful narratives	Was there dialogue between the participants? How do the designers build narrative (their own stories and the groups)? Why is storytelling important? How can effective dialogue be facilitated? How can reflection on previous experiences help in dialogue?	
Empathy	Empathy requires designers to challenge their preconceptions and to look at every situation from every possible perspective. This facilitates designers to develop holistic perspectives as well as argue issues from different sides (taking into consideration current and future scenarios). In order for empathy to go neyond the superficial designers must engage with and face stakeholders in a real way.	How can empathy be evaluated? Can empathy be evaluated? Do the outcomes display empathy? If yes, how ans what process has been used to achieve it? If no, why not? What failed in the process? Can the failure be prevented in the future? How much does background play a role?	
Reflection	Making and taking time to considers the observations of critical thinking and life experience. Choosing to dream and engage in dialogue so as to get real wisdom from an experience. Looking at oneself and ones own actions through the mirror of other people and traditions.	Did reflection occur? How did it occur? Was it facilitated or spontaneous? Have the designers looked through other mirrors? If yes, what outcomes did it bring? If no, why not? Has either yes/no shaped the process? When did the reflection occur?	
Social Interaction	Accpetance that designers are not 'demi-gods', just catalysts who can choreograph change by learning the power, value and impact of interacting with all social entities.	Who did the designers interact with? How was the level of interaction? Was the interaction 'forced' or natural? How did the designers create the choreography for interaction? Did they create the choreography? Or was it random and spontaneous? When did the interactions occur? Have the designers been democratic/ autocratic in their process?	
Participation	Participation is an inclusive process that offers an alternative to apathy and passivity as it encourages interaction between people, things and systems.	Who/ What has been included in the process? How were the participants included? Were the players active and engaged? Were the players passive and apathetic	

FACTOR	CONSTRUCT	QUESTIONS	
Acceptance of Diversity			
New Processes			
		Where has the knowledge come from?	
		How much have the designers brought with them?	
Understanding	Acquiring understanding cannot be taught, instead it stems from acquiring other qualities such as empathy, acceptance of diversity and new perspectives etc. As such it builds appropriate and useful knowledge for long-term resilience and future-proofing.	How much have they acquired through the project? On their own , from the others?	
		Have they displayed greater understanding of the background, language, situations of their partners?	
		How deep is this understanding? Surface, middle, deep?	
		How can the acqusition of knowledge and understanding be enabled?	
		Where have the ideas come from? Can their provenance be traced?	
Sharing		Who (if anyone) had greater influence over the development of ideas?	
		Was the sharing be equal?	
	Sharing the process of design (ideas, experiences, systems) by using it as an empathic tool to solve problems across all social, technological and environmental paradigms.	Was the entire process shared?	
		Who took the 'load' at the different times?	
		Was the process of team-work effective?	
		Is the success/ failure evident in the outcomes?	
Team-work		How can team-work be evaluated?	
		What makes effective team-work?	
	The process of engaging in dialogue, interacting and working with others to create new perspectives and new solutions.	Is it better when people know or don't know each other?	
		Can team-work be effective when the teams don't meet?	
		To what extent has the act of particiaption in the projects encoourages engagement?	
		Have the designers engaged fully?	
Engagement	Having genuine passion for the subject and the ability to motivate others towards common goals/performing sustainable acts together. To be engaged requires active involvement (being pragmatic), perseverance, attention to detail as well as humility and the ability to be political (make decisions and advocate) when change is required.	Why, why not?	
		Who plans the engagement?	
		Is how effective the engagement is down to the project, the conditions, the people participating, external factors, the people organising?	
		Who else was involved in the process (outside of the design team)?	
		How did these people become involved?	
Openess		What were the feedback loops through the process?	
	Transparency in the process, inviting others to take part, accepting and requesting feedback. The process of explaining (to others) and understanding (yourself) the design process can be very beneficial and educational. Desingers must learn to be open about what they are doing and how the are doing it in order to yield better outcomes that help people other than themselves.	Were the feedback loops more important and effective at different stages?	
		How much of the information was shared (was the process truely open)?	
		How was the information shared?	
		What was the language used to share the information?	
		Who else was involved in the process (outside of the design team)?	
		How did these people become involved?	
		How were problems identified and then honed down?	
		Did the problems evolve or change over the process?	
Compromise		Where in the process did the compromises occur?	
		How was consensus reached (if it was reached)?	
		Was there disagreement that couldn't be resolved?	
		How did the team move on after disagreement?	
		Did any team member(s) appear dissatisfied with the decisions?	
	Compromise is the recognition that no project or individual can solve all problems. It is about adjusting your ambition to what you can achieve, yet pushing yourself further than you think you can achieve. Ascertaining what is realistic in a project needs to come from dialogue and engagement with as many stakeholders as possible.	How did the communication play out when compromises were being made?	
		What type of language was used?	
		Was everyone given a fair voice?	
		What were the consequences of the compromises (on the process and the outcomes)?	
		How does the designer take responsibility?	
Accountability	Taking responsibility for what you design and how it is designed. To do this effectively designers must reflect, be prepared to compromise and have empathy with and understanding for the other stakeholders involved.	How can they be facilitated to take responsibility?	
		Is the responsibility 'deep' or superficial'?	
		Does the responsibility extend beyond the project length?	
		Is there any evidence from subsequent work?	
		How 'cocky' is the designer?	
Humility	An acceptance that designers are not demi-gods just catalysts for creativity and choreographers for change	How much have the needs of the other stakeholder been considered?	
		Is there such a thing as true humility?	
		Can humility be learned or practised or is it a core personal value?	
Humour	In order to reach people we can no longer focus on the 'negative'. Instead we need to appeal to the humour people can engage with, not comedy, but the use of imagery and more light-hearted, positive perspectives. This will ideally alter/ lift the mood thereby encouraging action and consistent change.		

Delphi Framework [revision 2]

FACTOR	CONSTRUCT	QUESTIONS		CODE	SUB CODES
Critical Questioning	Look holistically, it is a reflective process, reflect, step outside your norms, challenge, be open-minded to other ways of doing things. It is a key attribute and an essential skill.	Has the designer looked at the bigger picture		QUESTIONING	Bigger Picture
		have they reflected on the exercise (with help or on their own)		NEED TO BECOME INFORMED	Moved beyond the norm
		Have they just accepted the 'norm'?		CONFIDENCE	Questioning
		Have they explored other ways of doing things		BIGGER PICTURES	Alertness to opportunities
New Perspectives	creating and sharing, fresh eyes, openness to learn from others, a re-thinking of design and education – paradigm shift. Bring and appreciate new views, understandings and approaches (positive) that are not inward looking or simply altruistic for the sake of it. Recognising that satisfying yourself (as a designer) or individuals or even humans might not be enough, find the balance between three elements of TBL.	Have they asked questions		NEW WAYS	
		have the designers looked outside themselves?		HEARING OTHER VOICES	
		Have they investigated other views and maybe created their own?		TRYING NEW THINGS	
		Does the work output and the process reflect an openess?		SHARING OPINIONS	
		Does the work output and the process take into account the whole picture (as much as is realistic)?			
Problem Solving	A mind-set where designers understand the full complexity of issues they are tasked with finding resolution for (but they must be cautious and not be over ambitious to not expect holism from the start). This mind-set must be open, aware of the impacts on people and planet, and must not include personal agenda because the issues involved are non-linear, evolving and open-ended.	Have the designers been outward looking?			
		Is the language external (us, we wider context) or internal (I, me, design)?		LANGUAGE USED	
		How have the designers gone about their process? Linear/ non-linear/ organsied/systematice/chaotic.		PROCESS USED	
		Which process(es) work best in what scenario or with what issue?			
Communication	Acknowledge that true/full communication is not possible. In recognising the limitation and the diversity (of politics, cultures and places etc.), however we can develop a middle ground or accepted language to connect with people across all social and geographical boundaries	how have the designers built a common language?	Encoding of messages	UNDERSTANDING EACH OTHER	
		Can we move beyond linguistic barriers?	Decoding of messages	LANGUAGE	Positive, negative
		Do we need to move beyond linguistic barriers?	Cultural influences		Misunderstanding
		How was the communication facilitated?	Sociocultural influences		Local language
		What was the story of the communication?	Psychocultural influences		
		What is the designer's own background (behaviour, norms, beliefs, rules, language)?	Environmental influences		
		How 'far apart' are the participants backgrounds?			
		How do the designers make sense of the difference/similiarities in order to ensure effective communication (if at all)?			
Positive Behaviours	Positive behaviours are necessary for education for social sustainability, they create the context for new solutions that can move the entire community (people and planet) forward towards a common improved situation	Have the designers displayed new/ positive behaviours?		NEW WAYS	
		Have the designers communicated these new behaviours?		OPEN TO NEW THINGS	Postive, Negative
		If so how?			
		Did the teams establish common goals to manifest their new/positive behaviours?		SHARED GOALS	Agreeing, meeting the goals
		How were these common goals established?			
Decision Making	Decisions must be made through the entire process. This ensures responsibility is borne by the designers and the other participants and that there is accountability and visibility. Good decision making stems from understanding the goals, the other participants and the process.	What decisions have been made?		DECISION MAKING	who made decisions,
		Have decisions been made individually?			Individuals
		Have decisions been made collectively?			Group
		What is the difference between collective and individual decisions?		AGREEING	How:
		How can we map the decision making process?			
		Where in the process were decisions made?			
		Who made the decisions?			
		Who were there key people in every decision			
		What were the results of these decisions?			
		How did the decisions made impact (positively/ negatively) on the outcomes?			

2. FACTOR	CONSTRUCT	QUESTIONS			
Dialogue	Having effective dialogue means designers need to know how to initiate and maintain communication with a broad range of stakeholders as well as drawing on their own experiences to create meaningful and powerful narratives	Was there dialogue between the participants?			
		How do the designers build narrative (their own stories and the groups)?			
		Why is storytelling important?			
		How can effective dialogue be facilitated?			
		How can reflection on previous experiences help in dialogue?			
Empathy	Empathy requires designers to challenge their preconceptions and to look at every situation from every possible perspective. This facilitates designers to develop holistic perspectives as well as argue issues from different sides (taking into consideration current and future scenarios). In order for empathy to go neyond the superficial designers must engage with and face stakeholders in a real way.	How can empathy be evaluated?		LOOKING AT DIFFERENT SIDES	
		Can empathy be evaluated?		UNDERSTANDING DIFFERENT SIDE	
		Do the outcomes display empathy?			
		If yes, how ans what process has been used to achieve it?			
		If no, why not?			
		What failed in the process?			
		Can the failure be prevented in the future?			
		How much does background play a role?			
Reflection	Making and taking time to considers the observations of critical thinking and life experience. Choosing to dream and engage in dialogue so as to get real wisdom from an experience. Looking at oneself and ones own actions through the mirror of other people and traditions.	Did reflection occur?			
		How did it occur?			
		Was it facilitated or spontaneous?			
		Have the designers looked through other mirrors?			
		If yes, what outcomes did it bring?			
		If no, why not?			
		Has either yes/no shaped the process?			
		When did the reflection occur?			
Social Interaction	Accpetance that designers are not 'demi-gods', just catalysts who can choreograph change by learning the power, value and impact of interacting with all social entities.	Who did the designers interact with?			
		How was the level of interaction?			
		Was the interaction 'forced' or natural?			
		How did the designers create the choreography for interaction?			
		Did they create the choreography?			
		Or was it random and spontaneous?			
		When did the interactions occur?			
		Have the designers been democratic/ autocratic in their process?			
Participation	Participation is an inclusive process that offers an alternative to apathy and passivity as it encourages interaction between people, things and systems.	Who/ What has been included in the process?			
		How were the participants included?			
		Were the players active and engaged?			
		Were the players passive and apathetic			
Acceptance of Diversity					
New Processes					

3. FACTOR	CONSTRUCT	QUESTIONS			
Understanding	Acquiring understanding cannot be taught, instead it stems from acquiring other qualities such as empathy, acceptance of diversity and new perspectives etc. As such it builds appropriate and useful knowledge for long-term resilience and future-proofing.	Where has the knowledge come from?			
		How much have the designers brought with them?			
		How much have they acquired through the project? On their own , from the others?			
		Have they displayed greater understanding of the background, language, situations of their partners?			
		How deep is this understanding? Surface, middle, deep?			
		How can the acqusition of knowledge and understanding be enabled?			
Sharing	Sharing the process of design (ideas, experiences, systems) by using it as an empathic tool to solve problems across all social, technological and environmental paradigms.	Where have the ideas come from? Can their provenance be traced?	WILLINGNESS TO SHARE		
		Who (if anyone) had greater influence over the development of ideas?	EVIDENCE OF SHARING		
		Was the sharing be equal?			
		Was the entire process shared?			
		Who took the 'load' at the different times?			
Team-work	The process of engaging in dialogue, interacting and working with others to create new perspectives and new solutions.	Was the process of team-work effective?	Team Work	Good, Bad	
		Is the success/ failure evident in the outcomes?			
		How can team-work be evaluated?			
		What makes effective team-work?			
		Is it better when people know or don't know each other?			
		Can team-work be effective when the teams don't meet?			
Engagement	Having genuine passion for the subject and the ability to motivate others towards common goals/performing sustainable acts together. To be engaged requires active involvement (being pragmatic), perseverance, attention to detail as well as humility and the ability to be political (make decisions and advocate) when change is required.	To what extent has the act of particiaption in the projects encoourages engagement?	ENTHUSIASM		
		Have the designers engaged fully?			
		Why, why not?			
		Who plans the engagement?			
		Is how effective the engagement is down to the project, the conditions, the people participating, external factors, the people organising?			
Openess	Transparency in the process, inviting others to take part, accepting and requesting feedback. The process of explaining (to others) and understanding (yourself) the design process can be very beneficial and educational. Desingers must learn to be open about what they are doing and how the are doing it in order to yield better outcomes that help people other than themselves.	Who else was involved in the process (outside of the design team)?			
		How did these people become involved?			
		What were the feedback loops through the process?			
		Were the feedback loops more important and effective at different stages?			
		How much of the information was shared (was the process truely open)?			
		How was the information shared?			
		What was the language used to share the information?			

4. FACTOR	CONSTRUCT	QUESTIONS			
Compromise	Compromise is the recognition that no project or individual can solve all problems. It is about adjusting your ambition to what you can achieve, yet pushing yourself further than you think you can achieve). Ascertaining what is realistic in a project needs to come from dialogue and engagement with as many stakeholders as possible.	Who else was involved in the process (outside of the design team)?			
		How did these people become involved?			
		How were problems identified and then honed down?			
		Did the problems evolve or change over the process?			
		Where in the process did the compromises occur?			
		How was consensus reached (if it was reached)?			
		Was there disagreement that couldn't be resolved?			
		How did the team move on after disagreement?			
		Did any team member(s) appear dissatisfied with the decisions?			
		How did the communication play out when compromises were being made?			
		What type of language was used?			
		Was everyone given a fair voice?			
		What were the consequences of the compromises (on the process and the outcomes?			
Accountability	Taking responsibility for what you design and how it is designed. To do this effectively designers must reflect, be prepared to compromise and have empahty with and understanding for the other stakeholders involved.	How does the designer take responsibility?			
		How can they be facilitated to take responsibility?			
		Is the responsibility 'deep' or superficial'?			
		Does the responsibility extend beyond the project length?			
		Is there any evidence from subsequent work?			
Humility	An acceptance that designers are not demi-gods just catalysts for creativity and choreographers for change	How 'cocky' is the designer?			
		How much have the needs of the other stakeholder been considered?			
		Is there such a thing as true humility?			
		Can humility be learned or practised or is it a core personal value?			
Humour	In order to reach people we can no longer focus on the 'negative'. Instead we need to appeal to the humour people can engage with, not comedy, but the use of imagery and more light-hearted, positive perspectives. This will ideally alter/ lift the mood thereby encouraging action and consistent change.				

M Delphi Framework [revision 3]

FACTOR	CONSTRUCT	QUESTIONS	NOTES	PRELIM CODE	SUB CODES
Critical Questioning	Look **holistically**, it is a **reflective process**, reflect, step outside your norms, **challenge**, be **open-minded** to **other ways** of doing things. It is a key attribute and an essential skill.	Has the designer looked at the bigger picture	Characteristics of Strond CT'ers:	QUESTIONING/ INQUSITIVENESS	Bigger Picture
		have they reflected on the exercise (with help or on their own)	Inquisitiveness, Truthseeking, Openmindedness.	NEED TO BECOME INFORMED	Moved beyond the norm
		Have they just accepted the 'norm'?	Concern to become well informed	CONFIDENCE	Questioning
		Have they explored other ways of doing things	Alertness to Opportunity, Self-confidence	BIGGER PICTURES	Alertness to opportunities
			Facione (2009) Core Skills of CT, 1- Analysis, 2- Inference, 3-Evaluation, 4-Explanation, 5-Self-regulation. Valencia'a THINK Core Competency THINK COMMUNICATE, VALUE, ACT. Watson Glaser Critical Thinking Appraisal (see also for decision-making) Blooms Taxonomy of Education Creating, Evaluating, Analysing, Applying, Understanding, Remembering. Blooms Taxonomy of Learning Domains Knowledge, Skills, Attitudes.		
			CRITICAL THINKING IN DESIGN (Barratt, 2009) Careful and Deliberate Analysis identifying genuine exisiting conditions. 'look in the mirror		
New Perspectives	**creating** and **sharing**, **fresh eyes**, **openness to learn from others**, a **re-thinking** of design and education – **paradigm shift**. Bring and **appreciate new views**, **understandings** and **approaches** (positive) that are **not inward looking** or simply altruistic for the sake of it. Recognising that satisfying yourself (as a designer) or individuals or even humans might not be enough, **find the balance** between three elements of TBL.	Have they asked questions		NEW WAYS	
		have the designers looked outside themselves?		HEARING OTHER VOICES	
		Have they investigated other views and maybe created their own?		TRYING NEW THINGS	
		Does the work output and the process reflect an openess?	From 'Measuring my CT' survey Q3	SHARING OPINIONS	
		Does the work output and the process take into account the whole picture (as much as is realistic)?			
Problem Solving	A mind-set where designers **understand** the full complexity of issues they are tasked with finding resolution for (but they must be cautious and **not be over ambitious** to not expect holism from the start). This mind-set must be **open**, **aware of the impacts** on people and planet, and must not include personal agenda because the issues involved are **non-linear, evolving and open-ended**.	Have the designers been outward looking?			
		Is the language external (us, we wider context) or internal (I, me, design)?		LANGUAGE USED	
		How have the designers gone about their process? Linear/ non-linear/ organsied/systematice/chaotic.		PROCESS USED	
		Which process(es) work best in what scenario or with what issue?			
Communication	Acknowledge that true/full communication is not possible. In **recognising the limitation** and the **diversity** (of politics, cultures and places etc.), however we can **develop a middle ground** or **accepted language** to **connect with people** across all social and geographical boundaries	how have the designers built a common language?	Sensemaking & Communicating with Strangers	UNDERSTANDING EACH OTHER	
		Can we move beyond linguistic barriers?	Encoding of messages	LANGUAGE	Positive, negative
		Do we need to move beyond linguistic barriers?	Decoding of messages		Misunderstanding
		How was the communication facilitated?	Cultural influences		Local language
		What was the story of the communication?	Sociocultural influences		
		What is the designer's own background (behaviour, norms, beliefs, rules, language)?	Psychocultural influences		
		How 'far apart' are the participants backgrounds?	Environmental influences		
		How do the designers make sense of the difference/similiarities in order to ensure effective communication (if at all)?			
Positive Behaviours	Positive behaviours are necessary for education for social sustainability, they **create the context for new solutions** that can **move the entire community** (people and planet) forward towards a common improved situation	Have the designers displayed new/ positive behaviours?		NEW WAYS	
		Have the designers communicated these new behaviours?		OPEN TO NEW THINGS	Postive, Negative
		If so how?			
		Did the teams establish common goals to manifest their new/positive behaviours?		SHARED GOALS	Agreeing, meeting the goals
		How were these common goals established?			
			Moving from AWARENESS - TO KNOWLEDGE- TO ACTION (McKeown, 2002)		
Decision Making	Decisions must be made through the entire process. This ensures **responsibility** is borne by the designers and the other participants and that there is **accountability** and **visibility**. **Good decision making** stems from **understanding the goals,** the other participants and the process.	What decisions have been made?		DECISION MAKING	who made decisions,
		Have decisions been made individually?	REFLECTION IN ACTION		Individuals
		Have decisions been made collectively?			Group
		What is the difference between collective and individual decisions?	What were the paradoxes (see Luschner & Lewis 'Sensemaking & Paradoxes)	AGREEING	How:
		How can we map the decision making process?			
		Where in the process were decisions made?			
		Who made the decisions?			
		Who were there key people in every decision			
		What were the results of these decisions?			
		How did the decisions made impact (positively/ negatively) on the outcomes?			
		When were the decisions made?			

2. FACTOR	CONSTRUCT	QUESTIONS			
Dialogue	Having effective dialogue means designers need to know how to initiate and maintain communication with a broad range of stakeholders as well as drawing on their own experiences to create meaningful and powerful narratives	Was there dialogue between the participants?	Link to Communication		
		How do the desingers build narrative (their own stories and the groups)?			
		Why is storytelling important?			
		How can effective dialogue be facilitated?			
		How can reflection on previous experiences help in dialogue?			
Empathy	Empathy requires designers to challenge their preconceptions and to look at every situation from every possible perspective. This facilitates designers to develop holistic perspectives as well as argue issues from different sides (taking into consideration current and future scenarios). In order for empathy to go beyond the superficial designers must engage with and face stakeholders in a real way.	How can empathy be evaluated?		LOOKING AT DIFFERENT SIDES	
		Can empathy be evaluated?		UNDERSTANDING DIFFERENT SIDE	
		Do the outcomes display empathy?			
		If yes, how ans what process has been used to achieve it?			
		What failed in the process?			
		Can the failure be prevented in the future?			
		How much does background play a role?			
Reflection	Making and taking time to consider the observations of critical thinking and life experience. Choosing to dream and engage in dialogue so as to get real wisdom from an experience. Looking at oneself and ones own actions through the mirror of other people and traditions.	Did reflection occur?	Reflection in Action' and 'Reflection on Action' (Schon, 1983) REFLECTION IN ACTION - to make decisions in order to move on. RELFECTION ON ACTION- reflection on decisions and actions after the effect, leads to learning.		
		How did it occur?			
		Was it facilitated or spontaneous?		Moments of reflection -what is reflection?	
		Have the designers looked through other mirrors?			
		If yes, what outcomes did it bring?			
		If no, why not?			
		Has either yes/no shaped the process?			
		When did the reflection occur?			
Social Interaction	Acceptance that designers are not 'demi-gods', just catalysts who can choreograph change by learning the power, value and impact of interacting with all social entities.	Who did the designers interact with?	Types of Interactions - Formal, Informal (see Wilder Collaboration Factos)		
		How was the level of interaction?			
		Was the interaction 'forced' or natural?			
		How did the designers create the choreography for interaction?			
		Did they create the choreography?			
		Or was it random and spontaneous?			
		When did the interactions occur?			
		How was the interaction managed?			
		Have the designers been democratic/ autocratic in their process?			
Participation	Participation is an inclusive process that offers an alternative to apathy and passivity as it encourages interaction between people, things and systems.	Who/ What has been included in the process?			
		How were the participants included?			
		Were the players active and engaged?			
		Were the players passive and apathetic			
Acceptance of Diversity	Recognising that cultural differences exist and allowing these differences to emerge and become apparent, working with the differences and not against. Caplitalising for the advancement of the project.				
New Processes	Across disciplines, across cultures, new project approaches. Breaking away from the norm.	What have they done Differently?			

3. FACTOR	CONSTRUCT	QUESTIONS			
Understanding	Acquiring understanding cannot be taught, instead it stems from acquiring other qualities such as empathy, acceptance of diversity and new perspectives etc. As such it builds appropriate and useful knowledge for long-term resilience and future-proofing.	Where has the knowledge come from?			
		How much have the designers brought with them?			
		How much have they acquired through the project? On their own , from the others?			
		Have they displayed greater understanding of the background, language, situations of their partners?			
		How deep is this understanding? Surface, middle, deep?			
		How can the acqusition of knowledge and understanding be enabled?			
Sharing	Sharing the process of design (ideas, experiences, systems) by using it as an empathic tool to solve problems across all social, technological and environmental paradigms.	Where have the ideas come from? Can their provenance be traced?	WILLINGNESS TO SHARE		
		Who (if anyone) had greater influence over the development of ideas?	EVIDENCE OF SHARING		
		Was the sharing be equal?			
		Was the entire process shared?			
		Who took the 'load' at the different times?			
Team-work	The process of engaging in dialogue, interacting and working with others to create new perspectives and new solutions.	Was the process of team-work effective?	Team Work	Good, Bad	
		Is the success/ failure evident in the outcomes?			
		How can team-work be evaluated?			
		What makes effective team-work?			
		Is it better when people know or don't know each other?			
		Can team-work be effective when the teams don't meet?			
Engagement	Having genuine passion for the subject and the ability to motivate others towards common goals/performing sustainable acts together. To be engaged requires active involvement (being pragmatic), perseverance, attention to detail as well as humility and the ability to be political (make decisions and advocate) when change is required.	To what extent has the act of particiaption in the projects encoourages engagement?	ENTHUSIASM	Shared goals	
		Have the designers engaged fully?		Holistic understanding	
		Why, why not?			
		Who plans the engagement?			
		Is how effective the engagement is down to the project, the conditions, the people participating, external factors, the people organising?			
Openess	Transparency in the process, inviting others to take part, accepting and requesting feedback. The process of explaining (to others) and understanding (yourself) the design process can be very beneficial and educational. Desingers must learn to be open about what they are doing and how the are doing it in order to yield better outcomes that help people other than themselves.	Who else was involved in the process (outside of the design team)?		Was the process open	
		How did these people become involved?			
		What were the feedback loops through the process?			
		Were the feedback loops more important and effective at different stages?			
		How much of the information was shared (was the process truely open)?			
		How was the information shared?			
		What was the language used to share the information?			

4. FACTOR	CONSTRUCT	QUESTIONS			
Compromise	Compromise is the **recognition** that no project or individual can solve all problems. It is about **adjusting your ambition** to what you can **achieve,** yet pushing yourself further than you think you can. Ascertaining what is **realistic** in a project needs to come from **dialogue and engagement with as many stakeholders as possible.**	Who else was involved in the process (outside of the design team)?	Constructive Ambuigity (Moore 2011)		
		How did these people become involved?			
		How were problems identified and then honed down?			
		Did the problems evolve or change over the process?			
		Where in the process did the compromises occur?			
		How was consensus reached (if it was reached)?			
		Was there disagreement that couldn't be resolved?			
		How did the team move on after disagreement?			
		Did any team member(s) appear dissatisfied with the decisions?			
		How did the communication play out when compromises were being made?			
		What type of language was used?			
		Was everyone given a fair voice?			
		What were the consequences of the compromises (on the process and the outcomes)?			
Accountability	Taking **responsibility** for **what** you design and **how** it is designed. To do this effectively designers must **reflect,** be prepared to **compromise** and have **empathy** with and understanding for the other stakeholders involved.	How does the designer take responsibility?			
		How can they be facilitated to take responsibility?			
		Is the responsibility 'deep' or superficial'?			
		Does the responsibility extend beyond the project length?			
		Is there any evidence from subsequent work?			
		Learn from mistakes			
Humility	An acceptance that designers are **not demi-gods** just **catalysts** for creativity and choreographers for change	How 'cocky' is the designer?			
		How much have the needs of the other stakeholder been considered?			
		Is there such a thing as true humility?			
		Can humility be learned or practised or is it a core personal value?			
		Learn from mistakes			
Humour	In order to reach people we can **no longer focus** on the **'negative'**. Instead we need to appeal to the humour people can **engage with,** not comedy, but the **use of imagery and more light-hearted, positive perspectives**. This will ideally **alter/ lift the mood** thereby **encouraging action** and **consistent change**.	Jokes, Casual language, Getting to know you, Challenge Norms & Standards of Propreity, Break Taboos,	See '5 Things Hollywood teaches us about Product Design'		

N AR1 Project Pack

product design + technology

Unitec NEW ZEALAND
Te Whare Wānanga o Wairaka

Cultural Leanings
'The Paddy's Vs 'The Kiwi's'

Year
Year 2 Product Design – University of Limerick, Unitec New Zealand

Project Schedule
Duration 4- 6 weeks

Project Statement
In an effort to bring together cultures divided by thousands of miles, you the 2nd year Product Design students of the Unitec New Zealand and the University of Limerick, Ireland are invited to participate in an international project.

Theme
National identity is what sets us apart from other countries; it cannot be reproduced in any context other than the culture from which it originates (despite countless efforts to recreate the Irish pub!). Within this, local history and tradition are essential components. Not only do they teach us not to remake mistakes of the past, they also allow us a cultural context in which to place our contemporary society.
Through the medium of design you are asked to demonstrate an aspect of your culture that will allow the other student group gain a deeper understanding of what makes your country unique.

Design Brief
- **In groups of two identify a tradition, a cultural phenomena or a historical practice specific to your country (art, religion, conflict, music and performing arts, literature, food, drink or anything that conveys the culture of your nation).**

- **Thoroughly investigate the details and trace the origins of your chosen area. Considering modern technologies, societal behaviour as well as the materials and facilities available to you as 21st century designers re-imagine your chosen topic in the present day. You are not asked to rebuild the past; instead to re-interpret it in a contemporary context.**

- **Your audience is 11,000 miles (18,000 kms) away and operates in a different time zone, because of this you will have to make your presentations deliverable and communicable by available technologies (i.e. web based communications, blogs etc.)**

Project Outcomes
Cultural Research, Presentation Skills, Design Process.

Stage 1: Briefing, and historical research (Archaeological and Anthropological)
Thorough research must be conducted at this stage. Before you decide on a final topic, investigate a number that interest you and then choose the one that offers the most potential for development. Research your chosen area in detail, comparing past technologies with modern ones, as well as fully exploring the environment and the contemporary society for which you are designing.
Deliverables:
Research Presentation + Design Specification (Product Definition Statement)

Stage 2: Idea Generation Conceptualisation

Generate as many solutions to the problem as possible. The solutions must be driven by your research. You are encouraged to use 3D techniques (full scale low fidelity models from card, paper, foam etc.), experiments and trials to test the validity of your ideas. Explore 3 of the most interesting in more depth.

Deliverables:

Drawings and sketches, evidence of practical idea testing (photographs, sketch models), 3 Concepts well presented **(to be evaluated via internet Blog)**

Stage 3: Design Development

Develop the most viable concept (or amalgamation of a number) more thoroughly. Explore the function, aesthetics and usability through sketches and test models. Detail the components, materials and technical functionality of the product (where applicable).

Deliverables:

Sketches, Test Models and Technical Drawings.

Stage 4: Design Realisation

Build a model and present high quality renderings of the final product.

Deliverables:

Final Design Presentation, Final Model **(photographed to send via internet Blog)**

As always you are designers so consideration of aesthetics, environmental impact and human factors are essential.

Criteria for good marks - Students should refer to their respective assessment criteria

Resolution of Problem
Teamwork
Originality + Innovation
Design detailing
Evidence of experimentation and testing
Presentation (visual + verbal)
Craft skills (model-making)

O AR1 Questionnaire and response [sample]

AR1 Questionnaire (Post Project)

We have a few short questions to ask about the project itself, the collaborative nature of the project and the use of web logs [Blogs] in design education.

Your survey responses may assist us in understanding how effective the Blogs were in supporting or enabling your Design Studio work and collaboration. On reflection, were they useful; would you use them in future; how could we improve their effectiveness?

Please take a few moments to complete the survey below.

Kia Ora - Go raibh maith agat

Muireann and Martin

1. Is this the first time you have created or used a Blog as part of your studies in Design?

☐ Yes

☐ No

2. How would you rate overall, your Blogging experience during the Cultural Design project?

☐ Excellent

☐ Very Good

☐ OK

☐ Bit of a hassle

☐ Hated it

3. Given the choice, would you use a Blog for a future design project?

☐ Yes, absolutely!

☐ Maybe

☐ No- never again!

Why?

[   ]

4. How does Blogging rate as a tool for documenting your research and design outputs?

	Excellent	Very Good	OK	Bit of Hassle	N/A
Yes, absolutely!	☐	☐	☐	☐	☐
Research material organisation	☐	☐	☐	☐	☐
Project Submission	☐	☐	☐	☐	☐
Dialogue between your own team	☐	☐	☐	☐	☐
Dialogue between groups e.g. NZ1-IRL1	☐	☐	☐	☐	☐
Sharing Resources	☐	☐	☐	☐	☐
An E-portfolio to display project outcomes	☐	☐	☐	☐	☐

5. How did the Blogs change your approach to design studio compared to past projects? e.g. research methods, concept generation, meeting stage deadlines, final design presentation…

```
┌──────────────────────────────────────────────────────┐
│                                                      │
│                                                      │
│                                                      │
│                                                      │
│                                                      │
└──────────────────────────────────────────────────────┘
```

6. Did you need more assistance or guidance from your lecturer to start Blogging effectively?

☐ No help required, we were sweet as/ grand so

☐ We asked others in the class when we needed help

☐ Yes, should have had more help from staff

7. The Project Matter: Cultural Leanings

	I Agree	I Disagree
I found the subject matter interesting	☐	☐
I thought the structure of the project made sense	☐	☐

The project stages were clear and well defined ☐ ☐

The workload was appropriate to the length of project ☐ ☐

The intended outcomes of the project were clear ☐ ☐

The deliverables and deadlines were clear and well outlined ☐ ☐

The project made sense in the context of my degree ☐ ☐

I understood the purpose of the project ☐ ☐

If no, please give a reason

8. On the Collaborative side of the project

	Excellent	Very Good	OK	Bit of Hassle	No Benefit
Working with another country was	☐	☐	☐	☐	☐
Sharing ideas with other design students was	☐	☐	☐	☐	☐
Communication between the two groups was	☐	☐	☐	☐	☐
I think the experience of collaborative work for my professional design career will be	☐	☐	☐	☐	☐

Comments please

9. Please make any additional comments you have about the project here.
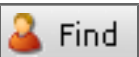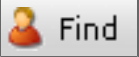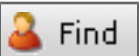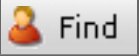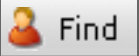
		Comment Text	Response Date
Find	**1.**	Basically, I think it's a great idea to let students have time to do their works rather than spent other time for things which look not so important. Of course I not saying that this is bad but at least do it at the end of the project.	Thu, 5/8/08 9:33 AM
Find	**2.**	Thoroughly enjoyed the conference and tasting a new culture.	Wed, 5/7/08 10:45 PM
Find	**3.**	All in all I enjoyed the project a lot and was quite disappointed that we wont be continueing with the blogs and with the interaction with the other university	Wed, 5/7/08 10:26 PM
Find	**4.**	See above. Raelly enjoyed overall. Had a great partner in mayli. I was blown away with the overall standard and dedication/ motivation of my class mates. Muirrean is a task master (but very good natured) and sets a good structure/rules. No talking, texting or laptops is good and insisting on promptnes. All good. The video conferance was really cool fun and a great finally. It may have been useful to do a video conference to introduce each group too. We did a concept presenation to our own class early on which was excellent. This could have been on conference. Good for the speaking and presenation skills too.	Mon, 4/28/08 1:55 PM
Find	**5.**	a collaboration between two groups was a great experience. the binding of 'teams' could have been tighter, eg. NZ1 & IR1 working as one 'team'. the 'collaboration' as a whole was a good experience.	Wed, 4/23/08 12:22 PM
Find	**6.**	Like wee little babes in the woods we venture forth into the wilderness unsure of our footing in the big an mysteriouse design world, creativity is a wonderouse thing,and have a big thumbs up to anything that ables me to do so better.	Wed, 4/23/08 12:37 AM

Find	**7.**	Overall I think this assignment was rewarding and an interesting project,it required cultural awarness and good concepts, which there were.And a good dose of Technology to make it happen.The blogging side of it was interesting,there was a lot of down time between group entries which made communication and idea swaping slow. This could maybe be developed to spure on ideas and interest. cheers	Tue, 4/22/08 6:54 PM
Find	**8.**	it had its ups and downs, but overall very productive in the long run i think.	Tue, 4/22/08 2:48 PM
Find	**9.**	A nice change!	Tue, 4/22/08 9:14 AM
Find	**10.**	Overall i thought it was a clas project that i enjoyed and benifited from	Mon, 4/21/08 10:22 PM
Find	**11.**	Good enough project but cant imagine we'd get a brief like that in the workplace	Mon, 4/21/08 10:13 PM
Find	**12.**	It was an interesting project, I liked the idea of getting started from the country itself because at the end you could see how many things a country can offer you :)	Mon, 4/21/08 8:08 PM
Find	**13.**	Switching the target country to design for would possibly be more informative and encourage more cross communication between the two.	Mon, 4/21/08 10:46 AM
Find	**14.**	i would like to do more projects using the same format.	Mon, 4/21/08 1:58 AM
Find	**15.**	It was a really good project	Sun, 4/20/08 7:42 AM
Find	**16.**	Heavy workload on top of everything else we have to do.	Sun, 4/20/08 4:27 AM
Find	**17.**	Blogs can be useful, but there are some things that are still awkward. Not being able to load PDFs, or Powerpoints directly onto the blog makes for odd work arounds - loading stuff up onto Slideshare or Googledocs etc. This all just takes a lot of time to do. I guess I felt a lot of time spent on maintaining the digital resource could be better utilised in thinking through the design more carefully. But I guess the flip side is the sharing of ideas and potentially beneficial input that you can get from doing that. I think there is probably a cut-off point ito size/ length of project/number of parties involved where the benefits of the blog will outweigh	Sat, 4/19/08 11:31 AM

the time spent maintaining it.

	18.	And all the interaction was great! I only wish we had done more of it!	Sat, 4/19/08 5:01 AM
	19.	very enjoyable would love to do a projact of similar guidelines again.	Sat, 4/19/08 2:58 AM
	20.	the vox brief is great, but we still need time get into this method:)	Sat, 4/19/08 12:20 AM
	21.	The project was great, i would like to do something like that again.	Fri, 4/18/08 11:56 PM
	22.	Maybe there are other ways witch incorporates the benefits but without it's shortcommings. It was a good experience for me even though there was just to less use of the tool (from both sides) to make the most out of it	Fri, 4/18/08 11:06 PM

P
AR2 Project Pack

Food for thought an international design collaboration project

Start date: 08.03.10

Duration: 6 weeks

background

Developments in agriculture and food cultivation, changing palettes, globalisation, increased demands, growing populations, changes in technology, shifts in economic and political situations and diminishing resources, all have had (and will continue to have) huge impacts on the way we eat. The situation varies from country to country but how we deal with the issues is a global problem.

brief

In international groups (comprising local teams from each country) you will be assigned one of the topics from the list below.

Domestic Food Cultivation
Community Food Production
Food preparation in the home
Purchasing food
Packaging and Transport
Food on the go
Shared Dining

Take your topic and look at the changing face of food in your country. You will then be assigned a role as a designer for one of the partner countries and as a client for another . Your local team will design a product* for your client (who is based in a country you most probably have never been to and/or know little about!) that provides a healthy and sustainable supply of food into the future. As the client for another team , it is your responsibility to ensure the products designed by your design team are suitable for yout context.

To enable you to share ideas you will use a NING platform as well as Twitter, Skype and desktop sharing software. You are required to collaborate as much as possible (with both your client and design team) to ensure the solutions generated are relevant, useful and necessary.

*Products in this instance dont refer only to physical products but also include service and systems

project aim

In an effort to bring together cultures divided by thousands of miles, you the Product Design students of the Unitec New Zealand, Universidad de Valparaiso, Chile and the University of Limerick, Ireland are invited to participate in an international project.

The aim is to share ideas, look at problems from diverse perspectives and learn how to co-operate across countries. To achieve this your design team will be designing for a different 'Client' country. Remember climatic, cultural,social and historical drivers vary from country to country. Each person and each place has their own story, how you tell the story is where the adventure lies.

Connect. Collaborate. Negotiate. Learn. Teach. Share.

(A) Project Brief

(1)

Step 1 Divide up into local teams. Set up an email address for the team. Send the email address to your tutor who will invite you to the NING site. Create your team NING profile within your group space

Monday 8th March

Step 2 Create a 1 minute video introducing your team to the group. Post your team info on your NING (names, design philosophy, design interests) Post it on the NING site. You will be assigned your client and design team.

Step 3 Each group is given the brief and their group topic.

Thursday 11th March

(2)

Step 4 Analyse your topic thoroughly, looking at social, historical, traditions, technological situations in your own country. Find out what makes your country unique.

Step 5 Gather your research findings to tell the story. Present the key findings in a visual manner

Step 6 Identify at least 10 different Product Opportunity Gaps (POG's). Briefly explain each one. Post all the research material on your NING.

Thursday 18th March

(3)

Step 7 Take the research file from your client team. With your clients input decide on one POG to explore in more detail.

Step 8 Generate design solutions that fulfil the POG. Use sketches and models to experiment. Consult with your clients to ensure your ideas are valid and relevant.

Step 9 Choose the two most viable design concepts. Present them clearly to show functionality and aesthetics. Post your concepts on your NING

Step 10 Host a Skype meeting with your clients. Using Teamviewer explain the two concepts. Taking their input make any changes necessary. Decide on a final concept to develop.

Thursday 8th April

(4)

Step 11 Take the final concept and develop it. Use sketches and test models to decide on functional and aesthetic features.

Step 12 Specify the materials and manufacturing processes. *Consult with your clients to ensure your manufacturing specification is realisable.*

Thursday 15th April

(5)

Step 13 Prepare the final model (either CAD or physical) and 2 presentation boards showing the key aspects of the product. What it is; What it does; Who it is for; How it works; Where it will be used.

Step 14 Prepare a short video showcasing your final design. Post it to NING. Host a Skype meeting to present the final design to your client team.

Thursday 29th April

Please note you also play a role as the Client for another team so you must also fulfill those duties.

Stage 1 Brief + Meet
Stage 2 Research
Stage 3 Conceptualisation
Stage 4 Final Design
Stage 5 Final Presentation

(B) Project Steps

Food for thought an international design collaboration project

client

Ireland 1

designer

New Zealand 1

Common Topic

Intro Video + Virtual Meeting

NING Upload

Thorough research, file completed and handed over to design team, along with a design brief identifying POG's

generate concepts to fulfill the brief. and satisfy the POG, loosely outline the best 2 concepts and present them to the client

NING upload

concept 1
upload line drawings + sketch model images onto NING

concept 2
upload line drawings + sketch model images onto NING

Virtual Meeting with Shared Desktops

Aesthetics, functionality, usability detailed through 2D + 3D sketching

Representational model + Marketing material Images, videos, presentation boards

NING upload

Final Presentation

Showcase Video

Stage 1 Brief + Meet
Stage 2 Research
Stage 3 Conceptualisation
Stage 4 Final Design
Stage 5 Final Presentation

C Collaboration Map

(1) NING Group software that allows for a closed network of collaborators to post work, chat and blog. Each team will have an individual Ning, this is where you will post all your project work as your team goes through the project. Videos, documents, slideshows and images can be posted on the NING. This is also where discussions will happen between groups and all the project information will be posted.

(2) TWITTER is ideal for real-time short communication. Use this to send short messages to your client or design team to inform them of uploads to the NING or to offer/seek advice on design decisions. Tweets can be sent directly from your NING site. Please put the #f4t10 tag at the end of every tweet so the messages linked to this project can be traced and gathered easily.

(3) GOOGLETALK is a VOIP (in otherwords an internet chat, video and audio service) that is free between gmail users. This will be used during the project to hold virtual 'meetings' between the clients and design teams. You will host a meeting with your client every week to ensure the work your design team are doing is appropriate for your client. After downloading Googletalk please remember to download the 'Video & Audio' plugin to ensure you can see your partners during the meetings.

(4) TEAMVIEWER is a desktop sharing software that allows you to view and control your partners desktop in real-time. This software will be used during meetings to allow changes to be made to designs in real-time. You give your partner access to view your desktop and as you present drawings, layouts etc. they can look at what you are doing and suggest changes. You can also grant your partner access to your desktop so they can make changes to your work.

In order to set up the NING, Twitter and Googletalk accounts you will need to establish a gmail account, please call the account after your team number e.g. Team 1 NZ, Team 1 IRL etc. Make sure all your team members have access to the gmail account as well as the Twitter and Ning accounts

(E) Project Technology

Q AR2 Questionnaire and response [sample]

1. Default Section

*1. How do you feel you (as a designer) can engage with social issues?

	1	2	3	4	5	6
1 = Low 6=High	○	○	○	○	○	○

Please comment briefly on your answer

[text box]

*2. How do you feel your project work enables you to engage with social issues?

	1	2	3	4	5	6
1= Low 6=High	○	○	○	○	○	○

Please comment briefly on your answer

[text box]

*3. How relevant are the following skills to design?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Working together	○	○	○	○	○
Knowledge share	○	○	○	○	○
Social interaction	○	○	○	○	○
Communication	○	○	○	○	○
Shared Goals	○	○	○	○	○
Dialogue	○	○	○	○	○
Understanding and empathy for Diversity	○	○	○	○	○
Decision-making	○	○	○	○	○
Questioning	○	○	○	○	○
Engagement	○	○	○	○	○
Openness	○	○	○	○	○
Sharing ideas	○	○	○	○	○
Participation	○	○	○	○	○
Compromise	○	○	○	○	○

*4. What do you understand by the term Social Sustainability?

[text box]

*5. What do you think Social Sustainability means to Design?

[text box]

Q4. What do you understand by the term Social Sustainability?	
1	I dont	Apr 14, 2010 10:02 AM
2	Keeping up and approving of human rights throught the world no matter what country or race	Apr 13, 2010 1:33 PM
3	that it will suit society and last in society for as long as possible	Apr 10, 2010 11:42 PM
4	What's the responsbility for a product designer.	Apr 10, 2010 4:31 AM
5	A society can only be considered sustainable if the work and production becomes more and more autonomous. If it had exceeded acute levels of poverty, or have conditions to go increasingly diminishing. If its citizens were engaged in meaningful work. If social security were guaranteed to those who are too young or old or sick and can not enter the labor market. If the social and political equality, as well as gender, continuously sought out. If economic inequality is reduced to acceptable levels. And finally, if its citizens are socially participatory and thus could be improved continuously to make concrete and democracy.	Apr 9, 2010 10:33 PM
6	that a design or concept can withstand "the test of time" in the public domain. as well as addressing the social issues and the expected future issues	Apr 9, 2010 9:34 PM
7	i think it means continued communication with all in society	Apr 9, 2010 7:18 PM
8	To be able to communicate with all your class mates with no problems.	Apr 9, 2010 4:11 PM
9	The ability to sustain oneself in a social environment.	Apr 9, 2010 3:41 PM
10	not much	Apr 7, 2010 11:49 AM
11	my understanding is a balance between socail interaction maybe...	Apr 6, 2010 4:13 PM
12	using the strength of a well informed and trustful community to keep productivity high and costs low	Apr 6, 2010 4:06 PM
13	doesn't age with the passing of social trends	Apr 1, 2010 10:32 PM
14	Aspects of our society that should be functional indefinitely	Mar 12, 2010 12:39 PM
15	that it encourages people from all aspects of life to at least try to be responsible for thier actions and be aware of the repreucutions of thier actions on the surrounding environments.	Mar 10, 2010 3:32 PM
16	a group of people doing there best to recycle and only buying products that are made from renewable resources, and materials that can be recycled.	Mar 10, 2010 10:18 AM
17	interacting with different people	Mar 9, 2010 10:29 PM
18	keeping our population content with there suroundings	Mar 9, 2010 2:46 PM
19	dnt know	Mar 9, 2010 2:35 PM
20	That people can remain interacting on good terms for the required amount of time.	Mar 9, 2010 12:51 PM
21	a marketing term	Mar 9, 2010 10:57 AM
22	creating a product that has a circular lifecycle	Mar 9, 2010 10:03 AM

Q4. What do you understand by the term Social Sustainability?		
23	Social sustainability encompasses human rights, labor rights, and corporate governance. In common with environmental sustainability, social sustainability is the idea that future generations should have the same or greater access to social resources as the current generation.	Mar 8, 2010 6:43 PM
24	something that can be done infinitely without residual negative effects on society developing	Mar 8, 2010 6:40 PM
25	when something affects peoples ability to interact with one another in a way that becomes part of the norm	Mar 8, 2010 6:34 PM
26	----------	Mar 8, 2010 5:13 PM

	Q5. What do you think Social Sustainability means to Design?	
1	dont know	Apr 14, 2010 10:02 AM
2	Easy for the influence of design from different non explored cultures through out the world into new designs we make today and in the future	Apr 13, 2010 1:33 PM
3	that we design in order to make lief better for society	Apr 10, 2010 11:42 PM
4	One big responsbility for designers apart from designing good looking.	Apr 10, 2010 4:31 AM
5	I believe that as designers we should be much more aware of the ecology, environment and sustainable society. Also take into account the processes of manufacturing, product durability and above all the consumerism. Designing for not having to recycle so quickly. Designing for a better world. I think to do a project that involves sustainability need to know more about other methods of manufacture, other methods of doing things. I think the commitment is the most important and should be there all the time. It is true that sometimes products are designed because is needed, I think a sustainable society is needed in our days, not only for the planet, but also for the future of humanity.	Apr 9, 2010 10:33 PM
6	it means that as designers we must think into the future and try to address as many potential issues as we can. it broadens our brief and can show a good design from a bad one	Apr 9, 2010 9:34 PM
7	i think it means that when you design something you must involve or communicate with the stakeholders and continue to communicate with them through the design process	Apr 9, 2010 7:18 PM
8	It has a big part because without it you cannot share your ideas and new designs.	Apr 9, 2010 4:11 PM
9	It is critical so the designer can exude confidence and self worth	Apr 9, 2010 3:41 PM
10	dont know	Apr 7, 2010 11:49 AM
11	having the right balance between goingout and talking to people and doing your own work behind closed doors....	Apr 6, 2010 4:13 PM
12	designing with the intention to better or ease community life	Apr 6, 2010 4:06 PM
13	producing meaningful designs	Apr 1, 2010 10:32 PM
14	This applies to design in the way that it is our ethical responsibility to only encourage sustainability to the best of our knowledge	Mar 12, 2010 12:39 PM
15	it means that we as designers are partly responsible for ensuring that our designs are nurtured in an environmentally friendly way and repect our surroundings without focusing on the benifits on an economic scale.	Mar 10, 2010 3:32 PM
16	it means a lot! it is important to keep the world healthy and functioning in a good manner	Mar 10, 2010 10:18 AM
17	nothing really only better products	Mar 9, 2010 10:29 PM
18	a market to tap	Mar 9, 2010 2:46 PM
19	dnt know	Mar 9, 2010 2:35 PM

Q5.	What do you think Social Sustainability means to Design?	
20	That ideas, points and solutions can get across between partners or a group throughout a project while keeping the energy positive and professional.	Mar 9, 2010 12:51 PM
21	people use the term to endear their products to others	Mar 9, 2010 10:57 AM
22	at the moment not a lot but in the coming decades it will increasingly important. Design has now to have morals.	Mar 9, 2010 10:03 AM
23	Designing for sustainability has become very important in recent times. As with Social Sustainability, designs should have the ability to be improved in the future...	Mar 8, 2010 6:43 PM
24	im not sure thats a real question.	Mar 8, 2010 6:40 PM
25	something needs a long lifespan and expands the borders of peoples ability to network and group and interact	Mar 8, 2010 6:34 PM
26	------------------	Mar 8, 2010 5:13 PM

R AR3 Project Pack

'One man's meat is another man's poison'
Aesthetics and interpretation

Date: 7th- 17th February

Date: 7th- 17th February
Tutors: Aideen Participant 1, Sean Taylor & Muireann McMahon

Background:
The domestic kitchen space is familiar and tangible, we all use it we inhabit it. We need to have it in our lives. We encounter it individually and with others. We use this space to service ourselves and to service others. The kitchen space can be manifested through physical structures and rules/regulations. And it can be experienced through body/senses (a holistic aesthetic experience). It is tied to feelings of fulfilment, shared and/or individual experiences, engagement, cleanliness, security, inhabitation, and sense of place.

The objects that inhabit this space aid us with our daily tasks. These objects are often banal, we do not give them much thought; the tea cup the spoon, the washing up bottle, the kettle, the dust pan, the brush, the ironing board etc.

How can we create an 'aesthetic' experience for the 'users' of this space that creates a conversation between the man-made and the organic, between the physical space and the objects and people that inhabit it?

Brief:
Design is about more than 'the object' and aesthetics is more than 'visual'. In groups of 6 (comprising sculpture and product design students) begin a conversation on what aesthetics means to both your disciplines. Find the commonality as well as the differences.

What are aesthetics? What makes something appealing to the senses? Is the aesthetic experience individual or shared? What do aesthetics offer the 'object' and the person? Are aesthetics even important?

Considering 'The Kitchen' as the centre of the home, explore the activities, people and objects that inhabit the space. Build on your collective interpretations of aesthetics and beauty to imagine and create an 'object' (either tangible or intangible) that provides an experience for or in the kitchen.

Schedule:
Groups formed of 6 persons (4 PDT students 2 A&D students) will respond to the theme and considerations posed by the project

Monday 7th Briefing (9.30am-1pm) UL studios
Thursday 10th Tutorials (2pm-6pm) LSAD studios
Tuesday 14th Presentations (9a.m-1pm) LSAD Lecture room.

Deliverable:
Each group will have 15 minutes to present the process they undertook during the project and the final conceptual solution (physical or virtual prototypes will help when describing the final work).

Considerations:
*How can an 'object' be poetic?
*Can an 'object' be disposable and yet leave a legacy?
*Can an 'object' be made out of a temporary or ephemeral substance? Does it have a life span? Does it leave an after image? How can you treat this?
*Can an 'object' be both functional and have an aesthetic of the sublime?
*How can the 'object' be experienced, individually, or collectively? Must everyone have the same experience?
*Consider the multiple in art and in product design. How has the multiple become the everyday domestic object? How can your proposed object become a multiple?

S AR3 Participant Diary [sample]

8th - 15th Feb - KSAD Project.
Collaboration

We had the priviledge to collaborate with
the KSAD for a one of project. After
been introduced to both courses we were
divided into mixed groups and were
given a brief. → To design an object
to be placed in a kitchen - aesthetically
pleasing.

At first I think we all found it hard
to work together as the product designs thought
of the functional aspects of design primarily
while the KSAD students focused mainly on
aesthetics. After several meeting and
brainstorming sessions we were able to
use all our strengths to create a
design everyone was happy with. We
came up with the Eco-Fridge. A fridge
which could be ran with very little
energy - As the weather would be used to
cool the fridge and one side would also
be used as a green house, allowing
fresh fruit and veg to be readily available

Linda Huggins

Thermostat ready to kick in power if freezer isn't cold enough

ceramic material

Freeze ↓

← water is collected evaporates and stored in freezer.

↓ plants
↳ fruit and veg

← heat causes the water to rise

melting watches

Runs through

keeping fridge cold

water is cooled and condensed

The 'Veg-acy'

"Humpty Dumpty got stuck in a wall
Humpty Dumpty glow for all"

(5)

---

to the user at all times. As a group we were all delighted with resulting product though we felt that the complexity of the Mechanics of the fridge took time away from perfecting the presentation of our product. Unfortunately there was no time for a Solid Model to be made or for Computer Aided Model. We had plenty of drawings to portray our idea, however it was very disappointing that we could not deliver to our best potential.

I find the project to be a massive success. I became more creative in my concept development rather than thinking of problems with my design instantly. New friends were made and our minds definitely left wide open a lot more open than when we entered it. It was well worth giving 100% to and the outcomes were priceless.

T AR3 Questionnaire and response [sample]

Choose your own adventure: My project story LSAD & UL

1.

This is where you get to tell us your side of the story from the collaborative project between LSAD (Sculpture and Combined Media)and UL (Product Design + Technology). We really want to understand your experience and learning in order to build a collective story so we can improve this type of project in the future.

This information WILL NOT be used in marking and it will be kept private so please be as critical and as honest as you want.We are adults and can take it!

We would love you to tell us the whole story but if this isn't possible tell as much as your time will allow (something is more useful than nothing!).

Thank you for doing this, we really appreciate it.

Aideen, Muireann, Amanda and Kate

*1. ONCE UPON A TIME I (insert your name)

[   ]

*2. worked on a project with (insert names of group members)

[   ]

✱3. Our challenge was to explore the domestic kitchen and create 'beautiful' experiences for users in that space. We began by ...*

***PROMPTS you could think about the following things from your individual experience and from the group experience: 'getting to know you';**

building trust;

making sense of the project;

the conversations (talking to each other);

overcoming 'language (discipline)' differences;

evolution of the project;

how ideas were found;

how ideas were realised;

the processes used;

how decisions were made;

moving from stage to stage;

group dynamics (interaction, relationships);

resolving issues- peace & conflict;

whose voice was loudest;

how knowledge was shared;

what did I bring to the table;

what did others bring to the table;

the division of labour;

different inputs (who did what & when);

lessons we/I learned;

skills I've acquired;

opening my eyes to new things (or not!);

similarities & differences;

moving beyond my own discipline;
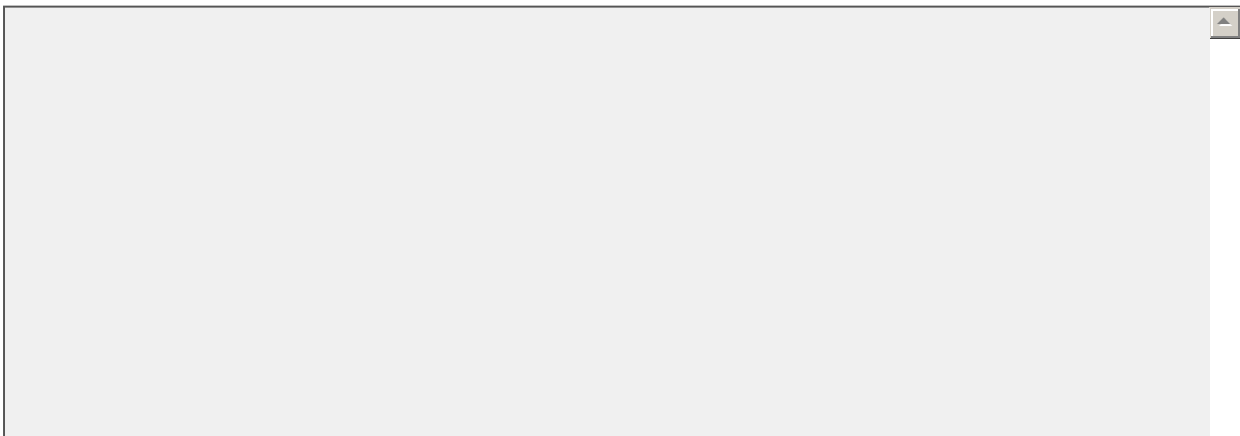
how did I make sense of the process;

where did I fit in;

how is this type of project useful/not useful;

relevance to my practice;

how I behaved compared to other project work.

[text box]

*4. FINALLY after a long two weeks we decided on our idea(insert a brief description of your final concept here)...

[text box]
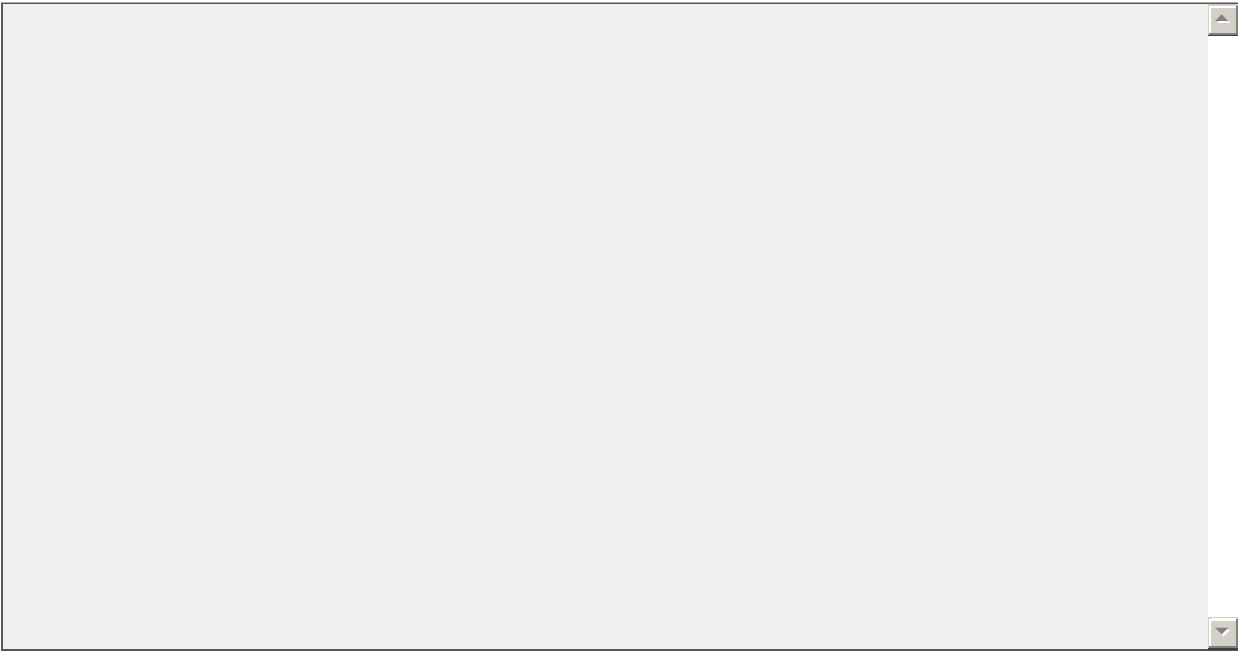
*5. and exactly how we chose was (how was this decision made)...

[text box]

*6. Now that some months have passed, I've had time to think (reflect on your project experience)...

[text box]

*7. The most important thing I've learned is that (put in the most important thing you learned)...

[text box]

＊8. and it's obvious in my work since then because (what if any influence has it had on your work or practice following the project)...

＊9. And so I would/ or wouldn't like do a project like this again.

☐ Would

☐ Would Not

THE END

Q3. Our challenge was to explore the domestic kitchen and create 'beautiful' experiences for users in that space. We began by ...*
*PROMPTS you could think about the following things from your individual experience and from the group experience: 'getting to know you';
building trust;
making se...

1	I found talking to each other to be very easy. The only difficulty we found were trying to make a time to meet up for everyone and the found it difficult to not constantly only think of the functional side of the object and we found it difficult to stop constantly thinking of the crazier side of the object. Ideas were found from the combination of everyones personal research. Ideas were also realized by concentrating on popular products and incorporating them into the project. The process we used was getting the product design students to ensure the product stability and function and the sculpture students designed the appearance of the product. Moving from state to stage was achieved by commencing with brainstorming-then research- more brain storming- thinking of practical use and functioning use- everyone deciding to stick to an idea, execute the idea- practicality function. Our group had a great group interaction everyone worked well together and accommedated each other time wise. We were all mostly on the same side and encouraging about each others ideas so there was no conflict to resolve. Out of all i taught that the sculpture students spoke up more in the assignments to generate more ideas. Knowledge was shared by product design sharing there constructional experties and the sculpture students helped the product design to think more outside the box. I felt that I contributed with my research and and my lateral thinking. Always ensuring to voice my opinion if I didnt agree with an idea. I felts others brought there open minded thinking, positivity and enthusiasm. The division of labour lay in the product design students knowing exactly how to construct the design created and the art students were a lot better for designing the product using very strange layouts.	May 23, 2011 2:49 PM
2	discussing options and then brainstorming together. We settled on one topic and then started coming up with our individual ideas to bring to the group so that we could chose a few to combine. at times i felt the UL group didnt take it that serious so there was more of a much from our side to try get things goin because the motivation wasn't great with UL.	May 23, 2011 2:39 PM
3	making sense of the brief. Listing practical functions and alternative functions of the space. Realistic and Unrealistic aspects of the space. The emotions prompted by the space. (safety, sense of ease etc) The origin of the object and products of the space. (food mainly) The expectations associated with the kitchen. And Ultimatley, the "expierience" of the space, and how we could highlight and draw attention to certain "forgotten aspects" involved with the kitchen. And how we are not as concious to the origin of products, found in the kitchen.	May 20, 2011 11:16 AM
4	...	May 10, 2011 1:57 PM
5	We never really got to know UL members of our team properly. This was partly due to the fact that we only met on the two occasions timetabled. We started brainstorming-writing ideas down on a large sheet of paper.We decided to focus on the idea of dangerous equipment in the kitchen.Discussions ensued around the notion that the kitchen looked safe for children but really wasn't. The playground was suggested as a safe place for children in contrast.We went away from UL the first day with the idea of dangerous kitchen equipment in a playground setting. We were thinking of making something that would give the message that the kitchen contained lots of dangerous objects and therefore children especially needed care in the kitchen. All members of the group contributed to the brainstorming.C	May 9, 2011 10:27 PM

Q3. Our challenge was to explore the domestic kitchen and create 'beautiful' experiences for users in that space. We began by ...*
*PROMPTS you could think about the following things from your individual experience and from the group experience: 'getting to know you';
building trust;
making se...

	from UL said he would send out all our email addresses to each member, which he did. That was Monday, 7th Feb. Tues. 8th I had rehearsal for performance and 'Dry' Performance that evening. Wed, 9th Cian, Annemarikye had a full day CCS lectures in George's Quay. Group met again on Thursday in LSAD. We all had done our best to do some drawings and further thoughts on idea. This was bad day for our group. Aideen and other tutors tried their best to help us out of our difficulties. Our problem was we were not discussing things. Ana from UL did her best. Others from UL did not talk really. It was all very tense. I suggested we leave playground idea behind but all of the other six members disagreed. To be honest I couldn't see way clearly myself. We didn't have brief sheet with us, when we wanted to check it. In hindsight I realised no one had any idea how to proceed. As a group we badly needed to open up and talk. It may have helped if I had taken more of a lead or someone else but nobody did. It was such a frustrating day. I knew we needed to meet again and suggested it. C from UL said he'd meet Annemarikye and I after 4pm Friday. He cancelled on Friday. Annemarikye offered to work on powerpoint presentation for the following Tues. 15th, which I had started.	
6	Getting to know eachother and generating ideas. At the beggining was everything ok, we have decide what products to go to, but I think we didnt interact within the group as we should. The division of work was unbalanced, were pwople that did nothing. It was interesting for me to open my eyes to other disciplines, but to be honest I have studied art and know the artistic aproach too, but what was new for me was working in collaboration. If was well planned the result could be better, but I guess the lack of interest from few and maybe lack enthisiasm are a barrier to succeed in a project. I think was useful to understand other disciplines.	May 9, 2011 5:36 PM
7	looking at all the "disgusting" things that grow in the kitchen, we looked at mould, decay etc. . . us, the art students had a more creative feel to the project, the ul students were more practical, we seemed to just be very idealistic, and we'd then try to make our ideas come to life, where as the Ul students were practical from the start, drawing out their ideas and keeping to more practical ways of thinking. it was cool that we thought in different ways, was nice to get to know how they thought and how they planned their work. we all worked very well as a team and we all put in an equal amount of work, research, drawings, ideas and all that stuff.	May 9, 2011 12:14 PM
8	I took this project on as group project that involved total group work and not just all individul work pooled together.	May 7, 2011 12:33 PM
9	Our project really started with a bit of chatting and getting to know each other. Telling absolutely absurd stories in realation to the kitchen eg. the woman in America who put her cat into the microwave to dry him and then wanted to sue the company for not stating that microwaves were unsuitable for drying pets... A bit mad I know, but it was none the less a great way of breaking the ice. As a result of these little anecdotes, our first thought was to put various things into a microwave and see what we could do with those materials. However we moved away from that idea for fear of it turning into something of a secondary school science experiment gone wrong. There was a definate feeling in the group to explore something environmental, which is what brought us onto the idea of food as cutlery, a whole meal could	May 7, 2011 10:38 AM

U AR4 Project Packs

Brief

Background

The role of the designer is changing; it is no longer to give shape to products instead it is to shape experiences for users and to use the creative spark to change behaviour for positive impact. With these considerations in mind look at the brief you have been given and together in a team (comprising members from Hogeschool Utrecht, The Netherlands & University of Limerick, Ireland), research, ideate and design innovative solutions that go towards tackling the issues.

Statement

A study has been performed for Driessen Aerospace, a Dutch supplier for Boeing and Airbus. This study looked at the resting experience of flight attendants (FA) during intercontinental flights. This exploration was completed quite recently by the Research Centre of the University of Applied sciences Utrecht (KTI). This study has produced quite a number of interesting user insights on the resting experience and the Crewrest Cabin for these FA's. These insights are clustered around several themes.

Your assignment is to create an improved resting experience by designing a completely new Crewrest from the user perspective. You will build on the research generated from the previous project and generate new ideas and concepts for the Crewrest area.

The focus of this assignment will be on innovative concepts rather than technical engineering. The level of innovation is described as: should be realistic in 5 years. Driessen Aerospace will use your ideas and concepts as input for further future development of their Crewrest. It is underlined that this assignment is therefore not fictional. It is part of a real research and design project!

You will work in teams with Irish-Dutch team members, bringing together a diverse mix of qualities, skills and backgrounds. This will give you an opportunity to discover and use each others skills. But this will also challenge you to deal with the differences in language, time and place. Therefore a productive co-operation between the Dutch and Irish team members is a key-factor in this assignment.

As the Crewrest Cabin is an immensly complex design project, each team will have an individual focus. They will be given a specific theme or perspective that will help them narrow the scope of their assignment. In that specific area the teams are expected to create profound insights, many innovative idea's and come up with sparkling concepts that have a certain degree of realism but also extensively provoke the imagination of the client!

You will be provided with information coming from the preliminary user studies. This consists of a PDF that you can find in Dropbox and on the blog, and a set of persona's. For further information your team can consult Fred on Tuesdays and Wednesdays, as he was involved with this user exploration project.

Each team will receive a rating every week. This is a signal as to whether your team is on track or if you will all have to increase your effort and quality. We will rate the team based on:
- your weekly presentation
- the quality of the material produced and blogged every week
- the impression your tutor was given during the team meetings

You're team will get one of the following comments:
* Come on put in some effort here (poor effort)
** It's ok but it's never going to be amazing if you stay at this pace (some effort but more needed)
*** It's going ok but go on push yourselves further (satisfactory).
**** Going well but it could be amazing with a little more effort (good)
***** Brilliant keep it up now!

At the end of the assignment the Dutch and Irish tutors will give final grades for their own students.

remember   http://designcollaborationhuandul.wordpress.com

. Ideas must be generated, decided upon and communicated collaboratively.
. The skill set of your multi-disciplinary team is wide and varied so exploit everyone's skills as best you can.
. Communication is key to effective collaboration; share your ideas with the team as much as you can. You are a team so always be 'selling' the same message.
. Be visual with all of your work, it's just easier to understand when english isn't a first language.
. Remember to understand and manage your clients expectations carefully.

.....Project Brief....

Brahim
practical & comfort
where ever I lay my head I sleep

rest=easy

fysical

resting =me

Jasmine
privacy & rituals
I must rest in order to perform well during work

Irene
freedom & control
I want to do, whatever I want

resting=work

rest=difficult

mental

Flexibility

The Crewrest is used for different activities, such as sleeping, reading, freshening-up, etc.. Besides that it is used by people with quite different characteristics: personally, culturally and demographically. A flexible interior would help flight attendants to rest comfortable and get ready for work in a way they want to, proving a sense of control and autonomy in a world where everything is done according to procedures.
- One should be able to personalise a bunk and bring your personal belongings
- Crew members should be able to adjust settings individually (temperature, lighting, alarm, position of the bed, etc.)
- Crewmembers should be enabled or invited in doing what suits them best at that specific moment of resting, whether that is reading, listening to music, sitting, lying down, doing some exercises.
You and your team have to explore realistic s (and maybe not so realistic) scenarios of using the bunk, and designing a bunk that fits the crewmembers need for freedom and flexibility taking in account the small available space and all the other colleagues!

Transitions

It is heard quite often from the FA's that it is a radical transition from work to rest in less than minutes.
A crewrest that helps FA's to make the journey from being a professional towards being a private person (and back) potentially will have much impact on the quality of the Crewrest.
- The layout could aid, or be altered to match the different steps of the resting process. From de-stressing, to sleeping and getting ready.
- Transitions could be made less hectic.
You and your team will have to become experts on all the different moments and actions during the transition from work to a relaxed rest moment. What happens during that transition and how can it be supported in order to help FA's transform?

Closing off

In order to create autonomy and a personal space for crew members, the crewrest should shield flight attendants from work and provide safety and privacy. And eliminate distractions, allowing crew members to rest peacefully, in a way they want to. Borders work two ways, they will have effect when you're afraid to wake others and they work when you are disturbed by others, helping you to close off.
- The crew-rest should probably provide privacy, allowing flight attendants to feel private, autonomous and do what they want to.
- It should probably isolate from disruptions such as sound and light
- The crew-rest should provide a sense of safety, a border between rest and work/ passengers
So how does one design for the sensation of privacy and safety?

Nurturing

The bunk must be clean and comfortable, optimally designed to have regenerating properties with a good soft "real" bed. The atmosphere inside the bunk and inside the hallway must be fresh and aid resting. And maybe there should be a way to refreshing yourself as well.
- The crew-rest is preferably be clean and tidy
- The air must be refreshing (clean, a good temperature, good humidity and smell)
- It might provide the ability to freshen up
- The crew-rest should aid resting (with sound, smell, comfort, etc.)
A nurturing crewrest could work as a 5 star hotel room, or a sauna, or... It's up to your team to come up with ideas and conceptual design that manages to deliver that qualities in a small space packed with tired colleagues! Go!

.....Project Brief....

Look & Feel

Current crew-rests give users the impression that weight, safety and production possibilities were during the design process higher rated than the way it looks and feels.

The visual aspects of the crew-rest, or the way the crew-rest looks extensively influence how the crew-rest is experienced and could potentially even improve the healing capacity of the crew-rest. On top of that it could be used to create a visual separation between work-space and private-space. Tactile, auditory and olfactory properties; feel, further define the feeling experienced by being inside the crew-rest.

- The crew-rest should look well taken care of
- Aimed at feeling like a resting place (like the chocolate on your bed in a nice hotel)
- It could provide a homey feeling
- It could look and feel different than the cabin so FA's can see the difference between work and rest better (other colours materials, lines/ shapes)

Service

The current crewrest is designed as a large space, a machine of technical unit that must perform according to endless pages of critical demands. The crewrest is designed as a "thing" rather than a place where a "service or small interaction" could make the difference!

During the research the FA's mentioned at several moments how wonderful their experience was when there were small interactions between colleagues: a steward who brought tea when it was time to wake up or a purser who had put on some music to wake up their staff in a personal and gentle way. In this theme you are challenged to come up with all kind off services performed between the staff members, and design the conditions that re-enforce such initiatives. All of that taking in account that people are frequently tired and are not always open to parties and so-one. So your challenge will be to design a crewrest with the focus on rich positive interactions!

NL — Hogeschool Utrecht

IRE — University of Limerick

x 3 students

x 3 students

project teams
getting to know you

05.09.11
Introductory meeting + Briefing
12 -2 (dutch time NL)
11-1 (irish time Ire)

1.Research

Begin: 05.09.11
Complete: 09.09.11

Research techniques
Team meetings:
Thursday 8th: 3-5 (NL),2-4 (Ire)
Friday 9th: 10-12 (NL),9-11 (Ire)
Diary Review

2.Ideation

Begin: 12.09.11
Complete: 16.09.11

Group meeting:
Monday 12th: 12 -2 (NL)11-1 (Ire)
Team meetings:
Thursday 15th: 3-5 (NL),2-4 (Ire)
Friday 16th: 10-12 (NL),9-11 (Ire)
Diary review

3.Concept Generation

Begin: 19.09.11
Complete: 23.09.11

Group meeting:
Monday 19th: 12 -2 (NL)11-1 (Ire)
Team meetings:
Thursday 22nd: 3-5 (NL),2-4 (Ire)
Friday 23rd: 10-12 (NL),9-11 (Ire)
Diary review

4.Synthesis + Presenation

Begin: 26.09.11
Complete: 30.09.11

Group meeting:
Monday 26th: 12 -2 (NL),11-1 (Ire)

30.09.11
Final presentation to clients
Friday 30th: 10-12 (NL), 9-11 (Ire)

1.
. Pick apart the brief.
. What does it mean (individual, team)?
. Understand the clients, users + situations of use.
. Identify stakeholders + their needs

Deliverable: visual presentation of key research findings + stakeholder needs, research pack containing details of research methods employed + results

2.
. Generate solutions to the research needs identified in stage 1
. Explore ideas from the most realistic to the most ridiculous! Be wild + crazy!
. Communicate of your ideas through diagrams, sketches + models.

Deliverable: visual presentation containing evidence of extensive idea generation + exploration.

3.
. Filter your ideas from stage 2 (refer to your research)
. Develop 10 of the most viable + interesting ideas (work on functional + aesthetic details).
. Test designs amongst the users (using prototypes

Deliverable: visual presentation explaining the details of the 10 chosen concepts.

4.
. Filter your ideas from stage 3 (use your testing to guide you)
. Develop 5 concepts (individual concepts or combinations of features). Filter the ideas again into 1 clear innovative design
. Specify the features of the design (materials, technical detail, functionality etc.)
. Communicate your ideas using storyboards, visualisations, video, models + marketing material.

Deliverable: Visual presentation detailing the final design concept.

.....Project Details....

record

Wordpress www.wordpress.com

Each team sets up ONE blog www.wordpress.com. This will act as a daily digital diary of the project activity.
Post your work, hold your conversations, reflect, show your processes + decisions. Record every aspect of the project.

The tutors will also post comments and feedback on your blog so that everyone can keep up to date with what is happening.

You will also connect your blog to a central project blog
http://designcollaborationhuandul.wordpress.com
where general project information will be posted.

talk

Skype www.skype.com

Skype will be used as the main way to talk to each other and to hold team meetings.

Each team should set-up two skype accounts (one in each location) and use these for formal and informal meetings. There will be times when formal meetings are needed and other times when a simple question needs to be answered.

Just remember time differences when you are arranging meetings!

share

DropBox www.dropbox.com

Dropbox will be used as the document folder for the project. It is where your team will upload all the 'working' documents for the project. Once the documents (reports, presentations, images etc.) are finished and agreed on by the team then they can be posted to the blog.

Set-up one dropbox folder per team dn invite all team-members to join.

Teamviewer www.teamviewer.com

This free desktop sharing software will allow your whole team to work together in real-time.

Team members in one location can see and access the desktop of their team members in another location. The whole team can work on the project together.

This will allow the teams to discuss and make changes to ideas immediately.You should use this software during formal meetings when important decisions are being made and design concepts are being worked through.

.....Project Tools....

Team roles

Each member on the team will have a role as well as acting as member of the team. This gives everyone some responsibility and adds to making this a really enjoyable and interesting project! The roles sound complicated but they're not! So have a look at what each role involves and decide on one person to take on each role in the two countries. Work closely with your counterpart in the other country to make the most of your skills! How you divide these roles between one-another is up to the team, but by Wed 7th your roles should be be clear and communicated to the tutors.

Co-Ordination

Your role is to look after the project (simple!) and to make sure everyone is getting involved in equal measure. You also have to plan when and how you are going to meet as a team and who takes on the different tasks so you deliver the best quality design work at the different stages of the project.

Basically you're there to make sure everything is running smoothly and that every detail (even down to the smallest one) is looked after! So if you love project management and are good with people (being diplomatic is key!) then this is the role for you.

co-ordinator

Presentation

This is the job for the person who loves making visually and verbally interesting presentations (imagine yourself as the next Steve Jobs!). So when your design work is been shown to the tutors and the clients it's up to make sure you have the contributions from everyone on the team and that it sells your ideas as well as possible.

You can give the presentations yourself or work with other team members to present the work. Some knowledge of presentation software would be a bonus!

presentations expert

Collaboration

Your job is to make sure the collaboration works perfectly (no pressure!) and that the two halves of the team know what's going on all the time. You will be keeping the blog up to date (which means updating as often as possible) and 'encouraging' the other team members to record and put up their work at the right time.

You will also be getting the hardware and software ready for your team meetings, setting up the Skype etc. so you should probably already know a thing or two about technology!

collaboration expert

.....Team Roles....   http://designcollaborationhuandul.wordpress.com

Brief

'We design to survive, to improve, to develop, to thrive, to evolve, to serve others, to make something of lasting quality and of real consequence'

(Nelson and Stolterman 2003).

Background

Design has the potential to bring about real and tangible improvements in the lives of users through creativity and a mix of disciplines. Having lots of different types of intelligence feeding into the creative process leads to more innovative solutions. Design and other creative industries are being encouraged to take the lead by employing their practical skills, problem-solving ability and technical knowledge to tackle some of the biggest challenges of modern life.

Bring on the clowns!

'In a world dogged by economic crises and natural disasters we are often so inundated with negative news that we forget the joy and happiness that can still be found. In your teams, comprising members from each country explore design ideas within the client brief that bring back a sense of fun for both the individual and the collective'.

Your client MWV (www.meadwestvaco.com) have asked your team to consider the statement above and to explore design solutions for food packaging in order to improve the user experience and guarantee safety, as well as reducing environmental burden.

Your assignment is to explore the broad area of food packaging and to identify areas of opportunity across any sector or user group. You must then translate these opportunites into innovative design concepts. Your designs should go beyond the current paradigm of packaging and begin to tell the story (a fun story!) of what is 'contained' within it.

Your team must work together (across the distance and time) to develop innovative and creative design solutions for your client. The better your team can collaborate the better the project experience will be.

As with all design projects you should take cognisance of function, aesthetics, materials & manufacturing, human factors and sustainability issues in your design solutions.

http://designcollaborationvcuandul.wordpress.com

remember

. Ideas must be generated, decided upon and communicated collaboratively.
. The skill set of your multi-disciplinary team is wide and varied so exploit everyone's skills as best you can.
. Communication is key to effective collaboration; share your ideas with the team as much as you can. You are a team so always be 'selling' the same message.
. Be visual with all of your work, it's just easier to understand when english isn't a first language.
. Remember to understand and manage your clients expectations carefully.

Assessment

Each team will receive a rating every week. This is a signal as to whether your team is on track or if you will all have to increase your effort and quality. We will rate the team based on:
- your weekly presentation
- the quality of the material produced and blogged every week
- the impression your tutor was given during the team meetings

You're team will get one of the following comments:
* Come on put in some effort here (poor effort)
** It's ok but it's never going to be amazing if you stay at this pace (some effort but more needed)
*** It's going ok but go on push yourselves further (satisfactory).
**** Going well but it could be amazing with a little more effort (good)
***** Brilliant keep it up now!

At the end of the assignment the US and Irish tutors will give final grades for their own students.

US — Virginia Commonwealth University

IRE — University of Limerick

x 3 students — **project teams** getting to know you — x 3 students

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08.09.11

Briefing 05.09.11
Introductory meeting Thursday 8th
10 -11 (US time US)
3-4 (irish time Ire)

1.Research

Begin: 05.09.11
Complete: 09.09.11

Research techniques
Individual review (local)
Team meetings (groups to arrange)
Diary Review

1.

. Pick apart the brief.
. What does it mean (individual, team)?
. Understand the clients, users + situations of use.
. Identify stakeholders + their needs

Deliverable: visual presentation of key research findings + stakeholder needs, research pack containing details of research methods employed + results

---

2.Ideation

Begin: 12.09.11
Complete: 16.09.11

Group meeting:
Monday 12th: 10-11 (US),3-4 (Ire)
Team meetings (groups to arrange)
Diary review

2.

. Generate solutions to the research needs identified in stage 1
. Explore ideas from the most realistic to the most ridiculous! Be wild + crazy!
. Communicate of your ideas through diagrams, sketches + models.

Deliverable: visual presentation containing evidence of extensive idea generation + exploration.

3.Concept Generation

Begin: 19.09.11
Complete: 23.09.11

Group meeting:
Monday 19th: 10-11 (US),3-4 (Ire)
Team meetings (groups to arrange)
Diary review
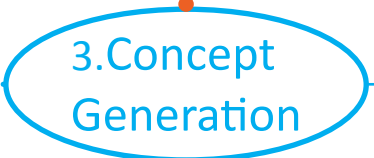
3.

. Filter your ideas from stage 2 (refer to your research)
. Develop 10 of the most viable + interesting ideas (work on functional + aesthetic details).
. Test designs amongst the users (using prototypes

Deliverable: visual presentation explaining the details of the 10 chosen concepts.

4.Synthesis + Presenation

Begin: 26.09.11
Complete: 30.09.11

Group meeting:
Monday 26th: 10-11 (US),3-4 (Ire)
Team meetings (groups to arrange)
Final Diary review

4.

. Filter your ideas from stage 3 (use your testing to guide you)
. Develop 5 concepts (individual concepts or combinations of features)
. Specify the features of the 5 designs (materials, technical detail, functionality etc.).
. Communicate your ideas using storyboards, visualisations, video, models + marketing material.

Deliverable: Visual presentation detailing final 5 concepts.

04.10.11

Final presentation to clients
Tuesday 4th Oct: 9-11 (US), 3-5 (Ire)

.....Project Details....

V AR4 Questionnaires and response analysis [sample]

Pre Project Questionnaire:
University of Limerick, Hogeschool Utrecht
and Virginia Commonwealth University

Name	
College	
Major	
Date	September 6, 2011

Please answer the following questions. Your responses will remain strictly confidential.

1. In your opinion, which discipline should drive the product innovation process: _____

2. Using the scale below, circle the response that indicates how much you disagree or agree with the following statements:

SD=Strongly Disagree   D=Disagree   N= Neutral   A=Agree   SA=Strongly Agree

1.	I am happy to work with individuals from other countries and backgrounds.	SD	D	N	A	SA
2.	I am willing to take partial responsibility for the successes and failures of team projects.	SD	D	N	A	SA
3.	I consider other people's views in decision-making (even if they differ from my own).	SD	D	N	A	SA
4.	My own work benefits from being involved in collaborations.	SD	D	N	A	SA
5.	I find it difficult to understand and consider the opinions of others in my work.[neg]	SD	D	N	A	SA
6.	Collaboration has advantages for the entire team.	SD	D	N	A	SA
7.	I find it easy to share project information and work.	SD	D	N	A	SA
8.	I am nervous about being judged if others see my work. [neg]	SD	D	N	A	SA
9.	All members of a team should have a shared vision.	SD	D	N	A	SA
10.	I can easily make decisions with others on my team.	SD	D	N	A	SA
11.	All team members should contribute in equal measure to the success of a project.	SD	D	N	A	SA
12.	I think I have a lot to contribute to team projects.	SD	D	N	A	SA
13.	I expect to experience new ways of doing thing from working with others.	SD	D	N	A	SA
14.	I feel comfortable pushing accepted boundaries to get new ideas.	SD	D	N	A	SA
15.	I am looking forward to this project.	SD	D	N	A	SA

3. Please rate your problem solving ability. Use the following scale:
SD=Strongly Disagree   D=Disagree   N= Neutral   A=Agree   SA=Strongly Agree

Making decisions on my own in my work is difficult. [neg]	SD	D	N	A	SA

4. What do you understand by the term *Social Sustainability*?

5. What does *Social Sustainability* mean to your discipline?

Thank you for completing this survey!

Comment [M1]: Participation/ Engagement

Comment [M2]: Responsibility, Team Work- ACCOUNTABILITY

Comment [M3]: Compromise. Openness

Comment [M4]: Benefits of collaboration

Comment [M5]: Compromise

Comment [M6]: Benefits of collaboration

Comment [M7]: Sharing Ideas

Comment [M8]: Comparison, Own Ability- confidence.

Comment [M9]: Synergy

Comment [M10]: Decision-making, Compromise

Comment [M11]: Responsibility

Comment [M12]: Own ability-confidence

Comment [M13]: New processes.

Comment [M14]: Confidence – own ability [pre]. Openness.

Comment [M15]: Participation/ Engagement

Comment [M16]: Decision-making, Confidence- own ability [pre].

Virtual Teaming Project – Post Survey
University of Limerick and
Virginia Commonwealth University

Name	
Major	
Date	October 2011

Please answer the following questions. Your responses will remain strictly confidential.

1. In your opinion, which discipline should drive the product innovation process: _____

2. Using the scale below, circle the response that indicates how much you disagree or agree with the following statements about **YOUR TEAM EXPERIENCE**:

SD=Strongly Disagree   D=Disagree   N= Neutral   A=Agree   SA=Strongly Agree

Team Experience

		SD	D	N	A	SA
1.	1 A lot of group interaction occurred on our team.	SD	D	N	A	SA
2.	4 Our team ideas were very creative.	SD	D	N	A	SA
3.	6 I was highly challenged by working on this team.	SD	D	N	A	SA
4.	7 The members of our team valued their membership on the team and worked to make it one of the best.	SD	D	N	A	SA
5.	8 There was a tolerance for new ideas.	SD	D	N	A	SA
6.	11 Members of our team encouraged risk-taking.	SD	D	N	A	SA
7.	12 Some members of the team did not pull their share of the workload.	SD	D	N	A	SA
8.	13 New ideas were encouraged, even if not all team members agreed with them.	SD	D	N	A	SA
9.	14 After an issue was raised, our team quickly reached a decision as to what to do about it.	SD	D	N	A	SA
10.	15 When faced with a problem, our team worked together to overcome it.	SD	D	N	A	SA
11.	16 The process we went through was effective for clarifying and understanding the challenge.	SD	D	N	A	SA
12.	18 Team members provided a lot of feedback to each other.	SD	D	N	A	SA
13.	19 On this project, team members were dependent on the cooperation of other team members to successfully do their jobs.	SD	D	N	A	SA
14.	20 The members of our team felt that they had a personal stake in the success of the team.	SD	D	N	A	SA
15.	22 Our team frequently experimented with alternative ways we might carry out our work.	SD	D	N	A	SA
16.	24 Our team communication was open.	SD	D	N	A	SA
17.	25 On this project, team members were required to jointly make important project-related decisions.	SD	D	N	A	SA
18.	28 The different expertise on my team greatly added to the quality of the solutions generated	SD	D	N	A	SA
19.	29 Information sharing among team members was strongly encouraged.	SD	D	N	A	SA
20.	30 Our team was highly imaginative in thinking about new or better ways we might perform our tasks.	SD	D	N	A	SA
21.	31 Team members made working on the project a priority.	SD	D	N	A	SA
22.	32 I felt other teams worked together better than ours.	SD	D	N	A	SA
23.	36 The group culture was tolerant of extreme ideas.	SD	D	N	A	SA
24.	37 People always responded to each other on our team.	SD	D	N	A	SA
25.	38 Team meetings were productive.	SD	D	N	A	SA
26.	39 Our team worked together like a team should.	SD	D	N	A	SA

Thank you for completing this survey!

27.	40 When a non-routine matter comes up in our work, we often invented new ways to handle the situation.	SD	D	N	A	SA
28.	41 We had to do a lot of negotiation to come up with ideas.	SD	D	N	A	SA
29.	42 Team meetings were well organized.	SD	D	N	A	SA
30.	43 Our team's ideas were innovative.	SD	D	N	A	SA
31.	44 In our team meetings, we often got sidetracked into informal casual conversations.	SD	D	N	A	SA
32.	45 Our team had mutual understanding.	SD	D	N	A	SA
33.	46 Our negotiations /arguments/discussions were productive in all parts of the process	SD	D	N	A	SA
34.	47 We depended on the expertise of the different disciplines in our team to complete the project.	SD	D	N	A	SA
35.	48 Members on the team were slow to share information.	SD	D	N	A	SA
36.	49 Everyone on the team believed that sharing information is important.	SD	D	N	A	SA
37.	50 The members of our team were committed to a common set of project objectives.	SD	D	N	A	SA
38.	51 Our team accomplished its project objective(s) and met project sponsors expectations.	SD	D	N	A	SA
39.	52 It was exciting for me to participate on this team.	SD	D	N	A	SA
40.	53 Our team had problems communicating.	SD	D	N	A	SA
41.	54 Our team shared ideas, information and resources					
42.	55 Some team members didn't respond well to critique of their work					
43.	56 Members of our team shared the same vision.	SD	D	N	A	SA
44.	57 Our team had great dialogues and a lot of two way communication going on.	SD	D	N	A	SA

Support Strategies used in problem solving

66 We argued to justify proposals or ideas.	SD	D	N	A	SA

3. Using the scale below, circle the response that indicates how much you disagree or agree with the following statements about your **INDIVIDUAL PROJECT EXPERIENCE:**

SD=Strongly Disagree   D=Disagree   N= Neutral   A=Agree   SA=Strongly Agree

My Project Experience

1 I enjoyed working with individuals from other countries & backgrounds	SD	D	N	A	SA
2 I felt uncomfortable sharing my ideas with the other team members.	SD	D	N	A	SA
3 I was willing to change my opinion after discussing my ideas with my team mates.	SD	D	N	A	SA
4 Throughout the project I felt I could give my opinions freely.	SD	D	N	A	SA
5 I feel my voice was heard when the team made decisions	SD	D	N	A	SA
6 I could not have done such a good job on my own.	SD	D	N	A	SA
7 I felt individual responsibility when the decisions the team made didn't work as well as intended.	SD	D	N	A	SA
8 At stages, I felt I needed some time away from the group to work on the project.	SD	D	N	A	SA
9 I had fun working on this team project.	SD	D	N	A	SA
10 I would look forward to continuing to work on this team.	SD	D	N	A	SA
11 I am personally satisfied with the way in which my team made decisions and reached solutions.	SD	D	N	A	SA

Problem Solving Ability

Thank you for completing this survey!

12 I feel my problem solving ability has improved since taking part in this project.	SD	D	N	A	SA

Evaluation

13 I would change some of the approaches or methods used if I were to do the project again.	SD	D	N	A	SA

3. In your opinion, what worked well for your virtual teaming experience (what were the successes)?

4. In your opinion, what did not work well for your virtual teaming experience (what were the challenges)?

5. How has your understanding of Social Sustainability changed since this project?

6. Feel free to provide any additional comments that you wish.

Thank you for completing this survey!

AR4 Pre and Post Project Questionnaire Responses (collated)

Category	Question Codes
Collaboration	Q2_4, Q2_6, Q4_6
Confidence	Q2_8, Q2_12, Q2_14, Q4_5
Participation/Engagement	Q2_1, Q2_15, Q4_1, Q4_9, Q4_10
Compromise	Q2_3, Q2_5, Q2_10, Q4_3, Q3_1
Decision Making	Q2_10, Q3_1, Q4_5, Q4_11
Risk Taking	Q2_14, Q2_15
Responsibility [Individual]	Q2_2, Q4_7
Division of work	Q2_11, Q2_7
Problem Solving	Q2_4, Q4_12
Sharing of Ideas	Q2_7, Q2_8, Q4_2, Q4_4
Synergy	Q2_9, Q2_43
New Processes	Q2_13, Q2_15, Q2_20
Dialogue	Q2_3, Q3_1, Q4_8, Q4_13

Participant metadata (Participant, College, Discipline, Gender, Team Number):

Participant	College	Discipline	Gender	Team Number
1	3	6	f	IRL US4-F
2	1	1	m	IRL NL4-3
3	3	2	m	IRL US4-E
4	3	7	f	IRL US4-B
5	3	2	f	IRL US4-B
6	3	6	f	IRL US4-A
7	3	5	m	IRL US4-F
8	1	5	f	IRL US4-D
9	1	1	m	IRL US4-C
10	3	2	m	IRL US4-F
11	3	2	m	IRL US4-D
12	3	2	m	IRL US4-C
13	2	10	m	IRL NL4-6
14	1	1	f	IRL US4-C
15	3	7	m	IRL US4-A
16	1	1	m	IRL NL4-2
17	1	1	m	IRL NL4-4
18	2	1	m	IRL NL4-4
19	1	1	m	IRL US4-F
20	1	1	f	IRL US4-A
21	1	5	m	IRL US4-E
22	1	1	m	IRL NL4-4
23	1	1	f	IRL NL4-3
24	3	6	m	IRL US4-E
25	1	1	f	IRL NL4-3
26	2	12	m	IRL NL4-5
27	1	1	f	IRL US4-B
28	3	2	m	IRL US4-D
29	3	2	m	IRL US4-F
30	3	6	f	IRL US4-C
31	1	1	m	IRL NL4-6
32	1	1	m	IRL US4-C
33	3	6	f	IRL US4-B
34	3	4	m	IRL NL4-1
35	1	1	f	IRL NL4-4
36	1	1	m	IRL NL4-4
37	1	1	m	IRL US4-F
38	3	5	f	IRL US4-C
39	1	1	m	IRL NL4-2
40	1	1	m	IRL US4-F
41	3	2	m	IRL NL4-4
42	3	6	m	IRL US4-D
43	3	2	f	IRL US4-A
44	3	5	m	IRL US4-A

Column averages (bottom row):

Q2_4	Q2_6	Q4_6	Q2_8	Q2_12	Q2_14	Q4_5	Q2_1	Q2_15	Q4_1	Q4_9	Q4_10	Q2_3	Q2_5	Q2_10	Q4_3	Q3_1	Q2_10	Q3_1	Q4_5	Q4_11	Q2_14	Q2_15	Q2_2	Q4_7	Q2_11	Q2_7	Q2_4	Q4_12	Q2_7	Q2_8	Q4_2	Q4_4	Q2_9	Q2_43	Q2_13	Q2_15	Q2_20	Q2_3	Q3_1
4.20	4.34	3.61	3.32	4.30	4.27	3.73	4.43	4.50	4.02	3.84	3.57	4.36	3.89	3.95	4.00	3.39	3.95	3.66	3.73	3.27	4.27	3.68	4.20	3.07	4.34	3.82	4.20	3.59	4.09	3.32	3.91	4.23	3.75	3.30	4.36	4.50	3.61	4.36	3.39

W AR4 Focus Group and Reflection Sessions coded [sample]

AR 4 Focus Group IRL NL4- Team 3 [extract]

Facilitator- So today the main purpose of this is to get your individual team experience of how the project process was for you. So really I'm just going to throw a few questions out there and really you can discuss them amongst yourselves you don't have to be responding to me.

Timeline to get things going of the actual project. Could I ask you all to get it started to think of most difficult part of the experience of doing the project, I'll get you to write it down and I'm going to get you to stick it onto the page. Just think about it yourself.

(a couple of inaudible group discussions)

Participant 1- the most difficult part of the project? Would you like just one of us to answer?

Facilitator - Grand so what was it for you?

Participant 1 -The final week

Facilitator - let's just see what everyone else has- yeah throw it up there, does anybody else have the same?

Participant 2- not being able to see the crew-rest for real

Participant 4- for me it was the synthesis

Facilitator - so getting everything together at the end?

Participant 2- are we supposed to place it here

Facilitator -yeah wherever it came up, that's the idea, ok yourself Participant 3?

Participant 3- yeah I suppose like the lads, the final concept

Facilitator - let's start with the end, tell us about the last week

Participant 1- it's just that I mean we were asked, everyone else was asked to do one concept and we were asked to do two concepts. And the sort decision was kind of taken out of our hands it was more towards the Dutch side. That they decided they wanted us to do two concepts and just kind of lumped on us…. But as I said last week in hindsight it was probably a good idea but it was just sort of lumped on us and there was no, no discussion, it was just like sort of'you're doing it and that's it' you know.

Participant 3- That happened because when they had the week before, the same week for the concepts , when we choose the concepts we choose one for the Irish team and one for the Dutch team. And at the end it was more like the Dutch team decision, I mean Dutch team idea wasn't our idea at all. It was like they, we didn't sell it properly or they didn't believe it

Participant 1- they didn't sell it properly.

Participant 3-So it was kind of ok, you do what you have to do, you do what you are told to do

Facilitator -What was the decision-making process? How did you engage in decision-making with your dutch counterparts?

Participant 3- there was another time, the Dutch teacher, lecturer

Participant 2- the lecturer decided what we were going to do and that was is.

Participant 4-the decision-making between their team and our team was pretty good I think.

All –yes

Participant 4- just talking about what we have to decide and getting opinions and criticisms went pretty good but the teacher was, yeah he interfered with a lot of decisions.

Facilitator -so could you talk about the communication process- something that was positive, would you all agree with that between the two team?

All – yeah

Facilitator -so what was it that facilitated that, that made it positive?

Participant 1- we were communicating through Skype and the Blog and I mean I think looking at other blogs ours was probably the most, the richest blog, I mean we just sort of communicated with each other, if someone did some good work we would congratulate them and you know they'd congratulate us back. There was just good banter between us, there good communication there. We didn't have any problem from the introduction to close enough to the very end we had a good rapport with our group.

Participant 2-we wanted to do well as well and every week there was a grading, it was like the best out of 5 stars and we had gotten 4's along the way so it was good

Participant 1- yeah we were consistent

Participant 2-it was good to try and reach to the 5, now I don't know if we had been getting 1 and 2's would we have cared as much then would our enthusiasm have slacked off if our scores were lower.

AR 4 IRL US4 Reflection Session [extract]

Positive Experiences

TC It was interesting, it was different talking to people from different disciplines. In the same way it wasn't brilliant because they didn't know what we were at their lecturer didn't tell them what we were at. So it was hard, it was a challenge…. Diego only did work when we asked him to. It had to be us telling them what to do which wasn't great.

We'd ask them through Skype, Chris and Patrick and I would talk before and then we would ring them and say 'here can you do that' they would always say yes but sometimes it wouldn't get done, or get half done.

They didn't talk about the project in class. They weren't getting told what to do.

[3.34] (Moira about Diego) He's a business major he can't sketch. It's not fair on him to ask. But anyone can sketch even if he got the vague idea across we could sketch it then.

We combined half our ideas with theirs.

So how did ye manage that?

This is only supposed to be our work. We told them the lecturers wanted our work up on the blog and not other peoples products.

[4.40] I think once we gave them very very specific tasks to do then they did them but you had to say exactly what you wanted them to do, you don't know what they would come back with.[1]

Why?

TC From the start they weren't told from the start.

TB They didn't seem to want to put in any effort. They didn't seem interested in wanting to do anything. There was only one on our team –Cassie who was even interested in trying the others were like we'll do it if we get time if not we won't kind of thing.

Was there anything good when Cassie did get involved?

Yeah she tried she gave them jobs to do but she was getting as frustrated as us with it not getting done. So she was trying to do bits and pieces herself but there was only so much she could have done 'cause she was in marketing so she was actually trying to help.

Do you not think it would be an advantage to have other disciplines on the team?

TB We were trying to get them to do stuff but they just didn't do it.

What did you try to get them to do the work?

TB She was trying to help us along. There was a graphic designer on their side and we tried to get her to do Photoshop images of our Solidworks but we ended up just getting a few sketches.

How did you ask her? Did you phone her?

It was on the calls, the blogs and the Skype and the emails and stuff.

They didn't want to use the blog either. They just emailed us their stuff and we had to put it up on the blog.

When you phoned them how would that go?

[7.02] We would only get one maybe two at best.

TB I think the Skype meetings went pretty well because we would all agree on what to do for the next couple of days. And then it would still be us pushing us to post stuff. We would have to continue to push them.

(Jon explaining the conflict at the final presentation)

Was it the discipline or the cultural differences that impacted on it?

TB [8.05] I think it was the disciplines because they didn't understand the process we were going through. We asked them for designs and they came up with stuff from the internet and I asked them can you please put up your sketches and I guess they didn't understand what we wanted from sketches.[2]

Was that an issue with different disciplines not having a common language?

[9.00] Yeah, I think we didn't explain it well enough what we were expecting, I asked Rachel for a storyboard, I was expecting the different stages and she sent one image.

And did they ever explain their process or way of working to you?

TB They didn't seem too interested or bothered with the project at all to be honest.

Cassie and Caitlin were going to do a big marketing thing, Clay was supposed to do Chemical engineering about the materials and manufacturing processes. But we have never seen anything they had done.

TA We had to go and tell them exactly what we wanted them to do….at the end we sent them an email saying Victoria can you do this Cesly can you do this and they did it….(more about asking them to do work and it not always getting done, about Bill vanishing when asked to do work).

But they were good for, like when I put up the jar and Bill made the comments about the size of the lid and we made the changes.

[12.00] Anything they gave us was really useful if only they had given us more it would have been way more useful for everybody.

Annotations

[1] US participants being controlled by the Irish team mates.

[2] Miscommunication- the US participants didn't understand what was expected of them because the planners and the Irish participants didn't explain. The project should have been more balanced in terms of cross disciplinary expectations that it was.

[1]

X AR4 detailed Data Coding

AR4 Data Analysis Coding (Participant)

| CODE	CODE NAME	DEFINITIONS	QUESTIONS	KEY WORDS	Method of Description	Occurance Node	SUBCODES						
	INTERACTION- TEAM												
A1	Collaboration Process	Description of the collaboration process over the duration of the project	What did the collaboration process look like over the duration of the project?What was the collaboration process employed? How did the team navigate the process? What techniques did they use?	Team-work, Sharing, Dialogue, Communication.	*Timeline- graphic representation of the process.*	High Level code under which all the other codes would fall.							
A2	Problem solving Process	A holistic look at the process, pivot points in the design process. Coming to terms with adn recognising the complexity of issues that are non-linear, evolving and open-ended.	What was the project process like over the duration of the project. A holistic look at the process, pivot points in the design process.		*Timeline- graphic representation of the process, mapped over the collaboration process, identifying the points where the two overlap.*								
B	Interaction process	How the teams interacted with each other over the project to achieve the aims.	How the teams interacted with each other to achieve the aims. Where and how did they interact, not including the technology. What did these interactions look like? What were the collective narratives and the individual stories from the interaction? Were they humble in their interactions?	Communication, Team work, Participation, Sharing, Engagement, Social Interaction.	*Codes and interaction timeline-mapped over process highlighting where things went well and where things didn't go well. Identify pivot points.*	When did the interactions occur?	Positive	Negative					
C	Communication models	Developing a middle ground or accepted language by which to connect with people across all boundaries. How the participants communicated over the duration of the project. Description of the tools and methods that were used over the duration of the project.	How did they communicate? What was the overall language like? What was their attitude when communicating?	Communication, Dialogue, Openess, Sharing, Participation.	*List of communication tools used and when*	Key communication points in process	Easy communication	Difficult communication	Two - way communication between participants	Language developed- building a common language	Multi-way	Controlled		
D	Decision-making	Making decisions through the entire process that the designers are accountable for and that are visible. Understanding the goals and ther other participants needs as well as the process is key to effective decision making.	Have to be made? How was the decision made? What were the outcomes of the decisions?	Decision-making, Problem Solving, Compromise, Negotiation, Critical Thinking.	*Code the discussions, through blogs.*	Making a decision- a decision	What were the results of decisions?	compromises	one side wins	Reaching the outcomes			
E	Negotiation (Dealing with Difficulties)	The process used to find common language synergy. Exploring how the dialogue between participants evolved when the expectations of different participants needed to be managed.	What were the difficulties that occurred, were the difficulties between individuals, between locations? What was the cause of the difficulty? Who took responsibility for the difficulties? What techniques were used to overcome problems?What was the negotiation process like? What language was used to negotiate (strong-forceful, understanding-empathic, weak-defeatist)?	Negotiation, Compromise, Dialogue, Humility, Acceptance of Diversity, Empathy, New Perspectives, Openess.	*Coding of incidences when decisions were made and how they were worked through.*	When was there a difficulty	resolved with success	failure to overcome	1 arguments	2 negotiation			
F	Compromise (Moving on)	Adjusting your ambition to what you can achieve, how do individuals adjust their expectations to reach a common consensus.	How did the teams move through the process? What methods were used? How was a compromise reached when a difficulty arose? Were behaviours, relationships changed after the move?	Compromise, Sharing, Openess, Humility, Humour, Empathy.	*Coding of incidences when decisions needed to be made and how they were worked through.Describing what the outcomes were and how this influenced subsequent stages of the project.*								
G	Responsibility/ Accountability	Taking responsibility for the what is designed and how it is designed and doing this when the outcomes are both positive and negative.	Shared or individual responsibility.Accountability and understanding. Being able to take responsibility for the decisions made and the outcomes.How did the team share the tasks? How did the individuals take ownership of the	Accountability, Empathy, Openess, Holsitic Perspectives, Positive Behaviours*Outward Looking* Critical Thinking, Openess, Engagement, Understanding, Reflection, Decision-making, Empathy.*Inward Looking*	*Code key decision pivot points and how they were navigated through.Focus on language, dynamic, decisions.Where and how was responsibility taken by individuals for the team decisions or their own decisions?*	How is the workload shared	Individual	Group					
H	Division of Work	The sharing of responsibilites and the working together to achieve the aims											
I	Sharing ideas	Learning from each other by sharing techniques, skills, ideas and perspectives.	Sharing the process and the techniques. What were the outcomes of the sharing? How good or bad were the outcomes?	Sharing, Openess, Reflection, Dialogue,Accountability, New Processes, New Perspectives.	*Codes: Where and when were ideas shared.*								
J	Achieving the aims	Meeting objectives-Solving the problems set out in front of them. By themselves or through the project brief.	Solving the problems set out in front of them. By themselves or through the project brief.	Problem-solving, Dialogue, Communication, Decision-making, Critical Thinking.	*Problem solving process (map over collaboration timeline)*								
K	Dialogue	Accepting and giving feedback. The act of initiating and maintaining communiction with other participants as well as drawing on their own experiences to create meaningful narratives.	What format did the dialogue take? How was the feedback given and received? Explain the stories	Openess, Feedback, Dialogue, Reflection.	*Code instances where feedback was given and received to move the project forward. Pinpoint the stories that participants used to explain situations.*								

CODE	CODE NAME	DEFINITIONS	QUESTIONS	KEY WORDS	Method of Description	Occurance Node	SUBCODES						
	CRITICAL THINKING- INDIVIDUAL												
L	Participation/ Engagement	Interaction between people, being genuinely passionate about and actively involved in the subject, being able to ejoy the experience and if not enjoy it get some benefit from it.	engagement,inclusivity how did the individual strive to take part? What form did this participation take? Leading following? How did they adapt to the new processes?	Participation, Engagement	*Map the interesting participation points on the timeline (when it led to a positive or negative outcome). Code the various participation points.*		Easy (comfortable)	Difficult (uneasy, awkward, nervous, intimidated)					
L	Reflection	Making and taking time to dream and engage in dialogue so as to get real wisdom from and experience. Looking at your individual actions through the mirror of other people.	How did the individual reflect on the process? How reflective were they during the project? Reflection	Reflection, Critical Thinking, Understanding, Humility.	*Codes: when did reflection occur? Reflective language used.*	During the project/ Post Project	Internal reflection- how did 'I', 'me' behave,'me vs them'	External reflection 'we' 'us' 'me and them'					
M	Understanding	Understanding other peoples perspectives, explaining your own approach.	How did the individuals explain themselves? How did they deal with the other perspectives?	Acceptance of Diversity, Humility, New Perspectives, New Processes, Team-work, Communication, Social Interaction.	*Codes: when did the individuals talk about other peoples methods, views? What was the attitude towards these views etc.?*	Explaining themselves	Understanding themselves	seek to understand others	showing concern				
N	Comparison	Noting the differences between the work											
	SOCIAL INTERACTION												
O	Disciplinary background	Looking at the influence of disciplinary differences- Holsitic Perspectives	When did the discipline of the individual come to the fore? What difference did it make to the collaboration process	Understanding, Openess, Participation, Acceptance of Diversity, Empathy.	*Codes: when did disciplinary differences come to the fore?*								
P	Cultural background of individual	Recognising that cultural differences exist and working with the differences to advance the project.	Where have cultural differences come to the fore? What were those cultural differences and how were they dealt with? How were the differences in culture integrated into the project? How did the differences manifest themselves?New Perspectives	New Perspectives, Dialogue, Humility.	*Codes: Identify points when cultural differences became apparent? How did they manifest themselves? Hermeneutics (written) language (audio)? How were the cultural differences dealt with?*								
Q	Behaviours towards others	Empathy, openness recognising the benefit of interacting with others to broaden the perspectives throughout the project. Having the humilty to adopt and adapt to other ways of working.	what is their way of dealing with others? How was feedback given and received? What were the consequences of these actions?*positive spins positive and vice-versa.* How did they make themselves understood? Language used, gestures etc.	Humility, Humour, Openness, Empathy, Dialogue.	*Codes: Type of language used? Identify key points where behaviour differed? Map feedback loops*		Positive	Negative					
R	Getting to know you	Getting to know the other participants both personally and professionally.											

CODE	CODE NAME	DEFINITIONS	QUESTIONS	KEY WORDS	Method of Description	Occurance Node	SUBCODES					
	NEW OPPORTUNITIES											
R	New Processes	Describing the new processes used. Breaking away from your normal way of doing things.Fresh eyes, ideas and learning from others. *Focused on the skills/practical side of the design process.*	Trying new things. Different from their norm.What were the new processes? How were they dealt with? Were the individuals willing to try new things? Were they open-minded?	New Processes, Humility, Openness.	*Map where new processes were identified and applied. Codes: where the new processes were recognised and applied, code what were the outcomes of the new processes.*		with success	with failure				
S	New Thinking	New ways of thinking about the problems, projects or ideas. Being openminded to new ways of thinking about things- *focused on the cognitive side of the design process.*	Applying new thinking. Where was new thinking applied? What form did the new thinking take? What were the outcomes from applying new thinking? Has there been application of the new processes since?	New Perspectives, Acceptance of Diversity.	*Map where new thinking was manifested. Code what form this new thinking took (language and behaviours). Code how it changed the process (positively or negatively)*		with success	with failure				
	ON THE LIGHTER SIDE											
T	Breaks from the project	Engaging with others in ways that stretch beyond the project process.	When did the communication go beyond the project? What form did this take? Who initiated it? How long did it take? What influence did it have on the process afterwards? How did the participants get to know each other? When were personalities evident? When was a break needed and why?	Humour, Humility, New perspectives.	*Code the different occasions when conversations and behaviours broke from the project.Language used and behaviours displayed.*		Jokes	Lighter side				
U	Enjoyment		When did the participants enjoy themselves? How was this manifested? Demonstrated engagement and getting something more than work from the project.	New perspectives, Engagement, Humour, Humility	*Code the instances where the participants were clearly enjoying the project. Identify why this was the case, what was happening around them to enable this? See how this instance impacted on the project subsequently.*		Casual language					
V	Humour	Where humour, jokes and light-hearted banter was used to navigate through the project.Seeing the positive side of things, using imagery and more positive perspectives to engage with people and the project. Altering the mood to encourage action and change.	How and when was humour used? To quell a situation? to get to know each other? To simply have fun?	Humility, Humour, Openness, Engagement.	*Code how and when participants used humour. Identify what impact the humour had on the situation.Note the type of language and the interaction between the team members.*							
	CONTINGENCIES											
W	Unexpected occurances, behaviours.		Anything else.									

AR4 Data Analysis Coding (Planning)

CODE	CODE NAME	DEFINITIONS	SUBCODES		
RESEARCHER LEARNING					
T	My Learning	Incidences where I have learned as a researcher. Reflection in and on action.			
PROJECT PLANNING					
U	Finding Synergy	Looking at the process of reaching synergy before and during the project process			
V	Managing expectations	How were the expectations explained and managed during the project.The expectations were what all participants wanted to achieve either together or seperately.			
W	Dealing with 'issues'	Processes employed to deal with issues of misalignment or conflict as they arose in the project.			
X	Reaching goals	How were the goals met during and after the project.			

Y AR4 Project Timelines

IRL NL4-1

Communication
Interaction
Critical Thinking

research · ideas · concepts · final design

IRL NL4-2

Communication
Interaction
Critical Thinking

research · ideas · concepts · final design

IRL NL4-3

Communication
research ideas concepts final design
Interaction
Critical Thinking

IRL NL4-6

Communication
research ideas concepts final design
Interaction
Critical Thinking

IRL NL4-4

Communication

research ideas concepts final design

Interaction

Critical Thinking

IRL NL4-5

Communication

research ideas concepts final design

Interaction

Critical Thinking

IRL NL4-A

Communication — research — ideas — concepts — final design
Interaction
Critical Thinking

IRL NL4-D

Communication — research — ideas — concepts — final design
Interaction
Critical Thinking

IRL US4-B

Communication
research   ideas   concepts   final design
Interaction
Critical Thinking

IRL US4-C

Communication
research   ideas   concepts   final design
Interaction
Critical Thinking

IRL NL4-E

Communication
research   ideas   concepts   final design
Interaction
Critical Thinking

IRL NL4-F

Communication
research   ideas   concepts   final design
Interaction
Critical Thinking