APPLYING USER JOURNEY DESIGN TO RESOLVE COMPLEX DESIGN PROBLEMS

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ABSTRACT

The proliferation of complex problems in a world of increasing indeterminacy, not least within developing contexts, places new demands on stakeholders, educators, students, practitioners and theorists.

A user, or customer, journey is a schematic representation of the path a user will take through lifecycle stages, touchpoints, channels, interaction modes, emotional states, content and functionality. User journeys have become a frequently applied tool for research and design in the practical fields of Design Thinking, Service Design, User Experience Design and Information Architecture Design. In our paper we position User Journey Design as both a tool and a rigorous self-reflective, data-driven process through information gathering, synthesis and into design, which assists the student designer in navigating the complexities of indeterminate problems.

Initially the paper present a history and review of the literature, application and limitations of User Journey Design in practice today which explores related literature from Design Thinking and the nature of indeterminacy in design (Buchanan, 1992, Brown 2008, Cross 2006,) to set the context for an approach that broadens the relevance and application of User Journey Design.

This paper then present two examples of student design work that demonstrate the application of user journey design in the resolution of complex problems.

User Journeys provide a structured approach to synthesizing large amounts of data in self-reflective, humanistic ways, where the path through complexity can be traced back from artifact to the original problem-formation. It is in this respect that User Journey Design not only provides an approach to solving problems that emerge through complexity, but also narrows the gap between practice, research and teaching.

Key words: User Journey design, Complex problems, Indeterminacy, Design research, Ideation

INTRODUCTION

In this paper, user journeys are positioned as both a tool and a rigorous self-reflective, data-driven process through information gathering, synthesis and design, which can assist the student designer in navigating the complexities of indeterminate problems[1].

The proliferation of complex[2] problems in a world of increasing indeterminacy places new demands on stakeholders, educators, students, practitioners and theorists. In this new paradigm, our experience has revealed that bridging the spaces of education, practice and theory is both rich with opportunity yet lacking in explicit approaches that tangibly assist in bringing these worlds closer together. Specifically, this paper focuses on the gap between understanding the contextual realities of design problems embedded in social complexity and the resolution of these kinds of problems in the absence of obvious solutions. While there are numerous theoretical accounts of these aspects of the design process and design professionals bridge this gap in practice there are few explicit examples that enable the novice student designer to cognitively conceptualise design solutions that take into the account the complexity of social reality in meaningful and original ways. This paper argues that user journeys can assist students in conceptualising solutions within complex, indeterminate problem ecologies.

A user journey is a schematic representation of the envisioned path a user will take through lifecycle stages, touchpoints, channels, interaction modes, emotional states, content and functionality of a designed system. In the practical fields of Service Design, User Experience Design and Information Architecture Design, user journeys are applied to provide a structured approach to synthesizing large amounts of data in self-reflective, humanistic ways, where the path through complexity can be traced back from artifact to the original problem-formation. Applying user journeys as a discipline neutral design tool may not only provide an approach to solving problems that emerge through complexity, but also narrows the gap between practice, research and teaching.

In reference to a range of theoretical texts, this paper will first describe how complexity is manifested in human- centered design[3] practices. This description will also broadly explain how design processes that are contextually specific and data driven nearly always require unique and tailor made design solutions. The

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1 Indeterminacy arises in design problems when situated in social reality. They are characterized as being ill defined, reliant on subjective social agreement and *wicked* in the sense that before they can be solved they need to be tamed, defined and limited (Rittel & Webber: 156). Indeterminacy arises in design solutions when there are numerous different (but potentially correct ways) of both understanding and solving the problem

2 Complexity can be said to occur when elements and structures within a system cannot be simulated nor easily predicated and thus present unexpected and unanticipated behavior (Rosen, in Resmini & Rosati 2011: 61).

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concluding argument of this section is that the process of ideation is in its own right, complex. It is in respect to this position, that we offer user journey design as a design tool that can help in bridging the cognitive jump of design ideation. After a short introduction to user journeys the remainder of this paper explains how user journeys can be used in design ideation. This explanation refers to relevant textual descriptions of practice and presents, by way of descriptive examples of student user journey design.

Indeterminacy at both ends

Traditionally, the role of the designer has focused on the creation of artefacts (Hagen and Robertson 78: 2012, Brown 86: 2008). However the reframing of design as an act of problem solving embedded in societal reality (Rittel & Webber, 1973: 156; Krippendorff 2007: 71-72) increasingly adds a cognitive complexity that simply does not occur in design activities that seek to innovate within the scope of existing categories of design product.

This reframing of design has been highly influenced by the discourse of Design Thinking (DT), which has a historical legacy in design that can be traced back in concept, if not in name, at least as far as the early 1970's. Fundamental to DT theory (and subsequently various contemporary design fields such as Service and User Experience Design) is a human- centered approach[4] (UCD) to design (Brown 2008: 86).

While there are many different variations of the cognitive processes involved in DT, the model depicted in Figure 1 is generically reflective of the main cognitive stages involved in DT. Figure 1 is also used to reflect a further level of organisation that separates the cognitive stages into three focus areas. The first of these areas, comprised of the Define and Research stages involves problem definition. The third area consists of the Prototype, Select, Implement and Learn stages. This composite area focuses on the design solution. Sandwiched between the first and second sections is the ideation stage/section, which represents the cognitive leap the design practitioner must make from the process of 'understanding' to the act of 'resolution'.

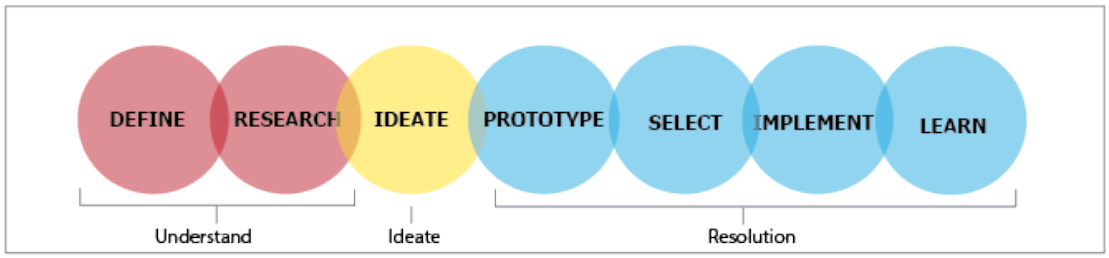

Figure 1: Basic Design Thinking process. (Harris & Ambrose 2009). Other examples are the IDEO methodology (Brown 2009) and Potsdam D- School's model (Weiner 2009)

A pragmatic description of human-centered design is that it is a design process that places an emphasis on understanding design problems from the perspective of the lived experience and environments of the user through applying rapid ethnographic research techniques and testing design solutions, in an iterative manner with users. Emphasis is placed on three lenses of practice: Desirability, feasibility and viability (IDEO, 2012)

The difficulty for the designer embracing a human- centered design approach within DT ethos is that both the Understanding and Resolution areas are characterized by hyper- complexity and indeterminacy. The cognitive act of ideation requires the notoriously difficult (Horst and Rittel 1973) formation of the design problem within the myriad complexities of the social reality and then formulating a solution, of which the form, function and logic is constructed purely in response to the particularities of the problem (Buchanan 1992:12) Thus, with a certain irony, we can describe the point of departure of a DT design project as 'the designer not knowing what they are going to do nor why they are going to do it'.

In this paper, user journeys are positioned as a design tool for the orientation of the design solution and its implementation through the complexities of the Ideation stage.

However, before we discuss the role of user journeys, we require clearer insight into the level of complexity and indeterminacy that can be generated within HCD.

Complexity related to user research

Numerous seminal designer theorists including Klaus Krippendorff, Horst Rittel and Melvin Webber, (1973), Richard Buchanan (1992), Nigel Cross (2006) and Donald Norman (2002, 2011) have described the value of understanding the reality of the end- user in order to fully understand the contexts and nuances of design problems. As Klaus Krippendorff succinctly suggests in *Design Research: an Oxymoron* (2007):

> If design is to encourage [artefacts] that are meaningful to others, to users or stakeholders, it must at least acknowledge, if not support, their conceptions and desires. This requires (a) listening to how other people think and justify their actions in worlds they always are in the process of constructing to live in, or (b) inviting the stakeholders of a design to participate actively in the design process. So conceived, design is an essentially social activity, one that cannot be separated or abstracted from the context of people's lives. (71-72)

The need to understand the end- user and stakeholders affected by and affecting the design problem and the subsequent design resolution has led to an increasing sociological approach to design research that applies various modes of fieldwork research to collect data. This is exemplified in the fields of Design Research (Koskinen et al 2011; Plomp & Nieveen 2009), User Experience Design (Laurel 2003; Kuniavsky 2003; Krug 2000) and Design Thinking[5].

Research enquiries that aim to describe the experiential needs of the end user, extend beyond demographic information and seek to extract insights that explain psychological perceptions and user behavior. While the focus of these research enquiries can be diverse, they all seek to explain motivations, values, beliefs and behaviors embedded in cultural, societal, technological and circumstantial identities. Concurrently and in addition, research activities that focus on

[5] See http://www.ideo.com/work/toolkit-for-educators

stakeholders, seek to explain the logic of the business or organisation that is attempting to resolve the identified problem. This focus may also include larger macro forces such as the economy and broader socio-political influences.

Regardless of the approach, technique and exact focus, any rigorous, humanistic research process, that attempts to gain an understanding of social phenomena, will generate large amounts of data.

The indeterminacy of the solution

The data generated from human- centered research forms the complexity from which design resolution must emerge and from which the design gains its cultural and functional logic. As early as the 1970's Hans Rittel and Mervin Webber emphasised the mutual and iterative relationship between design problems and design solutions. Rittel and Webber argue that the process of identifying, understanding and forming the problem is a prerequisite for solving the problem. That is to say: the formulation of a complex problem is the solution (1973: 161).

Richard Buchannan (1992:12) develops this reasoning further as he describes design as a field of practice within which, the fundamental activity is the conceptualisation and development of solutions purely in response to the contexts of the particular problem at hand. Johann van der Merwe[6] in a *Natural Death is Announced* (2010:6) similarly describes design as a discipline-neutral groundless field of knowledge that constantly sources knowledge, skills, practices and contexts from other fields of knowledge as dictated by location of *the 'specific design problem'* (2010:8). Van der Merwe's observation implies that design solutions are in their own manner as indeterminate as design problems and contain no natural form or structure and are always acts of synthetic construction. In our experience many design traditionalists often view a problem- led approach to design (as described above) as harmful to the 'crafting' of discipline relevant design products. However, we believe that a discipline neutral approach to design does not seek to negate the design artifact but rather argues that a careful consideration of the problem should take place before solutions are implemented so as to avoid the practice of designing problems to fit pre- conceived solutions.

Additionally, the recent emergence of multi-channel integration and cross-channel design (Resmini 2011) and Service Design (Lusch & Vargo 2006) challenge the traditional notion of the design solution as being embedded within the single artifact. These new fields of design position the design solution as systemic, where the design product is considered to be a mere 'avatar' of the service (Kuniavsky 2011: 104). This conceptualisation of design solutions as uniquely constructed and often systemically distributed, highlights the indeterminate and complex nature of design solutions that emerge from HCD research processes.

Nigel Cross in *Designerly Ways of Knowing* (2006: 79) describes the process of design as the iterative, systemic testing of formulated solutions against the constraints and complexities of the problem. Within Cross's testing iterations, the design problem informs the solution and the solution, reciprocally, in reference to

what is possible from the perspective of both the designers knowledge and available technology, reforms the problem. Therefore, as shown if Figure 2, the complexity of the problem and the indeterminacy of the solution create a hyper-complex ideation ecology, through which the designer must navigate. It is in response to this complexity that we position user journey design as an approach to easing the cognitive load involved in the design process

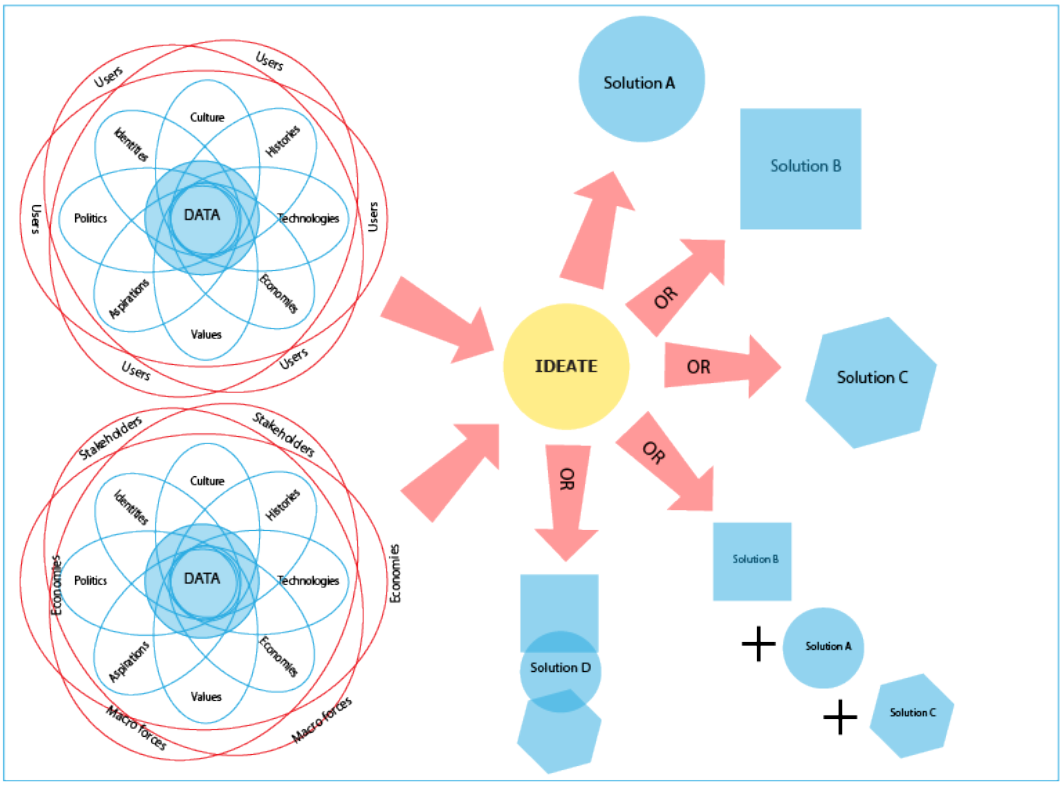

Figure 2: A representation of the complexity and associated indeterminacy of the ideation ecology (Fenn & Hobbs 2013).

User Journey Design

User journeys are design tools that schematically detail the envisioned paths users will take through a system (Caddick & Cable 2011: 78). These journeys can highlight both problems experienced by users and successful moments in the existing experience of the system. User journeys can be used to represent channels of delivery, touchpoints within which users interface with the design system, content and functionality. Additionally user journeys can also reflect factors such as the emotional state of the user, interaction modes[7], key marketing messages, micro barriers and breakpoints (drop-off) along the way.

User journeys have been applied extensively in the field of information architecture design over the past decade with specific reference to the evaluation, research and design of digital experiences. The emergence of user journeys can be viewed as a merging of business process design, customer relationship

[7] As users progress through journeys their modes typically change, for example from information gathering, to making choices and narrowing decisions, to fine-tuning, customizing and personalising

management and human centered design. More recently, the rise of human-centered design methods taking root in businesses (Brown 2008), multi-channel integration and cross-channel design (Resmini 2011), and Service Dominant Logic, in the form of Service Design (Lusch & Vargo 2006), have extended the user journey focus to include the full business value-chain, user experiences that span channels and business / departmental remits, and an interest in the total service ecology within which users operate (Browne 2011).

User journeys present the output of synthetic cognition, represented in diagrammatic plans that are then translated by other design disciplines or developers into final design artifacts with which users interact. As represented in Figure 3, User journeys are the design solution *blueprints* that represent the re-organisation and re-intepretation of data discovered through research and that act as the basis for design artifacts that will emerge from the 'blueprints'.

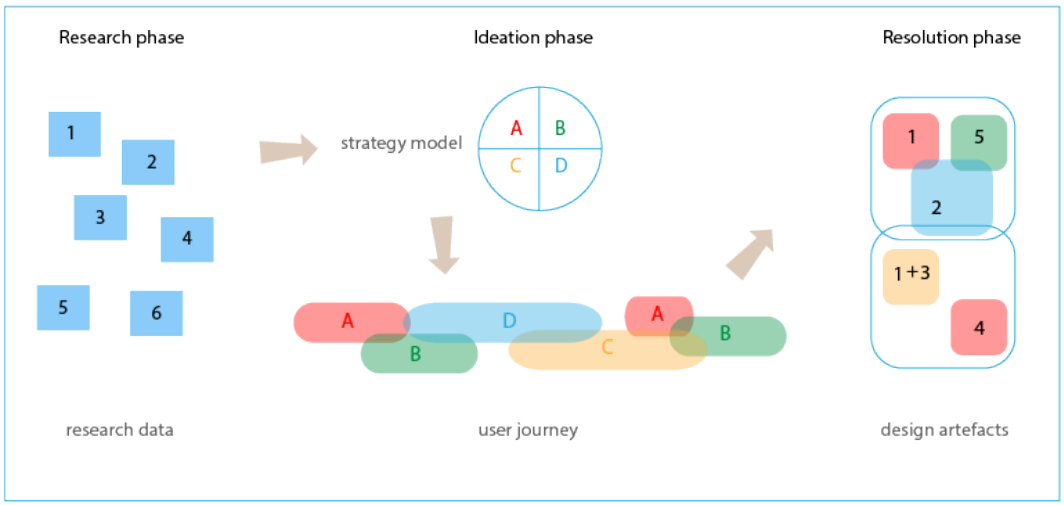

Figure 3. In this diagram (Fenn & Hobbs 2013) the design flow within which user journeys operate is shown. Additionally, the prevalence of insights gained in the Research phase, are indexed through the various stages of the design cycle.

In order to appreciate the value of user journey design within indeterminate and complex design projects, the following section of this paper will briefly describe how user journeys function within a broader HCD flow[8] common to design fields such as Service, User Experience and Information Architecture Design.

The description of user journeys and associated design tools in the design flow will be exemplified in reference to two examples designed by design students at the University of Johannesburg.

As previously noted, most user- centered design processes begin with a research phase, which regardless of technique result in substantial data. This data is normally comprised at this stage of numerous discrete units and is usually captured in forms such as photographs, spreadsheets, video, sketches and notes.

[8] See Caddick & Cable, 2011: 78 for an in-depth practice orientated account of a UXD flow

The data is then analysed and synthetically organised in a range of design tools such as personas (for an example of a persona, see Figure **7),** personnel cards, content analysis graphs, content inventories and desk- top research reports. At this stage, the conceptual process is still focused on understanding the complexities of the problem. Much of the cognitive activity is first focused on comparing, contrasting and applying value to the data and then grouping, associating and structuring the data. Outcomes are focused on determining insights such as user-needs (psychological and behavioral), and organisational strengths, weaknesses, opportunities and threats.

Once the data reaches a point of organisational saturation, the design tools used to organize the data are themselves used to inform a strategic response to solving the identified problems. The strategy represents the designer's interpretation of the problem and their particular notion of problem resolution. Strategy is often represented in models that at a low- level of information fidelity represent the essential focus of the strategy. These models, depending on the design intent, could reflect different strategic goals such as business needs, user needs and user interactions. Relationship models that articulate the relationship between the user and business are another common example of a strategic model.

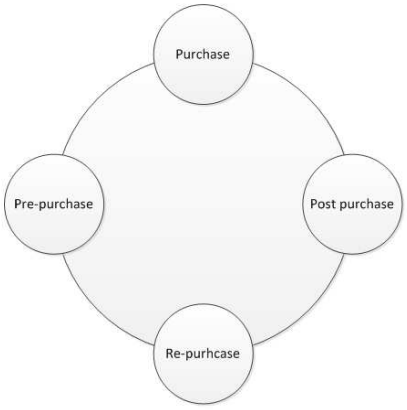

Figure 4. An illustration of a generic, commercially oriented relationship model (Fenn & Hobbs)

While models operate at a generic, low- level of detail and are therefore still open to indeterminacy, user journeys can be considered instantiations of the relevant chosen model that include specific details of the particular envisioned solution. As such user journeys begin to articulate the tactical response of the designer to the design problem within the general strategic aims of the solution.

Each lifecycle phase would have an associated user journey: the pre-purchase journey, the purchase journey, and so on.

Fundamental to the design of user journeys are the use of scenarios. Scenarios are a technique applied in HCD to 'tell the story' of an interaction at a low level of detail and thus simply and succinctly communicating the most important aspects of an intended design experience[9]. Applying the scenario technique, the designer will imaginatively construct a narrative that represents a user need, as identified in

[9] An example of a scenario for an online bookstore: *John is never sure of the delivery date of his ordered books. He would like to track the progress of his latest acquisition through the handling process to ensure that it arrives in time for his wife's birthday*

the research and that relates to the particular lifecycle phase. Using the earlier created design tools that reflect the research data (usually a persona), the designer will schematically sketch- out the key journey requirements that the end user will require to achieve their goals as well as the goals of the business. Scenarios along a journey can reflect the changing needs, need-states, modes and emotions of users. The structure of the journey is created by the selection, order and linkage of scenarios. The user journeys form a procedural progression through the relationship model. The designer, when creating user journeys using scenarios, attempts to layer an envisioned conceptual model detailing how users will perceive and use the design system over a conceptual model of the organisational strategy.

At the level of the user journey artifact, scenarios are highly generalized. For example, the journey will not describe all the possible detail in a user login scenario, just that a login is required at this stage in the journey. The information details of the scenarios will be described in successively more detail in design artefacts such as task flows, wireframes, prototypes, use cases and final design products. These artefacts allow for the user journey design to be tested in three distinct ways[10]. Firstly, in reference to the logic of the research data, which often directly informs the details of the design, secondly in terms of the design logic imbedded in best practices and principles and lastly, in direct testing with end-users.

In summary the value of user journeys in the ideation of design solution can be described under a number of key points.

Firstly, user journeys operate at a level of abstraction that articulates the fundamental tactical responses to the design problem without the detail complexity of high fidelity prototypes such as wireframes. However as user journeys hold the 'blueprint' for greater fidelity, they are not overly abstract and operate cognitively in the reality of users, society and existing technology. The level of abstraction of user journeys allows for a malleability that encourages repurposing, exploration and editing.

Secondly as they are derived from research data, user journeys represent societal complexity and real world organizational and business goals. Thus, in addition to serving the function of synthesis tool, user journeys also become the map through which the life of the data can be traced back from final designed artifact to the original research phase and problem-ecology. Therefore user journeys complement a conceptualisation of design that has shifted away from a prioritisation of aesthetics consideration and product to focus instead on problem solving that effectively, empathetically and sustainably seeks to improve the life experience of people through answering user needs, wants and desires.

Thirdly, user journeys provide for the theory of the solution to be revealed, discussed, shared, critiqued and tested in a visual form. They support reflection

[10] For further examples of user experience design research techniques refer to Saffer, D (2010), Garret, J (2010), Kuniavsky (2003) (amongst many others

and any subsequent iterative reconsideration of design decisions occurs in a structured, iterative and creative manner. The cognitive resolution of the ideation ecology is contained within the user journey. Thus user journeys not only help to structure the thinking required for solving the complexity of the ideation ecology but also allow for (newly) determined solutions to be evaluated.

Fourthly, while generally associated with artefacts from the digital design fields, user journeys, as illustrated in our case examples, are capable of describing user experiences across multiple and alternative journeys, channels and environments. User Journeys are therefore design- discipline neutral and highly effective for the design of any human- centered systems regardless of artefactual type.

Spialux and *Gulper*, student design examples.

The two examples that exemplify the application of user journeys in the solving of complex problems were conceptualized and developed during an interdisciplinary design project involving interactive design students from the Department of Multimedia and students from the Department of Industrial Design at the University of Johannesburg. The project took place over 5 weeks in April and May 2012. The students involved in the project were in their 4th-yr of study. The students were divided into nine design teams that incorporated at least one student from each department and tasked with establishing and responding to an open problem that had only two constraints, namely:

1. That the groups identify and solve problems framed within the context of the home environment
2. That the solutions need to incorporate an aspect of ubiquitous computing in the final product system

Initially all the groups collaborated on developing a set of ten questions[11] that formed the primary qualitative interview instrument. Each group then added a further five questions that were particular to the specific user group, that they wished to focus on. Additionally individual groups developed their own individual research probes.

The first case study, *Spialux* focused on the needs of elderly people in the home. Beyond the interview questions, the students also used probes such as mood-cards, on which user's recorded their emotional experience involved in the use of household products, 'a day in the life' photo surveys, and priority tree mapping (see Figure 5). The data generated from the combined research activities reflected the natural complexity of the home environment, as depicted in the word clouds shown in Figure 6. It is worth noting that at this stage of the design process, the problems represented in the word cloud do not invoke a 'natural' design solution and could potentially be solved by any number of varied solutions.

[11] The questions were qualitative semi structured and or open in nature, Examples of questions included: What is your favorite space in the home, why?; What spaces do you spend most of your time in?; What technologies do you use and where?

The second case study, *Gulpe*r focused on families in which both parents work. The specific research probes that the group applied included time-line diaries in which users mapped their daily activities and cardboard wishing stars, on which participants recorded their aspirations. While focused towards a different user group, the resulting data returned from the research process was as complex as those illustrated in the Spialux word cloud.

The data that was generated was then analysed and synthesized into a range of visual organizational tools such as the word cloud, personas (Figure 7) and space mappings (Figure 8). Collectively, these tools helped the groups to begin to develop their strategic response to the problem ecologies. The Spialux group strategy focused on designing a system that while facilitating and optimizing home management and security for the elderly also allowed relatives and friends to monitor the elderly in a non- invasive manner. The Gulper group identified the need to maximize quality family time spent at home by minimizing time spent on chores and general maintenance. The Gulper group's strategy went through a number of different concepts and tactics before they decided to focus on a garden management system.

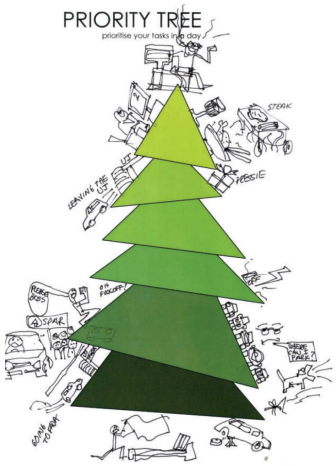

Figure 5: Priority Tree (FADA, UJ). The participants were asked to sketch in order of preference their main daily activities.

Figure 6: Word Cloud reflecting the complexity of the problem ecology and the emerging synthesis of data (FADA, UJ).

Figure 7: Example of a persona (FADA, UJ).

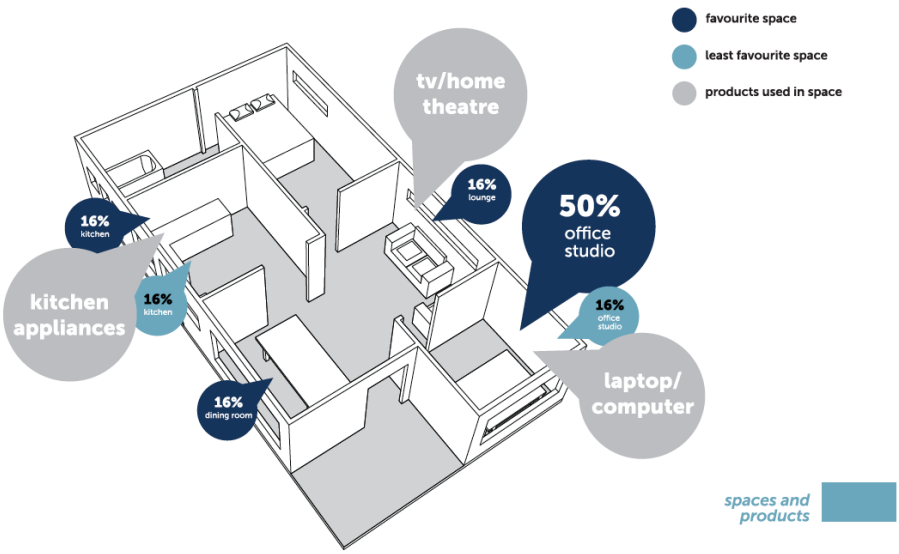

Figure 8: An informational mapping of the home spaces depicting the preferred spaces in the home and the use of products in those spaces (FADA, UJ).

Figure 9 and Figure 10, depict the two user journey and relationship models designed by the students, Figure 9 represents a very early version of the *Spialux* user journey model. This model clearly shows how the relationship model is been used to ideate different needs and user touchpoints. The model represents design decision-making that is at this stage akin to brainstorming. This can be level of conceptualization can be compared to the *Gulper* model, which depicts a much

more developed conceptual representation of the user journey through three of the four relationship stages based on the specific user scenario detailing how the user could check if a specific type of plant needed a particular type of maintenance. What is perhaps most interesting to note is that at this stage, the design solutions are viewed in both examples as seamless systems with journeys crossing between (what later emerges as) different product channels.

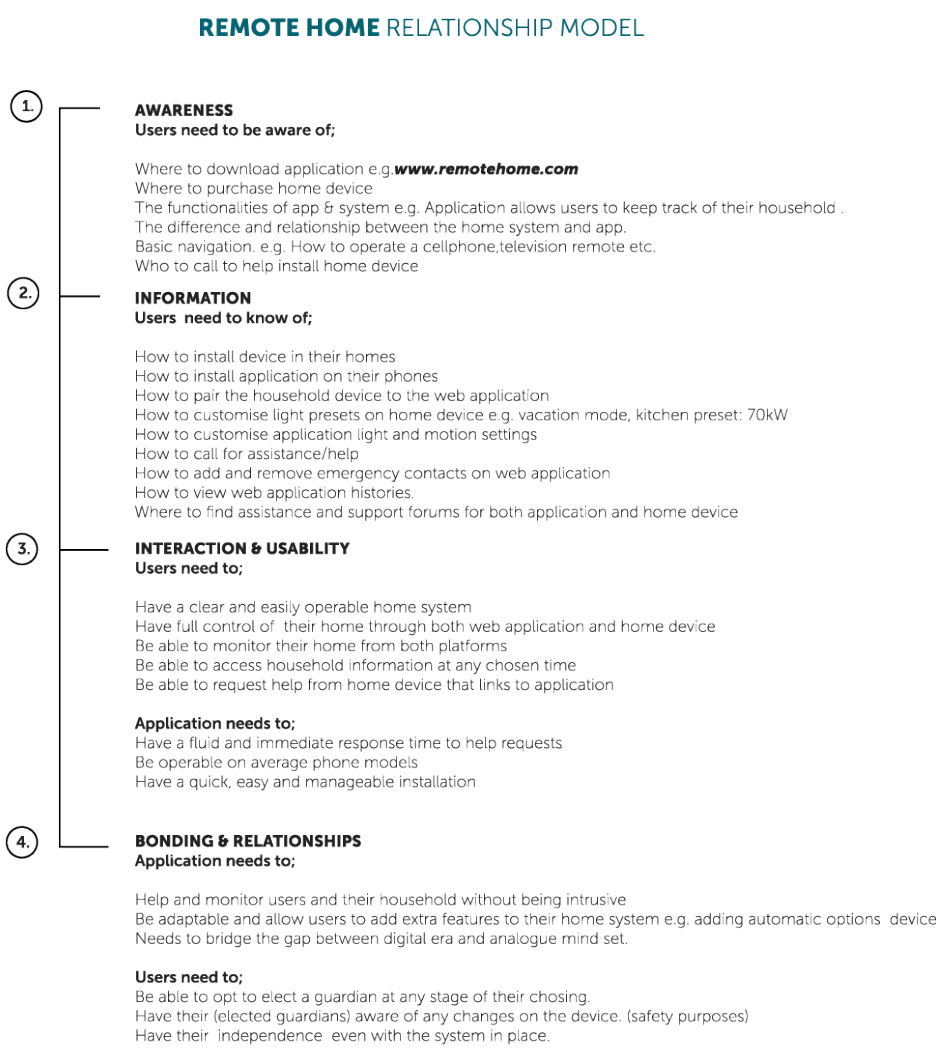

Figure 9: Student example of a user journey. This example as described in text is an early instantiation of a user journey depecting a wide range of functional and information. This example highlights many of the concepts evident in the final prototype but also contains other ideas, many of which were compacted or discarded in the final prototypes (FADA, UJ).

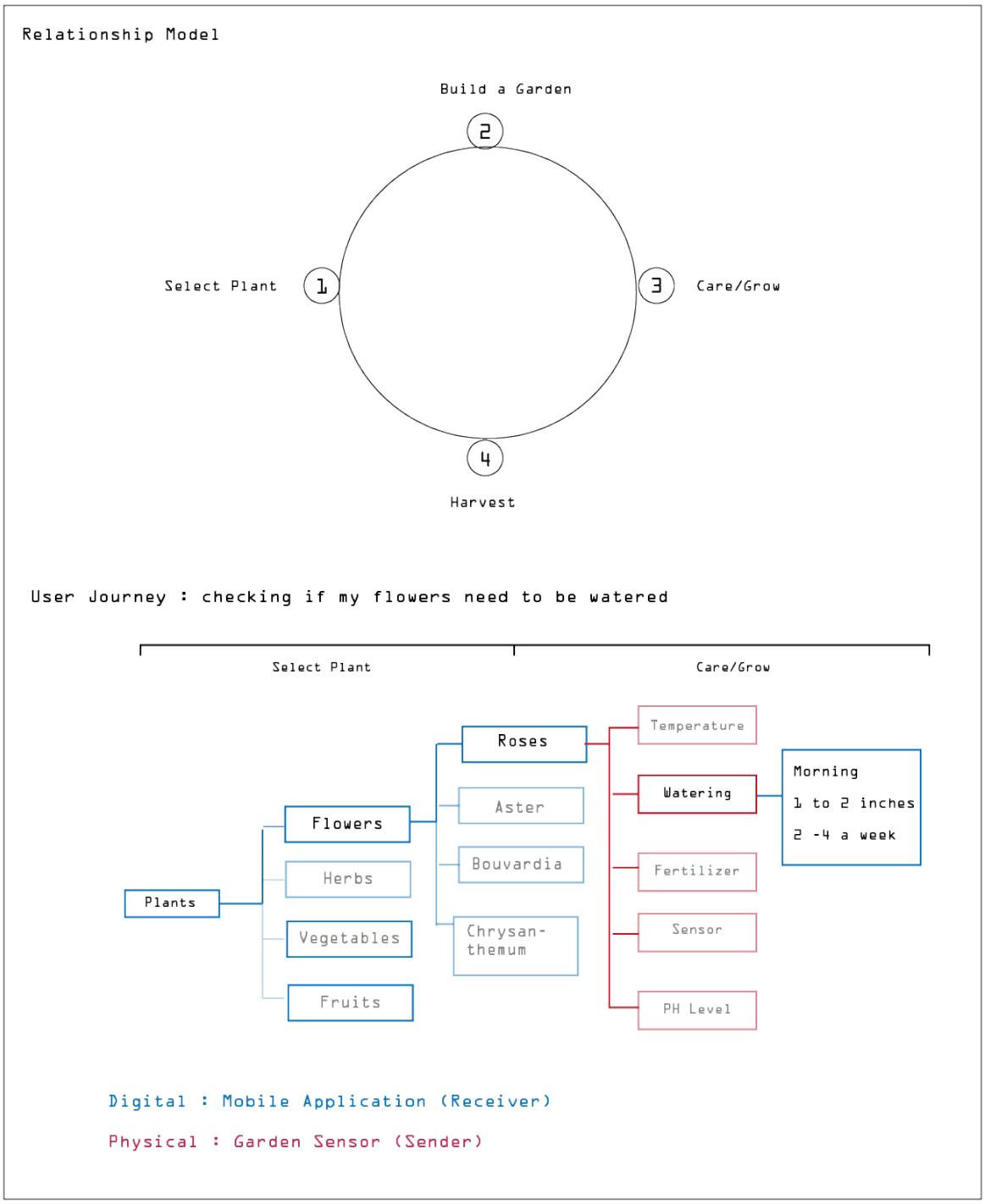

Figure 10: Relationship model and user Journey**.** A more developed and focused student user journey the Figure 8, that represents a specifc scenario. This example shows the journey through two of the four stages of the relationship (Select Plant andCare/Grow). The user journey also articulates how this particular journey moves through both the digital application and the garden sensor (FADA, UJ).

In Figure 11, a task- flow shows the design of the 'how to adjust the lighting' function of the *Spialux* system. This task- flow illustrates a high- fidelity iteration of a solution that can be traced back to the user journey and the original research data as depicted in the word cloud. As evident in the user journey and the final

products, this particular piece of functionality is required to be interoperable with the other functional requirements that were simultaneously designed. The ability of the user journey to conceptually 'hold' and converge the discrete tasks under design is an essential and powerful characteristic in the iterative development of design ideation. The user journey The final design resulted in a system that incorporated a bedside light (Figure 12) and wall mounted lights that facilitated easy and remote control of a home lighting/security system as well and a mobile application that could be used for the initial set up of the system and monitoring of emergency requests and movement within the home by a remote guardian (Figure 13). The final product of the *Gulper* design (Figure 14) resulted in a garden sensor that sends information regarding the status of the garden to a mobile application. Beyond receiving the information feed the mobile app is used to change the settings of the garden sensor, help design efficient and climate friendly gardens and provide information on plants in the garden (Figure 15).

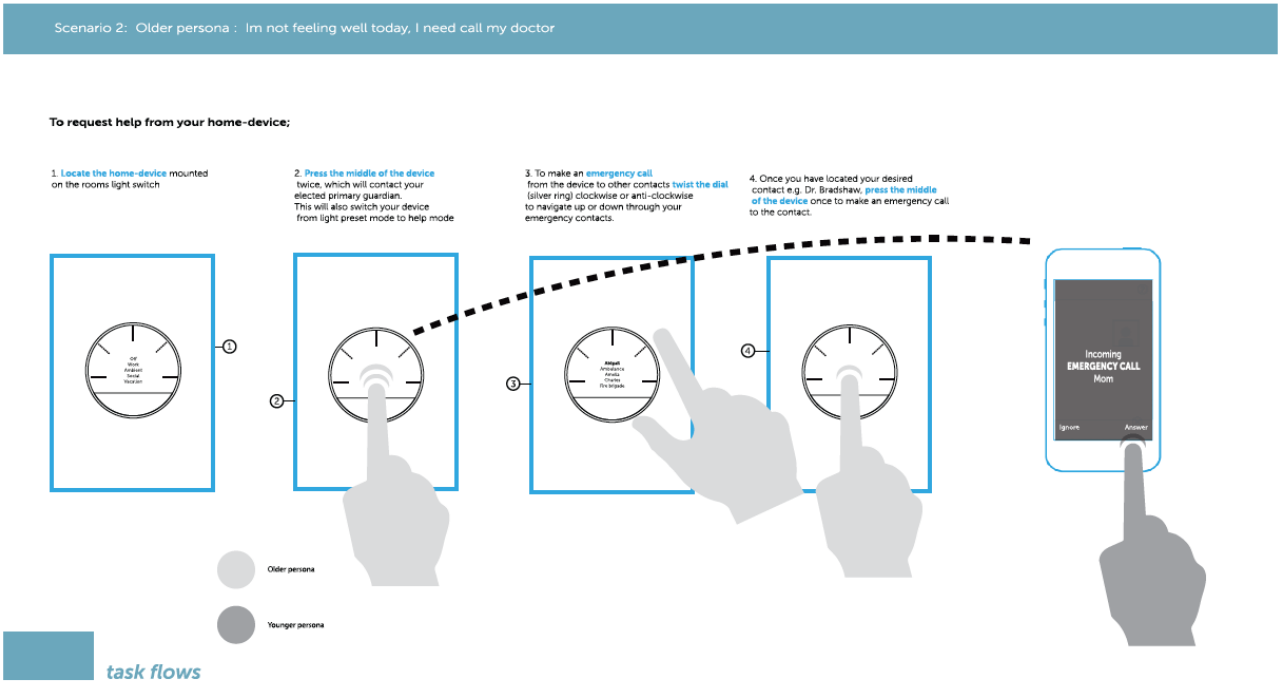

Figure 11: This diagram represents the development of the concepts embedded in the user journey to the design of the physical product. The early stage interaction and product design diagrams are shown to directly map to scenario stages (FADA, UJ).

Figure 12: A render of the *Spialux* bedside light product concept. (FADA, UJ)

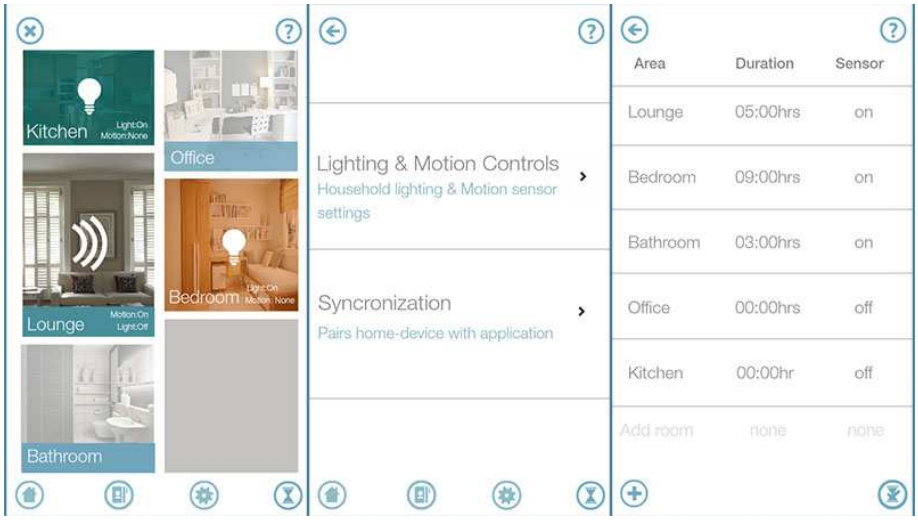

Figure 13: A selection of screen shots showing various stages of the *Spialux* mobile application. The image on the far left shows the default page of the app that shows an over view of the home space, light usage, settings and motion detection. The center and right image show to sequential images from journey related to the set up and monitoring of the home lights. The rooms depicted on the app would index those shown on the interface of the product affording dual and alternative control of the system (FADA, UJ).

Figure 14: A digital render of the *Gulper* garden sensor (FADA, UJ).

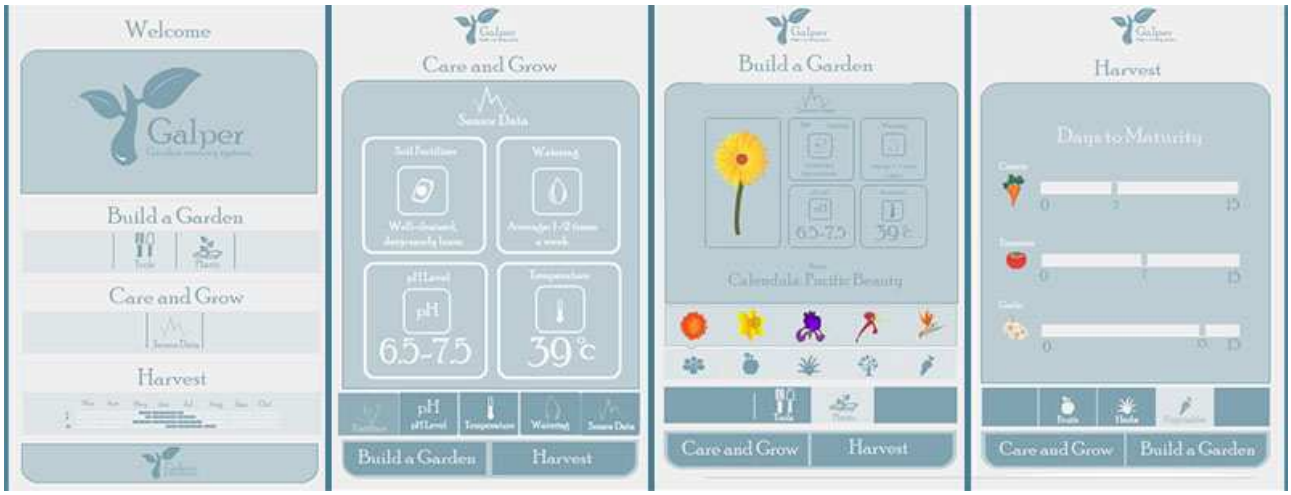

Figure 15, A selection of screen shots showing a variety of the informational and functional offerings of the *Gulper* mobile application (FADA, UJ).

CONCLUSION

Students who seek to practice design within human centered ethos will be required to resolve design problems that are highly complex and often requiring specific and original solutions that can only be constructed after a thorough exploration of the societal realities of the problem. The dilemma for design students is that the level of cognitive decision making required to perform design under these circumstances is not always considered as relevant to undergraduate courses. This paper argues that dealing with complex problems and indeterminacy should be part of undergraduate courses particularly in the developing world.

For this reason, this paper, positions the role of user journey design as a explicit and useful tool for conceptualizing, managing and reflecting on the ideation phase of human- centered. User journey support the ideation of design concepts in a number of ways. Firstly, the level of cognitive abstraction afforded by user journeys in the articulation of design solutions, supports the repurposing, exploration and editing of tactical responses. Secondly, ensure a ‘golden thread’ that directly connects final design solutions to user and business needs in a direct and meaningful manner. Thirdly, user journeys provide for the theory of the

solution to be revealed, discussed, shared, critiqued and tested in a visual form. Lastly, user journeys are design discipline neutral and are capable of describing user experiences across multiple and alternative journeys, channels and environments.

This paper concluded by describing the application of these four characteristics of user journeys in examples of student design project that were conducted in response to complex and indeterminate problems.

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