THE USER EXPERIENCE (UX) ENTRENCHMENT ENIGMA:

Why user experience practices are not being incorporated into South African enterprises' information systems development methodologies (ISDMs).

---

by

JACQUES BROSENS
(11337525)

submitted in accordance with the requirements
for the degree of

MASTER OF INFORMATION TECHNOLOGY
INFORMATION SYSTEMS
MIT(IS)

at the

Department of Informatics
Faculty of Engineering, Built Environment and Information Technology
University of Pretoria
Supervisor: Prof. J.H. Gelderblom

October 2017

ABSTRACT

Research shows that software projects have a high failure rate. User involvement has been identified as one of the most important success factors for software projects. User experience (UX) practices have been shown to engender several benefits with respect to the implementation and delivery of information systems. However, the institutionalisation of UX within organisations remains low. The question thus arises on why the managers of software programmes or projects neglect to incorporate UX practices into their teams' information systems development methodologies (ISDMs). This dissertation presents a study that investigated the perceptions of software programme or project managers in large South African enterprises about UX and its related concepts, its benefits, and the factors that restrict the adoption of associated practices. Interviews were conducted with six software programme or project managers working for large companies in six different industries. The main contribution is an explanation of the potential reasons for the lack of integration of UX activities into software development projects. The study finds that UX is often disregarded because the quality of software solutions as perceived by its users is not typically a measure of success for the project. A secondary contribution is an appraisal of eight potential instruments for persuading non-UX IT practitioners to integrate UX activities into their software projects. Results show that the demonstration of credible business cases and coherent recommendations from UX specialists have the highest power to persuade.

ACKNOWLEDGEMENTS

I wish to thank the following people/institutions for the parts they played in the completion of this dissertation:

- Professor Helene Gelderblom, my supervisor, for the guidance and support that she so elegantly and excellently provided.
- The CSIR for their financial support through the CSIR DST-Interbursary Support (IBS) Programme.
- Rendani Kruger, my best friend and business partner, for his selfless and unceasing willingness to listen, advise, and encourage me throughout this quest.
- Thabiso Mapulane, my girlfriend, for her enduring love, understanding and moral support.
- The informants who were willing to take time out of their busy schedules to show an interest and participate in my research.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

Chapter 1: Introduction

1.1 Introduction

> *"If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization."*
>
> *– Gerald M. Weinberg*

52% of software development projects are completed late, over-budget, or lacking some of its originally planned features, while 19% are not completed at all. This is according to the Standish Group's 2015 Chaos Report which conveyed the findings of a study of 50,000 software development projects around the world (Hastie & Wojewoda, 2015). This means that 71% of projects in the software development industry are critically challenged or failing. In this comprehensive study by the Standish Group, it was found that the most critical indicator of success, which they defined as a project that delivers all originally planned features on-time and within budget, is the involvement of users throughout the development process. In addition, the factor mentioned most frequently as the reason for software projects being challenged is a lack of user involvement.

If a user does not find a software application useful and usable, it is reasonable to expect an unhappy or frustrated user. If the user has a choice, he/she will likely not make further use of the application. If the user is obliged to make use of the application, he/she will lack satisfaction and will not be as productive as otherwise possible (Shneiderman, 2010). As far as a software user is concerned, the interface through which he/she interacts with a product, is very often the essence of that product (Karat, 2005). The design of this interaction is about far more than just

creating beautiful screens. In the interest of bringing about happy users, digital products should not only satisfy the utilitarian requirements of users, but also meet the hedonic goals of users, and, in doing so, engender user experiences that are memorable and delightful (Fallman, 2003). And so, it makes sense that the involvement of end-users during the design and development of an information system was found to be such a vital factor.

It is, however, often pointed out that the incorporation of activities conducive to an improved user experience is scarce in software development practice (Ardito, Buono, Caivano, Costabile, & Lanzilotti, 2014; Cajander, Larusdottir, & Gulliksen, 2013; Lárusdóttir, Cajander, & Gulliksen, 2012). In South Africa, only a few enterprises explicitly deliberate and develop strategies in furtherance of usability and UX (Pretorius, Hobbs, & Fenn, 2015). This dissertation provides an account of a research study that was carried out to look at the perceptions and practices related to UX within software development teams that function inside large South African enterprises.

This chapter provides some background information and context related to the study reported in this dissertation, highlighting the status quo of the UX scene in South African enterprises. The problem focused on in this research is also discussed, before the research questions and sub-questions of the study are posed. Furthermore, this chapter indicates where the boundaries for this investigation were drawn to clearly delineate the scope of the project. The significance of this study, considerations with regard to research ethics, and the formulated research design and methodology are also briefly discussed in this chapter. Finally, an overview of the structure of this dissertation is presented.

1.2 Rationale

It has been suggested that increased usability can lead to increased revenue, reduced costs, and improved user satisfaction (Ketola & Roto, 2008). Similarly, enhancing UX can have a positive impact on customer satisfaction, brand image, and reputation as a result of, among others, affirmative word of mouth (Desmet & Hekkert, 2007). The matter of coming up with system designs that facilitate comfortable interactions between people and digital products has given rise to a number of spheres of activity, interest, and study (Dix, 2009). Various design practices have been developed to improve UX. Moreover, several tools, techniques, and methods have been established to assess how well digital products achieve UX imperatives.

Some dissonance subsists regarding the definition of UX (Wechsung, Naumann, & Schleicher, 2008). A significant driver of this uncertainty is the fuzzy nature of UX, which encompasses affective and experiential facets of users (Law, Roto, Hassenzahl, Vermeeren, & Kort, 2009). These aspects are often regarded as somewhat difficult to assess and design for, seeing that they may be influenced by so many of the personal characteristics of users. Historically, business and project managers have also doubted the reliability of UX designs and evaluations, as they are often based upon so-called UX experts' subjective opinions instead of empirical evidence (Scapin, Senach, Trousse, & Pallot, 2012). Pretorius et al. (2015) studied the maturity of the UX field in South Africa and found that although interest is growing, the institutionalisation thereof is clearly still lacking.

The incorporation of UX practices into information systems development methodologies (ISDMs) can be beneficial to the perceived usefulness, ease-of-use, and quality of software solutions (Karat, 2005). These enhancements can lead to

improved user satisfaction which may, in turn, evolve into higher user adoption and loyalty (Van der Heijden, 2004). Despite these benefits, which have been repeatedly stated and demonstrated by a variety of academic researchers, those responsible for the decision on what a software development team's ISDM comprises are still apprehensive and unwilling to adapt their methodologies to include UX practices (Pretorius & Calitz, 2014). This may be due to misconceptions that have formed about UX, or the existence of challenges and barriers that restrict the application of practices in this regard (Sward & Macarthur, 2007).

The lack of maturity around UX in South African enterprises represents the central problem to be investigated by this study (Pretorius et al., 2015). This work aims to conduct an in-depth exploration of the understanding, perceptions, and practices that exist currently among large South African organisations' software development programme or project managers regarding UX. Furthermore, this study pursues an explanation for the lack of adoption of UX practices in industry.

1.3 Research questions

With a view to the resolution or clarification of the aforementioned problem, the following research question and secondary questions established the objectives of this study:

Main	**Why do software development programme or project managers in South African enterprises neglect to incorporate user experience (UX) practices into their teams' information systems development methodologies (ISDMs)?**
SQ 1	What do software development programme or project managers in South African enterprises understand about the concept of user experience (UX)?

SQ 2	What do software development programme or project managers in South African enterprises regard as the benefits of incorporating UX practices into their ISDMs?
SQ 3	What are the constraints on the incorporation of UX practices into the ISDM of a software development team?
SQ 4	What mechanisms can be used to persuade software development programme or project managers in South African enterprises to incorporate UX practices into their teams' ISDM?

1.4 Demarcation

This research was carried out to gain detailed insights into software development teams and their relationships with UX. In the name of achieving the desired blend of breadth and depth, the scope of this study was carefully delimited (Walsham, 2006).

1.4.1 Large South African enterprises

The prevailing dynamics and decision making processes in software development teams may diverge extensively depending on the type of organisation they find themselves in (Levesque, Wilson, & Wholey, 2001). It is presumed that the views held and approaches undertaken, as far as software development is concerned, differ depending on the size of the organisation. Smaller or start-up companies with many multi-role positions are likely to have different factors at play and, consequently, different decision making mechanisms in place compared to large enterprises (Clarke & O'Connor, 2012). Owing to the potential contextual influences on the research outcomes, this study's focus was limited to large enterprises. Only companies that employ more than 200 people and those with a revenue of greater than R10 million a year were considered for this study.

1.4.2 Programme or project managers

Software development teams customarily consist of various positions, each with unique roles and responsibilities (Sawyer, 2004). Individuals allocated to these positions may have differing views on the value and impact of UX along with the challenges associated with it. An assumption of this research was that software development programme or project managers, or individuals with comparable roles, have some influence on the planning and control activities of software projects. Professionals appointed in such positions typically have the responsibility to keep business stakeholders satisfied by ensuring the objectives of assigned projects are accomplished (Jurison, 1999). Hence, programme or project managers typically hold authority when it comes to the processes and practices that are incorporated into the ISDM being followed by their teams. These managers' views on UX may contrast with those of, say, programmers and designers, but it is assumed that they have superior organisational influence, which allows them to instruct their teams to implement practices conducive to the enhancement of UX. For that reason, this research was restricted to the understanding and perceptions held by software development programme or project managers on the matter of UX.

1.4.3 Various operational contexts

The operational context that software development teams function in can have a substantial impact on the approach they follow and the methods they employ (Pearlson & Saunders, 2009). Software development operational contexts, as related to this study, can be influenced by the company's industry or sector, by the nature of the software applications being developed, and by the adopted ISDM. In the interest of establishing a degree of breadth with regard to the assessment of the perceptions and practices concerning UX in South Africa, companies from six different industries

were investigated. These sectors were telecommunications, higher education and training, investment banking, information technology consulting, insurance, and low-cost airlines. The software development teams studied within these companies employed various ISDMs in order to deliver on the unique expectations placed on them.

1.5 Research design and methodology

The research disseminated in this dissertation was based on the interpretive research paradigm. Consequently, a philosophical assumption associated with this study is that realities are socially constructed and cannot be distinguished from the minds of those perceiving it (Walsham, 2006). Knowledge was constructed through empathetic interpretation, taking into account the researcher's subjectivity.

A multiple case study research strategy was employed in order to gather rich understandings of individual perceptions from different contexts and the impact these may have on UX practice (Yin, 2013). Correspondingly, qualitative data collection and analysis methods were applied. Semi-structured interviews were conducted with six programme or project managers as representatives of six large South African organisations from various industries. Thematic analysis was used to examine and find meaning in the voluminous sets of textual data produced through the transcription of interviews.

1.6 Ethical considerations

Proper care was taken to ensure that all research activities were conducted in an ethical and conscientious manner. A formal ethical clearance was sought and obtained (Appendix A) from the Committee for Research Ethics and Integrity under the Faculty of Engineering, Built Environment and IT (EBIT) at the University of

Pretoria. Informants to this study are anonymous and the confidentiality of personal and other sensitive information is guaranteed. Informed consents were signed by each of the programme or project managers interviewed during this study. A sample of the consent form is provided in Appendix B. Formal permission was also requested and obtained from top management at each of the six enterprises with regard to the participation of employees as informants in this study. In order to protect the identities of the companies approached, none of the letters of permission are included or appended to this dissertation. Signed permission letters were, however, a precondition for the acquisition of ethical clearance.

1.7 Significance and contribution

The primary contribution of this study is an understanding of why South African enterprises neglect to apply UX practices when developing information systems or software applications. This is supported by a series of insights into the perceptions of programme or project managers, who are overseeing software development teams functioning inside large South African enterprises, with respect to UX. Insights include managers' appreciation of the notion of UX and related constructs, their perceptions of the benefits and value brought forth by adopting UX practices, and their views on the constraints that limit or prevent the adoption of UX practices.

This study makes another contribution by identifying the UX practices that are currently being employed by some of the largest enterprises in South Africa. This advanced the existing understanding of how practitioners define UX practices and allowed for an interpretation of the UX maturity of these organisations.

By studying organisations from different sectors, this study provides a broad indication of how the operational environment of a team can impact the UX-related

perceptions and practices of that team. This study also contributes a description of the evident variations in the nature of the barriers hindering UX in teams employing Agile ISDMs versus teams following more sequential ISDMs, such as the Waterfall methodology.

A further contribution of this study is a tentative set of persuasion instruments that can be used by UX practitioners to persuade non-UX practitioners to adopt UX practices. During the study, a set of UX persuasion instruments were adapted from an existing (albeit non-academic) source, and evaluated by asking the project and programme managers from industry to share their judgements regarding the usefulness of each instrument. Two additional instruments were also identified.

In concluding their study, which applied quantitative methods to survey the UX landscape of the South African software industry, Pretorius et al. (2015) called for in-depth qualitative accounts concerning UX in South Africa. The study reported by this dissertation contributes such rich details of UX practice in South Africa, as called for by Pretorius and his colleagues. Moreover, no other study relating to UX in South Africa provides qualitative descriptions from the standpoints of practitioners that do not necessarily have a background in UX. In this study, the perspectives of South African project or programme managers regarding UX are considered for the first time.

1.8 Layout of the chapters

This dissertation consists of five chapters. The composition of these chapters are illustrated in Figure 1.1.

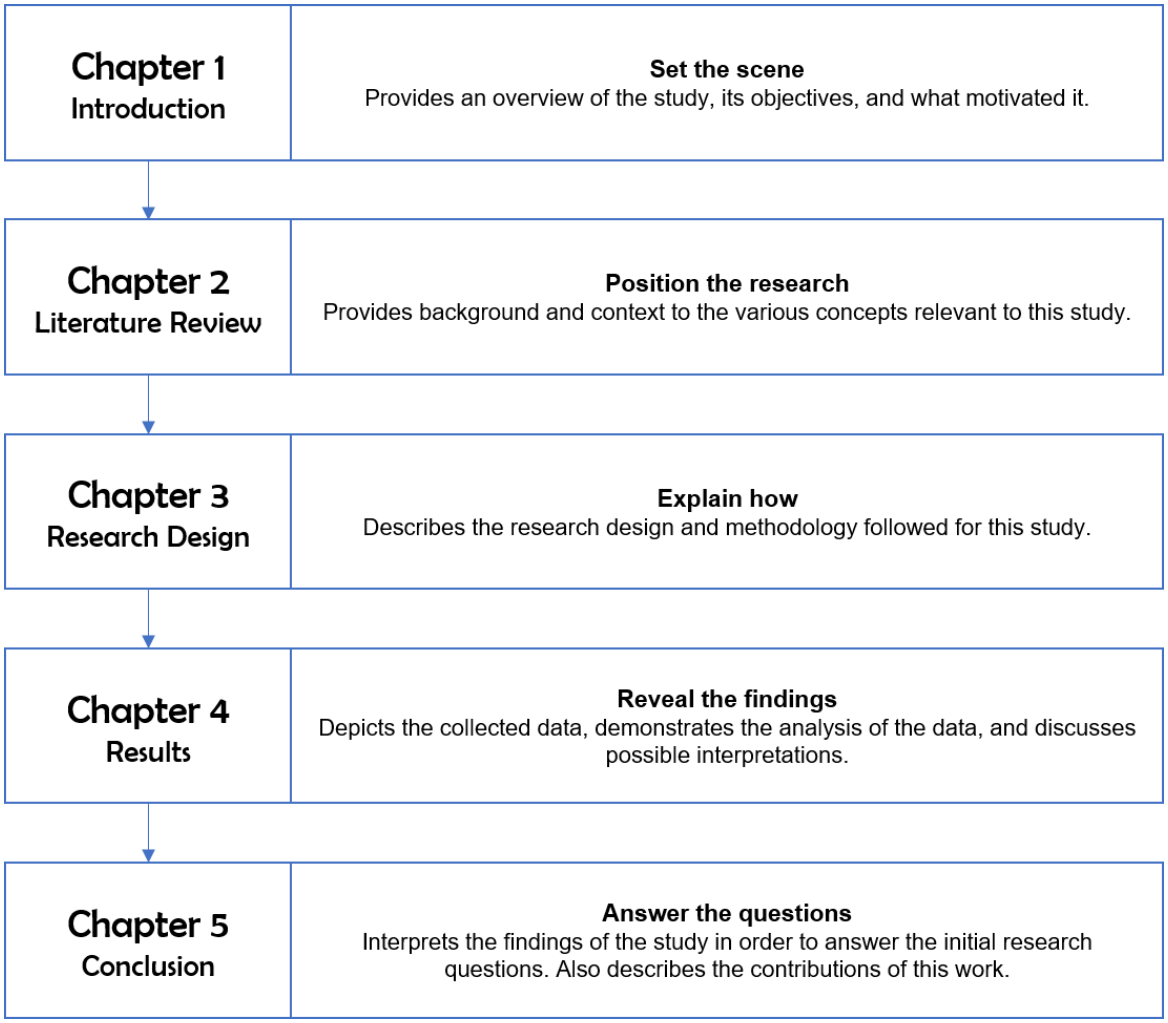


Figure 1.1: Layout of the chapters

In Chapter 1, background information about the study and an outline of the dissertation is provided. In addition, Chapter 1 describes the motivation, significance, and scope of this study. The study is then thoroughly unpacked and explained in the four chapters that follow. A detailed overview of existing scholarly work relevant to this study is provided in Chapter 2. The literature review chapter aims to delve deeper into the essential elements concerning UX, as well as the contextual factors that could influence supplementary practices.

Chapter 3 discusses and justifies the way in which this study was carried out, along with the consequences of the preferred research design. Chapter 4 disseminates the results of the research by providing a detailed account of each case investigated,

before illustrating the outcomes from the process of thematic analysis. The results chapter also provides a summative interpretation of the results.

Chapter 5 concludes this study by summarising the findings in a way that directly addresses the main research question and underlying sub-questions. The closing chapter also proposes the contributions of this study, makes suggestions for further research, and offers a reflection on how suitable the research design was given the results it produced.

Chapter 2: Literature review

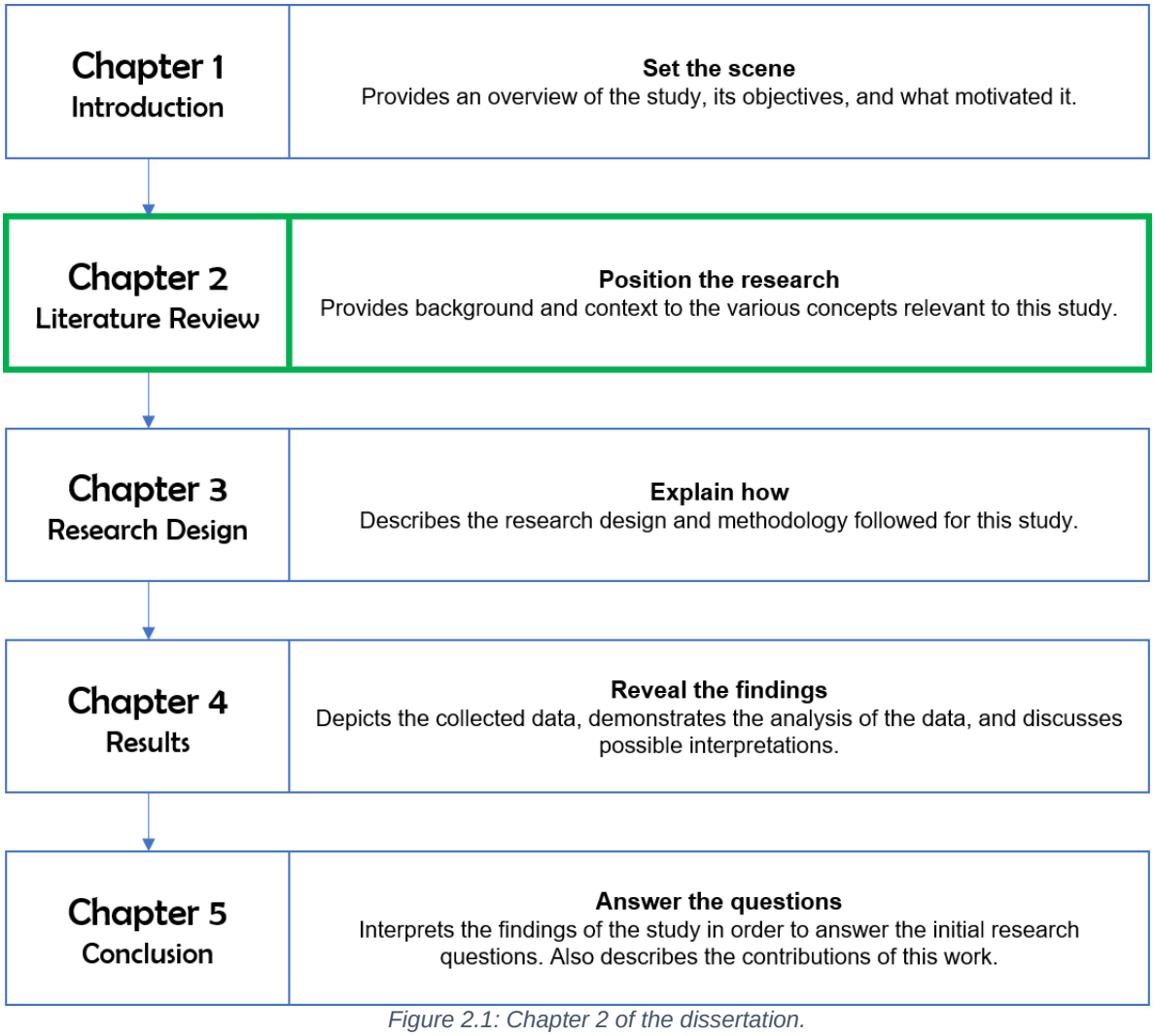


Figure 2.1: Chapter 2 of the dissertation.

2.1 Introduction

Considerable research has been executed to investigate whether the way human beings interact with technology can be improved, how this can be achieved, and what the value is in making such improvements. This chapter provides a summary of some of the collected works on this matter. The description of related literature is intended to set the scene for this study of the perceptions and practices around UX in South African enterprises.

To start, the human-computer interaction (HCI) field of study is discussed. Thereafter, the concept of user experience (UX) is deliberated and defined. The relationships between UX and related constructs are also discussed in detail. In addition, the tools, techniques, and methods that have been devised to support the augmentation of a system's UX are reviewed. The considerations that are required when incorporating such practices into teams' information systems development methodologies (ISDMs) are explored as well.

Furthermore, an overview regarding the benefits of putting some of the suggested UX practices to use is provided. Works that consider how the nature and purpose of an information system can affect the planning and application of UX practices during its development, are also studied. A look into the UX landscape in South Africa is provided, before reviewing a model for the evaluation of organisational UX maturity. Lastly, this chapter contemplates the available means to persuade IT practitioners to adopt UX practices.

2.2 Human-computer interaction

One of the core concepts considered throughout this study is User Experience (UX). UX and associated practices are typically positioned in the field of Human-Computer

Interaction (HCI). In order to ascertain exactly how UX forms part of broader HCI research, the HCI field and the broad topics that comprise it must be understood. Hence, this section discusses HCI along with associated subfields in order to establish the theoretical context within which this study conducts its investigations.

2.2.1 Defining HCI

Information systems facilitated by computers and software are mostly meant to be used by people. *Human-computer interaction* is concerned with methods and tools for the design, implementation and evaluation of interfaces between computer systems and its human users (J. Preece & Rombach, 1994). For Carey et al. (2004), the purpose of studying HCI is to ensure system functionality and usability, to facilitate effective user interaction, and to create a pleasant user experience. According to Kotzé and Johnson (2004, pp. 2-3), HCI strives to "*improve the quality of interaction between human and machine by systematically applying knowledge about human capabilities and limitations, and machine capabilities an limitations; also, to improve the productivity, functionality, effectiveness, efficiency, and usability of technology*". In other words, HCI is devoted to establishing means to enhance the design of interactive systems in such a way that it allows users to accomplish specified tasks on such systems with minimal effort (Dix, 2009).

HCI as a subject finds its roots in multiple disciplines, with computer science, psychology and cognitive science at its core (Dix, 2009). Management Information Systems (MIS) is a field of study where a community of scholars conceptualise, create and introduce information and communication technology systems. Their application in organisational and social environments, the use of such systems, as well as their impact are also studied (Laudon & Laudon, 2012). MIS has been gradually steering from "*a techno-centric focus towards a more balanced technology-*

organizational-management-social focus" (Baskerville & Myers, 2002, p. 11). HCI, with its emphasis on the user, has therefore also been growing as a subfield of MIS.

2.2.2 HCI Frameworks

HCI has developed into a broad field of study covering a wide range of topics (Soegaard & Dam, 2012). Hewett et al. (1992) made the observation that consensus had not been reached amongst scholars regarding a defined range of topics for HCI. Zhang and Li (2004) attempted to address this by proposing an integrated framework of broad HCI themes grounded on the assessment of three existing frameworks. The subsequent paragraphs provide a brief overview of each of the frameworks considered in order to determine and illustrate the high-level issues attended to by the HCI research community. This will assist with the positioning of UX within the field of HCI.

2.2.2.1 Eason - Three-level model of HCI

Eason (1991) proposed a model, depicted in Figure 2.2, which is made up of three broad levels to capture the themes in HCI.

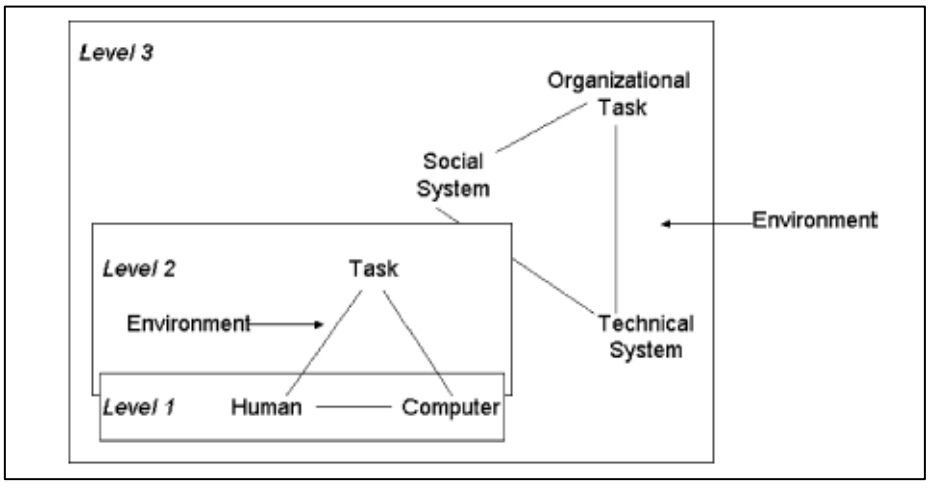


Figure 2.2: Three level model of HCI (Eason, 1991)

Level 1 treats HCI as a mode of exchange between two information processing nodes. Level 2 takes this further by incorporating the user tasks and the contextual

factors that may affect the performance of these tasks. On this level, environmental factors that affect task performance are limited to the physical environment within which computers are utilised, and not social, organisation or user related factors. Level 3 introduces the broader environments of the technical system, the organisational task and the social system. This level shows how the interaction between technology and humans impacts social systems. For example, organisations' modes of operation, the makeup of jobs, and the way in which people interact with each other may change as a result of the introduction of human-computer interactions (Zhang & Li, 2004). Eason's framework shows that a human interacting with a computer to complete a specific task should be viewed as an instance of a broader notion where a social system interacts with a technical system to address some organisational task. Although this model indicates impacts on HCI by environmental factors, it does not break down the particular kinds of environmental factors.

2.2.2.2 Preece, Rogers and Sharp - Factors in HCI

J. R. Preece, Sharp, Benyon, Holland, and Carey (1994) also distinguished between the technical, the human, and the interface in their HCI framework, but described these areas according to the various environmental factors that may influence them.

Figure 2.3: Factors in HCI (J. R. Preece et al., 1994).

As illustrated in Figure 2.3, the framework is comprehensive in its discernment of HCI factors. The user is not only surrounded and influenced by organisational factors, environmental factors, health and safety factors, and comfort factors, but also impacted by internal cognitive processes, capabilities, and inherent characteristics. With respect to the computer, technology, or software component in the model, Preece and colleagues identify various kinds of factors such as productivity factors, system functionality, and task factors. Furthermore, aspects which impact on the actual interface between the human and the computer are also highlighted.

In essence, this framework provides a map of the contextual aspects that should be taken into consideration during HCI design.

2.2.2.3 Hewett et al. - ACM SIGCHI curricula for HCI

For Hewett et al. (1992), the approach was slightly different as they intended to propose a HCI curriculum for Computer Science students. Their framework, as seen in Figure 2.4, is still useful as a layout of the components of HCI.

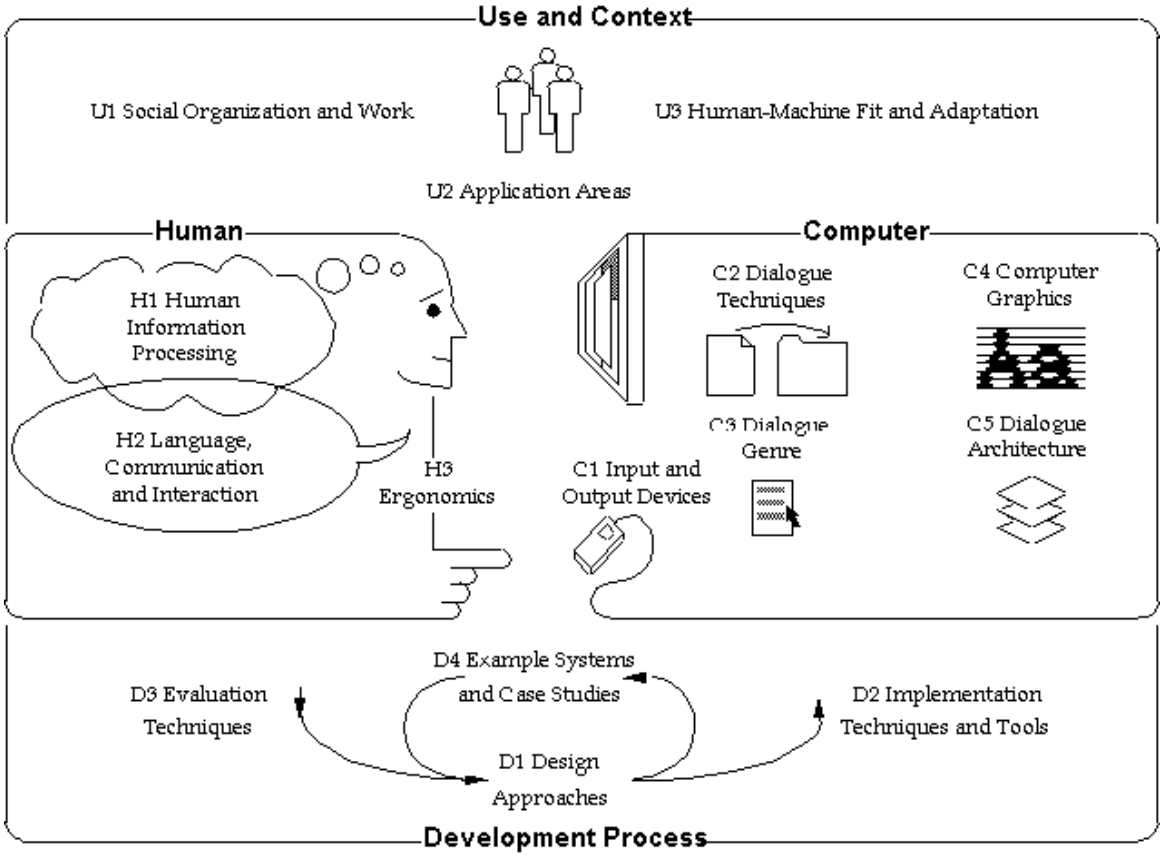


Figure 2.4: ACM SIGCHI curricula for HCI (Hewett et al., 1992).

This framework identifies three layers on the human side of HCI, namely internal cognitive sense making characteristics (*human information processing*), external interaction characteristics (*language, communication, and interaction*), and comfort factors (*ergonomics)*. On the side of computers, the framework outlines techniques to enhance the design of interactive systems with reference to dialogs, graphics and devices. Similar to the other frameworks, this one indicates that environmental factors (*use and context)* on both the human and computer side can have an effect on the interaction. The authors further propose a system development process that

aims to augment the interaction between humans and computer-based solutions. This process is depicted as an iterative process that starts with design, initially informed by examples of similar systems and case studies, followed by implementation of the interactive system, then evaluations of interactions. The success or failure of these interactions then informs further design improvements, and in this manner, the steps are repeated until satisfactory interactions are measured.

2.2.2.4 Zhang and Li - A framework of broad HCI issues and concerns

Zhang and Li (2004) contended that although the existing frameworks contribute to our understanding of the themes in HCI, it did not adequately address the juncture between HCI and MIS. In light of this, they proposed a framework of their own, which is depicted in Figure 2.5. As with the three frameworks discussed before, Zhang and Li's framework of broad HCI issues and concerns demonstrates the human and computer components core to HCI as well as the factors that influence the operation and/or processing of each. Furthermore, this framework emphasises the impact of the specified task as well as the global, social and organisational context on the interaction between human and technology. Similar to the framework in Hewett et al. (1992), this framework not only describes the importance of design techniques for a satisfactory interaction, but also that of feedback from real-world use, evaluation, and impact. The focus on social and organisational factors together with the evaluation of the impact of technology adoption on technology interaction, serve as the areas where Zhang and Li's framework incorporates elements from MIS.

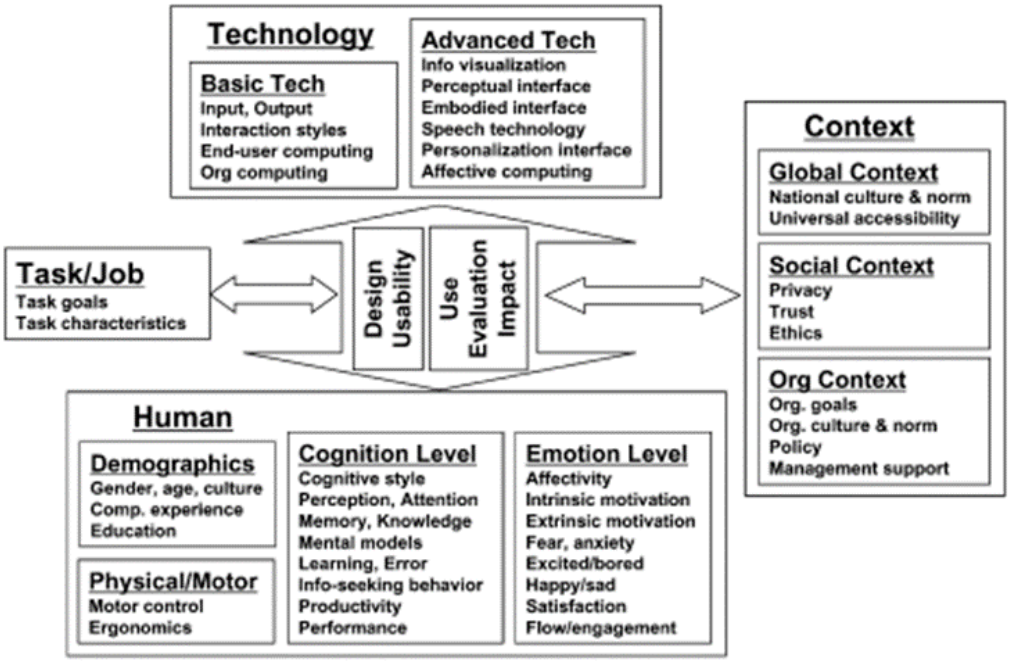


Figure 2.5: A framework of broad HCI issues and concerns (Zhang & Li, 2004).

2.3 User experience (UX)

HCI is concerned with the design, implementation, and evaluation of interactive systems and the interfaces that facilitate conversations between humans and technology (Carey et al., 2004; Kotzé & Johnson, 2004; J. Preece & Rombach, 1994). In this section, academic literature is examined in order to establish a coherent definition of user experience and to position user experience in the broader HCI field. From the frameworks and definitions of HCI depicted in section 2.2, it can be seen that the primary focus is on user task goals and how effectively and easily these task goals can be achieved. Task goals relate to the concepts of usefulness and usability. This section discusses these concepts before examining and defining the notion of UX. Thereupon, scholars' descriptions of usefulness, usability, and user experience are reviewed together with the conceptual HCI frameworks discussed in preceding sections, in order to determine where UX falls within the field of HCI.

2.3.1 Usefulness and usability

In HCI and MIS literature, two concepts emerge that appear to fit appropriately into the delineations of the HCI frameworks discussed in section 2.2.2, namely perceived usefulness and perceived usability (Bevan, 2009a; Davis, 1989; Dicks, 2002; Jokela, Iivari, Matero, & Karukka, 2003; Van der Heijden, 2004).

The concept of perceived usefulness was introduced by Davis (1989) with the Technology Acceptance Model (TAM), a fundamental and influential theory which explains and predicts the adoption and/or acceptance of new technologies in organisations (Venkatesh, Morris, Davis, & Davis, 2003). Perceived usefulness is "*the degree to which a person believes that using a particular system would enhance his or her job performance*" (Davis, 1989, p. 4). Perceived usefulness is stated as a dominant influential factor as far as technology acceptance is concerned. The other variable affecting technology acceptance, according to Davis, is perceived ease of use, which can be defined as "*the degree to which a person believes that using a particular system would be free of effort*" (Davis, 1989, p. 4).

Perceived usefulness indicates how purposive a system or product is from the user's standpoint, and accentuates the significance of putting together suitable functional capabilities in new systems. Interestingly, Davis (1993) found that perceived usefulness was 50% more telling than perceived ease of use in establishing technology usage. To wit, if the user cannot perceive any value from making use of a system or technology, he or she will most likely not feel inclined to accept and adopt that system or technology. Additionally, if the user struggles to make use of a new system or technology, it could have an adverse effect on the likelihood that he or she will accept and adopt it, although this influence is likely to be less than that of perceived usefulness.

Perceived ease of use, as described by Davis, ties in closely with the concept of usability. According to the ISO 9241-11 definition, usability is "*the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*" (Jokela et al., 2003, p. 54). Usability with regard to a software product or system, therefore, deals with whether or not users are able to complete tasks embarked upon (overall effectiveness), how much time and effort users have to spend in order to accomplish the tasks (overall efficiency), and how comfortable and gratified users felt during and after system interaction (user satisfaction) (Bevan, 2009b). Many researchers and field experts have executed experiments, collected and analysed voluminous datasets, and produced artefacts to guide designers and developers on how to create usable systems based upon the traditional notion of usability (Venkatesh & Ramesh, 2006).

2.3.2 Defining UX

A concept that has emerged more recently and harboured considerable attention is user experience (UX) (Hassenzahl, Diefenbach, & Göritz, 2010). But what is UX and how does it relate to or differ from usefulness and usability? Furthermore, how does UX fit into the HCI picture?

UX is a notably nuanced, fuzzy, and complex concept which transcends the material towards a more non-utilitarian view of interacting with technology (Hassenzahl & Tractinsky, 2006). UX can be considered a sub-category of experience that simply concentrates on the curation of experience via a particular mediator, namely interactive products (Scapin et al., 2012). Some frame experience as a distinct, immediate, in-the-moment event (Forlizzi & Battarbee, 2004; Kahneman, Kahneman, & Tversky, 2003), while others prefer to view experience as "*memorised stories of consumption*" constructed by threading together a series of momentary experiences

encountered during the time of usage (Hassenzahl, 2013, p. 2). This study was performed in concurrence with the latter, since users' decisions to continually make use of and recommend interactive products to other people are more likely to be based on their recollection of the experience as a whole, rather than singular, momentary interactions (Van Boven, 2005).

Hassenzahl (2013, p. 3) asserts that an experience arises from "*the integration of perception, action, motivation, and cognition.*" He continues to explain that an experience should be understood as an episode whereby a human being underwent a conversation with his or her world, intertwining the perceived stimulants, i.e. "*sights and sounds, feelings and thoughts, motives, and actions*", into a packaged experience, stored and categorized in memory, recalled, and disseminated to others.

Experience, and thus user experience, comprises and/or relates to an eclectic range of intangible concepts, such as experiential, affective, emotional, and aesthetic factors, which makes the formulation of an appropriate definition of UX challenging. The dynamic and confounding nature of experience has resulted in numerous definitions being suggested for user experience in academic and other works. Law et al. (2009) conducted a survey that asked 275 active members of the UX community to comment on five widely-cited UX definitions for the sake of gathering the requirements of a suitable definition for UX. These definitions respectively describe UX as:

1. "*All aspects of the end-user's interaction with the company. Its services and its products. The first requirement for an exemplary user experience is to meet the exact needs of the customer without fuss or bother. Next comes simplicity and elegance that produce products that are a joy to own, a joy to use. True user experience goes far beyond giving customers what they say they want, or providing checklist features.*" (Nielsen & Norman, 2014).
2. *"A consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.) the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.)"* (Hassenzahl & Tractinsky, 2006, p. 95).

3. *"The entire set of affects that is elicited by the interaction between a user and a product including the degree to which all our senses are gratified (aesthetic experience) the meanings we attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience)" (Desmet & Hekkert, 2007, p. 59)*
4. *"The value derived from interaction(s) [or anticipated interaction(s)] with a product or service and the supporting cast in the context of use (e.g. time, location, and user disposition)" (Sward & Macarthur, 2007, p. 36)*
5. *"The quality of experience a person has when interacting with a specific design. This can range from a specific artefact such as a cup toy or website up to larger integrated experiences such as a museum or an airport" (UXnet, 2010)*

The insights acquired from UX experts allowed the authors to illustrate that the ISO 9241-210 definition encompasses the important elements of UX and is in alignment with these experts' views on an apt definition for UX (Law et al., 2009). This definition refers to UX as "*a person's perceptions and responses that result from the use, or anticipated use, of a product, system or service*" (ISO, 2010, pp. 5-7).

2.3.3 Positioning UX in HCI

With respect to the question of how UX fits within the HCI field, Zhang and Li's framework of HCI issues and concerns has relevance. According to this framework, HCI devotes itself to the iterative process of design for the sake of usefulness and usability, evaluation of technology use and impact, and redesign (Zhang & Li, 2004). This HCI design and evaluation must, according to each of the four frameworks described in section 2.2.2, take cognisance of the multifarious environmental factors that influence human-computer interaction. These include factors affecting technology design, factors relating to human perception and cognition, broader contextual factors, as well as factors concerning specific tasks.

Although most of these frameworks take a utilitarian and material view of HCI, with minimal reference to intangible aspects such as delight, they do state that the purpose of HCI design is to enhance the perceived interactions of humans when using technology. When considering the accounts given of the notion of user

experience up to now, we can position UX as the primary consequence or dependent variable being affected by HCI design and evaluation. UX can be regarded as the ultimate output of HCI design and evaluation. In other words, HCI design and evaluation activities not only address the aspects of usefulness and usability, but can also be carried out in order to augment UX as a whole.

2.4 UX in practice

Since this study examines why South African enterprises seem hesitant to incorporate UX practices into their formal technology development processes, it would be fruitful to establish what UX in practice comprises. This discussion focuses, not so much on literature's descriptions of how to select the most appropriate practices for a particular context or how they should be employed, but rather on illustrating from literature the eclectic range of UX practices that are available to improve UX in an enterprise environment. Hence, this section reviews academic work for the purposes of outlining the underlying principles of UX practice, defining what constitutes a UX practice, describing UX practice areas, delineating the phases of UX practice, and providing examples of the tools, techniques, or methods that can be applied for the sake of UX.

2.4.1 User-centred design (UCD)

User-centred design (UCD), also referred to as human-centred design, represents a philosophy and set of principles that stresses the importance of designing for, and involving those parties who will eventually be expected to use a system in the design and development of that system (Abras, Maloney-Krichmar, & Preece, 2004). UCD exalts the inclusion of activities that grant significant attention to the needs, characteristics, environment, tasks, and workflow of the users throughout the design

process (Maguire, 2001; Norman & Draper, 1986). Table 2.1 summarises the fundamental principles of UCD, as suggested by Gulliksen et al. (2003).

Table 2.1: Principles of UCD according to Gulliksen et al. (2003)

1.	User focus	The needs and expectations of the potential users of the system guide the development of the system.
2.	Active user involvement	Representative users should be recruited early and asked to actively participate in systems development activities throughout the development process.
3.	Evolutionary systems development	Iterative and incremental systems development should be employed.
4.	Simple design representations	Designs based on or for the purposes of feedback from users should be easily understandable.
5.	Prototyping	Early and continuous development of prototypes that allow users to visualise and evaluate ideas.
6.	Evaluate use in context	The behaviours, reactions, opinions, and goals of users should be observed and gathered in the environment that they would typically interact with the system.
7.	Explicit and conscious design activities	The systems development process should contain activities that are dedicated to designing with the users in mind.
8.	A professional attitude	The systems development process should be carried out by multidisciplinary teams to cater for the different aspects of design.
9.	Usability champion	The systems development process should involve experts in usability early and continuously.
10.	Holistic design	Systems should be developed as components of a broader socio-technical system. The broader picture should be considered throughout the development process. Auxiliary aspects, such as work organisation, work practices, or

		individual roles, must be designed in parallel.
11.	Process customisation	The UCD process must be adapted to suit each organisation where and when it is implemented.
12.	A user-centred attitude should always be established	All parties involved in the systems development process and aspects related thereto, accept and are committed to the importance of user-centricity.

Although these principles come from a somewhat dated source, which explains the many references to usability instead of UX, they still hold true in modern user-centred systems design and development. This assertion is supported by Usability.gov (2017), that puts forward similar principles some 14 years later. These, more recent, principles appear in Table 2.2.

Table 2.2: UCD principles according to Usability.gov (2017)

1.	User focus	Design decisions are based upon the definitive understanding of users' needs, tasks and environments.
2.	User involvement	Users are involved throughout the design and development process.
3.	Test with users	The design process is directed and refined by means of user evaluations.
4.	Iterative design	The design process is iterative.
5.	Holistic UX	The design process devotes effort to the whole user experience.
6.	Multidisciplinary skillsets	The design team encompasses and combines several branches of learning from multiple disciplines.

The principles of UCD constitute the philosophical foundation of most UX practices (Garrett, 2010). There have been numerous UX practices advanced by scholars and practitioners alike with various usability or UX objectives in mind. As the approaches followed by systems development teams at different organisations may vary extensively, UX practices must often be adapted to suit the requirements of the particular setting. UCD, however, represents the overarching and essential objectives that should be preserved by each UX practice.

2.4.2 What is a UX practice?

The HCI field has produced a number of tools, techniques, and methods related to the experiences engendered by information systems and digital products (Bevan, 2009b; Shneiderman, 2003). In this dissertation, a UX practice refers to any such tool, technique, or method that can be applied with the intention to improve the experiences curated by an information system for its users (Wechsung et al., 2008). A UX practice is an activity that adheres to the principles of UCD, but its application area and focus may vary. A UX practice can be applied for the sake of enhancing perceived usefulness, perceived usability, or UX as a whole (Battarbee, Mattelmaki, & Makela, 2001).

2.4.3 UX practice areas

UX is "*a person's perceptions and responses that result from the use, or anticipated use, of a product, system or service*", as defined in section 2.3.2. Since UX refers to the holistic result of the user's engagement with the system, it encompasses the combined effects of designers' inputs into that system. There are, however, several aspects that make up an information system, including the hardware infrastructure underpinning the system, the software that provides the logic and intelligence of the system, the data and information that constitutes the system's content, the structure

of that content, the process flows that determine how to move through and perform tasks on the system, and the aesthetics of the system's interfaces. Each of these aspects, ranging from technology to the point of human interaction, should be designed in order to curate a deliberate user experience (Hassenzahl, 2013).

Designing for each of these aspects with a premeditated and integrated UX in mind requires skillsets from a broad array of disciplines and fields of practice. Boersma's T-model of UX, cited in Hobbs, Fenn, and Resmini (2010) and illustrated in Figure 2.6, contributes to our understanding of the various practice areas related to UX.

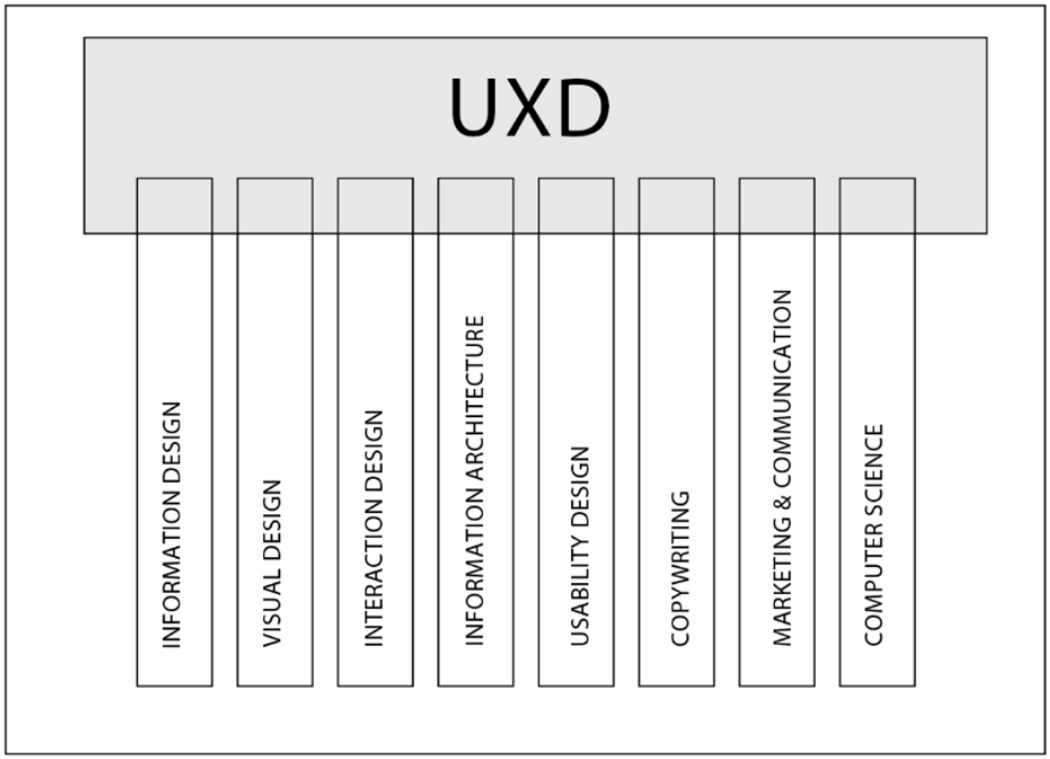


Figure 2.6: T-model of UX design (Boersma, 2005).

The computer science and software engineering fields offer the capabilities required to design and develop the hardware and software components of the system (McGuffee, 2000). Marketing and communication practitioners can decide on the strategy of how content should be shared with users, while copywriters have the skills to develop the content (Edwards, 2015). Usability designers are the architects

of the utilitarian aspects of the system and they design to ensure that users can complete tasks effectively and efficiently (Shneiderman, 2010). Information architecture is a practice focused on solving problems associated with the accessibility and navigability of information (Resmini & Rosati, 2012). Interaction design is about the design of interactive products to support people in their contexts (J. Preece, Rogers, & Sharp, 2015). Interaction designers, therefore, look at the users in their everyday and working lives, and design system interfaces, or points of interaction that will allow these users to comfortably and satisfactorily use the system. Visual designers are responsible for the "*look and feel*" of a digital product or system, putting together design elements such as colour, typography, imagery, use of space, icons, and more (Garrett, 2010). Information design, which often integrates skills from information architecture and visual design, is used to disseminate complex ideas and information with clarity, precision, and efficiency (Pettersson, 2010).

2.4.4 Phases of UX practice

The literature presents a myriad of ways that may enhance the UX mediated through a technological product (Battarbee et al., 2001; Bevan, 2008, 2009b; Butler, Kim, Nieman, & Wilson-Delfosse, 2015; Chi, 2002; Garrett, 2010; Maguire, 2001). Each of these approaches are unique in the way they forge UX, but many bear similarities as far as their general objectives are concerned. For Roto (2007) and J. Preece et al. (2015), the tools, techniques, and methods that aim to create an improved UX can be categorised into three classes based on shared purpose, namely research, design, and evaluation.

2.4.4.1 Research

According to J. Preece et al. (2015), when designing for users, it is important to understand who the users are, what their needs and expectations are, and what the requirements are for the product to satisfy these needs and expectations. Analysis of the potential end-users of an interactive system or product is important as it underpins further design and development decisions. According to the UCD philosophy, products and systems should not be designed for ideal users, i.e. in a way the product owner, designer, or developer imagines the system will be used. The assertion is that, in order for users to like and continually make use of the system being created, it is necessary to escape the restricted perspectives of those producing it, rather seeing things from the users' standpoints (Garrett, 2010). The tools, techniques, and methods that are classified as "*research*" therefore have the purpose of identifying users' needs and subsequent requirements. This often involves interviewing or observing the behaviours, reactions, and processes of potential users in context (Gulliksen et al., 2003).

2.4.4.2 Design

When producing designs for the purposes of enhancing UX, it may be fruitful to consider whether the goals regarding the artefact being produced are to address a particular component of UX, such as usefulness or usability, or whether the intention is to address UX as a whole (Roto, 2007).

The literature on design thinking in HCI rarely distinguishes between designing for usefulness, usability or UX (Fallman, 2003; Rudisill, 1996; Zimmerman, Forlizzi, & Evenson, 2007). Some sources do speak of designing for usability, but do not clarify why the propositions pertain specifically to usability, and not to UX (Butler et al., 2015; Chi, 2002; Gould & Lewis, 1985; Nielsen, 1999; Venkatesh & Ramesh, 2006).

Similarly, other authors talk about designing for UX without an explanation of how it is different to usefulness or usability design practices (Battarbee et al., 2001; Garrett, 2010; McCarthy & Wright, 2004; Pretorius et al., 2015).

As discussed in section 2.4.1, an underlying theme in design related works is the notion of human-centred design. This approach encourages collaboration with intended users via dynamic conversations in natural environments (Maguire, 2001). It emphasises behaviour and emotional meaning rather than demographics in furtherance of a product that is empathetic to the users' performance and hedonic needs. The tools, techniques and methods categorised under "*design*" support the synthesis of ideas and prototypes in order to meet the requirements gathered in the "*research*" phase (J. Preece et al., 2015). Many of these practices are meant to be effectuated early in the software development process and to be iteratively improved upon throughout the process (Fallman, 2003).

2.4.4.3 Evaluation

Tools, techniques and methods under this category aim to test how successful a system is in meeting users' needs in terms of UX as a whole, or a component of UX like usefulness or usability (Vermeeren et al., 2010).

Unlike literature on "*UX design*", works related to "*UX evaluation*" or "*UX testing*" clearly delineate indicators that serve to measure either the usefulness, usability or UX of an information system, or part of the information system (Bevan, 2008; Dicks, 2002; Väänänen-Vainio-Mattila, Roto, & Hassenzahl, 2008; Vermeeren et al., 2010). Evaluators can make use of both qualitative methods (e.g. interviews, cognitive walkthroughs, focus groups, and think aloud protocols) as well as quantitative

methods (e.g. eye-tracking, A/B testing, and surveys) to assess the usability of software products (Nielsen, 1994b; Poole & Ball, 2006).

The concept of usability and methods to evaluate it have been around for longer than those of UX (Wechsung et al., 2008). The evaluation of UX includes the assessment of many behavioural, affective, and experiential aspects that are less palpable than the factors measured for usability, which endeavour to determine effectiveness, efficiency, and user satisfaction, or usefulness, which simply appraises the utility of a system (Bevan, 2009b). As such, there are more established and reliable means to measure the elements that impact usefulness and usability as opposed to those that exist for UX. Nonetheless, some evaluation methods have been proposed for UX. These include experiential pilots (Isomursu, 2008), emotion sampling (Hole & Williams, 2007), repertory grids (Karapanos & Martens, 2009), and multiple sorting (Al-Azzawi, Frohlich, & Wilson, 2010). Vermeeren et al. (2010) collected and analysed 96 UX evaluation methods and found that most of these methods depend on participants' own reports of emotion and experience, which may be unreliable since people are not necessarily consciously aware of all emotions being experienced.

2.4.4.4 Available tools, techniques, or methods for UX

There are plentiful tools, techniques and methods beneficial to the various aspects of UX put forth in the literature, and even more emanating from non-academic sources. In Table 2.3, a list of 20 practices typically associated with UX is described. This list does not include all possibilities, but it is meant to show the wide range of options that managers who wish to incorporate UX practices into their ISDMs more regularly have at their disposal.

Table 2.3: List of UX practices

No	UX Practice	Phase	Description
1	Blueprints	Design	Blueprints are simple clear diagrammatic representations of a service as a whole. It distinguishes between the interfaces, or “touchpoints”, that are visible to the user and the behind-the-scenes processes. This tool allows designers to identify and visualise key user interactions and to optimise the sequencing of these interactions. (Hollins & Hollins, 1990)
2	Customer journey maps	Design	Customer journey maps are interpretations, in graphical or narrative form, of the relationship between a customer and an organisation from the customer’s perspective. Data for customer journey maps is thus directly drawn from user research. The word customer is used here because this tool focuses on all interactions between customer and organisation. The user experience is therefore an approach from a broad perspective. (Kojo, Heiskala, & Virtanen, 2014; Lemon & Verhoef, 2016)
3	User stories	Design	User stories are concise, one-sentence descriptions of user goals used to keep products focused, to promote design collaboration, and to prevent feature creep. User stories aim to refine the usefulness component of UX by very concisely depicting user task goals, for example “as an employee I would like to download a payslip”. (Jurca, Hellmann, & Maurer, 2014)
4	Personas	Research	A persona is a fictional representation of a user whose profile embodies the characteristics of a particular social grouping. These archetypes are developed through extensive research of the intended users of the product being designed. Personas ensure that designers take into account users from different social groups and do not create a product for a single, convenient user. (Getto & Amant, 2015; Idoughi, Seffah, & Kolski, 2012)
5	Ecosystem maps	Research	Ecosystem maps are visualisations of the contexts within which users operate and how pertinent factors interrelate and affect the eventual user experience. These graphs look at users, their practices, their information behaviours, the services available to them, the people around them, the devices they use, and their communication channels. (Levin, 2014)
6	Heuristic evaluations	Evaluation	Heuristic evaluations intend to assess the usability of a product based on a predefined set of criteria. Many sets of best practices and interactive system design guidelines exist, and a heuristic evaluation checks the adherence of a system to such a set. (Nielsen & Molich, 1990)

7	Design games	Design	Games may be used to provide a platform for all participants to get involved in a co-designing session. Ideas come up via conversation during the game instead of a more conservative session characterised by ideas being pitched, after which they are approved or shot down. The benefit of this approach is its tendency to draw tacit knowledge out of participants. Users are also more likely to continue their involvement in the design process if it is enjoyable and informal. (Brandt & Messeter, 2004)
8	Wireframes	Design	Wireframes are visual representations of user interfaces without any visual design elements, such as branding and colour schemes. Wireframes aim to establish the hierarchy of elements on a screen and the layout of these elements. (Rudisill, 1996)
9	Stakeholder interview	Research	Stakeholder interviews is a research instrument used to collect data from anyone with an interest in the outputs of the project, including users and parties from the business side. The interviewer asks a series of questions based on the information that the design team would need to effectively perform their work. Gathering input from different stakeholders aims to clearly understand the expectations related to the product before designs are created. (Unger & Chandler, 2012)
10	Sitemap	Design	Sitemaps are hierarchical representations of the information architecture or navigational structure of a digital product. Sitemaps are intended to ensure findability of the information and functions in a system. (Garrett, 2010)
11	Cognitive walkthroughs	Research or Evaluation	A cognitive walkthrough refers to a process where a researcher or evaluator observes as a user or a person acting as a specific user characterisation, and performs a task or set of tasks on a system or product. The aim of applying the cognitive walkthrough technique in research is to establish the process a user is supposed to take and to gather their expectations throughout this process. In testing, the intention is to pick up on any usability or experiential issues as the user performs the specified task. (Arvola & Artman, 2006)
12	Rough prototyping	Design	Rough prototyping is a rapid method to create a low fidelity preliminary sample of a system, component, or set of components. These basic prototypes are applied to simulate the interactions in order to disseminate and receive feedback on initial design ideas. (Maguire, 2001)
13	Experience prototyping	Design or Evaluation	The experience prototype method simulates the product in a high-fidelity state involving recruited end-users to demonstrate and evaluate how the product performs in a near production environment. Facilitators may choose to focus on usefulness,

			usability, and/or the whole experience during users' interactions with the prototype. (Buchenau & Suri, 2000)
14	Use cases	Design	Use cases are typically associated with systems analysis and design approaches where business analysts narrate system processes in detail. In these instances, use cases also serve as specifications for systems analysts and developers to use when compiling a system's functional specifications or when implementing the actual technology. In terms of UX, use cases are typically used in interaction design to iron out the sequencing of activities and to communicate design decisions with developers. (Morelli, 2006)
15	Brainstorming	Design	Brainstorming is a commonly used method for the sake of generating as many ideas or solutions to a particular problem as possible. The method entails a group of people sitting together discussing possible solutions to a problem, denoting any ideas that emerge for later investigation. (Maguire, 2001)
16	Storyboards	Design	Storyboards twine together use case narratives with personas via a sequence of visual representations. The intention of the storyboard technique is to communicate, in an easy and non-technical fashion, the series of interactions required to use part of a product or system. When attempting to acquire feedback on designs from users who may not understand the technical terms or complex graphics present in some of the other UX practices, storyboarding could be useful. (Vertelney & Curtis, 1990)
17	User research	Research	There are various quantitative and qualitative user research techniques such as surveys, workshops, interviews, contextual inquiries, etc. with the purpose of gathering information from potential or existing users of a product or a system. The insights gained from user research are an important precondition for many of the other tools, techniques, and methods mentioned in this list. (Garrett, 2010)
18	Wizard of Oz	Evaluation	Adopting its name from the famous tale, Wizard of Oz is a testing technique where users interact with a product while, unbeknownst to them, the experimenter is observing and taking note of any issues or concerns the users may be experiencing. This technique guards against altering their behaviour or responses due to a possibly unnatural experimental environment. (Molin, 2004)
19	A/B testing	Evaluation	A/B testing, or split-run testing, entails making available and testing two or more variants of the same component or product to evaluate which produces the most satisfactory results. Typically, this method is applied to evaluate design changes made to an

			existing product. The impact of these changes is then tested by evaluating particular metrics and comparing them against the same metrics from the original solution. (Kohavi et al., 2013)
20	Eye tracking	Evaluation	Eye tracking uses sophisticated equipment to trace and follow the gazes (fixations) and movements (saccades) of users' eyes while making use of a system or digital product. This type of information offers useful insights for designers of interactive systems. For instance, eye tracking can show which part of the screen attracts the most attention. Several quantitative metrics like number of fixations and duration of fixations could also be worth analysing. (Garrett, 2010; Poole & Ball, 2006)

2.5 Information systems development methodologies (ISDM)

Projects to develop information systems, software applications, and other forms of interactive technologies are typically carried out within frameworks, called information systems development methodologies (ISDMs). ISDMs organise, plan, and control the development process to deliver software solutions in line with stakeholders' requirements (Kerzner, 2013). Therefore, if UX practices were to be employed by software development teams, they would have to be assimilated into these teams' ISDMs. In this section, academic definitions and descriptions of ISDMs are examined. Furthermore, existing ISDMs, their handling of issues related to UX, and the incorporation of UX practices into these ISDMs, are discussed.

2.5.1 Defining ISDMs

Various definitions are available in literature for an information systems development methodology (Flynn, 1992; Iivari, Hirschheim, & Klein, 1998; Maddison & Baker, 1983). What is more, there are many ISDMs advanced by several different scholars, each varied in nature and approach (Checkland & Scholes, 1999). Avison and Fitzgerald (2003, p. 568) noted the superfluity and disparity of literature on ISDMs, subsequently endeavouring to systematically harmonise the scholarly works on

information systems development methodologies, techniques and tools. On this basis, they proposed a unified definition for an information systems development methodology:

> *"A systems development methodology is a recommended means to achieve the development, or part of the development, of information systems based on a set of rationales and an underlying philosophy that supports, justifies, and makes coherent such a recommendation for a particular context. The recommended means usually includes the identification of phases, procedures, tasks, rules, techniques, guidelines, documentation and tools. They might also include recommendations concerning the management and organization of the approach and the identification and training of participants"*

ISDMs usually comprise various tools and techniques that are designed and combined to follow a certain rationale or philosophical theme (Iivari et al., 1998). Numerous different ISDMs have been proposed with varying advantages and disadvantages which are often closely associated with the thematic orientation and focus of the methodology (i.e. people-oriented, object-oriented, process-oriented, data-oriented, etc.) (Wynekoop & Russo, 1997). Organisations' software development teams customarily execute their processes in accordance with one such methodology (Kerzner, 2013).

For Checkland and Scholes (1999), ISDMs comprise three elements, namely an intellectual framework, a methodology, and an application area. The intellectual framework provides for the underlying philosophy of the ISDM by presenting the ontological and epistemological assumptions made in its formation. The methodology materialises these theoretical underpinnings into a coherent set of recommendations for the development of information systems, typically including advocated methods and techniques. The application area refers to the problem

space that is being addressed and thus articulates the unique environmental factors existent in that context.

The adoption of an ISDM may occur for varying reasons in different social or organisational settings. However, the constitution of a higher quality end product, the establishment of a more coherent, optimised development process, and the standardisation of the development approach across multiple projects are ordinarily the broad reasons for employing an ISDM (Avison & Fitzgerald, 2003).

2.5.2 ISDM themes

The intellectual frameworks and philosophies of various ISDMs give rise to certain themes, or focus areas, when examined. These themes may be used to categorise the diverse range of ISDMs that exist. Again drawing from the synopsis provided by Avison and Fitzgerald (2003), methodologies can be typified as:

2.5.2.1 Process-oriented methodologies

Process-oriented methodologies place an emphasis on decomposing a complex problem into its functional components by modelling the activities and steps required to complete these functions. These methodologies typically aim to break business processes down to the lowest level, i.e. simple and manageable units of logic. Examples of process-oriented methodologies include Structured Analysis, Design, and Implementation of Information Systems (STRADIS), Yourdon Systems Method (YSD), and Jackson Systems Development (JSD).

2.5.2.2 Object-oriented methodologies

Object-orientation, which stems from the Object-oriented programming (OOP) paradigm in Computer Science and Software Engineering, utilises a range of techniques and tools to render a problem area as a series of interacting objects that

encapsulate data attributes as well as behaviour. The primary benefits of OOP are modularity and re-usability of system components. And so, object-oriented methodologies strive to facilitate the analysis, design, and implementation of systems that exemplify these benefits. Instances of such methodologies include Object-Oriented Analysis (OOA) and Rational Unified Process (RUP).

2.5.2.3 Rapid and evolutionary development methodologies

Rapid and evolutionary development methodologies favour the quick delivery of prototypes over extensive planning, analysis, and design. The techniques and tools within these methodologies gather requirements as speedily as possible, after which software development commences. Software development, in these cases, is iterative and evolutionary in the sense that prototypes are incrementally improved upon and released as a component or module of the information system. Feedback from the customer and other stakeholders guide subsequent iterations. Information systems are broken into modules that can be developed in parallel with an emphasis on speed and adaptability. The Evolutionary, Rapid Application Development (RAD), and Agile methodologies each have themes that align with this orientation, but with variations in their particular guidelines, techniques and tools. There are several examples of rapid and evolutionary development methodologies, such as James Martin's RAD, Dynamic Systems Development Method (DSDM), Extreme Programming (XP), and Web Information Systems Development Methodology (WISDM).

2.5.2.4 People-oriented methodologies

There are also a number of ISDMs that underscore the role of people in developing and using an information system. These methodologies tend to employ techniques and tools that identify and prioritise stakeholders of the information system, and

endeavours to gather information from these people not only to adequately plan the development of the system, but also to test and acquire feedback once parts of or the entire system has been completed. Specific people-oriented methodologies may differ largely based on whom their stipulated stakeholders should be. Due to the business-centric philosophies of many people-themed methodologies, the customer, i.e. the product owner from the business' side, often takes priority over end-users. Archetypal ISDMs with strong people themes are Effective Technical and Human Implementation of Computer-based Systems (ETHICS), KADS, and CommonKADS.

2.5.2.5 Organisational-oriented methodologies

Organisational methodologies integrate techniques and tools that direct attention towards a holistic view of an information system, taking into account its organisational context. These methodologies focus primarily on the needs of an organisation and its stakeholders, looking at how information systems can interrelate to accomplish certain strategic objectives. An application is therefore not considered in isolation, but rather as a part of a greater technological architecture. Examples of organisational methodologies include the Soft Systems Methodology (SSM), Information Systems Work and Analysis of Change (ISAC), Process Innovation (PI), and Projects in Controlled Environments (PRINCE).

2.5.2.6 Blended methodologies

Some methodologies draw from or focus on multiple themes in order to derive integrated benefits and mitigate weaknesses of particular themes. With a mono-themed methodology, the techniques and toolsets operationalise a particular orientation, e.g. focus on processes, focus on people, and focus on rapid development. Conversely, blended methodologies serve as hybrid solutions, incorporating techniques and toolsets with various focal points. Structured Systems

Analysis and Design Method (SSADM), Merise, Information Engineering (IE), and Welti ERP development are examples of blended methodologies.

2.5.3 Incorporating UX practices into an ISDM

As noted earlier, ISDMs are predicated upon specific philosophies comprising certain sets of assumptions and principles which bring about discernible themes in the methods, techniques and tools that are incorporated into these ISDMs. Avison and Fitzgerald (2003) were exhaustive in their collation of ISDM philosophies and accompanying themes, methods, tools, and techniques from a comprehensive anthology of related work. Accordingly, most mainstream or regularly applied ISDMs were investigated and described by these authors. However, out of the ISDMs illustrated, those that deliberately address the issue of UX grounded on the philosophy of UCD are few and far between.

The nature of the UX practices discussed in section 2.4 clearly demonstrates the principles of UCD and could therefore be incorporated to formulate a new user-centred ISDM or to adapt an existing ISDM to be more user-oriented. If teams wished to employ UX practices, these efforts may need to be tailored to integrate with their selected, and possibly customised, ISDM. Zhang, Carey, Te'eni, and Tremaine (2005) demonstrated how UX can be integrated into modern structured analysis and design (SA&D) approaches, while Chamberlain, Sharp, and Maiden (2006) illustrated how UCD and associated UX activities can be incorporated into Agile development methodologies. Multiple other methodologies to institutionalise UX or to incorporate UX practices into ISDMs are available in the literature (Caddick & Cable, 2011; Ide-Smith, 2011; ISO, 2010; Pretorius & Calitz, 2014; Schaffer & Lahiri, 2013; Usability.gov, 2017).

Due to the potential adaptions managers of software development teams would have to make, it would be reasonable to assume that they would wish to see the benefit of incorporating UX practices into their ISDM.

2.6 The value of UX practices

There is an extensive assortment of practices that can be carried out at various stages during the design and development of an information system, with the express purpose of improving users' impressions of and interactions with the system. Some practices target components of UX, such as usefulness and usability, while others attempt to enhance UX as a whole. These practices may have slight variations in their specific objectives, but most derive value from positioning the user and his/her needs at the centre of the systems development process.

The application of UX practices does not imply that the team developing the system should pay no heed to the objectives that the business had in mind when it was first decided that a system should be built. UX is instead an alternative approach that assists with the accomplishment of those same objectives (Sward & Macarthur, 2007). Managers of a business may, for instance, have the objective to reduce costs, and strive to achieve this through the automation of customer registrations by means of an online portal. In such a case, UX practices can be applied to design a user-friendly portal by taking cognisance of users' environments and capabilities. If the ultimate end-users are able to effectively and efficiently make use of the system, the envisaged cost reduction would be more likely. Therefore, UX does not change the objective, but intends to make the accomplishment of that objective more likely through enhanced user experiences (Ide-Smith, 2011).

UX also aims to optimise the degree to which business objectives are achieved by delivering higher quality outputs as perceived by customers (Garrett, 2006). To expand on the example, UX may assist in reducing costs purely because customers' interactions with the portal are free of effort and frustration, resulting in more customers that are willing to move over to the online system, and so the reduction of costs is maximised.

The literature illuminates numerous benefits for organisations who are willing to adopt UX practices for the sake of developing information systems with superior experiences for its users, rather than exclusively focusing on the satisfaction of business stakeholders or testers. These are:

2.6.1 Improved customer loyalty

One of the essential advantages of allowing users to engage with systems that are designed for an optimal experience is the enhancement of their sentiment around the particular product and the organisation's brand as a whole (Herman, 2004). Customers who are empowered to quickly and easily fulfil the need they envisioned, will likely have an improved perception of the product and the brand, which may lead to improved loyalty and embolden those customers to promulgate the value of a brand to new audiences (Chitturi, Raghunathan, & Mahajan, 2008; Garrett, 2006).

Anderson (1998) demonstrates a positive relationship between improved customer satisfaction and word of mouth favourable to the organisation or brand. He also shows that the inverse relationship not only holds true, but is in fact stronger. In other words, an increase in customer dissatisfaction leads to an increase in word of mouth that is harmful to the reputation of an organisation or brand. Exceedingly dissatisfied customers participate in negative word of mouth more than the extent to which

exceedingly satisfied customers participate in positive word of mouth (Anderson, 1998). In their comparison of customer acquisition techniques, Villanueva, Yoo, and Hanssens (2008) found that making use of *marketing* to gain new customers produced slightly better results over the short-term, but that *word of mouth* outperformed marketing by nearly double over the long-term.

These scholars therefore show that UX may have a significant effect on customer satisfaction, which directly impacts word of mouth, either positively or negatively. What is more, it is shown how detrimental or useful word of mouth can be terms of customer acquisition and retention. The benefit is thus clear: UX practices that enhance customers' satisfaction lead to an increase in positive word of mouth and a reduction in negative word of mouth, and this will lead to an increase in loyal customers.

2.6.2 Increased revenue

On the most basic level, enhanced UX implies the execution of proper user research to accurately determine what users' needs and expectations are regarding a particular system or product. This insight will heighten the probability of creating an offering more suited to users' requirements which are therefore more likely to be purchased (Weinschenk, 2005).

Certain digital platforms may enjoy an increase of revenue, not only due to the improvement in customer sentiment and resultant traffic, but also on account of the likelihood that easier-to-use systems cause higher conversion rates, i.e. the ratio of product views versus product purchases (Ketola & Roto, 2008). Google analytics uses the term *"bounce rate"* to describe the proportion of users that navigate away from a website immediately after landing (Sculley, Malkin, Basu, & Bayardo, 2009).

According to Hasan, Morris, and Probets (2009). The bounce rate of a system is a useful indicator of its usability as perceived by users. The less easy it is to use your system, the higher the bounce rate. Consequently, if a system meant to facilitate customer processes like reservations, purchases, registrations, and so forth is unclear and complicated, customers are likely to drop out, costing the organisation potential sales.

For systems used by employees rather than customers, confusing and nebulous interactions, or unnecessarily lengthy process designs may cause each transaction to be processed more slowly. This may have an adverse effect on the number of transactions that can be processed in a certain period of time, thus allowing less revenue generating processes to be completed (Garrett, 2010).

2.6.3 Reduced costs

Many UX practices focus on improving the usability of a system. This typically involves the application of usability principles, or heuristics (Nielsen & Molich, 1990). Two of the most widely cited usability principle sets are the *Eight Golden Rules of Interface Design* by Shneiderman (2003) and *The 10 Usability Heuristics of User Interface Design* by Nielsen (1994a). Both these sets emphasise the importance of error prevention as well as the elegant handling of errors. By reducing the number of errors made by users on a system, costs may be reduced as a result of fewer expensive refund transactions and reduced call-centre traffic.

Enhanced usability can also have the effect that users perform their tasks quickly and easily, without spending a large amount of time either figuring out how to do what they wish to do on the system, or having to redo tasks due to errors. The reduced time and effort exerted by individual users may accumulate to bring about a

reduced demand for possibly expensive system resources (Karat, 2005). Furthermore, a more intuitive system may reduce the need for extensive training in certain instances which can also result in the benefit of saving costs (Donahue, Weinschenk, & Nowicki, 1999).

2.6.4 Competitive advantage

In an era where many software solutions offer similar features, usability and UX may be the one area upon which organisations can concentrate to obtain a competitive edge. Functionality alone is no longer the distinguishing aspect of competing software products, as technology users are bombarded with a myriad of software applications across multiple platforms on a daily basis. Those developing a new digital product must ensure that their offering stands out from the crowd (Donahue et al., 1999). It is one thing for a system to do what the market demands, another to do it effectively, efficiently and satisfactorily, and yet another to curate a remarkable holistic experience for the user that results in positive word of mouth. UX practices may, therefore, be beneficial in the development of a product that is of a higher overall quality compared to those offered by competitors (Herman, 2004).

2.6.5 Economical and higher quality software development

A further series of benefits that arise from the application of UX pertains to the software development process itself. Scholarly works, as well as research put forward by several concerned organisations, assert that it is far more expensive to correct a design flaw in the later stages of the development process as opposed to early on. Stated differently, it is a lot easier and less expensive to test for, discover, and fix faults, inefficiencies, or unsatisfactory system behaviours while still in the conceptual design or prototyping phases of the project than having to go back and fix these issues when the software modules have already been developed (Boehm,

1984; Jain & Joshi, 2016). Since UX design aims to ascertain users' expectations very early on, and continually designs for and evaluates against those expectations, it is likely to encounter and amend problems early. If appropriate UX practices are applied dependably, one would expect only minor concerns to be raised by the time the system is released, thus minimising expensive redevelopment. To quantify this, Pressman (2005, p. 423) stated the following: "*For every dollar spent to resolve a problem during product design, $10 would be spent on the same problem during development and $100 or more if the problem had to be solved after the product's release*". Hence, UX reduces the number of development errors contained in the published product, which in turn reduces development costs, development time, maintenance costs, redesign costs, and support costs.

2.7 The type of system and its impact on UX

This study is concerned with the lack of UX practices in South African enterprises' development methodologies, but cognisance must be taken of the nature and purpose of software applications, as this may have an effect on the way in which UX practices are planned and applied. Depending on different environmental factors, the objectives, challenges, and methods of designing and evaluating how interactive systems facilitate a positive UX, may vary. The subsequent sections describe how the nature of an information system can affect UX practice.

2.7.1 Customer-facing versus internal systems

If the intention is to position the end-users of a system at the core of the design and development process, then the identity and characteristics of users as well as the social environments within which they operate will have an undoubted impact on UX considerations (J. Preece et al., 2015). Careful thought must be given to develop

accurate and complete characterisations of users, but one of the fundamental distinctions that can be drawn is whether users are internal or external to the organisation.

The created UX of systems that are targeted at employees are perhaps easier to manage than those targeting outside users, such as customers. Employees operate in more predictable and controllable physical and social environments than customers. It does not, however, render UX less important or less useful when developing systems for employees, but it may alter its objectives (Fuglseth & Sørebø, 2014).

With internal, employee-facing systems the focus may be on optimising usability in interest of processing as many transactions as possible in a given timeframe (Hsieh, Rai, Petter, & Zhang, 2012). Making use of UX to simplify employees' work could save time and money due to reduced errors and increased job performance. In these environments, training is far easier to facilitate and it may be expected that a greater portion of employee users could eventually become expert users. With this in mind, one could argue that learnability for first-time users is perhaps less important than the availability of short-cut keys and optimal navigation paths. Conversely, external, customer-facing systems may be intended for users that access the product more intermittently without real possibilities of substantial training, thus requiring higher degrees of learnability (J. Preece et al., 2015). Systems interacting with clients may be subject to reduced margins of error, since customers may decline to accept and adopt a product due to imperfect first impressions and stiffer opposition from comparable products.

Applying UX in the interest of fulfilling users' task, performance, and hedonic goals, may be considered vital for both employees and customers. Employees, because UX could have a significant impact on team or organisational culture and job motivation, especially if employees have no choice regarding the use of a particular system (Shneiderman, 2010). Customers, because their perceived UX may affect the probability of their own continued use and whether or not they are likely to recommend the product to friends and family (Garrett, 2006).

2.7.2 Custom-developed, off-the-shelf, or ERP systems

Different companies have varying recourses when building and establishing information systems and other software applications in their technology ecosystems. Some companies develop bespoke systems, where new software solutions are developed according to specific stipulations meant to address a specific set of problems. Other companies prefer purchasing and integrating pre-packaged software. In addition, some companies employ Enterprise Resource Planning (ERP) systems, rather than choosing the custom-developed or off-the-shelf products mentioned before. ERP software integrates solutions that automate and streamline the various functions and processes comprising a business value-chain, such as manufacturing, inventory, order management, supply chain management, accounting, human resources, customer relationship management, and more, into a single complete system (Kumar & Van Hillegersberg, 2000). ERP systems are expensive and complex to introduce as they encompass most aspects of a business (Shaul & Tauber, 2013). ERP systems are typically made up of an extensive and integrated software solution at its core, supplemented with numerous bolt-on software modules that are tailor-made for a particular business scenario or process.

Some of the most recognisable ERP systems are SAP, Oracle, Infor, Microsoft Dynamics, and Epicor.

When assessing the perceptions, constraints, and applied practices pertinent to UX in a particular team and environment, the nature of the software used by that team can be a key factor. Custom-developed software will allow for more freedom as regards the chosen information systems development methodology and, therefore, may be more accommodating to the incorporation of UX practices (Mann, Kumar, Kumar, & Mann, 2017). When teams work mostly with off-the-shelf software solutions or ERP systems, they may have less of a say as far as the design of the product is concerned. With off-the-shelf solutions, UX may be incorporated by including usefulness, usability, and UX metrics into the selection process that decides which product to eventually purchase and incorporate. The choice of ERP system is frequently decided based upon affordability, integrability, and business-fit rather than the satisfaction of user goals (Botella et al., 2003). Once the core ERP system has been implemented, it would be difficult to justify migration to another ERP for the sake of superior UX. As with off-the-shelf solutions, metrics related to UX can be consulted when deciding on the appropriate system. Furthermore, UX work could be incorporated into the design and implementation of the software components bolted onto the core ERP software, although there would be a multitude of inherent design constraints enforced by the ERP provider (Hwang, 2014).

2.8 UX in South Africa

Interest in the field of UX in South Africa is expanding with more and more UX agencies and consultancies coming on the scene, offering a range of services intended to assist their clients in the creation of digital products that provide enhanced experiences for its users. Visiting the websites of well-known UX agencies

in the country, such as Mantaray, Deloitte Digital, and Human Factors International, reveals portfolios of projects for some of the largest and most recognisable enterprises in South Africa.

However, a review of the limited UX-related literature pertaining to the South African context, indicates that UX interventions in South Africa are generally carried out in an ad hoc fashion instead of being performed routinely as part of an ISDM and in consonance with a UX strategy (Pretorius & Calitz, 2014; Pretorius et al., 2015). In their survey of 105 self-identified UX practitioners in South Africa, Pretorius et al. (2015) concluded that the South African UX field had not yet matured into an established and recognised field of study and practice. The authors noted that UX practitioners stem from an eclectic range of disciplines, attributing this to the amorphous structure of UX that involves multiple fields related to HCI as well as Computer Science, MIS, cognitive science, psychology, sociology, and philosophy. Pretorius et al. report many obstacles to practicing UX in organisations. Buy-in from management, time constraints, lack of skilled UX staff, lack of formalised UX processes, and budgetary constraints were some of the main challenges communicated.

Many of these challenges may be underpinned by the lack of formalised tertiary-level UX education. Even though some degrees contain courses that touch on HCI and UX, there are no degrees in SA with a core focus on HCI or UX, which is in contrast to the USA and some countries in Europe. UX practitioners in South Africa may, therefore, be required to supplement their minimal exposure to UX with short courses available from various institutions (Gelderblom, Adebesin, Brosens, & Kruger, 2017). Practitioner-led conferences and informal meet-ups related to UX occur frequently in South Africa, but there are few academic conferences that

concentrate specifically on HCI or UX (Pretorius et al., 2015). The inaugural African Conference for Human-Computer Interaction (AfriCHI) was held in Nairobi, Kenya, in 2016. Organisers of AfriCHI are planning to host this conference in a different African city every second year moving forward. The sparsity of UX-focused academic conferences in South Africa is again different to the cases of the USA and Europe.

2.9 Evaluating UX maturity

Feijo (2010) proposed the model depicted in Figure 2.7 to classify the degree to which an organisation has bought into UX and how willing they are to incorporate it into their day-to-day activities. The model illustrates six possible maturity ranks in terms of UX, from *unrecognised*, where the organisation under investigation has no regard for UX and the possible value it may bring about, up to *embedded*, where the organisation is believed to comprehensively understand and agree with the purported benefit of incorporating usability and UX practices into their software design and development activities.

Figure 2.7: UX maturity model (Feijo, 2010).

This model, called the UX maturity model, was used by Pretorius and Calitz (2014) to evaluate the level of capabilities reached by South African Provincial Governments (SAPGs) in terms of carrying out user-centred activities. In that study, the UX maturity model proved useful in comparing how mature SAPGs were with respect to UX according to a standardised mechanism. In the same way, the study reported in this dissertation used the model to establish how extensively UX has been institutionalised within selected South African enterprises.

2.10 Persuading non-UX practitioners to adopt UX

One of the objectives of this study was to determine what it would take to move an organisation towards UX maturity. In an organisation with low UX maturity, it is reasonable to assume that the parties responsible for deciding which software development activities to employ, have limited awareness or knowledge about UX, or that they are sceptical about the value of UX. In this dissertation, IT practitioners who

have not bought into UX due to a lack of awareness or as a result of scepticism, are referred to as non-UX practitioners.

In order for an organisation to move from a state where UX is unrecognised and rarely employed, to a state where UX is an embedded part of routine software development activities, it may be necessary to persuade non-UX practitioners about the value of UX. It is acknowledged that people within software development teams typically possess dissimilar mental models and motivational factors (Levesque et al., 2001). In other words, managers are likely to differ from information designers and software engineers with regard to ways of thinking, ways of communicating their ideas, and factors they deem important. Those advocating the adoption of UX practices would therefore be well-advised to focus their efforts on influential decision-makers with respect to software development processes and methodologies (Baddoo & Hall, 2002).

In light of this "*need for persuasion*", a practical strategy to convince influential non-UX practitioners to adopt UX practices into their usual ISDMs, would be useful. Scholarly works on persuasion models or sets of persuasion instruments in the fields of HCI and UX are in short supply. McKay (2016) proposed a model containing seven tactics to persuade non-UX practitioners to accept UX. This model is presented in Figure 2.8.

Figure 2.8: Everett McKay's model for UX persuasion

In his Persuasive UX model, McKay argues that expert opinion has the least persuasive influence on business-oriented people, such as project managers. Conversely, aesthetically pleasing or beautiful designs would be the aspect most likely to persuade managers to consider the inclusion of usability and UX practices. McKay developed this model based on his experience in the UX industry, and not through a recognised, rigorous research methodology. McKay's model is not assumed to be necessarily correct, but it was used as a point of departure for the research reported in this dissertation. Data was collected during this study to assess the perceived utility of each of the tactics suggested by this model.

Although the viewpoints of the informants from this study may not be sufficient to validate, refine, and/or debunk McKay's model, it may shed some light on the reliability of this model. Therefore, a tentative appraisal of persuasion instruments was produced in this research by adapting McKay's model. This can be tested and

validated in future research. Ultimately, the development of an artefact of this nature could alleviate the dichotomy that exists between ISDM decision-makers in a business context and those campaigning for the increased application of usability and UX practices.

2.11 Conclusion

The purpose of this chapter was to present the existing literature that shaped the basis and background for the study conveyed by this dissertation. Additionally, the related works discussed in this chapter served to demonstrate the position of this research within the broader field of study. In this chapter, the HCI field as well as the concepts of usefulness, usability, and UX were defined, described and related. UX practices and information systems development methodologies (ISDMs) were discussed in detail, together with a justification for the integration of UX practices into ISDMs. The way in which the traits of a system could impact UX considerations was also reviewed. Furthermore, an overview of UX in South Africa was provided to portray the context within which this research was carried out. Finally, means to evaluate organisational UX maturity as well as tactics to persuade IT practitioners to improve their organisations' UX maturity were discussed.

Chapter 3: Research design

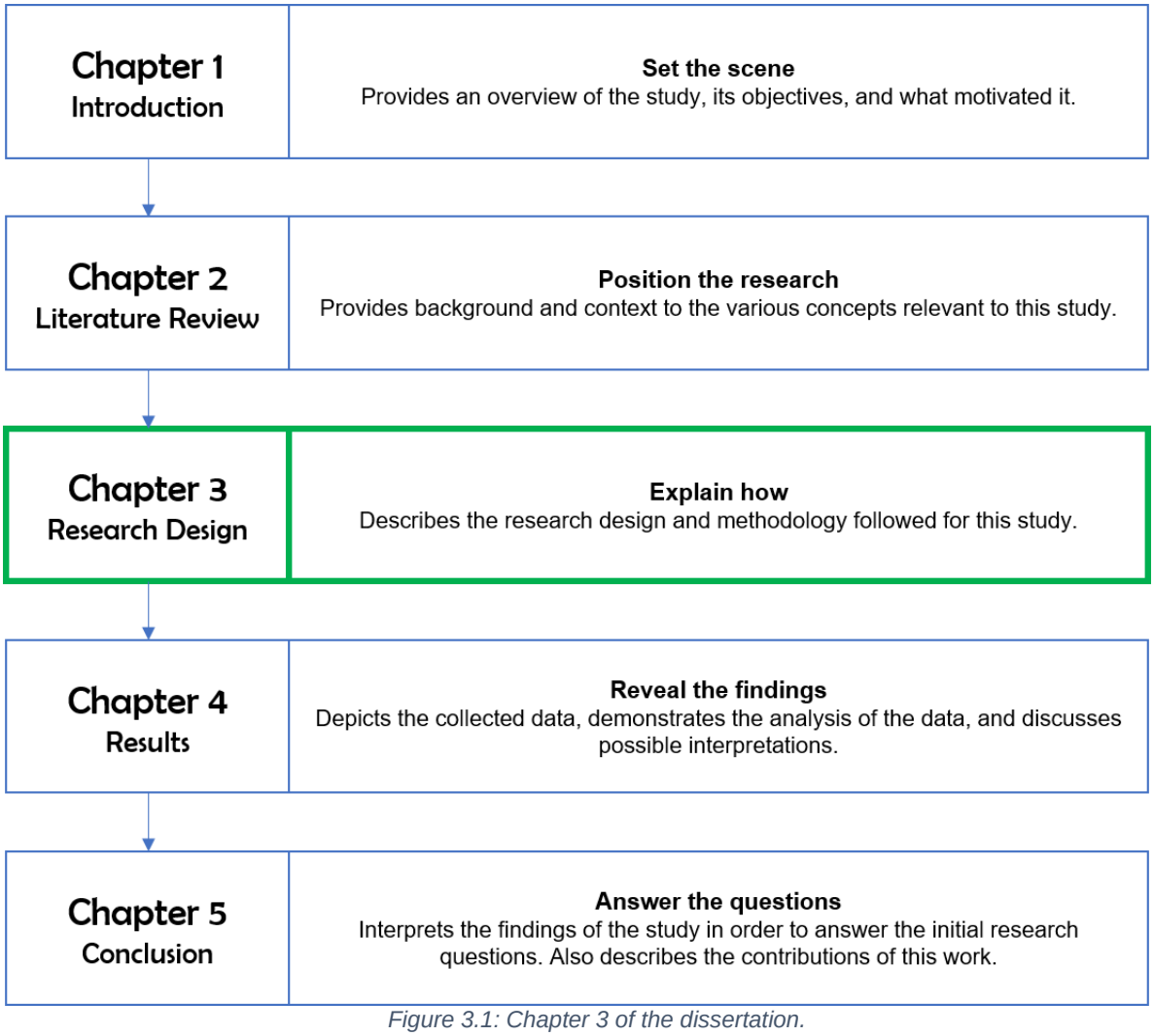


Figure 3.1: Chapter 3 of the dissertation.

3.1 Introduction

This chapter describes how the research was designed in order to address the problem area conferred in chapter one. Although there are numerous points of view regarding the design of research studies, its objective is to provide a strategy that will assist the researcher in understanding and solving the problem being investigated, in a structured and rational manner (Terre Blanche, Durrheim, & Painter, 2006).

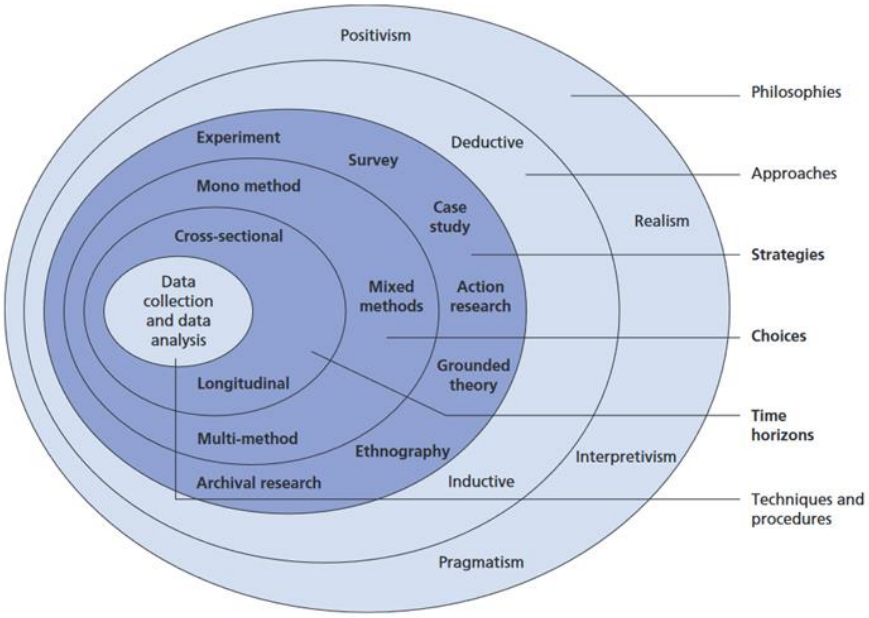


Figure 3.2: Research Onion (Saunders, 2011).

Saunders (2011) presented the *research onion*, depicted in Figure 3.2, as a means to illustrate the fundamental aspects that must be considered when formulating a research design. In this chapter, the research design is discussed according to the layers of Saunders' research onion. First, the philosophical point of departure, along with the significance this has on the rest of the research design is described. The consequent decisions, with respect to the research approach, strategy, choices (classification), time horizon, data collection method, and data analysis method, are also described and justified. This chapter is concluded with an overview of how the entire research design fits together.

3.2 Research philosophy

Scientific work or research is typically based upon a set of implied ontological, epistemological, and methodological premises. These underlying frames of reference establish the philosophical fabric, or paradigm, of the research. The chosen research paradigm can aid the researcher to delineate what the subject matter should be, which inquiries should be made, and how responses on these inquiries should be interpreted. Opposing assumptions about the nature of reality as well as the way in which knowledge and explanations are constructed about phenomena within this reality, have been debated among philosophers and scientists for some time (Lee, 2004). Positivism, interpretivism, constructivism, and pragmatism are the four preeminent paradigms in social research.

Positivists are traditionally described as those who believe in the existence of an objective reality beyond the human mind and that a person (or researcher) can be divorced from the reality being studied (Gregor, 2006). In this school of thought, it is possible to obtain reliable, secure, and objective knowledge with research that primarily focuses on generalisation and abstraction. The principles of determinism, empiricism, parsimony, and generality are typically adopted by positivist scholars (Cohen, Manion, & Morrison, 2013). Interpretivists, on the other hand, believe that perceptions of the world are indistinguishably linked to a mental framework that has been formulated from experiences throughout an individual's life (Walsham, 2006). Knowledge, according to interpretivists, is a social construct built by making sense of the world through a subjective lens. Constructivists, characterised by scepticism and critical standpoints, consider reality a social construct and explain it by deconstructing the various versions that exists thereof. Pragmatists believe in the existence of an external reality, but also acknowledge the value of understanding

subjective interpretations of this reality. Their worldview is, therefore, a blended one chosen to best allow the answering of research questions (Saunders, 2011).

In selecting a research paradigm, the researcher ties him or herself to the data collection and analysis techniques that are rationally more appropriate within the paradigm. Positivists are said to make use of quantitative research methods such as experiments, surveys, and field studies to produce empirical results which are analysed in a way that uphold the values of validity, rigour, and replicability (Gregor, 2006). Conversely, interpretivists typically make use of research techniques such as case studies, ethnographic studies, and interpretive action research, which are more focused on rich, detailed data to establish deeper insights into the phenomena under investigation (Myers, 1997). Constructivists and pragmatists apply methods that best suit the matter being studied, which may be quantitative or qualitative, or a mix of both.

This research was carried out with the assumption that our theories about or regarding reality are ways to make sense of the world around us, and are thus internal mental constructs, rather than detached actualities existing outside of us. Furthermore, it aligns with the position that intersubjectivity leads to the formulation of shared understanding and meaning rather than objectivity (Walsham, 2006). As such, the interpretive research paradigm was the basis of this study.

The questions addressed by this research required analytical depth as they intended to explain *why* specific people employ specific practices and this, in turn, necessitated an understanding that was empathetic in nature. The adoption of interpretivism, as well as its associated research approaches and methods, allowed for the in-depth inquiries required by this research.

3.3 Research approach

The extent to which theory is made explicit at the beginning of the research undertaking, i.e. when designing the research that will be carried out, determines whether the research will implement a deductive or inductive approach (Saunders, 2011). With deductive research, theory is developed at the start in the form of a hypothesis or hypotheses, after which it is subjected to rigorous testing (Collis & Hussey, 2013). Alternatively, theory could be constructed as a result of the analysis of collected data. In this inductive approach, theory is not made explicit during the research design phase, but instead follows from the data (Bryman, 2015). Deductive research is typical in the natural sciences where a cause-effect link between particular variables are theorised and tested. However, the deductive approach does not express notable interest in understanding the way in which humans interpret their social environments, while the attainment of a richer understanding of humans as well as the contexts within which they exist and interact is suggested as a strength of the inductive research approach (Saunders, 2011). In consideration of the objectives laid out for this research, which strove to understand the perceptions and practices of managers of software projects or programmes regarding UX, an inductive research approach was followed.

3.4 Research strategy

According to De Villiers (2005), a research strategy is the foundational model that substantialises the study. The set of implied ontological, epistemological, and methodological premises associated with the paradigm discussed before, is therefore embodied and materialised by the selected strategy.

This study was aimed at unearthing insights into the practices of software development teams in a particular context, and more specifically the perceptions, attitudes, beliefs, and values driving these practices. The aforementioned factors are not clearly observable as they are tightly coupled or intertwined with numerous other factors that make up who people are and why people act the way they do (Lamb & Kling, 2003). In order to holistically understand the problem area, it was necessary to thoroughly investigate the variables that may affect decision making around the IS development methodology and its components, rather than a large set of subjects where only a limited range of variables, and the relationships among them, could be studied.

Benbasat, Goldstein, and Mead (1987, p. 371) delineate eleven key characteristics of case studies. Three are of particular importance to this study:

I. Case study research allows *"for the study of information systems in a natural setting, to learn about the state of the art, and generate theories from practice."*
II. Case study research allows "*the researcher to answer how and why questions, that is, to understand the nature and complexity of the processes taking place."*
III. Case study research is *"an appropriate way to research an area in which few previous studies have been carried out."*

Based on these assertions, we can see that case research is particularly appropriate when looking at practitioner related problems in context. Moreover, case research is most suitable in scenarios where *"research and theory are at their early, formative stages"* (Benbasat et al., 1987, p. 369).

A case study research strategy fixates the enquiry and analysis efforts on a demarcated context (Lee, 1989; Yin, 2013). This allows for an in-depth consideration of the various aspects at play in a real-world scenario. Other research approaches, which investigate numerous phenomena in order to establish relationships between prevailing factors and generalise findings, may overlook the complexities intrinsic to certain contexts (Cavaye, 1996). A recognised disadvantage of case studies is that their findings are difficult to generalise. However, Lee and Baskerville (2003) as well as Walsham (2006) argue that the possibility of generalisability is not necessarily removed when case studies are employed. These authors show that the insights gathered from case studies could be generalised in the form of concepts, theories, or specific implications that apply to broader contexts. The case research strategy was used for this study owing to the alignment of its benefits with the stipulations of the research questions related to this investigation.

Moreover, the unit of analysis, as well as the type of case study must be determined before conducting case research (Baxter & Jack, 2008). Miles and Huberman (1994, p. 28) define a unit of analysis, or case, as "*a phenomenon of some sort occurring in a bounded context*". Yin (2013) provides definitions for the distinct types of case studies, including exploratory, descriptive, explanatory, and multiple case studies. The multiple case study research strategy allows for a comparison of phenomena between different bounded contexts, or cases (Baxter & Jack, 2008)

This study looks at why UX practices are not integrated more regularly into the ISDMs of South African enterprises. Different organisations and teams, however, make use of different ISDMs depending on various considerations, including the operational environment (Fitzgerald, 1998). Some of the barriers impeding the inclusion of UX practices in software development practice may be related to or

determined by the applied methodology or the context. For this reason, the practices of particular development teams were investigated within multiple enterprises so that additional insight into the possible reasons for the lack of maturity of UX in South Africa could be gained. As such, this research was a multiple case study that examined six different South African enterprises from different industries, namely higher education and training, low-cost airlines, banking, insurance, information technology, and telecommunications.

3.5 Research choices

Research can be classified according to its methodological style as mono-method (using a single data collection technique), multi-method (using more than one data collection technique, but from the same worldview – i.e. qualitative or quantitative), or mixed-method (combining multiple data collection and analysis techniques from both the qualitative and quantitative perspectives) (Saunders, 2011). Data collected during this investigation took the form of written language collected by means of a single method. The analysis of this data required the identification of themes or patterns. Hence, mono-method qualitative research was selected for this study. Qualitative research was applied for its enablement of rich data gathering in order to explain why certain decisions or behaviours occur regularly in particular contexts. Quantitative research methods were considered less appropriate for the objective of gathering deep insights pertaining to humans' interpretations of their context and the effect these interpretations may have on their decisions and behaviours (Myers & Newman, 2007).

3.6 Time horizons

The time horizon related to a research design determines whether the study collects and analyses data over a period of time in order to assess change and development, called a longitudinal study, or whether it takes a snapshot of a situation at a particular time, called a cross-sectional study (Saunders, 2011). Since the intention with this study was not to investigate change over time and given that this study was conducted in fulfilment of a time-constrained academic qualification, a cross-sectional study was executed.

3.7 Research techniques and procedures

Myers (1997) notes the difficulty in qualitative research to make a clear distinction between data collection and data analysis. Tacit analysis of the data often starts while the data is being collected by the researcher (Cohen et al., 2013). Furthermore, when collecting less structured data, such as oral or written text, it usually relies on interpretation in order to bring forth explanations and make sense of the materials collected (Miles, Huberman, & Saldana, 2013).

Qualitative analysis is criticised at times for lacking clear and concise guidelines, leaving room for subjective biases and for researchers to put together ad-lib methodologies without sufficient constraint (Antaki, Billig, Edwards, & Potter, 2003). To rebut this critique, it is important that interpretive researchers follow principles that definitively and succinctly demarcate their efforts (Braun & Clarke, 2006). The set of principles for conducting and evaluating interpretive field studies put forward by Klein and Myers (1999, p. 72), which is particularly focused on interpretive research of a hermeneutic nature, is suggested to be useful in producing more reliable and credible results. These principles were taken into account and applied during the

data collection and analysis activities that formed part of this research. Table 3.1 provides a brief summary of each of these principles.

Table 3.1: Set of principles for conducting and evaluating interpretive field studies (Klein & Myers, 1999)

Principle	Description
1. The Fundamental Principle of the Hermeneutic Circle	Understanding collected research materials (or data) as a whole requires an understanding of the interdependent meaning of its parts. However, the parts that comprise the data can only be understood by understanding the whole. Understanding is therefore gained by iterating between the interpretations of individual parts and the data as a whole
2. The Principle of Contextualization	The social and historical background of the environment within which the research is being executed must be reviewed and its influence on the status quo must be considered.
3. The Principle of Interaction Between the Researchers and the Subjects	How the research materials were created through social interaction between informants and researchers must be taken into consideration.
4. The Principle of Abstraction and Generalization	Findings discovered through the interpretation of data should be related to theories that describe the nature of human behaviour wherever possible.
5. The Principle of Dialogical Reasoning	Researchers must be sensitive to the possibility of contradictions between the theoretical preconceptions that directed the design of the research and the eventual findings of the research.
6. The Principle of Multiple Interpretation	Researchers must be sensitive to the possibility of variations in interpretations of the same phenomena among the different participants.
7. The Principle of Suspicion	Researchers must be sensitive to possible biases, underlying interests, and misrepresentations in the narrated accounts offered by participants.

The subsections that follow describe the data collection and data analysis techniques used in this research.

3.7.1 Data collection

This case study pursued detailed accounts of existing understandings and perceptions of UX within selected South African enterprises. Furthermore, the UX practices employed at these enterprises and the hurdles impeding the more frequent application of UX practices as part of these enterprises' software projects were also examined. Lastly, this study attempted to shed light on what influential decision makers with respect to software project activities consider useful instruments that UX practitioners could bring to the table in order to obtain buy-in from managers or other IT practitioners that do not have a background in or knowledge of UX practices. Addressing these aims required a collection technique that produced comprehensive data from which rich insights could be gathered.

Semi-structured interviews were conducted with software development project or programme managers at the selected enterprises to explore their views, experiences, beliefs, and motivations as regards UX and UX practices. The title '*software development project or programme manager*' was termed differently at different organisations. The essential aspect was the informant's role in the enterprise, particularly around software development projects. Software development teams often consist of various roles such as business analysts, systems analysts, database specialists and administrators, back-end developers or programmers, front-end developers, information designers, external consultants for various specialised areas, project managers, and more (Levesque et al., 2001). Interviews were conducted with individuals whose roles equipped them with influence in the selection or formulation of ISDMs in software development projects or programmes. There are two reasons for this. Firstly, it was reasonable to assume that the individual who played an integral part in deciding which activities formed part of the

ISDM, would be in a good position to explain current system development activities employed by an enterprise as well as encapsulate the stance an enterprise might have on UX and UX practices (Kerzner, 2013). Secondly, in order to understand what it would take to persuade enterprises to employ UX practices more frequently, it was considered prudent to interview individuals who regularly experience and influence decision making with respect to software development approaches. Even though only a single manager was interviewed at each organisation, due to the influence associated with their roles and the depth of the interviews, these informants were regarded as suitable representatives of the organisations being studied.

One of the primary advantages of interviews is the generation of detailed information, which is useful in acquiring an understanding of the context and applied practices within that context (Keats, 1999). Interviewing is a qualitative method that grants a comprehension of social phenomena that is typically deeper than would be obtained through solely quantitative methods (Miles & Huberman, 1984). Face-to-face discussions allow researchers to observe non-verbal indications, such as body language and emotion. The requirements of this study, which relate to human beliefs, attitudes and motivations, aligned well with the advantages of the interview research instrument. One of the possible drawbacks of interviewing is the heavy reliance on the ability of the interviewer to gather quality data (Myers & Newman, 2007). The capturing of all relevant data that stems from interviews may also be considered a challenge, due to the velocity of open conversation. In view of this, audio recordings were made of the interviews, which permitted thorough post-interview analyses and reduced the risk of unexploited information.

Incorporating a certain structure into the interviews by means of preparing questions, assured that sufficient and relevant data was obtained. At the same time, open-ended questions stimulated fluid dialogue with participants and allowed supplementary insights to emerge (Miles & Huberman, 1984). No questions were sent to informants beforehand. This was to ensure that the informants did not enter the interviews with any preconceived ideas or prepared answers that might have hidden their true emotions and beliefs vis-à-vis UX. For instance, if the question "*What do you understand around the concepts of usability and user experience"* were sent to an informant in advance, that person might have done research and prepared a traditional, textbook answer to the question. This would not have been appropriate, since the aim was to understand existing and unaltered perceptions regarding UX and related practices.

Each interview also included a card sorting exercise. McKay (2016) proposed an ordered list of instruments that he suggested could be used to persuade business-minded decision-makers to introduce more UX practices into their usual software development efforts. Although McKay is not an academic scholar and was perhaps not as rigorous in the formation of his UX persuasion model, which is discussed in section 2.10 and again depicted in Figure 3.3, the research reported in this dissertation used his model as a starting point to find out which instruments informants believed to be most effective to convince business-minded people of the value of UX.

Figure 3.3: Everett McKay's model for UX persuasion

Table 3.2 lists and describes the eight instruments that were adapted from McKay's model and presented to interviewees.

Table 3.2: Instruments for UX persuasion

Instrument	**Description**
Adherence to design best practices	Carrying out UX related activities will ensure that we adhere to sets of principles and practices that are generally regarded as superior with respect to designing for users. I will apply UX because it will make me design in the way that all good designers do.
Adherence to technological frameworks	Carrying out UX related activities will ensure that we apply technological frameworks that are generally regarded as superior for creating enhanced experiences for users. I will apply UX because it will

	make me apply technological frameworks in a way that will improve the experiences perceived by end-users.
Aesthetically pleasing prototypes	Carrying out UX related activities will ensure that beautiful interfaces are designed. I will apply UX because it will lead to more beautiful digital products.
Credible business case	It is shown, by way of one or more real-world examples, how benefits were realised through the implementation of UX related activities. Carrying out UX related activities will ensure that you realise similar benefits as proven by the business case. I will apply UX because other companies or teams tried it, and it worked for them.
Empirical evidence (quantitative research)	It is shown, by way of quantitative research methods, how benefits were realised through the implementation of UX related activities. I will apply UX because empirical research shows that it adds value.
Expert recommendations	The advice of an individual or team of people that have an abundance of experience in the matter vouch for the value added and benefits realised through the application of UX related activities. I will apply UX because I trust the guidance of specialists, and they have suggested that I should apply UX since it will add value.

Input from end-users	It is shown, through commentary provided by those using our digital products, that the experiences curated by these products are unsatisfactory. I will apply UX in order to either address unhappiness on the part of end-users, or to heed valuable advice provided by end-users.
Logically valid arguments (qualitative research)	It is shown, by way of logical reasoning and the interpretations of researchers executing qualitative research, how benefits could be realised through the implementation of UX related activities. I will apply UX because I fully agree with the reasoning behind the purported value of UX.

After each of the instruments was described to interviewees, cards depicting the names of the respective instruments were randomly arranged across a desk and interviewees were asked to rank the cards in an order from most likely to succeed in persuading business-oriented individuals regarding the value of UX, down to least likely.

An interview guide was prepared and used to plan, structure, and direct the entire interview process including the card sorting exercise. The interview guide appears in Appendix C.

3.7.2 Data analysis

To analyse responses to the card sorting exercise, as described in the previous section, scores were assigned to each instrument based on their rankings in each

case. If an instrument was ranked most likely to persuade, it received a score of 8, while the least likely was assigned a score of 1. Scores for the respective instruments were then summed and compared through simple descriptive statistical analysis.

Thematic analysis was used to examine the themes or patterns in the materials collected during the less structured parts of the interviews. Thematic analysis is a method to effectively organise, make sense of, and describe data sets in detail and is often utilised in qualitative research for its ability to effectively organise and describe rich data sets (Guest, MacQueen, & Namey, 2011). Thematic analysis is closely related and shares similarities with other methods of analysis that strive to identify, organise and describe themes or patterns in qualitative data, such as interpretative phenomenological analysis (IPA) and grounded theory (Braun & Clarke, 2006).

There are, however, particular differences that distinguish thematic analysis from these other methods. IPA is tightly coupled with the phenomenological epistemology, which pays special attention to understanding people's everyday experience of reality in order to appreciate the phenomenon under investigation (Biggerstaff & Thompson, 2008). Grounded theory, in turn, requires the development of plausible theory of the phenomena grounded in the data (Charmaz, 2014). Conversely, thematic analysis does not subscribe to the theoretical commitments and requirements of IPA and grounded theory, which thus offers a more accessible and flexible form of analysis (Braun & Clarke, 2006).

The data analysis steps described by Terre Blanche and Kelly (1999) were followed to provide a coherent and practical procedure that materialises the thematic analysis method. The steps of this procedure are now discussed:

3.7.2.1 Familiarisation and immersion

In order to gain a good understanding of the phenomena being studied from a holistic perspective, the researcher immersed himself in the collected data. This immersion involved listening repeatedly to the interview recordings, while following the associated transcripts. Annotations and visual illustrations were created to aid in making sense of the data. The objective of this step was to become acquainted and comfortable with the data in interest of the steps that follow.

3.7.2.2 Identify themes

The second step involved the discovery of themes, or patterns, within the data. Given the flexibility of thematic analysis and the various forms it could take, Braun and Clarke (2006) presented a set of questions relating to the identification of themes, which had to be explicitly considered and is discussed so that its application is clearly delineated:

I. Deductive (theoretical) versus inductive analysis

Two approaches can be followed when identifying themes in the data, namely top-down, or deductive, and bottom-up, or inductive (Braun & Clarke, 2006). The top-down approach alludes to the researcher starting with a predefined set of themes or categories and searches for instances in the data that fall within each of those themes or categories. Each interview question was, in some way, informed by and prepared for the sake of answering one of the research questions. From this it follows that the research questions established predefined categories that were used

during the organisation of data. The following categories existed before data was analysed:

1. Understanding of the concepts of usability and UX.
2. Perceived constraints to the incorporation of practices for the enhancement of usability or UX
3. Perceived benefits of incorporating practices for the enhancement of usability or UX.
4. Means or instruments to persuade non-UX IT practitioners or managers towards the incorporation of UX practices.

Semi-structured interviews, however, allowed for open discussions with informants, which resulted in the generation of textual data that did not particularly relate to one of the predefined categories. It was therefore possible to induce additional themes by way of inferring general notions from specific cases. And so, the bottom-up approach was also applied. By combining these two approaches, an appropriate intermixture of themes was identified. The objective was to establish an adequate set of themes that enabled effective interpretation, yet not too many to render the collection overly complex. This required a process of iterative refinement of the chosen themes.

II. What should be regarded as a theme?

Another important consideration alluded to by Braun and Clarke (2006) relates to the criteria used when deciding whether a data item possesses an adequate level of relevance or prevalence. In other words, what qualifies as a theme within the data set? The identification of themes was less based upon the prevalence of a potential theme within the data set than it was on whether the potential theme captured important insights with respect to the answering of the research questions. A

patterned response would, therefore, be marked as a theme if it was deemed contributory to addressing the problem under investigation.

III. Semantic versus latent themes

The depth of interpreting meaning during the identification of themes is also a key matter to consider when conducting thematic analysis (Braun & Clarke, 2006). During the analysis, the researcher may wish to identify semantic themes or delve deeper to identify latent themes. The semantic approach seeks to find the explicit or surface meanings of the material being examined. Semantic thematic analysis progresses from description, where the data is organised in a simple manner so that encompassed patterns are revealed, to interpretation, where an understanding of the wider meanings and implications of these patterns are pursued (Boyatzis, 1998). Latent thematic analysis looks beyond the surface meanings of patterns in the data, and studies the causal ideas, assumptions, and conceptualisations that give rise to or enlighten the content of the data (Vaismoradi, Turunen, & Bondas, 2013).

The identification of semantic themes was carried out to interpret informants' responses in this particular study.

3.7.2.3 Coding

Coding involves the meticulous examination of data to discover instances within the data that are related to a particular theme. Relevant pieces of text were marked in a way that linked it to a suitable theme or category. Throughout the process of coding and further analysis, new themes appeared and existing themes became obsolete. Consequently, codes and themes identified throughout the process morphed throughout the iterative process.

3.7.2.4 Elaboration

With the material coded according to themes, it was then analysed to find likenesses, contrasts, and linkages within the data, which resulted in new insights. This allowed for informed descriptions of identified themes, and subsequently the interpretation of the results.

3.7.2.5 Interpretation and checking

In view of the interpretive nature of this analysis, it is possible that insignificant aspects were improperly accentuated or that the researcher's partialities led to incorrect findings. This step of the analysis process, therefore, aimed to audit the study in order to pinpoint and correct cases of logical inconsistency, over-interpretation and bias. In addition, final interpretations of findings were made during this step.

3.8 Applying the research onion

The design of this research was developed and structured according to the *research onion* tendered by Saunders (2011). Figure 3.4 shows the philosophy (interpretivism), approach (inductive), strategy (multiple case study), choice (mono-method qualitative), time horizon (cross-sectional), and research techniques and procedures (semi-structured interviews analysed by means of thematic analysis) that constituted the research design of this study.

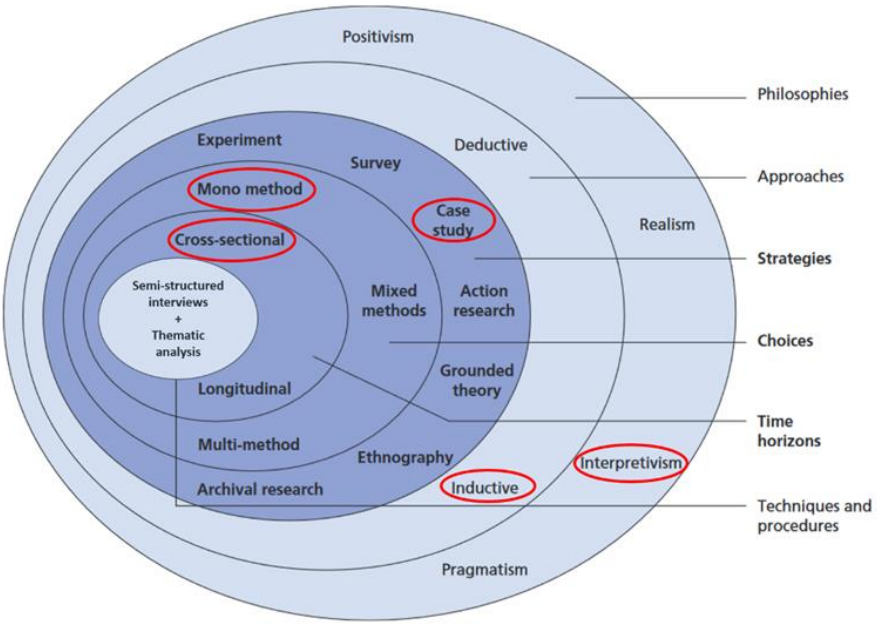


Figure 3.4: Research onion as applied in this study.

Figure 3.5 illustrates how the selected data collection and analysis methods were used to carry out this research. Data was collected by means of interviews at six different organisational contexts. Software development project or programme managers, or persons with similar roles, were interviewed at each of the enterprises in a semi-structured manner. All interviews were recorded and transcribed. Once the data had been collected, analysis was executed by means of thematic analysis following a semantic approach. Actions of familiarisation and immersion were utilised to gain a big picture understanding of the material before patterns of meaning were identified. Finally, themes were defined and comprehensively described in contemplation of the research questions.

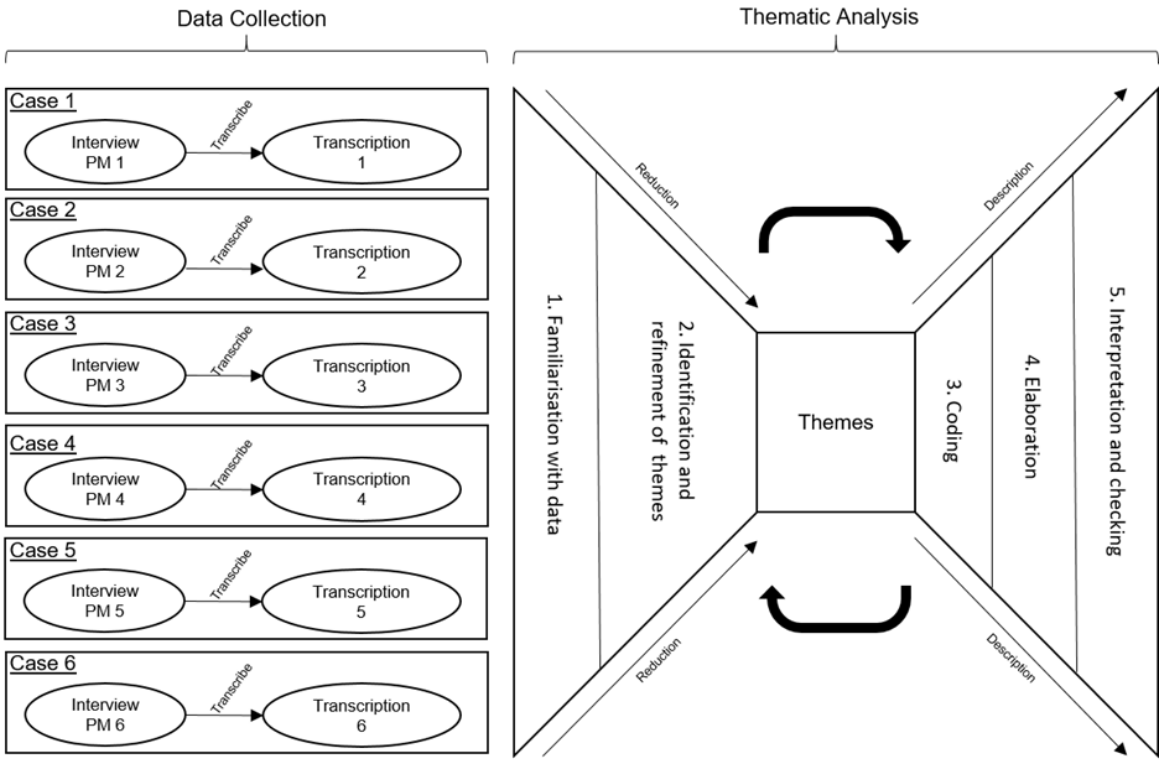


Figure 3.5: Methodological Approach

3.9 Conclusion

The purpose of this chapter was to describe the research process followed in this study. The research design was formulated according to the *research onion* proposed by Saunders (2011). This included a discussion of the philosophical paradigm that formed the foundation of this research. The research approach, research strategy, methodological choice, and time horizon were also illustrated and explained. Lastly, the methods used to collect and analyse data for the sake of this study were comprehensively discussed.

Chapter 4: Results

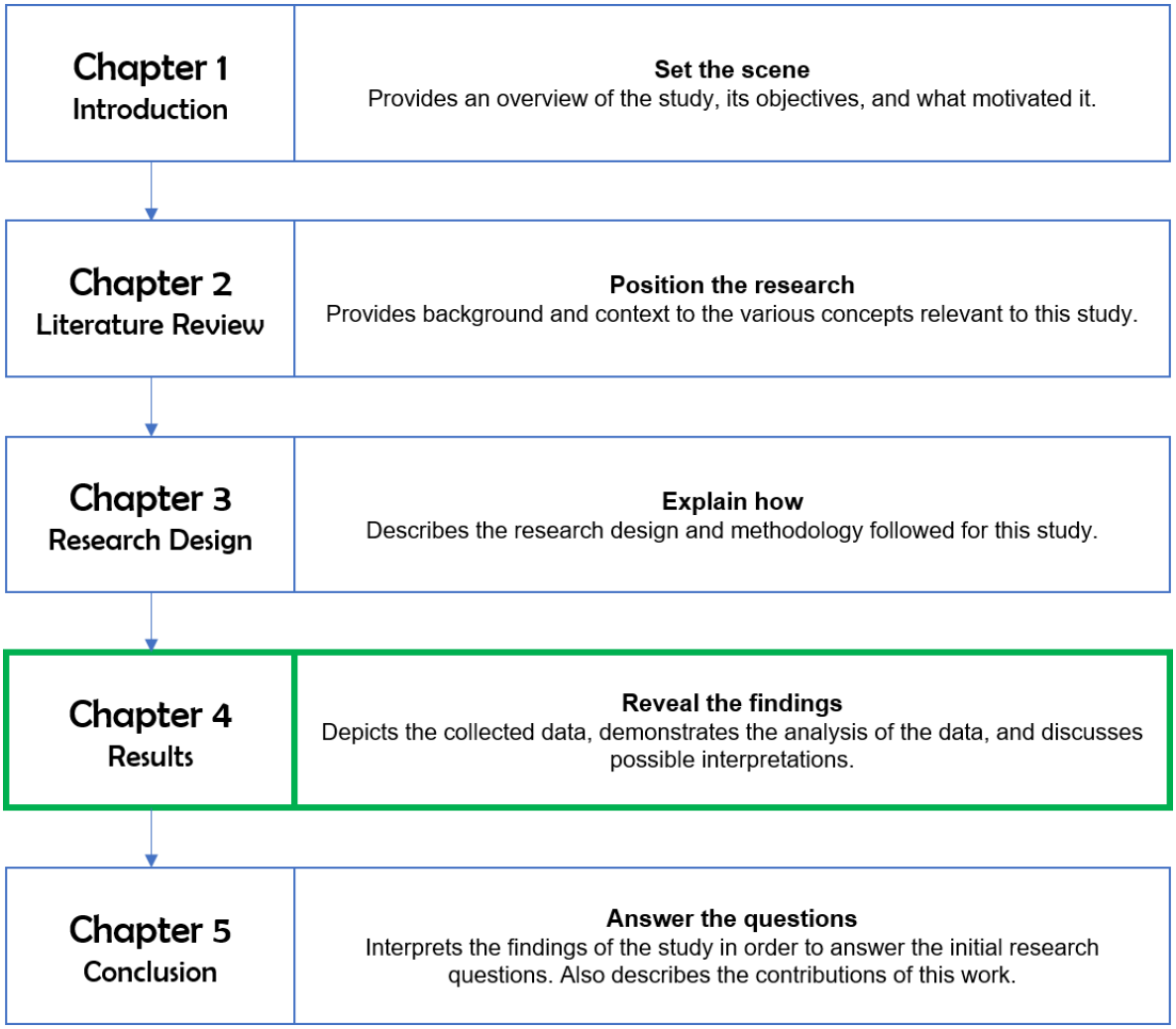


Figure 4.1: Chapter 4 of the dissertation.

4.1 Introduction

This chapter reports on the results of the six in-depth interviews conducted for this research. The conversations that emanated from these semi-structured interviews are firstly described in detail. Transcriptions were subjected to thematic analysis, which led to the discovery of several meaningful patterns. An elaboration of each identified theme is presented before a summative interpretation of the themes is expressed.

4.2 Content descriptions

4.2.1 Informant 1

The first informant interviewed for this study is the programme manager at a telecommunication enterprise operating in South Africa. In 2016, the company employed 17,509 people and reported a revenue of R147 billion for the preceding fiscal year. This manager is in charge of the technology side of developing a key new product being rolled out across multiple nations on the African continent. His role is to manage a series of teams to deliver the end-to-end information and communication technology solutions required to take this new product to market. An end-to-end solution (E2ES) refers to the case where the provider of a software application, digital product or information system will equip the customer with all hardware and software necessary to render the solution completely functional so that no other service provider is brought in for the sake of meeting the delineated requirements. E2ES includes installation, integration, and setup (Frye & Gulledge, 2007).

A considerable part of this programme manager's role is to oversee the custom development of various software applications. Many of the software products

delivered under this programme are customer facing. Multiple software development teams operate under this manager, with each team leader expected to report to him on a regular basis. All of his software development teams employ the Lean software development approach which is rooted in seven key principles, namely eliminate waste; amplify learning; decide as late as possible; decide as fast as possible; empower the team; build integrity in; and see the whole (Poppendieck & Poppendieck, 2007). Lean follows the evolutionary, adaptive, and iterative principles of the Agile software development approach.

When asked about the concepts of usability and UX, this informant admitted to not having any formal education or personal experience in this area, but interpreted usability as the ability of a software application to perform a specific task; and user experience as the degree of comfort with which a user can complete that task using the software application. These understandings are not precisely in line with explanations found in the literature.

This organisation does not have any formalised UX strategy in place. That is, a strategy that prescribes the incorporation of specific UX practices or manifests agreed upon UX principles such as user-centred design. According to the interviewee, their industry is one where time to market is imperative so as to match or surpass the offerings of competitors. For this reason, even though every software project is initiated by compiling a detailed scope of work, portions of that scope are often discarded for the sake of achieving ambitious deadlines. The basis for the prioritisation of features, components and design elements are 1) regulatory compliance with governing bodies (e.g. different nations' laws and ICASA, the Independent Communications Authority of South Africa); 2) directives and/or requirements called for by business stakeholders; and 3) IT architecture, design and

capacity considerations. The holistic experience of the user is, therefore, not explicitly considered when scope adjustment decisions are made.

Their employment of the Lean software development approach is advantageous in this context and with this development philosophy due to its reliance on test-driven development (TDD) where work is broken down into small units of software which are repeatedly tested and refactored to produce higher quality software more timeously (Madeyski & Szała, 2007). The limitation of TDD is, however, that it is not necessarily concerned with the environmental and human factors that may influence the use of the software being developed, frequently implementing automated stubs or mock-ups that perform basic simulations of user interface functions (Martin, 2003).

In the case of this telecommunications company, no design or test practices are incorporated that expressly focus on UX. This informant has never been involved with a project carried out by this company where an external UX specialist was brought in to advise on or execute UX practices. Additionally, no internal positions exist for UX professionals in this informant's team structures. There is, according to the interviewee, a stakeholder who represents the interests of customers at selected stages during certain projects. This "*proxy of the customer*" is usually one of the managers from the company's call-centre and it is believed that this person would have an adequate understanding of the customers' needs and expectations. This person will typically be involved twice throughout the entire project: once at the beginning of the project as one of the many stakeholders consulted by a business analyst, and later, at the pre-release testing session where this stakeholder is required to test and sign-off before the software module or function may be released.

With certain high-risk releases, production testing is carried out. This test procedure attempts to evaluate the effectiveness of a software solution in an environment that is similar to what will be encountered once the product is released. This company conducts production testing by involving several of their employees from non-technical departments, such as finance and marketing, to use the application as if they were customers. The point of contention here is that the intended users of the application live in rural and semi-urban areas of Uganda and Ghana, while the testers are typically employees of the company who work in metropolitan areas of South Africa. Hence, the testers and intended users are worlds apart as far as their demographics, backgrounds, educations, degrees of exposure to technology, and various other factors are concerned. Nevertheless, production tests that have been executed were seemingly still successful in pointing out a number of flaws that may have been damaging to the product's reputation if launched. Users' satisfaction and experience with products released by these teams are not explicitly tested. However, based on issues raised with call centres, the trend is that early releases of products are usually accompanied by an influx of queries as a result of users experiencing complications with the software. As time progresses and subsequent improved versions of the software are released, queries of this nature subside.

This manager estimated an allotment of approximately thirty to forty percent of software development budgets on the improvement of user experience. He rationalised this by explaining that this either comes from the amount of development time spent on responding to issues particularly raised by or concerned with users, or by having to customise certain off-the-shelf packages to suit their particular customer base. Be that as it may, he concluded that their expenditure on practices with a

direct focus on UX, as opposed to the more indirect user related expenses mentioned before, is not much if anything at all.

In each case, informants were asked whether, given more time, budget, and resources, they would devote more effort to the incorporation of practices pursuant to the enhancement of UX, or whether they would prefer consigning the added capacity towards something else. In the case of this manager, in spite of his inexperience regarding UX, he was still convinced by the line of reasoning that asserts the business value of UX. He suggested the expansion of their Lean software development approach to an approach called Lean UX, where unit tests are supplemented with meticulous user testing as well as the incorporation of prototyping.

On the subject of constraints to the incorporation of UX practices into their formal processes, the informant was unequivocal in stating that the primary reason for their failure to routinely perform such activities was the stringent time-to-market expectations placed on his teams. He felt that for big corporates the issue of money was not necessarily an insurmountable obstacle, and that although his teams did not possess the required UX skills, the UX expertise could be brought in if sufficient time were granted to formally incorporate certain practices into their process.

In an attempt to unearth instruments that are likely to persuade managers of software development teams about the inclusion of UX practices, each informant was asked to sort the instruments of persuasion, taken from McKay (2016), according to their likelihoods to persuade IT practitioners towards the incorporation of UX practices. This interviewee ranked a credible business case as the most likely instrument to convince him to incorporate UX focused practices into his teams'

processes. He believed that aesthetically pleasing prototypes would not be a useful tool for persuasion. This informant's appraisal of the persuasion instruments is depicted in Figure 4.2.

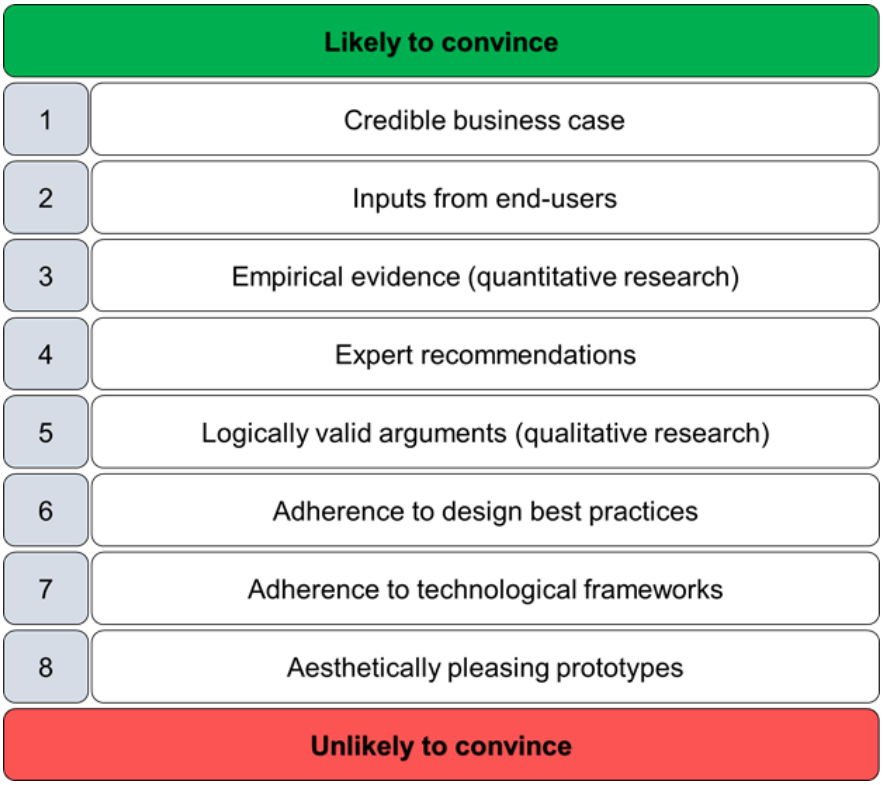


Figure 4.2: First informant's ranking of UX persuasion instruments.

The manager highlighted two potential instruments of persuasion for UX that were not expressly listed by the interviewer, namely benchmarking and risk. He explained that managers are often swayed in other spheres of business to sanction certain interventions by comparing their organisation's products and processes to those of competitors, and illustrating how competitors are outperforming them in certain aspects. In this manager's opinion, if it could be shown how a product's UX is clearly lagging behind that of a competing product, it may convince those with influence over decision-making processes that a more targeted effort towards UX is required. Alternatively, demonstrating the risk associated with not incorporating UX practices

or the risks caused by products with poor UX, may be a useful way to argue for the increased adoption of UX practices.

The interview concluded with the informant telling a story where the lack of proper user research and omitted UX activities cost the company millions of rands. The following excerpts are taken directly from the interview transcripts:

> *"we did something for [the company] about two, no I think it's longer than that, some seven eight years ago. We completely changed the pricing structure, contract structure, the way you bill your customers, everything, so it was a fantastic idea on paper and we didn't want to reveal anything about it, it was very hush-hush, a very high confidential project. But the CEO was actively involved and putting pressure on us, we had to report to the CEO on a daily basis on progress, so time was crazy.*
>
> *So you didn't have the time to do the customer experience, it was just go and develop, go and test, so it didn't follow any methodology from a project perspective, it just ran basically, so never ever did we test that customer experience and one of the key things, one of the constraints on the project was that they booked media for a certain day and they paid millions for that media for a certain day so nothing could be postponed. I remember I was sitting that Sunday reading the newspaper and [the company] said, next Sunday in the newspaper there's going to be something exciting. I was the project manager, I said 'oh my word'.*
>
> *So, we actually did the bare minimum to get us in, so we got in just on time and after that I went on leave unfortunately. I think it's a week or two after that and it was just crazy. That call centre was buzzing because the billing was incorrect, the*

customer couldn't SMS out, and customers did not know how to do the basic stuff.

And so, although you got this new fantastic price plan that was launched and we did something, we tried to differentiate ourselves from our competitors by implementing this, the user experience just fell through the cracks and that cost [the company] a lot of money, so a lot of customers left us because of that, not because of the new price plan but just because of their experience at the end of the day"

4.2.2 Informant 2

In the second case, a senior project manager overseeing strategic projects in the information technology project office of a major South African university was interviewed. In 2016, the university employed 4,099 permanent staff members and reported an annual revenue of R5.5 billion. The university set out long-term objectives meant to point the way for all institutional endeavours leading up to the year 2025. The IT office has the purpose to support and expedite the achievement of these objectives through the implementation, support and maintenance of technology-based systems. The role of the senior manager in this office involves the execution of planning, organisation, leadership, and control functions required to carry out requested projects such that their concomitant deliverables are completed within budget and on time.

IT projects are typically started when business owners or sponsors, i.e. staff members from the various departments or faculties of the university, approach the IT project office and formally request a software application or system. Projects include the development of both internal staff-facing systems and systems accessed by

clients or the public. Each project request is evaluated separately and the appropriate course of action is typically determined on a project-by-project basis. However, the general approach is to seek out a suitable off-the-shelf product that addresses the requirements set by project sponsors before taking the custom development route. "*Purchase and customise*" is, therefore, preferred over "*development from scratch*" due to the reduced costs associated with that approach.

A significant consideration when implementing solutions in this organisation's landscape is the matter of integration. The university has large systems already implemented, including an Enterprise Resources Planning (ERP) system that manages many aspects of the university's value-chain. The data contained within these systems typically overlaps with the needs of other systems, notwithstanding differences in functionality. It is generally less expensive and considered a better tactic to rely on existing databases instead of establishing new databases that duplicate certain subsets of other databases. With this approach, however, the new system has to communicate with existing systems, but due to the heterogeneity in technologies used between the various existing systems and that of the new system being introduced, some work must be completed to properly integrate these systems. Accordingly, the IT project office has a team of developers that mostly work on customising and integrating purchased software. On occasion, bespoke solutions are developed consistent with the specific requirements of sponsors. Furthermore, this team supports and maintains existing systems in cases where such systems are not taken care of by external service providers already.

The senior manager interviewed in this case, applies the Prince2 project management methodology. Prince2, an acronym for Projects IN Controlled Environments, is a process-oriented arrangement of techniques and methods for the

effective management of projects (Turner, 2016). Prince2 is recognised for its strong emphasis on business justification, defined team structures, and product-focused planning. The software development methodology employed depends primarily on the requirements and constraints of the project. The rhythm of the university is of such a nature that timetables are known a year in advance. Hence, software development projects and associated resource allocations can be staggered. This aligns best with the sequential Waterfall software development approach, also referred to as Structured Systems Analysis and Design Methodology (SSADM). However, occasionally it happens that timelines are imperative on a project for the sake of legislative compliance or government directives. In these cases, the SCRUM development approach will be applied. SCRUM is an iterative and incremental software development methodology rooted in the Agile software development philosophy, with special attention paid to the establishment of flexibility and synergy within the team and its processes (Vijayasarathy & Butler, 2016).

The interviewee described usability as the extent to which the system enables the user to accomplish the tasks that the user wishes to accomplish, i.e. the effectiveness of the system. User experience, in the opinion of this senior manager, can be regarded as the degree to which the accomplishment of the designated task was seamless from the user's point of view, i.e. he equates it to efficiency. When asked about his appraisal of the quality of the information systems produced by his team, the interviewee responded tentatively. He explained that the development team almost always feels that additional features could be included into a delivered product to make it more useful, effective and efficient, but that his team is typically constrained by the demands of business stakeholders. What they have found in past projects was that the project sponsors had a particular need or problem, and once

that was satisfied or solved, their appetite for technology was saturated. Added features tend to be underutilised and it is thought that the resources used to implement them are being wasted. As a consequence, the team has settled to deliver only what their clients request. The manager concluded that, in absolute terms, their products may not be as useful, effective or efficient as possible, but he was satisfied that they were successfully delivering on their mandates.

The informant asserted that he never really considered usability and UX as explicit concepts and believed that they are "*very blended and awash with grey areas*". In other words, he finds it difficult to distinguish between usability and UX and feels that reliably measuring these aspects is difficult. For this reason, his teams do not formally recognise, plan for, and ultimately incorporate practices with a view towards enhanced usability and UX. Moreover, he suggested that it would be helpful if one could put each concept, that is, usability and UX, in an independent "*container*" and establish an ecosystem around each. To wit, having access to explicitly codified knowledge apropos these notions may make it easier to incorporate. System requirements are mostly gathered from the product owner or sponsor. The team relies on these stakeholders to supply any information about users that require particular attention, for example a higher than usual disabled user base. On this basis, best practices are drawn from academic and practice-led research, which will then be applied in order to address these unique requirements.

As far as testing methods are concerned, the project manager supposed that the combined 65 years of experience along with an abundance of institutional knowledge allowed the testers in his team to address matters such as usability and UX adequately, and that these aspects were naturally and intuitively handled. Even so, they do not have formal training or education in UX practices, and the testers do not

expressly address, document, or test for usability and UX. The informant, however, still suggested that they were tacitly considering UX while testing. The manager affirmed that users are involved to a certain extent during product testing, but to a lesser extent during system design. A testing and sign-off procedure is a customary activity with every project and is supplemented with a benefit realisation exercise, which ascertains whether the project's objectives were met and whether the implementation of the information system gave rise to a discernible return on investment.

Furthermore, user forums are used with certain projects. For instance, elected student councillors and representatives were asked to comment on a new student-facing system, particularly around accessibility issues for blind and colour-blind students. The recruitment of forum participants are generally realised by asking the project sponsor to introduce the development team to selected superusers. Superusers are users of an information or computer system with special privileges needed to administer and maintain the system. The organisational roles and types of tasks completed by superusers usually differ from those of standard users. The number of superusers of a system is also typically much less than the number of standard users. Accordingly, superusers do not offer an adequate sample or a true representation of the average user of a system and it is not regarded good UX practice to only involve superusers when designing and developing an information system (J. Preece et al., 2015).

Expenditure on activities specifically directed towards usability or UX was estimated by the project manager at approximately two percent of projects' budgets. He expressed that since their approach is to purchase many of their systems out of the box and much of their customisations are concerned with integration, they never

really look at usability and UX as criteria when deciding on which candidate system to go for. He continued by explaining that looking at the time spent with users and the number of adaptions made specifically to render products more comfortable and delightful for users, the expenditure on UX practices would not be significant.

Assuming more resources such as time, money, and skilled staff were at his disposal, this informant agreed that he would devote more effort towards usability and UX over other potential activities. His reasoning was based on the belief that the incorporation of explicit UX practices, if it were clearly understood and properly integrated with the existing methodology, would allow his team to avoid unforeseen mistakes. It would, according to this interviewee, ensure that useful products were delivered instead of taking the risk of producing "*white elephants*". He argued that it would be a requirement to justify and obtain the permission of project sponsors before these UX practices could be included. In other words, he would need to sit down with the project sponsor and justify the additional investment and demonstrate the added value. In his words: "*If you looked back about 25 years ago, change management struggled with the same problem*". The informant asserted that, due to the fact that UX may be regarded as a soft science and that its benefits are difficult to quantify upfront, people would be hesitant to invest. He continued by stating that there are many similarities between UX and what he experienced with change management a while back.

The project manager listed the unquantifiability of the benefits of UX (which makes it difficult to justify added expenditure) and the lack of clarity on how to incorporate these practices into one's project without negatively impacting timelines as the principal constraints related to the inclusion of UX practices. He acknowledged that if those advocating UX could demonstrate the financial and other benefits of UX

through quantitative as well as qualitative research more clearly, then he would be more inclined to incorporate these activities into his processes, since it would make it easier for him to explain the activities to his clients and principals. He ordered the predetermined list of UX persuasion instruments as illustrated in Figure 4.3. This demonstrates his preference for quantitative research (ranked mostly likely to convince him) and qualitative research (ranked third). The presentation of a credible business case showing the value of UX was also indicated as an instrument more probable in succeeding to sway this manager towards the use of UX practices. Direct inputs from end-users experiencing problems with a product and aesthetically pleasing designs were listed as unlikely to trigger a change in his approach. On the question of whether he would add anything to the list, the interviewee responded by stating that a clear and credible financial return on investment formula would be a useful tool to demonstrate the value of UX practice more tangibly.

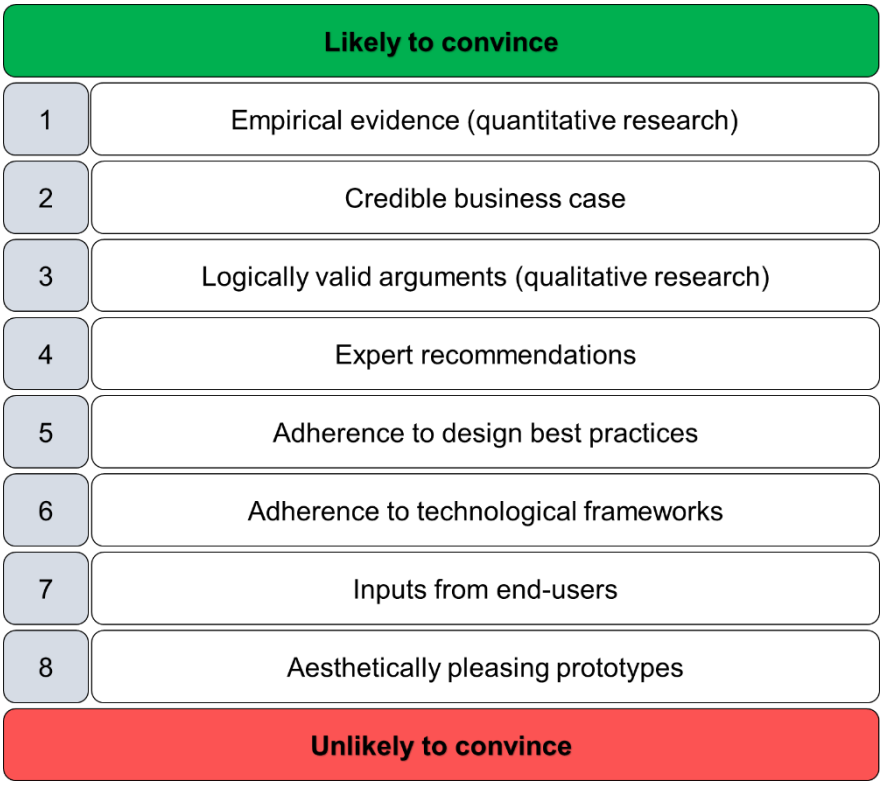


Figure 4.3: Second informant's ranking of UX persuasion instruments.

Finally, the project manager at this major university pointed out that there was no direct involvement from executive level managers in IT projects regarding any aspect, including matters related to the experiences of users with software systems. He added that they have a bureaucratic system where everything comes through the structure and set management lines. Executive staff do not have direct input into their ISDM activities.

4.2.3 Informant 3

The next case focused on the banking sector, which is a highly competitive industry in the area of digital products and services. The interviewee is a project manager in the information technology division of a large South African investment bank that employs approximately 9,029 people and reported an annual operating revenue of R19 billion in 2016. One of the foremost functions of his division is the development, support and maintenance of information systems for bankers, and it is his role to

oversee one of the software development teams within the division to successfully deliver the outcomes of allocated projects. These internal systems assist staff members by streamlining and augmenting the business processes involved in servicing clients. As far as ISDM is concerned, this organisation applies the SCRUM methodology from the Agile family of ISDMs.

Interestingly, this informant was recently introduced to the concept of UX and the practices in support thereof. He developed a keen enthusiasm for the field, having been won over by some of the practice-led research he came across at the time. He signed up to a few UX courses and continues to do a lot of reading on the subject, but claimed that he is perhaps the only one "*beating the UX drum*" in his division.

The extensive reading that this interviewee has done on the topic provides him with a good understanding of the concepts of usability and UX. He describes usability as a discipline within UX that entails the time and effort required by a user to complete a particular task and the satisfaction with which this task can be completed. He defines UX as the user's holistic experience from start to finish, which is not limited to interactions with the digital touch point itself, but also includes the environment around it, such as the packaging and pre-existing brand perceptions. The informant's understanding appears to be in line with many of the definitions provided by scholars in the field.

Because this project manager has bought into the value of UX through his own studies, he has started to execute a number of activities aimed at improving UX. These include user research, usability testing, and early prototyping, but he conducts these activities completely by himself. His reasoning is that those in higher management do not really understand the fundamental concept and value of UX,

and he would like to put together a solid business case with proven value from his personal undertakings. By presenting this business case and evidence to management, he hopes to be afforded more freedom and capacity to formally incorporate the pertinent practices into his team's processes. He also mentioned that he had shown some of his results to his principal, the programme manager, and that she was impressed and excited about the results presented.

This informant is convinced that, due to insufficient engagement with users and underutilisation of proper UX practices, their digital offerings are coming up short with regard to usefulness, usability, and UX as a whole. Furthermore, he believes strongly that users are not satisfied with the systems they are currently required to use, and he is in the process of conducting surveys to determine average SUS (System Usability Score) and average NPS (Net Promoter Score) metrics for different software applications. This, he hopes, will provide him with further evidence that exhibits the need for UX practices in the organisation's software development approach.

When asked about the benefits of UX and the application of UX practices, the informant started by describing the process that most teams in his organisation follow at present. Teams typically possess a completely business-centric view as opposed to one where users are at the centre. Consequently, the objectives of software projects are generally along the lines of getting a "*good enough*" product signed-off and released into a live environment as quickly as possible in order to realise the presumed business value. However, with this approach users are treated as peripheral stakeholders who are interviewed, but only from a business perspective. After the initial interview, users do not see any part of the system until it has been developed, and even then, the demonstration is conducted by a business

analyst. Users themselves do not interact with these early versions of the system and the business analyst typically carefully clicks through the system in a manner that avoids the disclosure of any flaws. And so, inputs from users throughout the current process are tremendously constrained and misrepresented.

Having painted the picture of the status quo, the informant then drew a contrast with his experience of projects that position users as essential informants, core to its processes and activities. He explained that the execution of thorough and proper user research would ensure that the objectives of the project are appropriately aligned with the needs and expectations of the user, thus avoiding major post-development design changes. Moreover, he suggested that the implementation of prototyping, which tests parts of the solution from the user's perspective, would identify flaws and inefficiencies early on, saving a considerable amount of time and money spent on adapting or rectifying the solution. He also felt that improved UX would reduce the number of report calls that would need to be serviced, where users are unhappy or struggling with certain tasks on the system. He had observed some of these benefits in his own projects with the elementary, experimental UX work he had implemented.

Recently the informant has started making use of a freelance UX specialist to consult on some digital product development efforts. This person usually works off-site and depends on the information and feedback gathered by non-specialists. This UX expert would advise on the design of interfaces according to UX best practices, but she is limited in the amount of work she can take on. Due to the fact that the informant is, for the most part, the lone pursuer of UX who is devoting substantial effort in order to generate some momentum for the associated philosophy and approach, UX practices are not employed broadly within this organisation.

The interviewee stated, without hesitation, that the amount budgeted for UX work on software projects is zero. He pointed out that any UX-related work carried out was conducted independently by himself, on his dime, and purely in furtherance of a credible business case for UX. He added that, in his mind, UX is supposed to be the number one priority for any software development project. Therefore, it was no surprise when he stated that he would definitely spend additional time, money and resources on the application of UX practices if it were granted.

The interviewee further identified a number of challenges to the incorporation of UX practices into his organisation's formal ISDM. At the moment, they do not have sufficient buy-in from role players in and around the development process, there is a lack of understanding as far as UX and related activities are concerned, and the purely business-oriented deadlines make it difficult to introduce new practices. He also feels that there is an intense sense of "*developer pull*", which refers to the dominion and sway software programmers tend to have over process decisions owing to their technical knowledge. He argues that software developers often have a strong mechanical focus, which fails to sufficiently reflect on the needs and expectations of the user. Since developers hold considerable influence with respect to the development processes followed, it may be challenging to incorporate new user-oriented practices.

Moreover, the interviewee raises the concern that they operate in an environment where the self-pride of individual team members seems to have a definite impact. People find it difficult to accept criticism on the ideas they put forward. Design decisions are often made, not necessarily for the benefit of end-users, but rather on the basis of power relations within the design team. As a solution, he advocates that UX designers and developers require specific skillsets and perhaps even intrinsic

traits that provide the means for human-centred action. Finally, this project manager believed that many development teams, not only in his organisation, but also in those of other companies, tend to be "*happy to stay on the hamster wheel, rather than hopping off and discovering ways of doing things better*". With this, he was suggesting that professionals in the industry are so focused on reaching deadlines and satisfying expectations set by business, that they do not have or take the time to innovate.

On the question of the instruments he would use to convince others about the value of UX, the informant surmised that definite evidence is required. He cited a few websites that do basic return on investment (ROI) calculations regarding UX and felt that, together with other forms of quantitative research, this could be an agent that effects change concerning people's methods. From the prepared list of possible instruments that could be used to convince people of the value of UX, this informant ranked highly items such as a credible business case, expert recommendations, input from end-users, and quantitative evidence, while he was less certain about the usefulness of logically valid or academic arguments, the adherence to design and technological frameworks, and aesthetically pleasing prototypes. His ordered list can be seen in Figure 4.4.

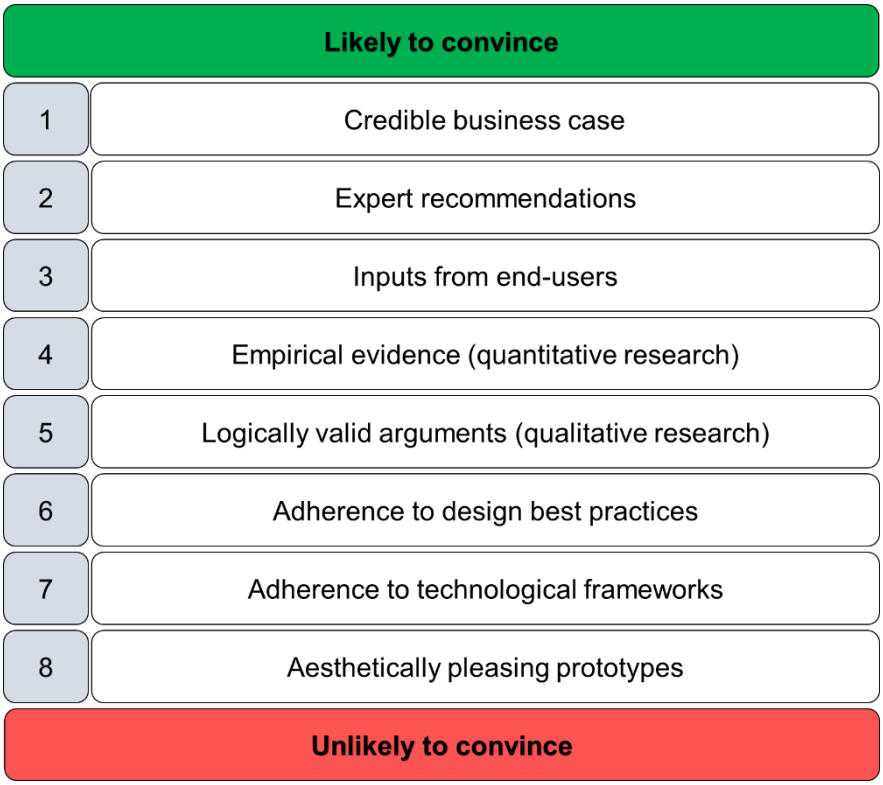


Figure 4.4: Third informant's ranking of UX persuasion instruments.

According to the interviewee, the executive managers of the organisation in question have not shown any express interest concerning the notion of UX, but this may be due to the fact that no real effort has been made to acquire their buy-in.

4.2.4 Informant 4

In this case, the interviewee is the head of a division, called the "*Delivery Management Team*", of a company that delivers information technology services according to the scopes, budgets and timelines provided by their clients. The company employs around 4,099 people and reported a twelve-month revenue of R6.1 billion in 2016. One of their primary offerings is the development of bespoke software solutions. This manager's role is to direct the programme and project managers under this division to ensure that services are delivered according to clients' expectations. This involves enforcing adopted methodologies, ensuring that governance policies and procedures are followed, establishing reporting

mechanisms within the division, managing client billing, and coordinating contractual matters.

Due to the client-specific nature of projects, the kinds of solutions they develop are diverse, with both customer-facing and internal systems being designed and implemented. Moreover, the teams operating under this division have the capacity to engineer an assortment of solutions including business intelligence platforms, web applications, mobile applications, and enterprise content management systems, and are open to the custom development of systems that run on other technologies depending on the specified requirements.

The variety in the types of projects undertaken requires frequent alterations of their ISDM depending on the requirements of the project. By default, the team follows a formalised software development methodology that they have adapted from the SCRUM methodology. If a particular project demands it, this approach is modified by adding or removing certain steps. Their essential process starts out with the step of gathering requirements from the project sponsor or client, which includes any technology or integration related needs. This step is conducted in the form of a workshop facilitated by a business analyst and a solutions architect. The stakeholders that attend these workshops are typically determined by the client, and would mainly comprise product owners, parties with an understanding of the client's technology landscape, and elected superusers. The insights gathered from these workshops are used to produce detailed requirements documentation and test cases, upon which the rest of the system design and development processes are based.

For this informant, the notions of usability and UX have to do with how easy a system is to use and what the system looks like. A key component of this, as far as her understanding goes, is the corporate identity of the organisation. She shared her view that a system that is not comfortable and intuitive to use, will most likely not be adopted by intended users, thus requiring a reversion back to outdated systems that people have gotten used to over the years. With respect to the difference between the two concepts, she outlines usability as having to do with the functioning of the system where findability, navigability, and understandability are the focal points, while she describes user experience as referring more to the aesthetics of the solutions.

The incorporation of selected UX practices, mainly wireframing and usability design, only occurs on projects where the client and project manager regard this as important for the specific type of solution. The most prominent case is that of mobile applications. This informant portrayed her understanding of UX as a "*look and feel*" element that is limited to the interface with which the user interacts. The division has several development teams working on multifarious digital solutions across various technologies and platforms, but have only employed a single UX specialist to offer advice on this matter. On certain projects, the UX person plays a role in the inception workshop, while on other projects he would only be brought in towards the end to refine user interface designs. Although UX practices are applied, it is often done as an optional extra step and not based on the philosophy of user-centred design.

On the subject of satisfaction, the informant revealed that they are primarily bound by what the client has asked for, but that they attempt to impart as much of the lessons that they have learned from previous projects and former clients to their current patrons. She believes it is important for the company to bring a particular risk

or opportunity, which the client may be missing, to their attention for the sake of formulating trust and loyalty. Therefore, her measurement of the success of a system is primarily based on the perception of clients, which are the business stakeholders, rather than the effectiveness, efficiency and satisfaction of the system as perceived by its users.

This division's testing practices, with particular reference to UX, are more thorough than some of the other cases, in that they attempt to recruit users from the target audience right at the start of the project and ask these participants to test portions of the implemented system. However, the tests do not follow recommendations of UX scholars. The clients are generally asked to provide a set of typical users, instead of formulating personas based on rigorous user-centred research. Users are simply asked to work with parts of the system and to provide feedback of any kind, meaning tests are not standardised or controlled and only take place once a unit of software has been developed already. Even so, the notion of involving real end-users reflect the idea of user-centred design and development, which may be an indicator of heightened UX maturity (Feijo, 2010).

As part of the project-envisioning workshop, the teams routinely gather information about people, processes, and technology in order to understand the precise needs and design considerations of the solution. The users' needs and expectations would normally emerge from the "*people*" leg of that conversation. Another technique often employed by this team for the acquisition of design requirements is to ask the product owner to highlight systems or products that already exist similar to the one being requested. This division's design approach does not expressly acknowledge the notion of UX or prescribe the application of UX practices. The informant did however speculate that UX would become increasingly important due to the variety

of technologies and connected devices emerging at the moment, particularly referring to recent advances in ubiquitous computing and the Internet of Things (IoT). She also referred to the immensely lofty expectations that the millennial generation, who she describes as the "*the workforce of the future*", tend to place on digital products as a result of their potentially expanded exposure to technology.

In terms of the division's conformity to technological and design best practices that may affect products' UX, the manager asserted that the organisation, as a general principle, embraces and strives to follow the standards and best practices suggested by authoritative bodies. She maintained that their reputation depends on the fact that they make use of modern and advanced methods. However, due to the fact that UX is not an area explicitly recognised by their software methodology, it is unclear whether the teams always make use of usability and UX frameworks to guide their designs. The informant was unaware of any principles that have particular relation to UX being applied by her teams.

With regard to the estimated expenditure on UX related practices, the informant felt that she was unable to answer the question accurately because of the vast differences between the different projects they encounter. UX is never listed as an explicit item on the budget, but she supposed that a substantial amount is spent on practices that tacitly address the UX aspect.

The interviewee suggested that a detailed illustration of how UX practices could engender a return on investment (ROI) would be a technique likely to convince many business people to employ such practices to a greater extent. The demonstration of other benefits, such as saving development time, would also go a long way to sway UX sceptics. This interviewee ranked a credible business case and expert

recommendations as the most likely instruments to advance the recognition of and investment into UX, while input from end-users and beautiful designs are less likely to have any lasting impact on the decisions of those that wield power and influence. Figure 4.5 illustrates this informants' view regarding the usefulness of different UX persuasion instruments.

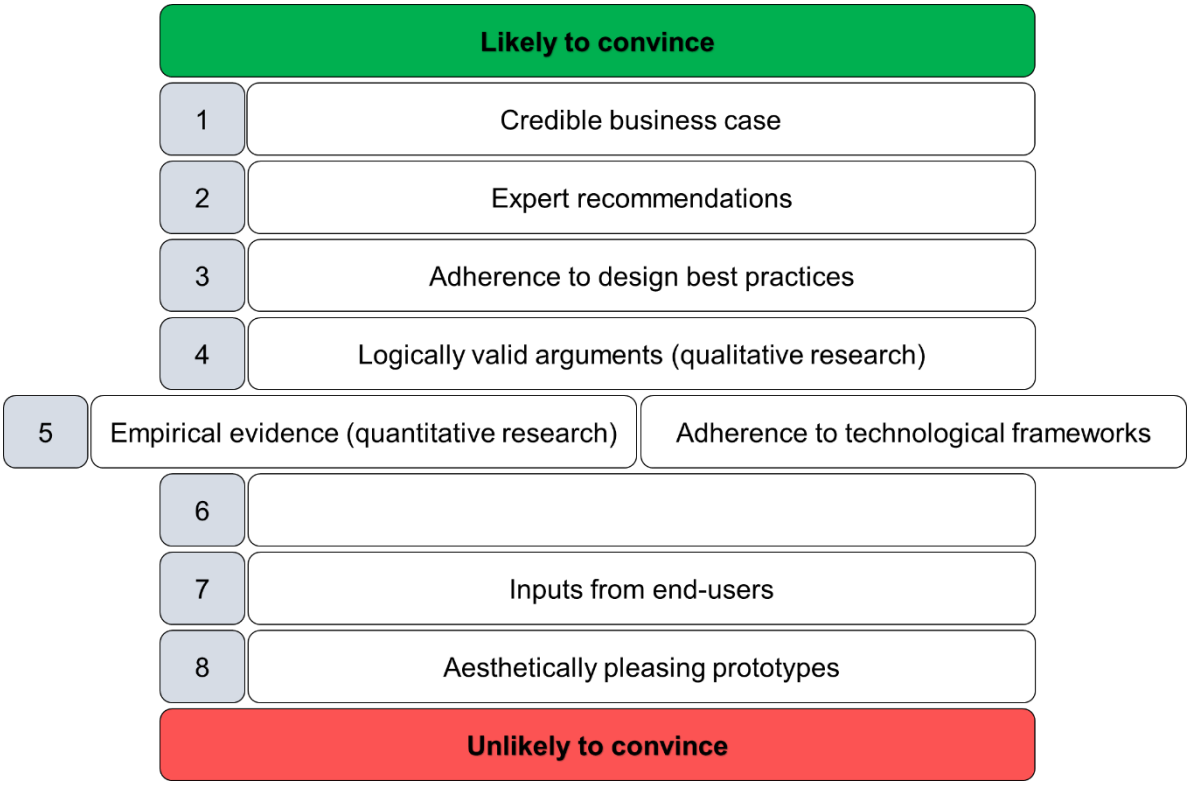


Figure 4.5: Fourth informant's ranking of UX persuasion instruments.

Since their business model requires the delivery of excellent interactive digital products, the organisation investigated in this case has in recent times paid more attention to the idea of user-centred design. Executive managers have themselves instructed teams to ensure quality in design, although no formal UX strategy has been adopted as of yet.

4.2.5 Informant 5

The next interviewee works for a leading South African insurance company, with around 17,976 employees and a reported revenue of R28.96 billion in 2016. She is a

programme manager overseeing a series of projects towards the development of a new micro-insurance product underpinned by several digital mediums. The organisation had, recent to the interview, launched the product in one African country together with the various technology platforms facilitating it, and were in the process of introducing it in two other countries. An integral component of this product's implementation is the ample need for the custom development of customer-facing software applications. This manager is responsible for the coordination and management of multiple software development teams. Depending on the particular markets being entered, various kinds of software that run on a range of devices are created by the teams operating in this programme. This includes Unstructured Supplementary Service Data (USSD), mobile applications, and web applications.

The informant shared that she makes use of a more structured, meticulous, and sequential approach, namely the Waterfall methodology, when it comes to the planning and organisation of the programme. On the software production side, where timelines are strict and strenuous, requiring rapid development, the teams prefer an Agile development philosophy. The SCRUM methodology is typically applied by her software development teams for its focus on flexibility and speed.

Upon the request to explain her understanding of usability and UX, the interviewee described usability as the degree to which the use of an application is free of effort, simple and intuitive, while seeing UX as the resultant perception created in the mind of the user. She, therefore, saw usability as a quality characteristic being perceived (cause) and UX as the resultant perception (effect). These descriptions, though incomplete, are consistent with the interpretations of many HCI and UX researchers.

The informant revealed that she and many of the stakeholders involved were markedly unsatisfied with the effectiveness and efficiency of the digital tools launched so far and that it was problematic given the significant role technology plays in making this insurance product accessible to their customers. She stated that although the website was mostly performing adequately and according to expectation, the application of short message services (SMS) and USSD to interact and communicate with customers, was not producing the desired effect. The USSD project had a negative impact on the perception of UX, because a UX expert was brought in to design the menu structures that customers were required to navigate through. However, the expert's designs resulted in various complaints from customers, with complexity and ambiguity being cited as substantial stumbling blocks for users. These designs caused dire technological errors that rendered entire processes completely ineffective at times.

The problem, according to this manager, was that the UX expert operated on the outskirts of the project and his work was not appropriately integrated with that of the development team. He produced artefacts and recommendations based upon research conducted by people who were not necessarily regularly involved with UX-related work. This person had no access to the software architects designing the underlying systems in order to evaluate the technological viability of his designs and was also not able to test his designs with end-users. The UX expert was appointed on an ad hoc basis to design interactions using only his theoretical knowledge of the field. The informant believed that the individuals in her team never questioned the inputs from the specialist owing to his position of authority when it comes to matters associated with UX.

Given the undesirable outcome of the USSD application release, the informant expressed her belief in the value of practices that could enhance usability and UX, but felt that it was, in a sense, a "*pipe dream*" due to the unreasonable time constraints placed upon her teams on almost every project. She bemoaned the tendency of business managers setting launch dates and triggering marketing campaigns according to these dates, all before consulting with the actual teams developing the product. Teams are, therefore, left in a position where they have to produce a functional digital product within unreasonable time frames. As a result, going through multiple iterations of research and user consultations or tests is simply not an option.

In an attempt to address some of the usability concerns, the product development teams have compiled and ordinarily apply a set of design guidelines and best practices, which were mostly derived from past projects and lessons learned. This prevents the repetition of blunders across projects. The manager pointed again to the time constraints when asserting that they do not make use of any testing techniques that specifically look at perceived usability and overall UX. There are functional tests throughout the development process and user acceptance tests just before the application is released. However, these user acceptance tests typically involve business stakeholders and the analysts who stipulated design specifications, rather than individuals recruited from the actual target audience. The interviewee added that defects, especially relating to UX, are often discovered in user acceptance tests, but cannot be resolved before a deadline and would, thus, be released along with the product. Hence, it is the aim of the responsible team to create a product that works well enough for it to be published by a particular date, rather than paying significant attention to the eventual experience of the end-user.

The interviewee's estimate that one percent or less of her teams' project expenses are on practices that relate particularly to UX confirms the shortage in UX adoption expressed before.

The informant asserted that she would love for her teams, were they afforded more time, money and skills, to incorporate activities that would lead to software that provides end-users with the best possible perceived experience. This would not just allow for the release of better quality products from the start, but also save lots of time and money on having to redo or fix software. She admitted, however, that she has had to make teams under her put additional features on ice in order to reach deadlines. She would therefore probably allocate a sizable portion of additional time, money and resources on efforts to wipe out that backlog since her principals are more interested in seeing a greater number of features than they are in enhancing feature quality. She argued that business managers, when asked, would probably pay lip service to the absolute importance of positive experiences for customers, but that it would be highly improbable that they would grant more time for this cause.

For this informant, the most probable instrument to convince people to include more UX practices into their processes would be to illustrate, in a concise, uncomplicated, and clear manner, the benefits of using such practices. Perhaps more useful, she asserted, would be a demonstration of the consequences of not using UX practices. With respect to the predetermined instruments, which all interviewees were asked to rank from most to least likely to persuade managers on the validity and value of UX, this manager regarded empirical evidence, input from end-users, academic or logical arguments and recommendations from UX experts as more useful than adherence to design or technological best practices, aesthetically pleasing prototypes, and a

credible business case. This interviewee's ordering of these instruments is depicted in Figure 4.6.

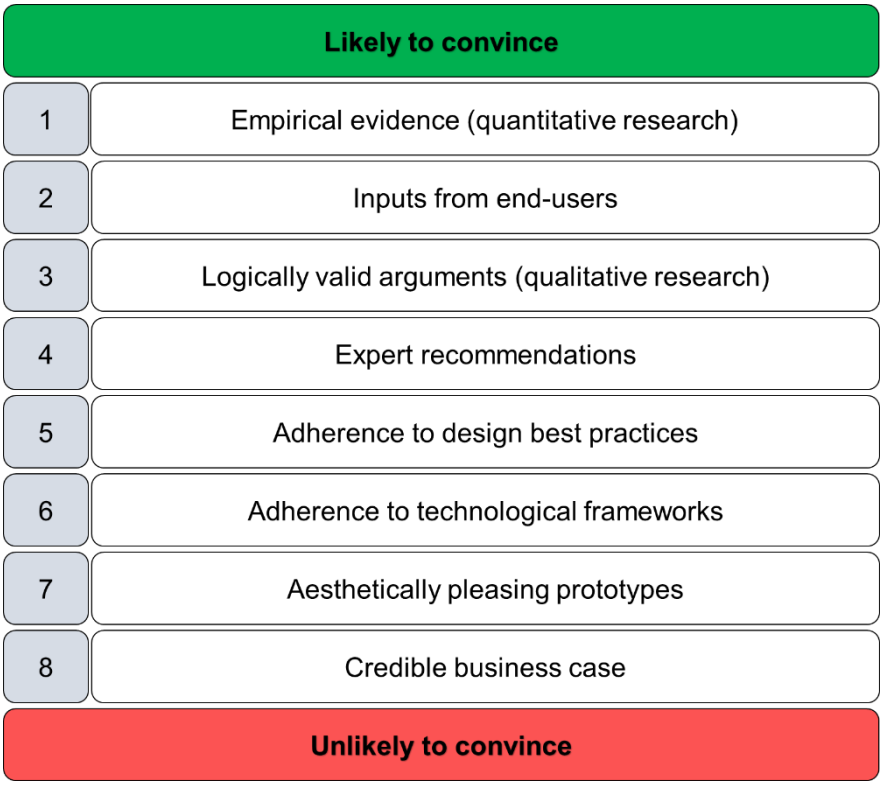


Figure 4.6: Fifth informant's ranking of UX persuasion instruments.

4.2.6 Informant 6

The final case looks at a South African low-cost airline company that employs approximately 501 employees and reported an operating revenue of R5.2 million in 2016. In this case, the company's head of information technology was interviewed in order to ascertain this organisation's approach regarding UX. This interviewee's job primarily entails the management of the people and processes employed towards the fulfilment of the information technology needs of the organisation. The IT division focuses on two key functions, namely "*IT support*" and "*Innovation*". IT support typically involves IT infrastructure support and maintenance, which comprise aspects such as networking, desktop support, office technology infrastructure, and more. The innovation function, while not exclusively fixated on IT, attends to the design,

development, and implementation of systems within the organisation in order to streamline and improve business processes, and this often encompasses the creation or application of software solutions. This broad collection of activities across the company employs various IT products, some purchased off-the-shelf and others developed on request according to stipulated requirements. Since the business operates in the profoundly competitive low-cost airlines industry, their website and its successful enablement of ticket searches and purchases is of utmost importance.

Although the interviewee regards his team as relatively small and not mature enough to strictly follow the prescriptions of a formal ISDM, they do agree with the principles of Agile development and make use of some of the tools and techniques put forth by the SCRUM development methodology. The innovation team is made up of only three internal analysts who are responsible for scoping new work and testing products. All software design activities are taken care of by a graphic design company while software development work is outsourced to a company in Sweden. The routine is to have weekly sprint meetings with the software developers of the respective applications to decide which items from the backlog should be prioritised for the upcoming week. The developers, in collaboration with the external team of designers if required, will then complete the allocated items within a couple of days, after which the analysts will test the products internally, reverting back to the developers if any defects are discovered. The informant highlighted his team's preference of effecting minor changes and improvements regularly, rather than introducing large modifications one or twice a year. When large projects are undertaken, they are usually completed in parallel to these continuous tweaks.

The interviewee shared his perception regarding the notions of usability and UX as well as their associated fields of practices. He stated that, from his experience, the

efforts around UX he observed in contexts such as the USA go beyond that of the industry in South Africa and his own team. He described usability as having fundamentally to do with simplicity, the act of stripping away any complexity so that users are able to perform tasks free of effort or frustration. He regarded UX as being very closely related to usability, where usability is more about functionality while UX was more about look and feel. He further remarked that his team does not separate these notions, but instead consider it a single aspect, which they call simplicity.

As far as his individual assessment of the overall quality of the solutions they produce, this manager argues that he is fairly content with the results. He explained that his team's chief success metrics are sales, revenue, and conversion rates, and that they were achieving their targets in terms of these aspects. He further argued that these assessments must always be made in cognisance of the capacity and objectives of the product development teams. He would therefore like to do more with the products his team creates, when looking at it from an objective perspective, but he believes they were delivering fair results considering their limitations. He regrets the rigidity of the underlying hardware infrastructure that their website is built on. He explained that they were facing various problems in terms of scaling up on hardware capacity, such as servers and network bandwidth, in order to adequately address the needs of sudden surges in user traffic. He contended that it does not matter how effectively, efficiently, or beautifully a system and its user interactions are designed, if it is rendered slow due to server and network complications, the user experience will be unsatisfactory.

This team does not routinely employ methods particularly focussed on assessing the usability or overall UX of the systems they develop and maintain. The testing process usually involves the developers testing portions of functionality they had built

themselves, after which the internal analysts test to evaluate whether their stipulated requirements have been met. The team occasionally looks at social media in order to take real end-users' perspectives into consideration, but the insights from these platforms are, according to this interviewee, very anecdotal in nature and not an authentic reflection of what users experience on average. Another technique used only from time to time is A/B testing. The team would run two versions of the same page or function in parallel for a period of approximately two months and evaluate which version delivers the best results.

The interviewee explained that they often work with an external company to address user interface requirements. Even though the aforesaid design agency has recently started offering services that could be considered broader UX consulting, this team uses them primarily for visual design. Hence, the team do not typically make use of an internal or external UX specialist during the development of their products. The team also prefers having open discussions in order to come to design decisions and are hesitant to rely on best practices and sets of design principles. The manager argues that imposing formalised rules and enforcing the adherence thereto would cause cumbersome red tape, which may slow the team down in a competitive environment and limit them to think critically or laterally about potential solutions. The interviewee, however, did indicate that they have an unwritten agreement amongst team members, designers, and developers as far as the "*dos and don'ts*" around the organisation's digital products are concerned.

The UX expenditure by the innovation team, as a percentage of the budgets of undertaken projects, was estimated by the informant at around forty percent. He justified this figure by stating that the people on his team encounter a lot of back and forth between themselves and the development team because of matters specifically

related to ease of use and simplicity. So, even though they do not label their efforts according to terms put forward by subject areas such HCI and UX, it is this informant's belief that significant attention and resources are expanded in pursuance of better experiences for their users.

Furthermore, this manager agreed that he would have placed a higher emphasis on improving the UX of the products created, if he had more resources. To quote him directly on this matter:

> *"It is something that you always park, you always say this is not great, this is not the best look and feel, but it's okay we will fix it later. You never fix it later because you get bogged down with many other things. You reckon functionality and more technical stuff are, basically, more important."*

The informant shared his opinion that, although there are numerous benefits contained in the practice of UX, the practicalities and pressures of developing software in a competitive, time-sensitive industry may always lead to the more intangible aspects, like UX, being perceived as a nice-to-have and reducing it to the "*can that is repeatedly kicked down the road*".

The interviewee, when asked about the constraints to the incorporation of UX activities into software development processes, suggested that the most fundamental concern is time. He explained that most software development teams, especially those following Agile ISDMs, are immensely pressed for time and that their primary focus is to get a working piece of software out before the end of the sprint. The broader picture of UX is rarely given serious thought, because adding more work to an already arduous schedule would, for most teams, be unthinkable. A further constraint to the incorporation of UX, according to this manager, is its

complexity and the understanding of which practices to incorporate in which contexts.

The informant believes that parties attempting to introduce or grow the prevalence of UX within organisations should keep their efforts simple so that managers can clearly visualise how its inclusion will benefit their business and processes. Often, he said, UX "*activists*" or "*experts*" would put forth a collection of static designs, complicated arguments, or unrealistic changes that are too big of a paradigm shift for managers to envisage the value of these practices. He arranged the list of instruments that could be used to persuade managers on the value of UX as depicted in Figure 4.7.

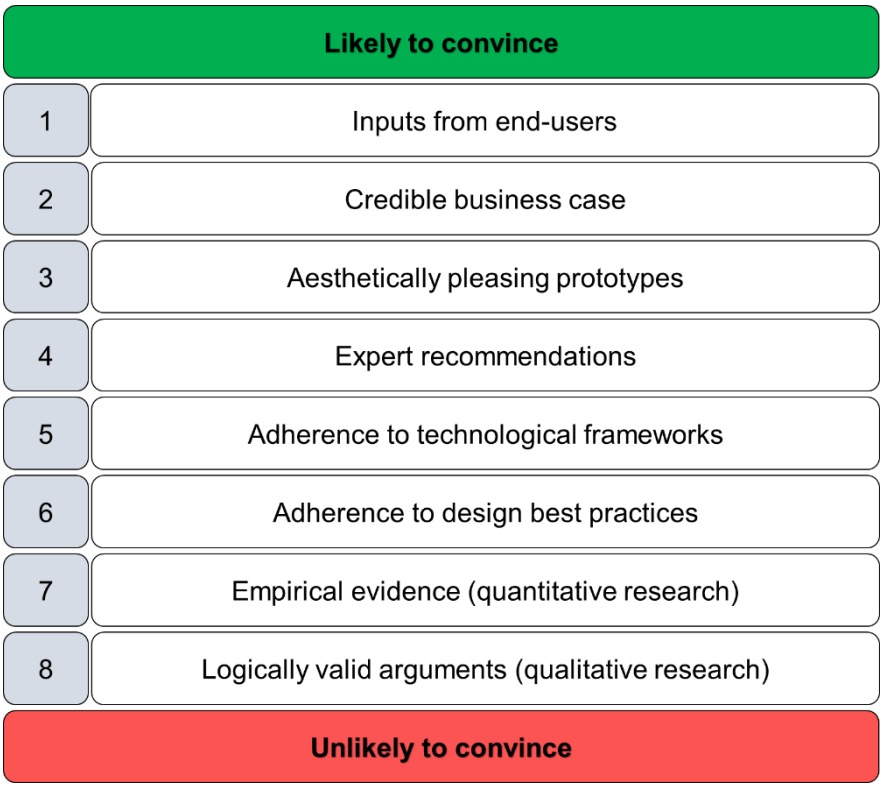


Figure 4.7: Sixth informant's ranking of UX persuasion instruments.

The interviewee stated that their organisation strives to foster a culture of openness and honesty, and that this goes all the way up to the executive management level. In

light of this, executives often make inputs and suggestions regarding the quality of the software platforms and usually welcome any advice on possible novel approaches, if it makes sense to them.

4.3 Themes

Data was collected by means of semi-structured interviews that consisted of predetermined questions. This naturally gave rise to a pattern in the data that, to some extent, corresponded with the list of prepared questions. For this reason, four themes existed prior to the commencement of the analysis procedure, namely:

1. Understanding of the concepts of usability and UX.
2. Perceived constraints to the incorporation of practices for the enhancement of usability or UX
3. Perceived benefits of incorporating practices for the enhancement of usability or UX.
4. Means or instruments to persuade non-UX IT practitioners or managers towards the incorporation of UX practices.

However, due to the informal nature of the interviews, conversations went beyond these four themes and an additional eleven themes were inferred from the data. During interpretation, it became clear that the fifteen themes identified through multiple iterations of coding and refinement could be categorised into three broader themes.

More specifically, when looking at each of the fifteen themes on a higher level of abstraction, it was found that themes could be grouped together according to similarities in what they describe. Three of the themes describe an aspect of the environment within which software systems are being developed. Eight of the

themes described matters that have to do with the current state of affairs in these environments as far as UX is concerned. By the same token, four themes are similar in that they describe different angles to people's perceptions of UX.

Based on these groupings, the broader themes of *Operational Context*, *UX Status Quo*, and *Perceptions of UX* were established. Figure 4.8 depicts the categorisation of themes. Appendix D contains the fifteen mind maps, one for every theme, that were compiled as a result of the thematic analysis process.

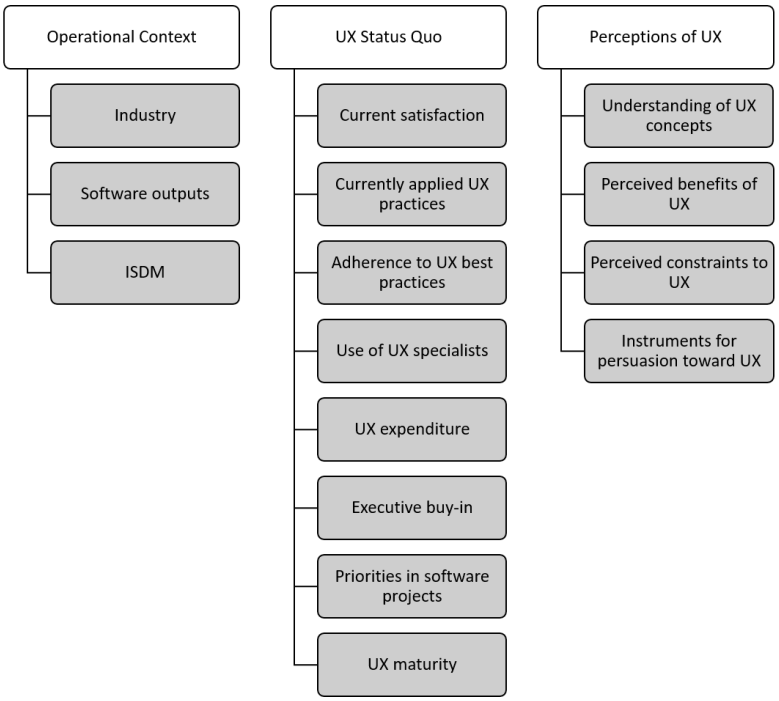


Figure 4.8: Classified themes.

In the subsections that follow, each of the broad categories as well as the themes that fall within those categories are elaborated.

4.3.1 Operational context

The operational context category is characterised by the environment within which interviewees, i.e. managers of software development projects or programmes, conduct their business activities. As asserted by Klein and Myers (1999) and

discussed in section 3.7, the principle of contextualisation must be applied in interpretive research to understand how findings are influenced by the social context and historical background of the setting under examination. Hence, in order to adequately make sense of aspects such as the existing perceptions about UX, the benefits of employing UX practices, the constraints inhibiting the employment of UX practices, and how to persuade managers or practitioners to start employing UX activities as standard practice, we need to understand what effects the operational environment could have on these aspects. Three themes were identified under this category, namely industry, software outputs, and ISDM.

4.3.1.1 Industry

This theme describes the industries or sectors within which informants' organisations operate. The macro and micro economic environments that organisations, and by implication their digital product development teams, reside and function in can affect the expectations placed upon, as well as processes followed by the people involved (Pearlson & Saunders, 2009). Likewise, the perceptions managers of software programmes or projects have of notions such as UX, and the practices they apply in furtherance thereof, are influenced by the parameters unique to their particular industry.

A diverse set of industries were investigated to obtain viewpoints from various angles and to determine whether there are similarities in the UX issues faced across these different contexts. The industry theme, therefore, paints the picture of the circumstances and background within which perceptions of UX and UX practices are being formulated or influenced. The more competitive contexts, such as the telecommunications, investment banking, insurance, and low-cost airlines cases, seemed to be more concerned with getting products to market rapidly. The informant

representing the higher education and training sector stated that they functioned in a slower, more measured environment, where ascertaining and delivering upon the exact needs of product owners receive greater emphasis. With the ICT services company, projects were said to be delivered on request according to specifications from a wide variety of clients stemming from different industries. Consequently, the requirements and pressures associated with each project could contrast significantly with those of other projects.

The multiplicity in the characteristics and dispositions of the contexts of the respective case studies had to be taken into account when assessing the perceptions and practices related to UX. For instance, the constraints to the incorporation of UX practices are perhaps different in a context where time-to-market is the flagship objective versus a context where due process and the adherence to prescribed standards carry more weight.

4.3.1.2 Software outputs

The software outputs theme relates to the kinds of software solutions or digital products created by the interviewees' development teams. Three aspects emerge under this theme.

Firstly, do the software outputs being produced target internal users, like employees, or external users, like customers? Although UX is applicable and could be beneficial for both, the way in which it is applied may vary when curating experiences for customers rather than employees. In two out of the six cases, teams are responsible for the development of software outputs that are directed at both employees and customers. In a single case, employees are the target user base, while in the remaining three cases customers are the primary software users.

Another feature of this theme is whether software outputs are custom developed or purchased off-the-shelf. All but one of the cases produced custom software instead of buying pre-packaged software. Custom developed software outputs are built in-house, which enables greater flexibility in terms of system design. With off-the-shelf products, teams have less of a say as far as system design is concerned and UX practices may have less of an impact. However, it could still play a significant role in the selection of the appropriate off-the-shelf product to purchase.

The third aspect arising from the software outputs theme is that of the underlying technological platform. In other words, are the software outputs required to run on multiple operating systems and devices, or are they built for certain platforms only? In all cases investigated, teams were required to create software that runs across a wide array of operating systems and devices. This typically makes the design of software more challenging and may have an effect on the development approach followed. Furthermore, the selection of practices applied for the sake of enhancing UX may vary depending on the operating system, platform, or technology being developed. For example, in two of the cases teams were responsible for the development of a product that interacted with its users via unstructured supplementary service data (USSD) channels. In these cases, designers needed to compose series of menus for interactions using the USSD protocol that only allows for textual messages up to 182 alphanumeric characters in length without any visual or graphic design (Wouters, Barjis, Maponya, Martiz, & Mashiri, 2009). This contrasts largely with the UX considerations of, say, a web application.

4.3.1.3 ISDM

ISDM is another theme that, similar to the industry and software outputs themes, does not pertain directly to the informants' perceptions of UX and its application, but

could affect it indirectly. Information systems development methodologies, as discussed in section 2.5, refer to an approach followed to coordinate and coherently guide the software development process. The chosen ISDM can have an impact on the way a team views or applies UX. The underlying philosophies and sets of principles upon which ISDMs hinge, offer some insight into the ways in which organisations think as far as software development is concerned.

Five out of the six cases make use of methodologies based upon the Agile development philosophy that stresses the importance of flexibility and speed. With many Agile-based methodologies, solutions are typically broken down into chunks of software that are developed in quick bursts. These bursts are called *sprints* in the SCRUM methodology, which four of the investigated instances prescribe to. Each sprint has a strict timeframe within which specified functions must be completed and integrated. Since the success of a sprint clearly depends on getting the specified functions working before a challenging deadline, time is a crucial factor for software developers employing this approach. Lárusdóttir et al. (2012) cited a notable lack of user involvement and UX activities in Agile software development, particularly SCRUM, and attributed this to the short-term and narrow focus that is so characteristic of Agile development bursts.

One of the managers disclosed that his team preferred the Waterfall methodology that places more emphasis on delivering precisely according to clients' original requirements at the expense of time and flexibility. UX design practices are typically iterative and evolutionary in nature (Garrett, 2010), which does not suit the more rigid and sequential principles of Waterfall.

The informants' responses demonstrated how the choice of ISDM is markedly influenced by the operational context and expectations placed on the software development team. All of the ISDMs mentioned by informants, whether Agile or Waterfall, present some constraints concerning the incorporation of UX but the nature of these constraints differed from one ISDM to the next. Section 4.3.3.3 discusses these constraints.

4.3.2 UX status quo

A number of the themes appertain to the existing UX practices within the organisations that were studied. This gave rise to the UX status quo category, which encompasses any patterned response collected from informants that delineates the "*as is*" state of affairs regarding applied UX practices. The themes in this category, therefore, offer detailed insights on what managers of software projects or programmes currently do, and fail to do, to benefit the usability and holistic experiences of the digital products they develop.

The underlying assumption of the research presented in this dissertation is that there is a shortage in terms of the application of UX practices in organisations' software development methodologies. However, this assumption had to be validated. In other words, is it really true that the organisations approached in this study do not routinely employ or institutionalise UX practices? Eight themes were identified that address this question.

4.3.2.1 Current satisfaction with produced software

In order to assess the perceived need or demand for practices related to UX, informants were asked to share their own levels of satisfaction regarding the

effectiveness and efficiency of the software outputs delivered by their teams. This brought about the "*current satisfaction with produced software*" theme.

Out of the six informants, only one perceived their software outputs as satisfactory. This contention was, however, not based on metrics that assessed the experiences of end-users, but instead on the achievement of business objectives such as increased revenue and traffic to the website. In the five other cases, informants either felt definitively unsatisfied or that they were partially satisfied considering the difficulties and limitations they are expected to work with. For this reason, it can be concluded that most of the informants felt that more could be done to design and develop higher quality products, albeit unlikely, in their opinions, that this could be achieved.

4.3.2.2 Currently applied UX practices

Interviewees were asked about their teams' current application of UX practices. Their responses in this regard led to the creation of this particular theme. They were specifically asked to divulge any UX practices currently employed by themselves or their teams in the categories of user research, synthesis or design, and evaluation. Analysis of responses related to this aspect reveals that UX practices are scarcely used. Moreover, when such practices are actually carried out, they are conducted with limited scope and applied only on an impromptu basis. This was so for all cases studied.

All interviewees indicated that they use certain UX practices, but many of the practices they refer to actually come from other study areas including software engineering and computer science and are not typically associated with UX. For example, business analysts engaging with stakeholders that ostensibly represent the

interests of users, such as the manager of the customer call-centre or the product sponsor, was regarded as user research by two of the informants. Although this practice is not discouraged by UX scholars, it is not considered a pure UX practice. User research, as envisaged by UX campaigners, should include direct involvement of the actual people who will be making use of the prospective product (Schaffer & Lahiri, 2013). Similarly, three of the informants pointed to user acceptance testing together with product sponsors or superusers. Again, this does not involve or gather inputs from actual end-users as necessitated by several usability and UX evaluation methods (Bevan, 2009b; Dicks, 2002; Garrett, 2010; Ketola & Roto, 2008).

4.3.2.3 Adherence to UX best practices

This theme, "*Adherence to UX best practices*", relates to discussions that arose with interviewees around their teams' willingness to follow sets of UX principles, such as the usability principles by Nielsen (1994a) and Shneiderman (2003). As with the application of UX practices, the adherence to best practices and principles put forth by UX scholars is also sporadic in the cases investigated. Only two of the interviewees expressed that they applied certain stipulated principles, and these only provided guidance on the visual design of user interfaces, rather than UX holistically. What is more, they only enforced these principles on selected projects and, according to both of the interviewees, the principles were developed internally and not drawn from UX research.

4.3.2.4 Use of UX specialists

Another theme that has a connection with existing UX-related behaviours is consultation with or use of UX specialists. This theme looks at the discussions with interviewees that pertained particularly to the appointment of experts, either internally or externally hired consultants, for advice on and assistance with UX

research, design, and/or evaluation practices. Analysis of related responses shows that the commissioning of UX specialists is uncommon and not considered a priority by the organisations investigated. Only half of the teams actually made use of any UX specialists. Two of these appointed external UX designers on a limited selection of projects, exclusively to contribute towards user interface design, as opposed to the range of potential practices that UX experts could help with. The one team that has a full-time UX appointee, indicated that there was not a specific role or approach for incorporating the work of this specialist into all projects. The UX person is generally spread across various projects to perform different ad hoc tasks. Hence, none of the organisations apportioned clear significance to the acceptance of contributions from UX specialists.

4.3.2.5 UX expenditure

The UX expenditure theme refers to the financial resources expanded by interviewees' teams on activities specifically related to UX. Interviewees were asked to estimate this expenditure as a percentage of project budgets. None of the interviewees indicated that they explicitly budgeted for UX, but most deemed that there was an amount indirectly spent on activities that related to UX. Four out of the six managers estimated that UX made up two percent or less of their average project budgets. The other two managers estimated this expenditure at forty percent, but this was not a result of explicit UX practices. Instead, these estimations were founded on the extensive rework frequently required to address UX related problems after the initial release of software products or features. Expenditure on UX related practices has not been of particular focus and has not increased at any of the organisations investigated in this study.

4.3.2.6 Executive buy-in and participation

The extent to which executive managers are convinced that the notion of UX holds water, and their willingness to participate in activities directed toward UX, constitute the "*Executive buy-in and participation*" theme. Four out of the six interviewees claimed that executive level managers did not involve themselves at all with any software development matters, including UX. Two interviewees, on the other hand, communicated that their executive managers do show interest in the UX engendered by their software platforms, but added that these managers have not made any prescriptions or mandated any strategic or methodological changes as far as UX is concerned. The buy-in and participation of executive level managers at these organisations are, thus, insufficient to indicate an obvious shift in broader company policy or strategy towards user-centred product development and UX.

4.3.2.7 Priorities in software projects

Due to the often-gruelling time constraints that software development teams and their managers have to deal with, activities and outputs related to software projects are typically prioritised. This is not different in other contexts, where time is perhaps less of an issue, but where compliance with long-established conventions and standards are often prioritised.

This theme, "*Priorities in software projects*", refers to such prioritisation decisions and looks at the data from interviews where informants explained which aspects they deemed more important than others in software projects. The prevalent orientation shared by the interviewed managers was towards compliance with business requirements and delivering functional features. Elements that focused on quality, such as UX, received a lower, if any, prioritisation.

4.3.2.8 UX Maturity

Feijo (2010) proposed a model to assess the UX maturity of organisations (see section 2.9). This theme refers to the interpretation of the UX maturity of studied organisations through the lens of Feijo's UX maturity scale.

Three of the organisations are interpreted as having the lowest UX maturity, namely "*Unrecognised*". On this level, an organisation does not consider UX important and its investment of resources towards UX is negligible. The remaining three organisations are only one degree higher, i.e. "*Interested*", where UX is regarded as important, but no investment has been made towards it (Feijo, 2010).

4.3.3 Perceptions of UX

One of the key questions that prompted this research was how the perceptions held by managers of software projects or programmes about UX influence their willingness to institutionalise practices in furtherance of UX. Hence, themes that were interpreted as pertaining to informants' perceptions of UX were categorised under this theme with a view to answering the aforestated question. In the end, four themes were identified and regarded as relevant to this category, namely informants' understanding of UX concepts, the perceived benefits of institutionalising UX, the perceived constraints to institutionalising UX, and means to persuade decision-makers toward UX institutionalisation.

4.3.3.1 Understanding of UX concepts

An appropriate understanding of the core concepts that underpin the UX field would be necessary for practitioners who wished to institutionalise UX by routinely incorporating UX practices into their software development methodologies. This theme refers to interviewees' articulations of their understanding of two concepts

regularly touched upon in HCI, namely usability and user experience (UX). Furthermore, this theme interprets the existing awareness among informants about the notions of usability and UX.

In all cases, informants understood usability to relate to the ease of use of software applications. Three informants appreciated that the effectiveness of software affects its usability. Only one informant was aware of all the aspects of usability, laid out by the ISO definition as effectiveness, efficiency and user satisfaction (ISO, 2010).

The broader concept of UX as well as the difference between usability and UX were less comprehensively understood. Only two out of the six interviewees communicated their understanding of UX in a way that agreed with the literature. Five out of the six admitted that they have not actively read up on or received any education regarding these concepts. Awareness and explicit deliberation of UX could, therefore, not be found in these contexts.

4.3.3.2 Perceived benefits of UX institutionalisation

This theme describes informants' perceptions regarding the benefits of incorporating UX practices more extensively in the design and development of information systems or digital products. The data collected shows that interviewees did not doubt the value of UX, with two or more explicit benefits highlighted in all cases. A benefit stated repeatedly across multiple cases was the avoidance of having to redo design or development work as a result of defects being discovered by end-users after product features have been released. Another perceived benefit was the enhancement of customer perception and loyalty due to higher quality releases. In light of informants' acceptance of the benefits of UX, it may be interpreted that a lacking appreciation of UX benefits is, prima facie, not the reason why UX practices

are not incorporated more routinely. Consequently, the lack of UX institutionalisation in South African enterprises may be due to alternative constraints or inhibitors rather than scepticism around its benefits.

4.3.3.3 Perceived constraints to UX institutionalisation

This theme refers to the factors that limit or prevent the integration of UX practices into ISDMs as perceived by the interviewees. For all but one of the informants, UX was not expressed as a priority with respect to their software development approaches, notwithstanding their accession to its benefits. The constraints encountered by practitioners who are contemplating the more frequent incorporation of UX practices into their software development efforts may reveal some of the reasons behind UX's thin and fragmented implementation in South African enterprises. As exhibited in section 4.3.1, the operational context may affect the nature of these constraints.

A lack of awareness concerning the concepts related to the UX field, such as usability and UX, was mentioned as a possible constraint. This is confirmed through the interpretation of the 'Understanding of UX concepts' theme discussed in section 4.3.3.1. UX is often misconstrued as having to do with the visual design of user interfaces alone, instead of a broader focus which includes usefulness, effectiveness, efficiency, satisfaction, and a range of non-utilitarian aspects (Hassenzahl, 2013). Three of the interviewees used language that confirms this misconception, recurrently using 'UI' interchangeably with UX. Additionally, an adequate understanding of precisely how to go about integrating UX practices into an ISDM was mentioned as a limitation in five of the six cases. Managers stated that they did not have enough knowledge of the field to understand exactly which

practices are suitable and how these practices feed into, or off of, other existing software development activities.

Four out of the six managers emphatically stated that a lack of time is the largest inhibitor to the incorporation UX practices. Each one of the managers grappling with time constraints operates in competitive industries and typically followed an Agile development methodology.

In the case where a more sequential and rigid ISDM was chosen as the means for software development, the inflexibility of existing systems and standards, as well as a resistance to change, were mentioned as impediments to the institutionalisation of UX. The nebulosity and impalpability of UX and its measurement were also named as constraints, but these were isolated to specific cases.

4.3.3.4 Means to persuade decision-makers toward UX institutionalisation

Supposing UX is not an established or widely applied discipline among South African enterprises, it may be reasonable to assume that most decision-makers inside these organisations, as far as software development approaches are concerned, are yet to be convinced with respect to the value or viability of UX. This theme emerged from interviewees' responses to questions in this regard.

Scores were calculated for each of the eight UX persuasion instruments based on the card sorting exercise, described in sections 3.6 and 3.7. These scores are indicated in Table 4.1. Figure 4.9 is a visual illustration of the scores associated with each of the instruments across the different cases.

Table 4.1: Scores calculated for UX persuasion instruments based on informant rankings.

Instrument	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Total
Credible business case	8	7	8	8	1	7	39
Expert recommendations	5	5	7	7	5	5	34
Empirical evidence (quantitative research)	6	8	5	4	8	2	33
Input from end-users	7	2	6	2	7	8	32
Logically valid arguments (qualitative research)	4	6	4	5	6	1	26
Adherence to design best practices	3	4	3	6	4	3	23
Adherence to technological frameworks	2	3	2	4	3	4	18
Aesthetically pleasing prototypes	1	1	1	1	2	6	12

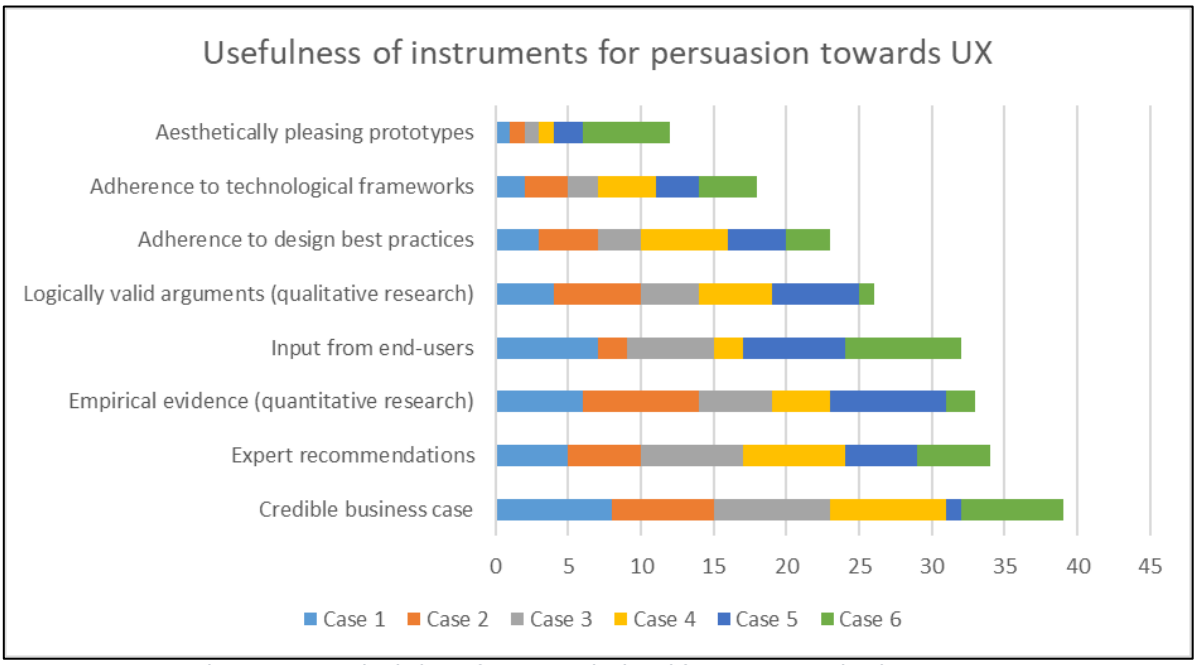


Figure 4.9: Stacked view of scores calculated for UX persuasion instruments.

From the illustrations above, it can be seen which instruments are, from the perspective of each of the managers, most and least likely to convince non-UX practitioners to take steps towards the institutionalisation of UX. The "*credible business cases*" instrument was deemed the most useful and likely to convince, while the demonstration of "*aesthetically pleasing prototypes*" was considered unlikely to be persuasive.

Interviewees do not agree with the assertions made by McKay (2016). Figure 4.10 shows how the interview responses varied from McKay's model. Major variations

include that McKay ranks aesthetics and visual design as the most likely instrument to persuade people on the value of UX, while interviewees ranked this instrument as the least likely to do so. Moreover, in McKay's model, the instrument related to business requirements and scenarios as well as the instrument concerning specialist prescriptions or advice, both rank towards the lower end of the scale, indicating that these are unlikely to sway people that have not yet bought into UX. On the contrary, the responses gathered from interviews suggest that these are the two instruments most likely to succeed.

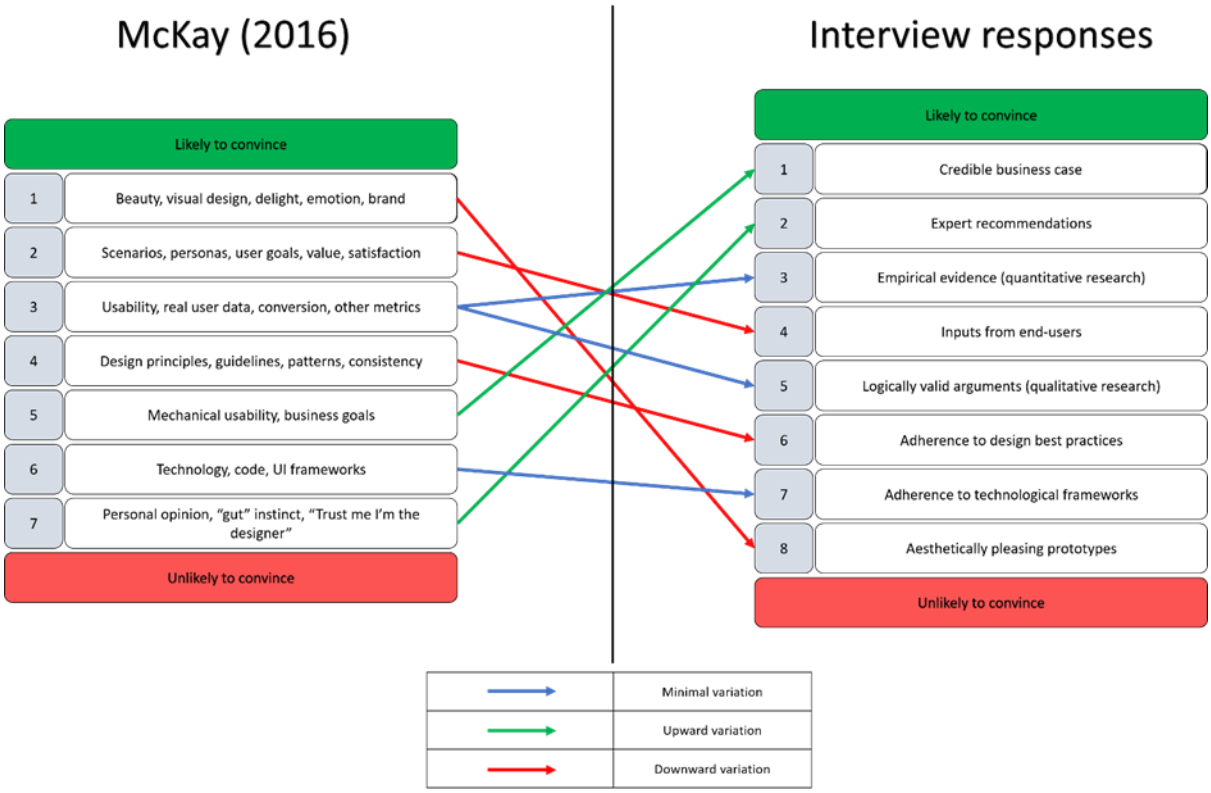


Figure 4.10: Variation between McKay's model and informants' rankings.

Apart from the instruments derived from McKay's model and presented to interviewees, interviewees suggested additional instruments that could also be used as instruments of persuasion. The demonstration of a financial return on investment, competitive benchmarking, and the risks associated with the insufficient

incorporation of UX practices, are examples of instruments of persuasion suggested by interviewees.

4.4 Summative Interpretation

Fifteen themes were identified and organised into three broader categories, namely Operational Context, UX Status Quo, and Perceptions of UX. By elaborating and interpreting the underlying themes, it became evident that the context affected the perceptions people, and particularly the managers, within software development projects or programmes held on matters relating to UX. These include their awareness and understanding of UX, its concepts, and its practices, their perceptions regarding the benefits of institutionalising UX, their perceptions concerning the constraints to the institutionalisation of UX, and their perceptions of the most effective means to persuade practitioners to adopt UX practices. In turn, the perceptions that influential decision-makers have of UX can affect whether or not UX practices are institutionalised.

The operational context that surrounds a software development project or programme sets the parameters that designers, developers, and managers have to function in when producing digital products. Three aspects of the operational context were noted as relevant as far as the institutionalisation of UX is concerned, namely the organisations' associated industry, the types of software outputs produced, and the ISDM adopted to guide the software development process.

Certain characteristics were shared in spite of contrasting operational contexts. Although the benefits of enhanced UX were appreciated by each informant, a lack of awareness and precise understanding of UX, its related concepts, and associated practices were either explicitly expressed by or derived from informants' responses.

Furthermore, all organisations investigated were regarded as having low levels of UX maturity, with limited adoption of UX practices, insignificant investment in UX skills and effort, low chances of executive buy-in and participation, and sporadic use of UX specialists. These themes align with the problem statement that drove this research.

Variations also existed in responses of informants from different operational contexts. Managers responsible for overseeing teams that operate in more competitive or fast-moving industries seemed to have different priorities, perceptions and approaches to the development of software when compared to those of managers in charge of teams working in more conservative and cautious environments, albeit that only one informant operating in the latter type of context was interviewed. Dynamic and highly competitive sectors seemed to necessitate quicker time-to-market strategies, which resulted in teams adopting ISDMs that follow the Agile approach. With many Agile methodologies, particularly SCRUM, software is broken into smaller chunks and developed in short bursts. Despite the numerous benefits associated with this approach, it does place time pressures on software designers and developers, resulting in a fragmented view of the "*big picture*" vision of the final solution. The time constraints typifying Agile approaches lead to inevitable prioritisation decisions. In other words, teams must decide which features and project activities to include and which to leave out or postpone.

This prioritisation, upon analysis of informants' responses, often comes down to prioritising quantity of features or chunks of software over quality, as long as the included features are "*good enough*" to be released. A trade-off is regularly made by time-constrained teams. It was apparent that the organisations following Agile methodologies, try to develop as many software chunks as possible, aiming only for an Acceptable Quality Threshold (AQT). The Acceptable Quality Threshold (AQT)

refers to the grade of overall quality (which includes UX) that software development teams regard as adequate for a software feature to be deployed and released. In other words, a feature will not be released by a team if it does not meet their AQT. Figure 4.11 illustrates this "feature *quantity/quality trade-off*" pattern presented by some managers interviewed for this study.

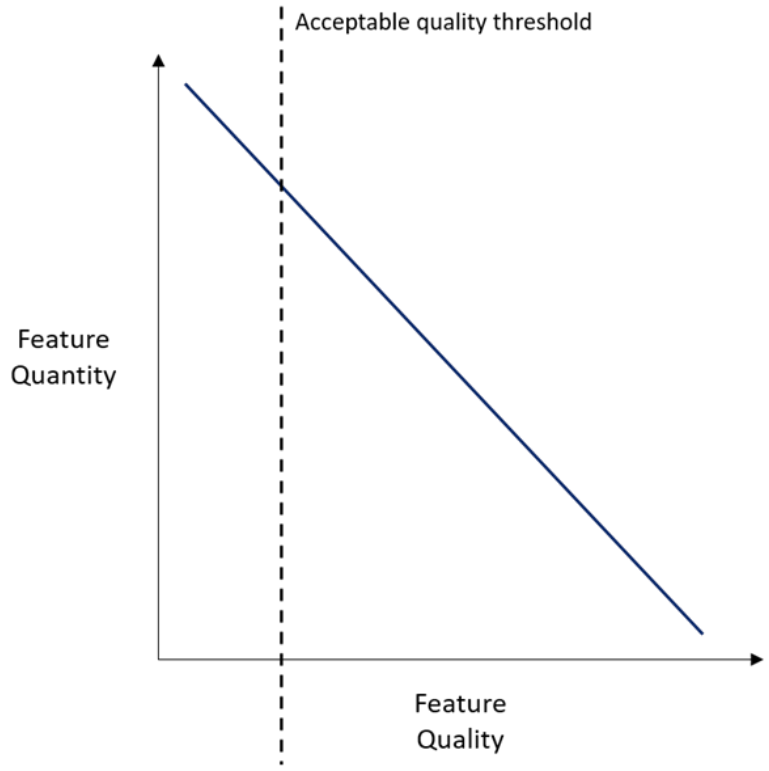


Figure 4.11: Feature quantity versus feature quality trade off.

The principles of user-centred design (UCD) suggest that the quality of digital products should receive increased emphasis and prioritisation. If teams followed the principles of UCD, their AQTs would likely be higher. This may result in less features released in the same amount of time, but they would be of better quality, and have the benefits of more delightful UX.

Therefore, the lack of awareness and understanding of UX practices and their underlying UCD principles, combined with the time constraints associated with Agile development, brings about a scant prioritisation of UX.

The reasons for the lack of institutionalisation in contexts that were described as more bureaucratic, and that follow fastidious and rigidly structured ISDMs appeared to be different. Only one of the six interviewees managed the development of information systems within such a regulated environment. Nonetheless, this interviewee provided responses that highlighted the inflexibility of processes, resistance to change, and confinement to the limitations of off-the-shelf systems as the dominant factors leading to the lack of incorporation of UX practices. Similar to the Agile development cases, it is not ignorance concerning the benefits of UX that stands in the way of its incorporation, but rather the bestowment of greater priority on activities other than those in the interest of UX. In this case, the environment is compliance driven. The committee for standards and policies has not mandated UX, and for this reason UX has not been pursued as a significant objective or performance measurement.

The teams within this particular setting also preferred the procurement of off-the-shelf systems over bespoke systems. This preference embeds certain limitations with respect to the control designers and developers have relating to UX. For example, the organisation implemented and maintains an Oracle ERP system. Typically, additions to this system involve the purchase of prebuilt add-ons, however, since these software modules were not developed in-house, the organisation would not have the freedom to make alterations for the sake of improved UX. What is more, given that these modules have to fit into, or integrate with, the core Oracle ERP, they generally have to adhere to the design principles put in place by Oracle. This may be

better than no design principles at all, but still leaves the UX design decisions in the hands of external entities.

In light of the inferior prioritisation of UX by organisations in software development processes, it may be useful to establish instruments that could be used by UX practitioners to persuade their less convinced colleagues towards the adoption of UX practices. Everett McKay, a UX consultant and regular speaker at practitioner conferences focused on UX, proposed and ranked seven instruments to persuade non-UX practitioners towards the integration of UX practices into their ISDMs, based on his personal experience (McKay, 2016). McKay's list of instruments, as well as his rating of these instruments' likelihoods to be effective in their attempts to persuade, is not a well-accepted theoretical model. It did, however, present a starting position that allowed for the appraisal of a set of potential UX persuasion instruments.

A list of eight instruments was developed by adapting McKay's model. The "*credible business cases*", "*expert recommendations*", and "*quantitative research*" instruments were ranked higher more frequently than other instruments. The "*adherence to design best practices*" and "*adherence to technological frameworks*" instruments were ranked low by majority of the informants. "*Aesthetically pleasing prototypes*" was ranked most frequently as unlikely to persuade. This stands in opposition to the assertions of McKay.

It must be stated that informants' rankings of instruments were not unanimous and were affected by the contexts and profiles of these individuals. A broader study may, therefore, be required to generalise this particular finding. In addition, two instruments emerged that were not included in the original list of eight, but were

mentioned by informants as possibly effective means to persuade practitioners to adopt UX. First, the demonstration of UX performance measurements in comparison to an organisation's competitors, in other words, benchmarking, was suggested as a useful instrument, especially in competitive industries. A second suggestion was the exhibition of the risks associated with not incorporating UX. For example, culturally insensitive content may have major legal, financial, and reputational consequences for an organisation, and UX practices would mitigate that risk.

4.5 Conclusion

The purpose of this chapter was to share the data collected from interviews as well as the resultant analyses and interpretations. The chapter comprised three sections, starting with detailed recounts of responses provided by each project or programme manager interviewed. This was narrowed down into descriptions of fifteen themes, classified into three broader categories that were identified and refined during a process of thematic analysis. Finally, a summative interpretation of the themes was provided to concisely reconcile these fifteen themes into coherent results.

Chapter 5: Conclusion

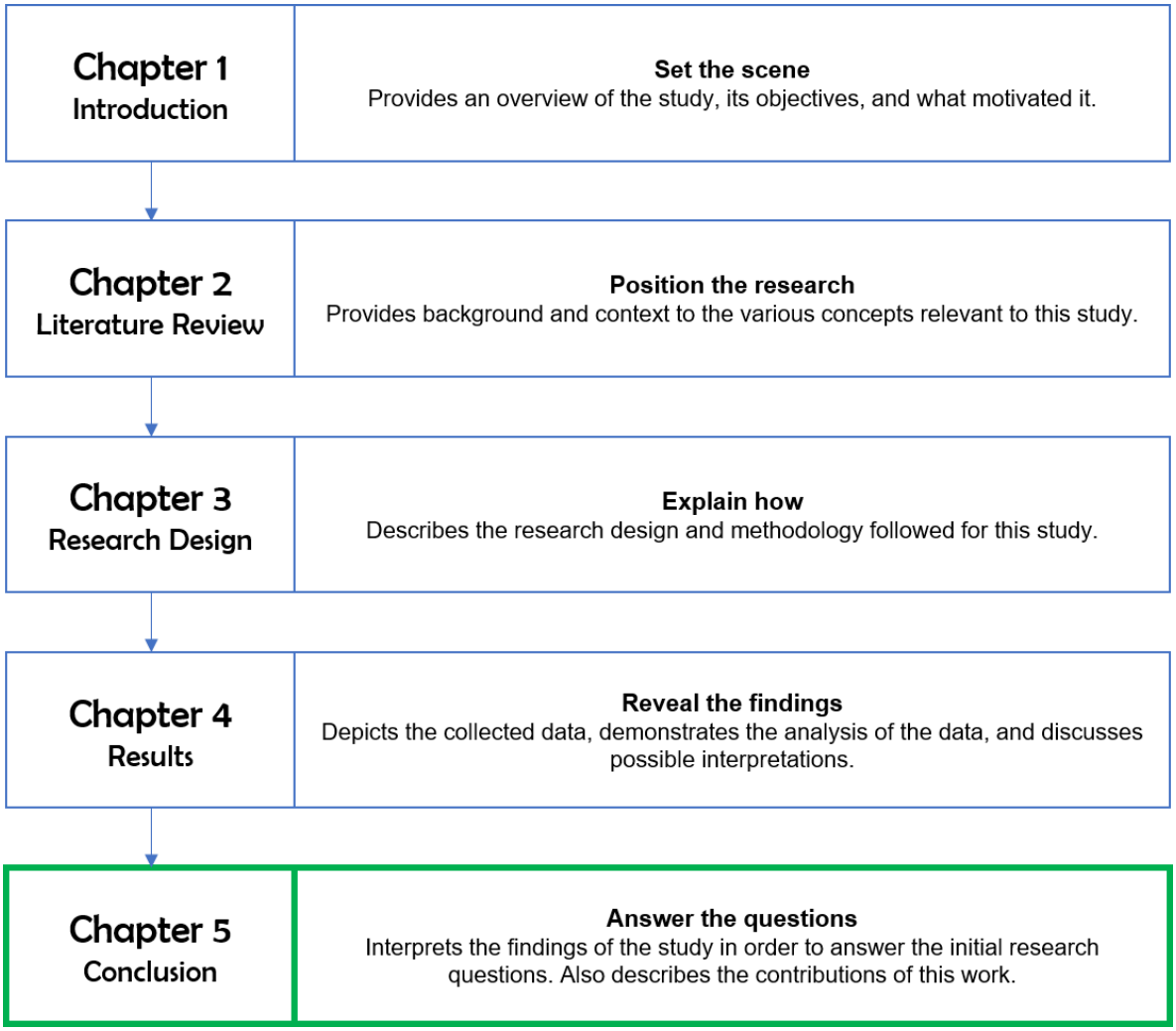


Figure 5.1: Chapter 5 of the dissertation

5.1 Introduction

The intention of the study disseminated by this dissertation was to advance the existent understanding of why UX practices are rarely incorporated into the software development approaches, or ISDMs, followed by large South African enterprises. This included the objective of gathering insights into the perceptions of software development programme and project managers regarding UX, because individuals in these roles were deemed to hold a meaningful influence in the context of software development teams.

Chapter 1 painted a picture of the problem area and expressed the research questions that were addressed by this study. An introduction to the methods that were followed in the execution of the delineated research was also provided in the first chapter, along with a detailed demarcation, which communicated the boundaries and limitations of this study. By way of meticulously describing the background, context, and related works, Chapter 2 illustrated where this study stood in the broader field of HCI and what gap in knowledge or understanding this study was attempting to fill. Chapter 3 detailed the way in which this research was designed, conveying the philosophical paradigm, research strategy, data collection method, and data analysis method carried out in pursuance of the stated objectives. Chapter 4 shared emergent results that stemmed from the thematic analysis of data that was gathered during six semi-structured interviews. These results contained detailed narrations of each case, descriptions of fifteen identified themes, which were classified into three wider categories, and a summative interpretation of the results.

The main purpose of this last chapter is to draw the study to a close. To that end, the next sections, respectively, summarise the research findings of the study, provide a reflection on the suitability of the research design for the purposes of the study,

discuss the contributions from this study, and outline the opportunities for future research.

5.2 Research findings

This study started with one primary research question:

> Why do software development programme or project managers in South African enterprises neglect to incorporate User Experience (UX) practices into their teams' Information Systems Development Methodologies (ISDMs)?

This essential question of the research was supported by four sub-questions:

1. What do software development programme or project managers in South African enterprises understand about the concept of user experience (UX)?
2. What do software development programme or project managers in South African enterprises regard as the benefits of incorporating UX practices into their ISDMs?
3. What are the constraints on the incorporation of UX practices into the ISDM of a software development team?
4. What mechanisms can be used to persuade software development programme or project managers in South African enterprises to incorporate UX practices into their teams' ISDM?

The data collected from six semi-structured interviews held with programme or project managers of software development teams operating in large South African enterprises were analysed by means of thematic analysis, the results of which were described in section 4.3. Section 4.4 provided an integrative interpretation of the

results, which allows for the answering of the research questions in this section. The sub-questions are addressed first, since they support the primary research question.

Sub-question 1: What do software development programme or project managers in South African enterprises understand about the concept of user experience (UX)?

Informants showed an estimable degree of awareness about the concepts of usability and UX. UX has received increasing attention over the past decade with some of the major software driven establishments of the world, such as Google and Amazon, proclaiming customer and user centricity as values that are vital for their success. This buzz around UX has resulted in most IT practitioners having, at least, heard of the term.

Awareness of UX and an understanding of what UX comprises, are somewhat different. None of the informants that were interviewed encountered UX during their formal education. South African universities, in fact, offer no undergraduate degree in HCI or UX and only a few single semester modules or short-courses are available in the country. The UX maturity in each of the investigated cases are low, assessed as either "*unrecognised*" or "*interested*" according to Feijo's maturity model (Feijo, 2010). This may have resulted in the faulty understanding of the UX concept that was found on the part of all but one of the informants.

A common misconception among the informants regarding UX, was that it referred to the "*look and feel*" of a system. A further erroneous perception was about user involvement and user testing. A majority of the informants misconstrued the

involvement of product sponsors, clients, or superusers as user involvement, while the literature stresses the point that the anticipated "*rank and file*" end-users of a system should actively participate in the design and development process. The concept of usability was better understood, with most describing it as having to do with ease-of-use and simplicity.

Sub-question 2: What do software development programme or project managers in South African enterprises regard as the benefits of incorporating UX practices into their ISDMs?

Notwithstanding their lack of a clear and accurate understanding of UX, all informants recognised the potential value in the more frequent application of UX practices as part of their software design and development process. Two benefits, in particular, were asserted frequently during discussions with the managers. Firstly, the informants believed that the incorporation of UX practices can lead to higher quality software applications as perceived by users, which will result in improved levels of customer satisfaction, loyalty, and competitive advantage. This corresponds with the findings revealed by a number of scholarly works (Chitturi et al., 2008; Garrett, 2006; Herman, 2004). The second benefit, stated by a majority of the informants, is the possible avoidance of expensive redesign and redevelopment work. It is costly to significantly alter a system feature or software module once it has been released (Pressman, 2005). Informants agreed that UX practices would enhance the quality of early software releases, by specifically designing according to the needs and expectations of the user, which would reduce the number of flaws that require rectification.

Sub-question 3: What are the constraints on the incorporation of UX practices into the ISDM of a software development team?

A set of key constraints were found to be contributory to the deficient adoption of UX practices in South African enterprises:

1. Lack of understanding regarding the concept of UX – As explained in the answering of sub-question 1, programme and project managers often characterise UX as a matter of user interface design. This is in contrast with literature's portrayal of UX as a formulated set of quality perceptions in the mind of the user resulting from his/her anticipated use, actual use, and posterior recall of a system as a whole. The purpose of UX and the notion that UX practices can address any aspect from the low-level technology through to the point of interaction and even the environment surrounding the system were not understood completely by those interviewed during this study. An inadequate understanding of these matters restricts practitioners' willingness to adopt UX.
2. Lack of understanding regarding the incorporation of UX tools, techniques, and methods into ISDMs – The programme and project managers frequently mentioned the difficulty they were experiencing in seeing where and how UX activities would, in practical terms, fit into their ISDMs.
3. Lack of UX skills and expertise – Related to the second constraint, managers also pointed out that they did not possess the appropriate capacity (skillsets

and expertise) within their teams to effectively incorporate UX practices into their software development processes.

4. Lack of prioritisation of UX – It clearly emerged that the relative importance assigned to UX within these contexts was low. The reasons for the nominal prioritisation of UX within teams that followed Agile ISDMs varied from the one that followed the Waterfall ISDM. The Agile teams operated in more competitive and time-sensitive industries in comparison with the more bureaucratic environment of the team that adopted the Waterfall approach. In Agile teams, significant priority was placed on the rapid development and release of as many useful features as possible. In Waterfall teams, the priority was rather on complying with the planned specifications of a solution and with the exhaustive sets of standards governing their work.
5. Lack of time in projects following Agile ISDMs – Owing to the emphasis on rapidly delivering useful features in Agile teams, time is considered a substantially valuable commodity. The incorporation of additional practices for the sake of improved UX would, in most cases, require more time. Combined with the low prioritisation of UX and the degree to which time is valued in teams employing Agile ISDMs, a lack of available time in these operational contexts was revealed as an essential hindrance to the adoption of UX practices.
6. Inflexible nature of Waterfall ISDMs – Most UX practices adhere to the principles of UCD, which stresses the importance of evolutionary and flexible design (Gulliksen et al., 2003). This is in contrast with the principles of sequential ISDMs, which meticulously plan, execute, and conclude a project

phase before moving on to the next, avoiding loopbacks to preceding phases as far as possible (Avison & Fitzgerald, 2003).

Sub-question 4: What mechanisms can be used to persuade software development programme or project managers in South African enterprises to incorporate UX practices into their teams' ISDM?

Eight instruments that can be used to persuade non-UX IT practitioners to adopt UX practices were presented in section 4.3.3.4. These instruments were adapted from a set of instruments proposed by McKay (2016). The set of eight persuasion instruments was appraised by asking each of the informants to arrange the instruments in order of their perceived effectiveness in persuading non-UX practitioners to adopt UX practices. The following order of instruments for UX persuasion were identified (in order of perceived persuasion power, with 1 being most persuasive and 8 least persuasive):

1. Credible business case
2. Expert recommendations
3. Empirical evidence (quantitative research)
4. Input from end-users
5. Logically valid arguments (qualitative research)
6. Adherence to design principles
7. Adherence to technological frameworks
8. Aesthetically pleasing prototypes

In addition, two potential instruments emerged from open-ended questions regarding the persuasion of practitioners towards UX:

- Competitive benchmarking – Informants asserted that comparisons of UX metrics produced by an organisation's systems against those of competing organisations, could be used to persuade IT practitioners to incorporate UX practices more frequently, especially if it is shown that competitors are delivering better results. This instrument is supported by the findings of Venturi, Troost, and Jokela (2006), who studied critical factors for a successful adoption of UCD in a development organisation.
- Demonstration of risk – Informants also suggested that a demonstration of the risks, or potential negative consequences, of not adopting UX may also be effective as a UX persuasion instrument.

The perceived relative effectiveness of these two instruments were not evaluated, as was the case with the other eight, since these two instruments only arose by means of analysing the interview data.

Primary research question: Why do software development programme or project managers in South African enterprises neglect to incorporate user experience (UX) practices into their teams' information systems development methodologies (ISDMs)?

Answer from the interpretation of results:

*Because the **quality** of systems, **as perceived by users**, is not used as a measure of success for software development projects or as a measure of performance for software development teams*.

Stated differently, the parties responsible for setting the success indicators for software development projects and those who decide on the key performance indicators for software development teams, are not aware of UX or have not sufficiently bought into UX. Project sponsors or clients are typically the ultimate arbitrators of success as far as the developers of a system are concerned. If the party that paid for the system to be developed is satisfied, then the developers are satisfied. If the product sponsor or client does not explicitly mandate the design of a system that breeds a delightful UX, then the development team are not motivated to pursue it.

Technologies and systems are in many cases developed to support and more recently drive business strategy (Markus & Loebbecke, 2013; Windahl, 2015). The project sponsors or clients, that is, the stakeholders who generally stipulate the markers of success for an information systems development project, are typically business representatives pursuing business objectives. Hence, the integration of user-centric principles into the business strategy, which guides product sponsors or clients, would be conducive to the institutionalisation of UX practices.

If UX was an express measure of success for systems development projects and teams, then those teams would do more to overcome the constraints described under Sub-Question 3. With UX as an objective, teams would ensure that they improve their understanding of the UX concept and associated practices. They would acquire the necessary capacity to execute UX activities. UX would be prioritised and their ISDMs would be modified to accommodate UX practices.

5.3 Methodological and scientific reflections

In this section, the suitability of the research paradigm and the chosen methods that comprised the research process is reviewed.

The purpose of this study was to understand why UX practices are not more frequently incorporated into South African enterprises' information systems development approaches. The aim was to gather and interpret comprehensive accounts of the perceptions and practices regarding UX within South African enterprises from sources that do not perform UX roles, but are instead in a position to influence decision-making on the activities to be incorporated into software development projects. These interpretations would then be used to cultivate the sought understanding around the perceptions and practice of UX in South African enterprises.

The interpretive research paradigm formed the basis of this research process. A multiple case study research strategy was chosen, which entailed semi-structured interviews with managers of software development projects or programmes at six companies from different industries. The unstructured textual data that emanated from the interviews was analysed by means of thematic analysis.

The objectives and advantages of alternative research paradigms, strategies, and methods did not align with the purpose and requirements of this study. Therefore, the research design is still considered appropriate inasmuch as the interpretive paradigm supports contextual immersion, while case studies and semi-structured interviews generate rich insights.

This study was limited in that it only involved interviews with managers of software development programmes or projects. Since these individuals held some influence

with regard to the processes of developing information systems, they were the preferred informants to share the UX scene at the chosen South African enterprises. However, if practical and logistical restrictions were abridged, this study could have been enhanced by gathering the perceptions of individuals with other roles, such as analysts and programmers. This would have enabled the comparison of different perspectives regarding UX and its challenges.

5.4 Contributions

The consideration and design of experiences engendered by a system for its users has received increasing attention as a key factor as far as the ultimate success and impact of that system is concerned (Øvad & Larsen, 2015). However, organisations have been sluggish in terms of their adoption of practices conducive to better user experiences (Ardito et al., 2014). This is particularly true in the South African software industry (Pretorius et al., 2015). The study reported in this dissertation investigated this problem area and has made the following contributions:

1. Advancing the understanding of why enterprises, particularly large South African enterprises, neglect to incorporate UX practices into their ISDMs. By understanding the nature of possible obstacles to UX, it may be possible to modify existing practices or formulate novel practices to overcome or circumvent these factors (Zhang et al., 2005). Although this research fixated on a few specific cases in specific contexts, the challenges faced by the investigated teams as regards the incorporation of UX may be applicable in other environments as well. Efforts devoted to the resolution of these issues may, therefore, be appropriate and of assistance within a broader context (Lee & Baskerville, 2003)

2. Providing insights into the perceptions of UX among managers of software development projects or programmes. An expanded appreciation of managers' understanding of UX-related concepts, their perceptions of the benefits and value of UX, and their perceptions regarding the constraints on the incorporation of UX practices, was presented. The misconceptions, i.e. notions that are in contradiction with the definitions provided by literature, that were identified among informants regarding the concept of UX is a significant contribution, because HCI advocates are likely to continue facing an uphill battle to have these practices incorporated into industry convention if industry has an incorrect perception of what UX truly entails (Scapin et al., 2012). Analyses of the perceived benefits of and constraints on UX adoption could also be regarded as a useful contribution. It was shown that the lack of incorporation was less a result of project managers not seeing any value in UX than it was due to the various constraints hindering UX adoption. This is useful inasmuch as it shows where UX advocates and supporters should focus their attention.
3. Presenting an appraisal of the currently applied UX practices among large South African enterprises. This enabled the development of an improved understanding of the state of affairs and maturity of UX in South Africa. An understanding of the "*as is*" state regarding UX in South Africa may inform UX researchers and practitioners about the academically developed tools, techniques, and methods that have not been accepted or are not well-known in industry. The demonstration that these large South African enterprises have low maturity with respect to UX confirms that further work is required to bridge the gap between UX in research and UX in practice.

4. Providing an understanding of how the operational context of a software development team can influence the willingness and ability of that team to adopt UX practices. The execution of UX practices does not happen in isolation. They need to be integrated into a broader software design and development approach and environment. Therefore, an appreciation of the relationship between UX and the various kinds of operational contexts could be of value to practitioners considering the adoption of UX practices into their ISDM.
5. Developing and evaluating a preliminary set of instruments that can be used to persuade non-UX IT practitioners to adopt UX practices. Given the relative scarceness of categorical UX adoption in industry, a set of practical instruments for the persuasion of those that do not have a background in UX or those that are sceptical about UX may be useful.
6. Conducting the first qualitative study of UX adoption among large South African enterprises across multiple sectors. The research design of this study may be replicated with other stakeholders including UX practitioners, analysts, programmers, potential product sponsors, or business leaders to gather insights into their perceptions regarding UX.

Furthermore, an indirect contribution from this study was the establishment of awareness among influential IT practitioners in South Africa on the subject of UX and its potential value for organisations. Extensive discussions about UX were held with managers of large and consequential programmes or projects. Therefore, these discussions may have had some impact on the awareness of UX in South Africa.

5.5 Recommendations for future research

Opportunities for further research were identified in the course of carrying out this study. These are:

- Conducting a survey to quantitatively evaluate each of the ten identified UX persuasion instruments.
- Using theories or models of persuasion from the field of psychology to further validate and explain how UX persuasion instruments function on a psychological level and how they can be applied when attempting to persuade individuals with different psychological profiles or motivations.
- The evaluation or development of quantifiable UX measures that are suitable for the purposes of measuring overall project success and team performance.

5.6 Conclusion

The main purpose of this study was to determine why software development teams operating inside large South African enterprises neglect or renounce the incorporation of UX practices into their ISDMs. The perspectives of software programme or project managers from six large companies functioning in different industries were qualitatively investigated. It was found that various constraints hinder the adoption of UX in industry. A fundamental reason for the lack of incorporation of UX into software design and development approaches was concluded to be the fact that the parties seeking and paying for the system (i.e. clients or product sponsors) do not explicitly demand and expect UX. In other words, the delivery of an enjoyable or memorable UX is not typically seen as a measure of success for systems development projects or as a measure of performance for development teams.

In this concluding chapter, the study was brought to a close. A summary of the research findings was provided by virtue of expressly addressing each of the originally stated research questions. The appropriateness of the research design, including the chosen philosophical paradigm and methodological approach, was also reflected upon. Additionally, the contributions effected by this study as well as future research possibilities were presented.

A software system is complex, dynamic and in a perpetual state of change before and after it has been launched. It may be argued that a software system is not as lucid and its overall success not as easily measured as is the case with a building. However, if programmers established delightful user experiences as their overall objective and measure of success, perhaps critical impressions as expressed by Gerald M. Weinberg (see introduction) would abate.

References

Abras, C., Maloney-Krichmar, D., & Preece, J. (2004). User-centered design. *Bainbridge, W. Encyclopedia of Human-Computer Interaction. Thousand Oaks: Sage Publications, 37*(4), 445-456.

Al-Azzawi, A., Frohlich, D., & Wilson, M. (2010). *Stability of user experience: Changes in constructs as users transition from anticipated to actualised interaction.* Paper presented at the Proceedings of the Fourth Irish Human Computer Interaction Conference, iHCI 2010.

Anderson, E. W. (1998). Customer satisfaction and word of mouth. *Journal of service research, 1*(1), 5-17.

Antaki, C., Billig, M., Edwards, D., & Potter, J. (2003). Discourse analysis means doing analysis: A critique of six analytic shortcomings.

Ardito, C., Buono, P., Caivano, D., Costabile, M. F., & Lanzilotti, R. (2014). Investigating and promoting UX practice in industry: An experimental study. *International Journal of Human-Computer Studies, 72*(6), 542-551.

Arvola, M., & Artman, H. (2006). Interaction walkthroughs and improvised role play. *Design and semantics of form and movement, 42*.

Avison, D., & Fitzgerald, G. (2003). *Information systems development: methodologies, techniques and tools*: McGraw Hill.

Baddoo, N., & Hall, T. (2002). Motivators of Software Process Improvement: an analysis of practitioners' views. *Journal of Systems and Software, 62*(2), 85-96.

Baskerville, R. L., & Myers, M. D. (2002). Information Systems as a Reference Discipline. *MIS quarterly, 26*(1), 1-14.

Battarbee, K., Mattelmaki, T., & Makela, A. (2001). Design for user experience. *Helsinki: University of Art and Design Helsinki*.

Baxter, P., & Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *Qualitative Report, 13*(4), 544-559.

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS quarterly*, 369-386.

Bevan, N. (2008). *Classifying and selecting UX and usability measures.* Paper presented at the International Workshop on Meaningful Measures: Valid Useful User Experience Measurement.

Bevan, N. (2009a). Extending quality in use to provide a framework for usability measurement. In *Human centered design* (pp. 13-22): Springer.

Bevan, N. (2009b). *What is the difference between the purpose of usability and user experience evaluation methods.* Paper presented at the Proceedings of the Workshop UXEM.

Biggerstaff, D., & Thompson, A. R. (2008). Interpretative phenomenological analysis (IPA): A qualitative methodology of choice in healthcare research. *Qualitative research in psychology, 5*(3), 214-224.

Boehm, B. W. (1984). Verifying and validating software requirements and design specifications. *IEEE software, 1*(1), 75.

Botella, P., Burgués, X., Carvallo, J. P., Franch, X., Pastor, J. A., & Quer, C. (2003). Towards a quality model for the selection of ERP systems. *Component-based software quality, 2693*, 225-245.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*: Sage.

Brandt, E., & Messeter, J. (2004). *Facilitating collaboration through design games.* Paper presented at the Proceedings of the eighth conference on Participatory design: Artful integration: interweaving media, materials and practices-Volume 1.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology, 3*(2), 77-101.

Bryman, A. (2015). *Social research methods*: Oxford university press.

Buchenau, M., & Suri, J. F. (2000). *Experience prototyping.* Paper presented at the Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques.

Butler, R., Kim, P., Nieman, M., & Wilson-Delfosse, A. L. (2015). Implementing Web Design and Usability Principles in Online Medical Curricula is Associated with Improved Student Utilization and Satisfaction. *Medical Science Educator, 25*(3), 255-259.

Caddick, R., & Cable, S. (2011). *Communicating the user experience: A practical guide for creating useful UX documentation*: John Wiley & Sons.

Cajander, Å., Larusdottir, M., & Gulliksen, J. (2013). *Existing but not explicit-The user perspective in scrum projects in practice.* Paper presented at the IFIP Conference on Human-Computer Interaction.

Carey, J., Galletta, D. F., Kim, Y., Te'eni, D., Wildemuth, B., & Zhang, P. (2004). The Role of Human Computer Interaction in Management Information Systems Curricula: A Call to Action. *The Communications of the Association for Information Systems, 13*(1), 62.

Cavaye, A. L. (1996). Case study research: a multi-faceted research approach for IS. *Information Systems Journal, 6*(3), 227-242.

Chamberlain, S., Sharp, H., & Maiden, N. (2006). Towards a framework for integrating agile development and user-centred design. In *Extreme programming and agile processes in software engineering* (pp. 143-153): Springer.

Charmaz, K. (2014). *Constructing grounded theory*: Sage.

Checkland, P., & Scholes, J. (1999). *Soft systems methodology: a 30-year retrospective*: John Wiley Chichester.

Chi, E. H. (2002). Improving web usability through visualization. *Internet Computing, IEEE, 6*(2), 64-71.

Chitturi, R., Raghunathan, R., & Mahajan, V. (2008). Delight by design: The role of hedonic versus utilitarian benefits. *Journal of Marketing, 72*(3), 48-63.

Clarke, P., & O'Connor, R. V. (2012). The situational factors that affect the software development process: Towards a comprehensive reference framework. *Information and Software Technology, 54*(5), 433-447.

Cohen, L., Manion, L., & Morrison, K. (2013). *Research methods in education*: Routledge.

Collis, J., & Hussey, R. (2013). *Business research: A practical guide for undergraduate and postgraduate students*: Palgrave macmillan.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS quarterly, 13*(3), 319-340.

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies, 38*(3), 475-487.

De Villiers, M. (2005). *Three approaches as pillars for interpretive information systems research: development research, action research and grounded theory.* Paper presented at the Proceedings of the 2005 annual research conference of the South African institute of computer scientists and information technologists on IT research in developing countries.

Desmet, P., & Hekkert, P. (2007). Framework of product experience. *International journal of design, 1*(1), 57-66.

Dicks, R. S. (2002). *Mis-usability: on the uses and misuses of usability testing.* Paper presented at the Proceedings of the 20th annual international conference on Computer documentation.

Dix, A. (2009). *Human-computer interaction*: Springer.

Donahue, G. M., Weinschenk, S., & Nowicki, J. (1999). Usability is good business. Retrieved from http://www.yucentrik.ca/usability.pdf

Eason, K. (1991). Ergonomic perspectives on advances in human-computer interaction. *Ergonomics, 34*(6), 721-741.

Edwards, J. (2015). The great oxymoron: B2B UX. *Journal of Direct, Data and Digital Marketing Practice, 16*(4), 266-269.

Fallman, D. (2003). *Design-oriented human-computer interaction.* Paper presented at the Proceedings of the SIGCHI conference on Human factors in computing systems.

Feijo, R. (2010). Planning your UX strategy. Retrieved from http://johnnyholland.org/2010/04/planning-your-ux-strategy/

Fitzgerald, B. (1998). An empirical investigation into the adoption of systems development methodologies. *Information & Management, 34*(6), 317-328.

Flynn, D. J. (1992). *Information systems requirements: determination and analysis*: McGraw-Hill.

Forlizzi, J., & Battarbee, K. (2004). *Understanding experience in interactive systems.* Paper presented at the Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques.

Frye, D. W., & Gulledge, T. R. (2007). End-to-end business process scenarios. *Industrial Management & Data Systems, 107*(6), 749-761.

Fuglseth, A. M., & Sørebø, Ø. (2014). The effects of technostress within the context of employee use of ICT. *Computers in Human Behavior, 40*, 161-170.

Garrett, J. J. (2006). Customer loyalty and the elements of user experience. *Design management review, 17*(1), 35-39.

Garrett, J. J. (2010). *Elements of user experience, the: user-centered design for the web and beyond*: Pearson Education.

Gelderblom, J., Adebesin, T., Brosens, J., & Kruger, R. M. (2017). Using Eye Tracking as a Tool to Teach Informatics Students of the Importance of User Centered Design. *To be published: International Journal of Information and Communication Technology Education, 13*(4).

Getto, G., & Amant, K. S. (2015). Designing globally, working locally: Using personas to develop online communication products for international users. *Communication Design Quarterly Review, 3*(1), 24-46.

Gould, J. D., & Lewis, C. (1985). Designing for usability: key principles and what designers think. *Communications of the ACM, 28*(3), 300-311.

Gregor, S. (2006). The nature of theory in information systems. *MIS quarterly*, 611-642.

Guest, G., MacQueen, K. M., & Namey, E. E. (2011). *Applied thematic analysis*: Sage.

Gulliksen, J., Göransson, B., Boivie, I., Blomkvist, S., Persson, J., & Cajander, Å. (2003). Key principles for user-centred systems design. *Behaviour and Information Technology, 22*(6), 397-409.

Hasan, L., Morris, A., & Probets, S. (2009). Using Google Analytics to evaluate the usability of e-commerce sites. *Human centered design*, 697-706.

Hassenzahl, M. (2013). User experience and experience design. *The Encyclopedia of Human-Computer Interaction*.

Hassenzahl, M., Diefenbach, S., & Göritz, A. (2010). Needs, affect, and interactive products–Facets of user experience. *Interacting with computers, 22*(5), 353-362.

Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. *Behaviour & information technology, 25*(2), 91-97.

Hastie, S., & Wojewoda, S. (2015). Standish Group 2015 Chaos Report-Q&A with Jennifer Lynch. *Retrieved, 1*(15), 2016.

Herman, J. (2004). *A process for creating the business case for user experience projects.* Paper presented at the CHI'04 extended abstracts on Human factors in computing systems.

Hewett, T. T., Baecker, R., Card, S., Carey, T., Gasen, J., Mantei, M., . . . Verplank, W. (1992). *ACM SIGCHI curricula for human-computer interaction*: ACM.

Hobbs, J., Fenn, T., & Resmini, A. (2010). Maturing a practice. *Journal of Information Architecture, 2*(1).

Hole, L., & Williams, O. M. (2007). *The emotion sampling device (ESD).* Paper presented at the Proceedings of the 21st British HCI Group Annual Conference on People and Computers: HCI... but not as we know it-Volume 2.

Hollins, G., & Hollins, B. (1990). *Total design : managing the design process in the service sector*. London :: Pitman.

Hsieh, J., Rai, A., Petter, S., & Zhang, T. (2012). Impact of user satisfaction with mandated CRM use on employee service quality. *MIS quarterly, 36*(4).

Hwang, Y. (2014). User experience and personal innovativeness: An empirical study on the Enterprise Resource Planning systems. *Computers in Human Behavior, 34*, 227-234.

Ide-Smith, M. (2011). Winning hearts and minds: How to embed UX from scratch in a large organisation. In.

Idoughi, D., Seffah, A., & Kolski, C. (2012). Adding user experience into the interactive service design loop: a persona-based approach. *Behaviour & information technology, 31*(3), 287-303.

Iivari, J., Hirschheim, R., & Klein, H. K. (1998). A paradigmatic analysis contrasting information systems development approaches and methodologies. *Information Systems Research, 9*(2), 164-193.

ISO. (2010). *Ergonomics of Human-system Interaction: Part 210: Human-centred Design for Interactive Systems*: ISO.

Isomursu, M. (2008). *Evaluating user experience in technology pilots.* Paper presented at the Human-Computer Interaction Symposium.

Jain, S., & Joshi, H. (2016). *Impact of early testing on cost, reliability and release time.* Paper presented at the Reliability, Infocom Technologies and Optimization (Trends and Future Directions)(ICRITO), 2016 5th International Conference on.

Jokela, T., Iivari, N., Matero, J., & Karukka, M. (2003). *The standard of user-centered design and the standard definition of usability: analyzing ISO 13407 against ISO 9241-11.* Paper presented at the Proceedings of the Latin American conference on Human-computer interaction.

Jurca, G., Hellmann, T. D., & Maurer, F. (2014). *Integrating Agile and user-centered design: a systematic mapping and review of evaluation and validation studies of Agile-UX.* Paper presented at the Agile Conference (AGILE), 2014.

Jurison, J. (1999). Software project management: the manager's view. *Communications of the AIS, 2*(3es), 2.

Kahneman, D., Kahneman, D., & Tversky, A. (2003). Experienced utility and objective happiness: A moment-based approach. *The psychology of economic decisions, 1*, 187-208.

Karapanos, E., & Martens, J.-B. (2009). The quantitative side of the repertory grid technique: some concerns. *arXiv preprint arXiv:0909.3158*.

Karat, C.-M. (2005). A business case approach to usability cost justification for the web. *Cost-Justifying Usability: An Update for the Internet Age*, 103-141.

Keats, D. (1999). *Interviewing: A practical guide for students and professionals*: UNSW Press.

Kerzner, H. R. (2013). *Project management: a systems approach to planning, scheduling, and controlling*: John Wiley & Sons.

Ketola, P., & Roto, V. (2008). *Exploring user experience measurement needs.* Paper presented at the Proc. of the 5th COST294-MAUSE Open Workshop on Valid Useful User Experience Measurement (VUUM). Reykjavik, Island.

Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS quarterly*, 67-93.

Kohavi, R., Deng, A., Frasca, B., Walker, T., Xu, Y., & Pohlmann, N. (2013). *Online controlled experiments at large scale.* Paper presented at the Proceedings of the 19th ACM SIGKDD international conference on Knowledge discovery and data mining.

Kojo, I., Heiskala, M., & Virtanen, J.-P. (2014). *Customer Journey Mapping of an Experience-Centric Service by Mobile Self-reporting: Testing the Qualiwall Tool.* Paper presented at the International Conference of Design, User Experience, and Usability.

Kotzé, P., & Johnson, C. (2004). Human Computer Interaction Study Guide for INF120-8. In: Pretoria: University of South Africa.

Kumar, K., & Van Hillegersberg, J. (2000). ERP experiences and evolution. *Communications of the ACM, 43*(4), 22-22.

Lamb, R., & Kling, R. (2003). Reconceptualizing users as social actors in information systems research. *MIS quarterly*, 197-236.

Lárusdóttir, M., Cajander, Å., & Gulliksen, J. (2012). *The Big Picture of UX is Missing in Scrum Projects.* Paper presented at the I-UxSED.

Laudon, K. C., & Laudon, J. P. (2012). *Management information systems : managing the digital firm* (12th ed., Global ed. ed.). Harlow, Essex ;: Pearson Education.

Law, E. L.-C., Roto, V., Hassenzahl, M., Vermeeren, A. P., & Kort, J. (2009). *Understanding, scoping and defining user experience: a survey approach.* Paper presented at the Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.

Lee, A. S. (1989). A scientific methodology for MIS case studies. *MIS quarterly*, 33-50.

Lee, A. S. (2004). Thinking about social theory and philosophy for information systems. *Social theory and philosophy for information systems*, 1-26.

Lee, A. S., & Baskerville, R. L. (2003). Generalizing generalizability in information systems research. *Information Systems Research, 14*(3), 221-243.

Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing, 80*(6), 69-96.

Levesque, L. L., Wilson, J. M., & Wholey, D. R. (2001). Cognitive divergence and shared mental models in software development project teams. *Journal of Organizational Behavior, 22*(2), 135-144.

Levin, M. (2014). *Designing Multi-device Experiences: An Ecosystem Approach to User Experiences Across Devices*: " O'Reilly Media, Inc.".

Maddison, R. N., & Baker, G. (1983). *Information system methodologies*: Wiley.

Madeyski, L., & Szała, Ł. (2007). *The impact of test-driven development on software development productivity—an empirical study.* Paper presented at the European Conference on Software Process Improvement.

Maguire, M. (2001). Methods to support human-centred design. *International Journal of Human-Computer Studies, 55*(4), 587-634.

Mann, H., Kumar, U., Kumar, V., & Mann, I. J. S. (2017). Providing custom enterprise resource planning solutions: benefits and challenges. *International Journal of Information Technology and Management, 16*(2), 147-161.

Markus, M. L., & Loebbecke, C. (2013). Commoditized digital processes and business community platforms: new opportunities and challenges for digital business strategies. *MIS quarterly, 37*(2), 649-654.

Martin, R. C. (2003). *Agile software development: principles, patterns, and practices*: Prentice Hall PTR.

McCarthy, J., & Wright, P. (2004). Technology as experience. *interactions, 11*(5), 42-43.

McGuffee, J. W. (2000). Defining computer science. *ACM SIGCSE Bulletin, 32*(2), 74-76.

McKay, E. (2016). *Persuasive UX.* Paper presented at the UXSA Conference, Johannesburg.

Miles, M. B., & Huberman, A. M. (1984). Qualitative data analysis: A sourcebook of new methods.

Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis: A sourcebook. *Beverly Hills: Sage Publications*.

Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative data analysis*: Sage.

Molin, L. (2004). *Wizard-of-Oz prototyping for co-operative interaction design of graphical user interfaces.* Paper presented at the Proceedings of the third Nordic conference on Human-computer interaction.

Morelli, N. (2006). Developing new product service systems (PSS): methodologies and operational tools. *Journal of Cleaner Production, 14*(17), 1495-1501.

Myers, M. D. (1997). Qualitative research in information systems. *Management Information Systems Quarterly, 21*(2), 241-242.

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and organization, 17*(1), 2-26.

Nielsen, J. (1994a). *Enhancing the explanatory power of usability heuristics.* Paper presented at the Proceedings of the SIGCHI conference on Human Factors in Computing Systems.

Nielsen, J. (1994b). *Usability inspection methods.* Paper presented at the Conference companion on Human factors in computing systems.

Nielsen, J. (1999). *Designing web usability: The practice of simplicity*: New Riders Publishing.

Nielsen, J., & Molich, R. (1990). *Heuristic evaluation of user interfaces.* Paper presented at the Proceedings of the SIGCHI conference on Human factors in computing systems.

Nielsen, J., & Norman, D. (2014). The definition of user experience. *NNgroup Online*. Retrieved from http://www.nngroup.com/articles/definition-user-experience/

Norman, D. A., & Draper, S. W. (1986). User centered system design. *New Perspectives on Human-Computer Interaction, L. Erlbaum Associates Inc., Hillsdale, NJ, 3*.

Øvad, T., & Larsen, L. B. (2015). *The prevalence of UX design in agile development processes in industry.* Paper presented at the Agile Conference (AGILE), 2015.

Pearlson, K. E., & Saunders, C. S. (2009). Strategic management of information systems. In: Wiley Hoboken, NJ.

Pettersson, R. (2010). Information design–principles and guidelines. *Journal of Visual Literacy, 29*(2), 167-182.

Poole, A., & Ball, L. J. (2006). Eye tracking in HCI and usability research. *Encyclopedia of human computer interaction, 1*, 211-219.

Poppendieck, M., & Poppendieck, T. (2007). *Implementing lean software development: From concept to cash*: Pearson Education.

Preece, J., Rogers, Y., & Sharp, H. (2015). *Interaction design : beyond human-computer interaction* (Fourth edition. ed.). Chichester, West Sussex :: John Wiley & Sons Ltd.

Preece, J., & Rombach, H. D. (1994). A taxonomy for combining software engineering and human-computer interaction measurement approaches: towards a common framework. *International Journal of Human-Computer Studies, 41*(4), 553-583.

Preece, J. R., Sharp, J., Benyon, H., Holland, D., & Carey, H. (1994). Human-Computer Interaction. In: Reading, MA: Addison-Wesley.

Pressman, R. S. (2005). *Software engineering: a practitioner's approach*: Palgrave Macmillan.

Pretorius, M., & Calitz, A. (2014). A methodology to institutionalise user experience in provincial government. *South African Computer Journal, 55*.

Pretorius, M., Hobbs, J., & Fenn, T. (2015). *The User Experience Landscape of South Africa.* Paper presented at the Proceedings of the 2015 Annual Research Conference on South African Institute of Computer Scientists and Information Technologists.

Resmini, A., & Rosati, L. (2012). A brief history of information architecture. *Journal of Information Architecture, 3*(2).

Roto, V. (2007). User experience from product creation perspective. *Towards a UX Manifesto, 31*.

Rudisill, M. (1996). *Human-Computer Interface Design: success stories, emerging methods, and real-world context*: Morgan Kaufmann Pub.

Saunders, M. N. (2011). *Research methods for business students, 5/e*: Pearson Education India.

Sawyer, S. (2004). Software development teams. *Communications of the ACM, 47*(12), 95-99.

Scapin, D. L., Senach, B., Trousse, B., & Pallot, M. (2012). *User experience: buzzword or new paradigm?* Paper presented at the ACHI 2012, The Fifth International Conference on Advances in Computer-Human Interactions.

Schaffer, E., & Lahiri, A. (2013). *Institutionalization of UX: a step-by-step guide to a user experience practice*: Addison-Wesley.

Sculley, D., Malkin, R. G., Basu, S., & Bayardo, R. J. (2009). *Predicting bounce rates in sponsored search advertisements.* Paper presented at the Proceedings of the 15th ACM SIGKDD international conference on Knowledge discovery and data mining.

Shaul, L., & Tauber, D. (2013). Critical success factors in enterprise resource planning systems: Review of the last decade. *ACM Computing Surveys (CSUR), 45*(4), 55.

Shneiderman, B. (2003). *Designing the user interface*: Pearson Education India.

Shneiderman, B. (2010). *Designing the user interface: strategies for effective human-computer interaction*: Pearson Education India.

Soegaard, M., & Dam, R. F. (2012). The Encyclopedia of Human-Computer Interaction. *The Encyclopedia of Human-Computer Interaction*.

Sward, D., & Macarthur, G. (2007). *Making user experience a business strategy.* Paper presented at the E. Law et al.(eds.), Proceedings of the Workshop on Towards a UX Manifesto.

Terre Blanche, M., Durrheim, K., & Painter, D. (2006). *Research in practice: Applied methods for the social sciences*: Juta and Company Ltd.

Terre Blanche, M., & Kelly, K. (1999). Interpretive methods. *Research in practice: Applied methods for the social sciences*, 123-146.

Turner, R. (2016). *Gower handbook of project management*: Routledge.

Unger, R., & Chandler, C. (2012). *A Project Guide to UX Design: For user experience designers in the field or in the making*: New Riders.

Usability.gov. (2017). User-centered design basics. *U.S. Department of Health and Human Services*. Retrieved from https://www.usability.gov/

UXnet. (2010). About UXnet. *User Experience Network*. Retrieved from http://www.uxnet.org/

Väänänen-Vainio-Mattila, K., Roto, V., & Hassenzahl, M. (2008). Towards practical user experience evaluation methods. *EL-C. Law, N. Bevan, G. Christou, M. Springett & M. Lárusdóttir (eds.) Meaningful Measures: Valid Useful User Experience Measurement (VUUM)*, 19-22.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences, 15*(3), 398-405.

Van Boven, L. (2005). Experientialism, materialism, and the pursuit of happiness. *Review of General Psychology, 9*(2), 132-142.

Van der Heijden, H. (2004). User acceptance of hedonic information systems. *MIS quarterly*, 695-704.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS quarterly, 27*(3), 425-478.

Venkatesh, V., & Ramesh, V. (2006). Web and wireless site usability: understanding differences and modeling use. *MIS quarterly*, 181-206.

Venturi, G., Troost, J., & Jokela, T. (2006). People, organizations, and processes: An inquiry into the adoption of user-centered design in industry. *International Journal of Human-Computer Interaction, 21*(2), 219-238.

Vermeeren, A. P., Law, E. L.-C., Roto, V., Obrist, M., Hoonhout, J., & Väänänen-Vainio-Mattila, K. (2010). *User experience evaluation methods: current state and development needs.* Paper presented at the Proceedings of the 6th Nordic Conference on Human-Computer Interaction: Extending Boundaries.

Vertelney, L., & Curtis, G. (1990). Storyboards and sketch prototypes for rapid interface visualization. *CHI Tutorial*.

Vijayasarathy, L. R., & Butler, C. W. (2016). Choice of Software Development Methodologies: Do Organizational, Project, and Team Characteristics Matter? *IEEE software, 33*(5), 86-94.

Villanueva, J., Yoo, S., & Hanssens, D. M. (2008). The impact of marketing-induced versus word-of-mouth customer acquisition on customer equity growth. *Journal of marketing Research, 45*(1), 48-59.

Walsham, G. (2006). Doing interpretive research. *European journal of information systems, 15*(3), 320-330.

Wechsung, I., Naumann, A. B., & Schleicher, R. (2008). Views on usability and user experience: from theory and practice. *Deutsche Telekom Laboratories*.

Weinschenk, S. (2005). Usability a business case. *White Paper Human Factors International*.

Windahl, C. (2015). Understanding solutions as technology-driven business innovations. *Journal of Business & Industrial Marketing, 30*(3/4), 378-393.

Wouters, B., Barjis, J., Maponya, G., Martiz, J., & Mashiri, M. (2009). Supporting home based health care in South African rural communities using USSD technology. *AMCIS 2009 Proceedings*, 410.

Wynekoop, J. L., & Russo, N. L. (1997). Studying system development methodologies: an examination of research methods. *Information Systems Journal, 7*(1), 47-65.

Yin, R. K. (2013). *Case study research: Design and methods*: Sage publications.

Zhang, P., Carey, J., Te'eni, D., & Tremaine, M. (2005). Integrating human-computer interaction development into the systems development life cycle: A methodology. *Communications of the Association for Information Systems, 15*(1), 29.

Zhang, P., & Li, N. (2004). An assessment of human-computer interaction research in management information systems: topics and methods. *Computers in Human Behavior, 20*(2), 125-147.

Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). *Research through design as a method for interaction design research in HCI.* Paper presented at the Proceedings of the SIGCHI conference on Human factors in computing systems.

APPENDIX A: FORMAL ETHICAL CLEARANCE

Reference number: EBIT/82/2016 29 November 2016

Mr J Brosens
Department Informatics
University of Pretoria
Pretoria
0028

Dear Mr Brosens,

FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY

Your recent application to the EBIT Research Ethics Committee refers.

Conditional approval is granted.

1. This means that the research project entitled "The sentiments of software development project managers concerning usability and user experience practices in South African enterprise" is approved under the strict conditions indicated below. If these conditions are not met, approval is withdrawn automatically. The applicant is not required to submit an updated application.

Conditions for approval

a) You indicated that audio recordings and transcriptions will be digitally secured by making use of password protected and encrypted storage devices. When your informants sign the consent form, which will also notify them of their rights as an informant in a study of this nature, also explain how the audio recording will protected.

b) The question on “What position do you hold in the organisation?” should be changed and only the level in the organisation (e.g. top management, middle management) and the main focus of the post must be identified. This is to protect the identity of participants.

Comments
The committee suggests that a more neutral term like "perceptions" may be more appropriate in the title of the study, rather than "sentiments".

2. This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Code of Ethics for Scholarly Activities of the University of Pretoria, or the Policy and Procedures for Responsible Research of the University of Pretoria. These documents are available on the website of the EBIT Ethics Committee.

3. If action is taken beyond the approved application, approval is withdrawn automatically.

4. According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of the EBIT Research Ethics Office.

5. The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

Prof JJ Hanekom
Chair: Faculty Committee for Research Ethics and Integrity
FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

EBIT Research Ethics Committee
Room 15-6, Level 15, Engineering Building 1
University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420 3736
Email mari.ferreira@up.ac.za

APPENDIX B: INFORMANT CONSENT FORM

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Informed Consent

University of Pretoria

Department of Informatics

Interview related to usability and UX

Dear participant

Thank you for taking time out of your schedule to take part in this interview. I am a Masters student from the Department of Informatics at the University of Pretoria and your participation today is very helpful and truly appreciated.

This study hopes to gain some insight into the ideas of usability and user experience in the South African corporate environment. Your inputs will assist me to understand the factors that influence the application of usability and UX principles and practices in real-world software development contexts.

Kindly note the following:

- This interview is anonymous and any comments you make will be treated as strictly confidential.
- This interview will take approximately 60 to 90 minutes.
- This interview is informal. Therefore, you can freely discuss any thought that you deem relevant to this topic.
- This interview will be audio recorded to ensure that all comments are taken into account.
- You may choose to stop and withdraw your participation at any point during the interview if you feel unsettled for any reason.
- The results of this study will be used for internal and academic purposes only.

By signing this document you agree that

- You have read and understand the contents of this form.
- You volunteer and give your consent to participate in the described study.

Participant signature _____ Date _____

Appendix C: Interview guide

Interview guidelines and notes

- The interview is semi-structured. As such, the interviewer should ask questions or make comments to guide the conversation and invoke the desired topics, but should not restrict open conversation or additional insight the interviewee may deem pertinent.
- The interviewer should have the interviewee read and sign the informant consent form before commencing with the interview.
- The interviewer has the responsibility to make the interviewee feel comfortable throughout the process. Professional conduct is important. For instance, the interviewer should avoid arguing with the interviewee regarding the topics at hand. The interviewee should understand that no ‘wrong answers’ are possible.
- The interviewer should place the audio recording device sufficiently close to the interviewee to ensure effective post-interview transcription.
- Interviewer should keep appropriate track of time. The interviews will be scheduled for approximately 60 to 90 minutes and should not run much longer than that. Informants are likely to have busy schedules and this should be respected.
- Interviews are likely to take place at the offices of the respective participants. Alternative arrangements should, however, be in place if this is not possible.
- Once the interview has been concluded, the interviewer should provide the interviewee with contact details. This is in case the informant has additional insights at a later stage, or if he/she has any questions or requests to make regarding the research.

Questions or discussion points to guide conversation during interviews

Introductory questions (Breaking the ice)

1. What position do you hold in the organisation?
2. Can you describe your role and responsibilities in this position?
3. How long have you been in this position?

Information systems development context and approach

4. Can you describe the composition of the software development team you form part of, or manage?
5. What types of software systems or applications are your team required to produce?
6. Please discuss the information systems development methodology your team uses to plan and control the implementation of software solutions.

Understanding of usability and UX

7. What do you understand regarding the concept: ‘Usability’?
8. What do you understand regarding the concept: ‘User Experience or UX’?
9. What do you consider to be the difference between usability and UX?

Current usability and UX practices

10. Do you believe the software products your team develops are as effective and efficient as can be?
11. Are your users typically satisfied with the interactions they have with your software solutions? What is your view in this based on?

12. Do you and your team explicitly consider and discuss usability and UX when planning a new product?
13. What are, in your view, the benefits of employing usability and UX practices? (Interviewer may provide a few examples of usability and UX practices to clarify)
14. Do you make use of internal or external usability or UX experts/specialists during product design?
15. Do you and your team make use of a specific set of design principles or a design framework when designing the structure and interfaces of a software solution?
16. Do you and your team make use of a particular method or technique to test the usability of your products?
17. Do you and your team make use of a particular method or technique to test the UX of your products?
18. If you could estimate, how much money (as a percentage of the combined budget for your projects) is typically spent on practices that pertain specifically to the enhancement of product usability or UX?

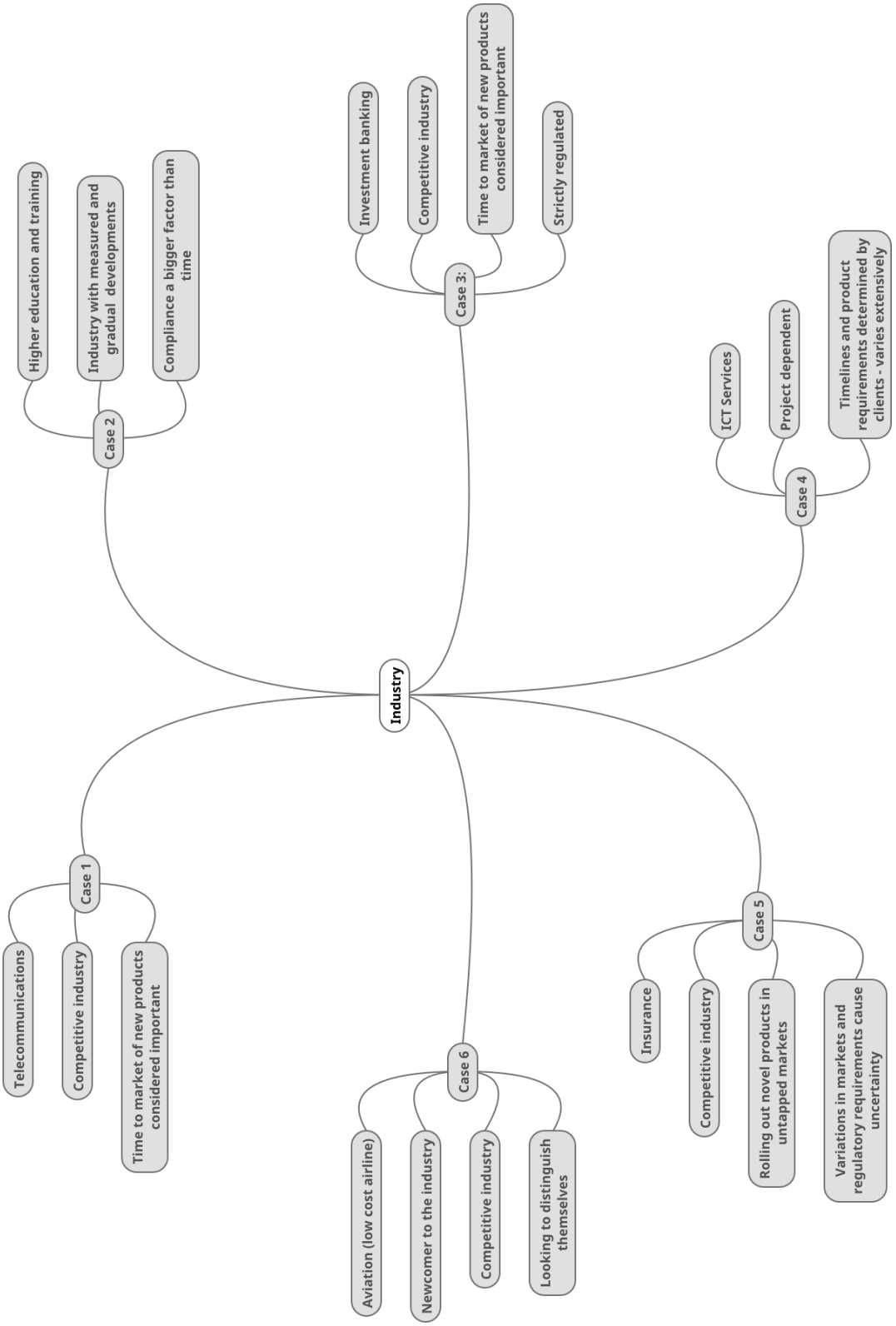
Expanding usability and UX

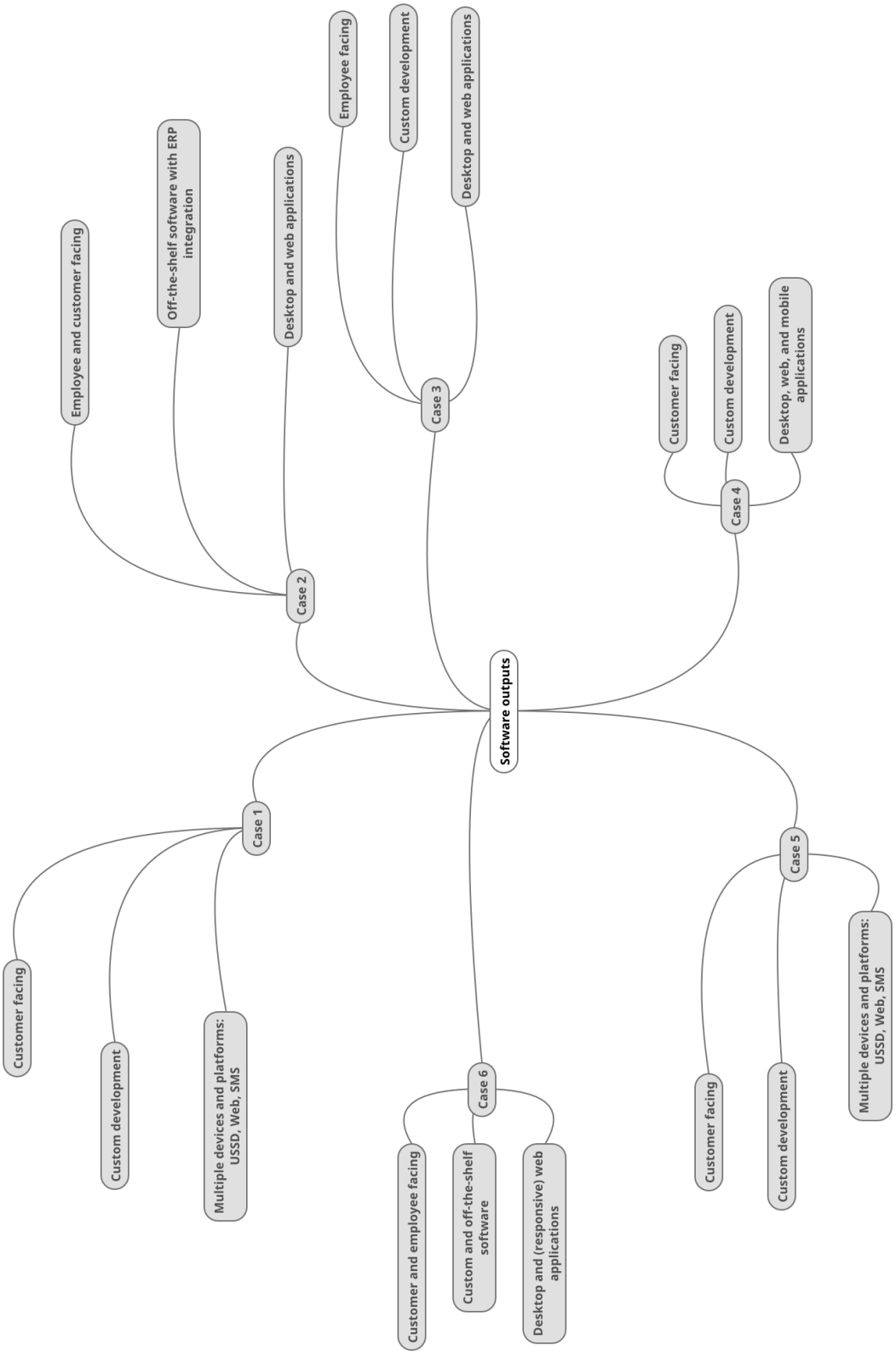
19. Assuming you had additional time and money for projects, would you include more usability and UX practices into your development approach? If so, which practices? If not, what would you rather spend the additional resources on?
20. What are the factors that limit the incorporation of usability and UX practices as part of your development approach?

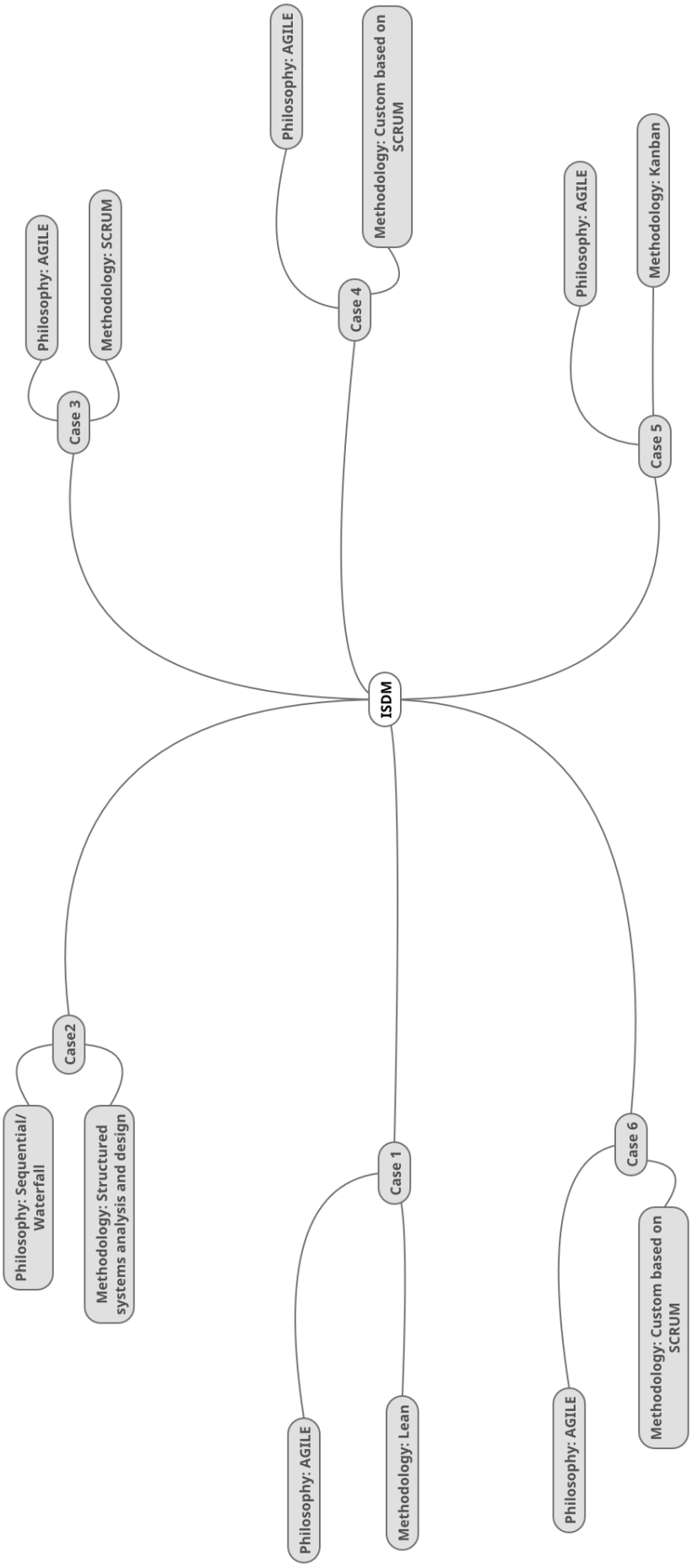
Decision making around investment (persuasive model)

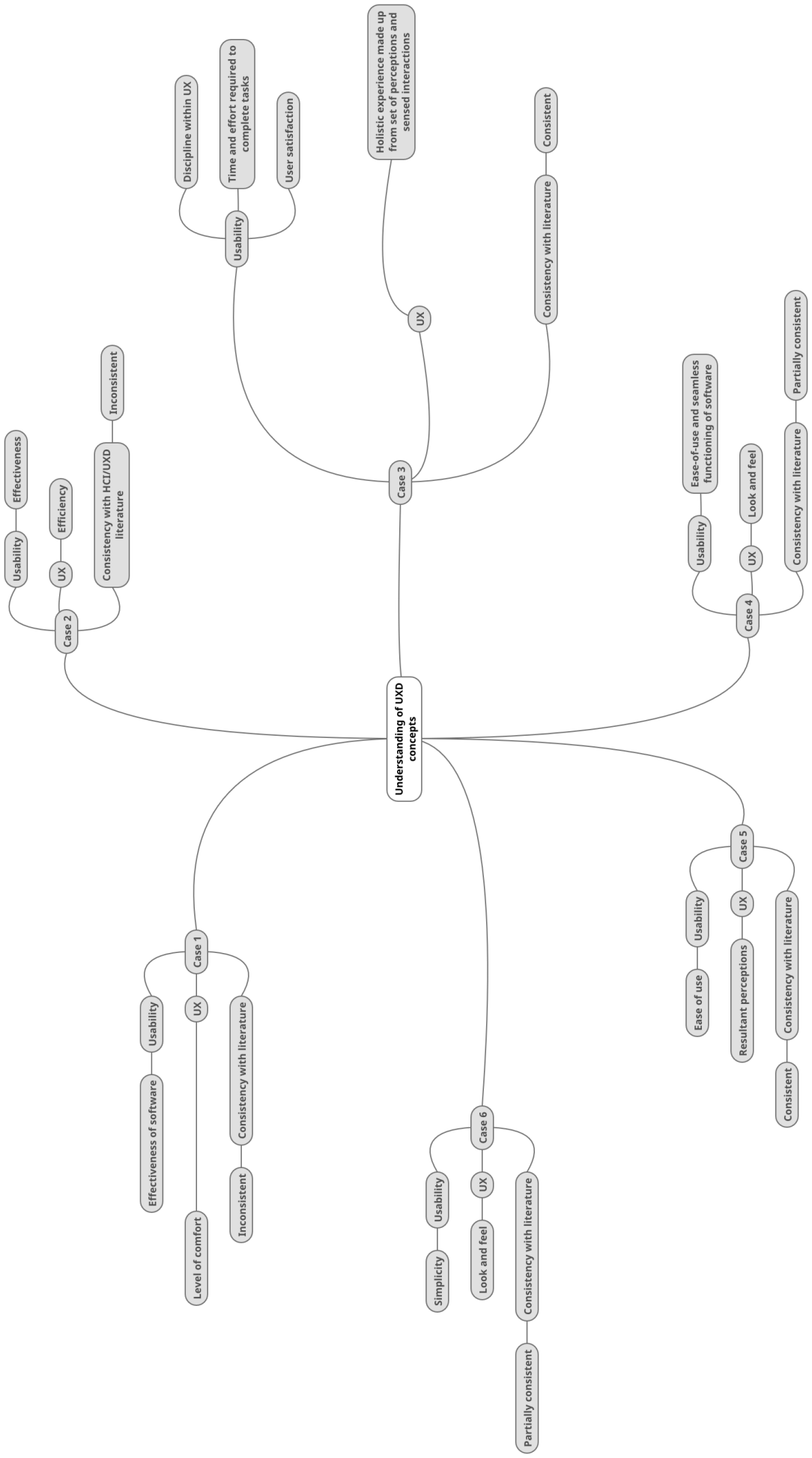
21. Assuming the incorporation of additional usability or UX practices would require the extension of project schedules and cost more money, what would convince you to still include these practices as a step or phase in your development approach?
22. Card Ranking Exercise**:**
    a. Arrange 8 cards randomly on table (each card has the name of an instrument for UX persuasion printed on it).
    b. Describe what each card means.
    c. Ask informant to rank the instruments by arranging the cards on the table from the most persuasive instrument at the top through the least instrument at the bottom.
    d. Take a photograph of the ranked cards.
23. In other spheres, i.e. not related to usability/UX, what mechanism do you use to decide whether or not to invest additional time or money for a cause? For example, do you go on gut feel, the belief that it will deliver ROI, or experts' recommendations, etc.?
24. Do higher level managers, possibly on executive level, enquire or talk about the usability/UX of the products you deliver?

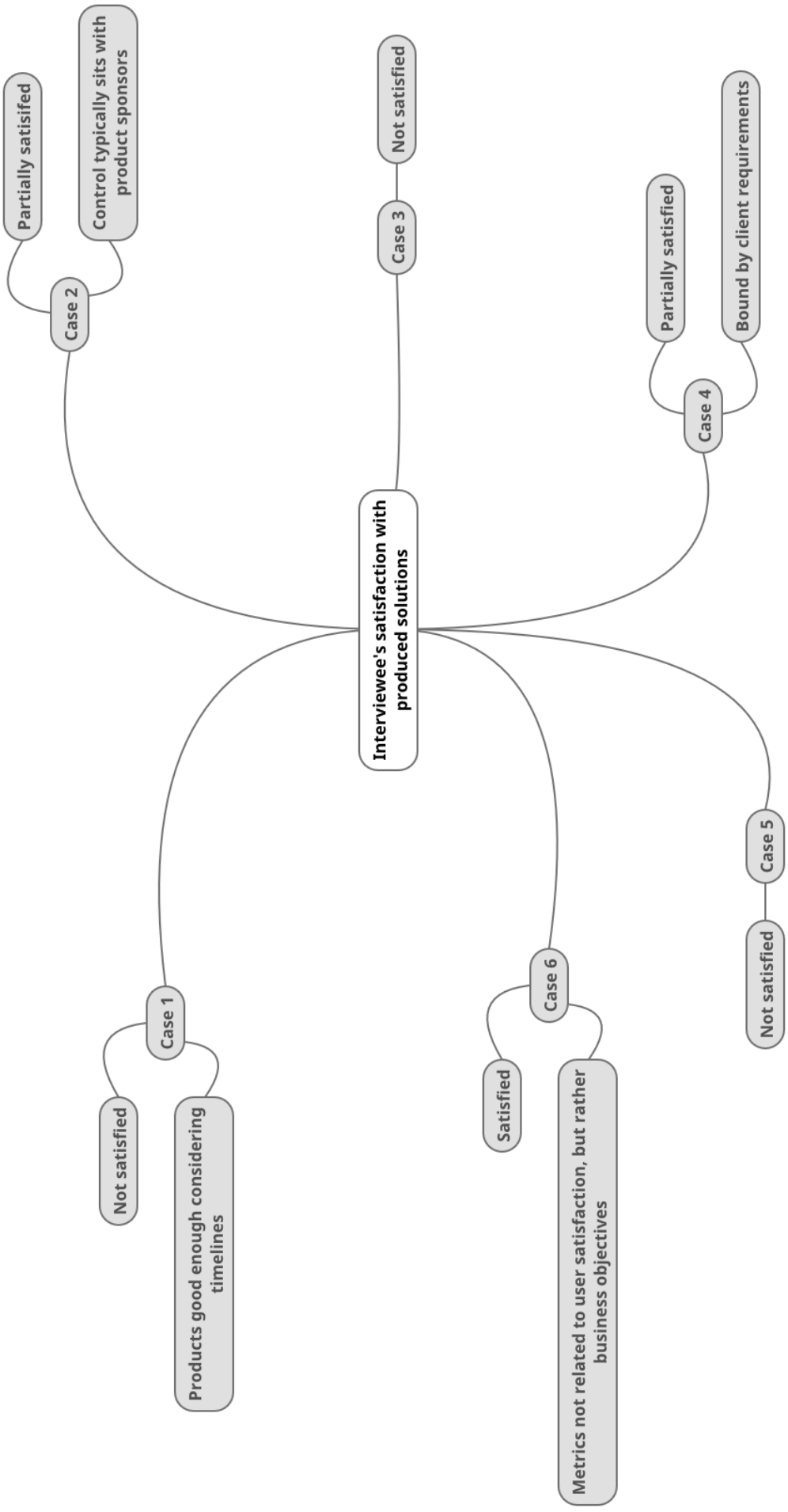
Appendix D: Mind maps from thematic analysis

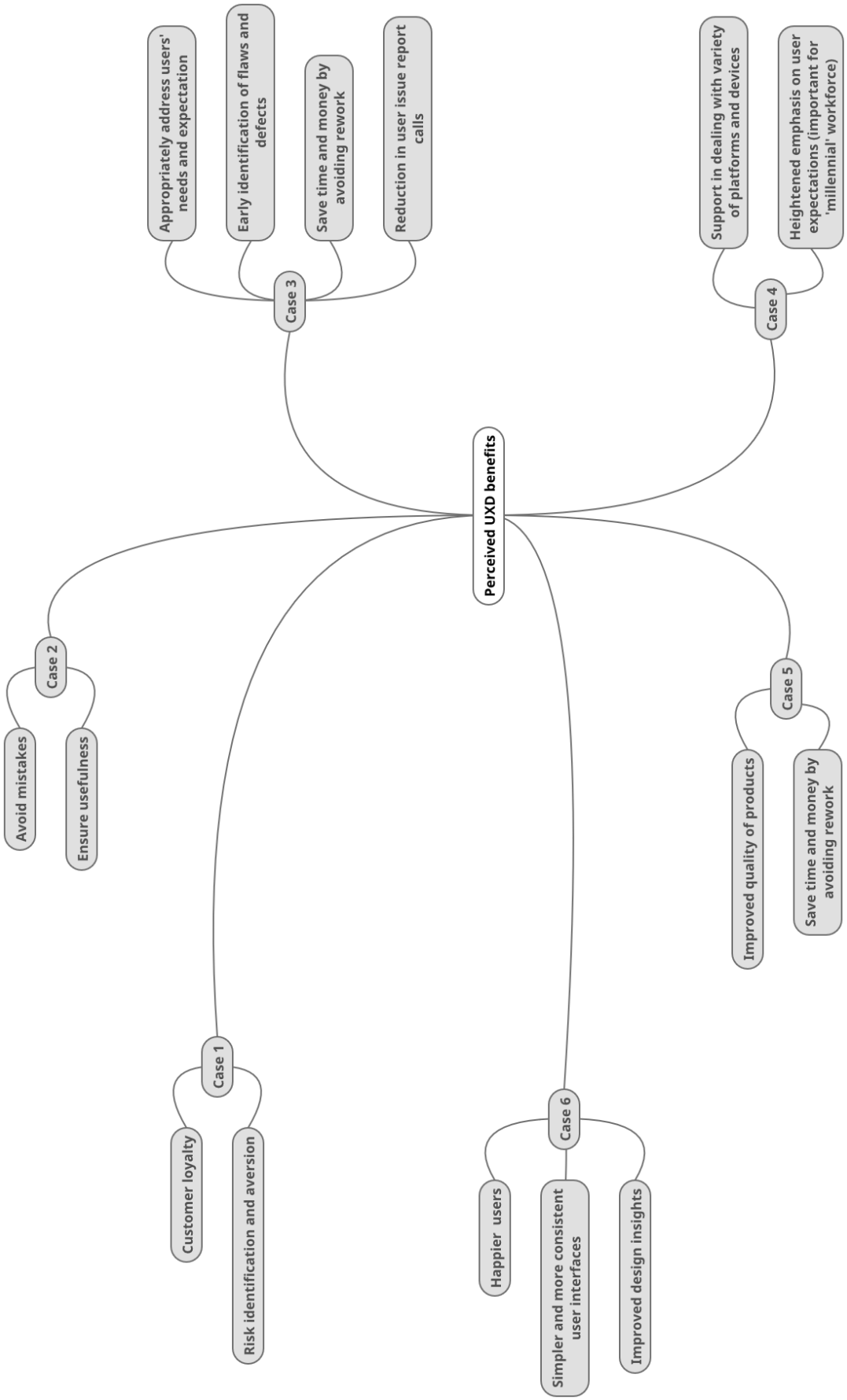


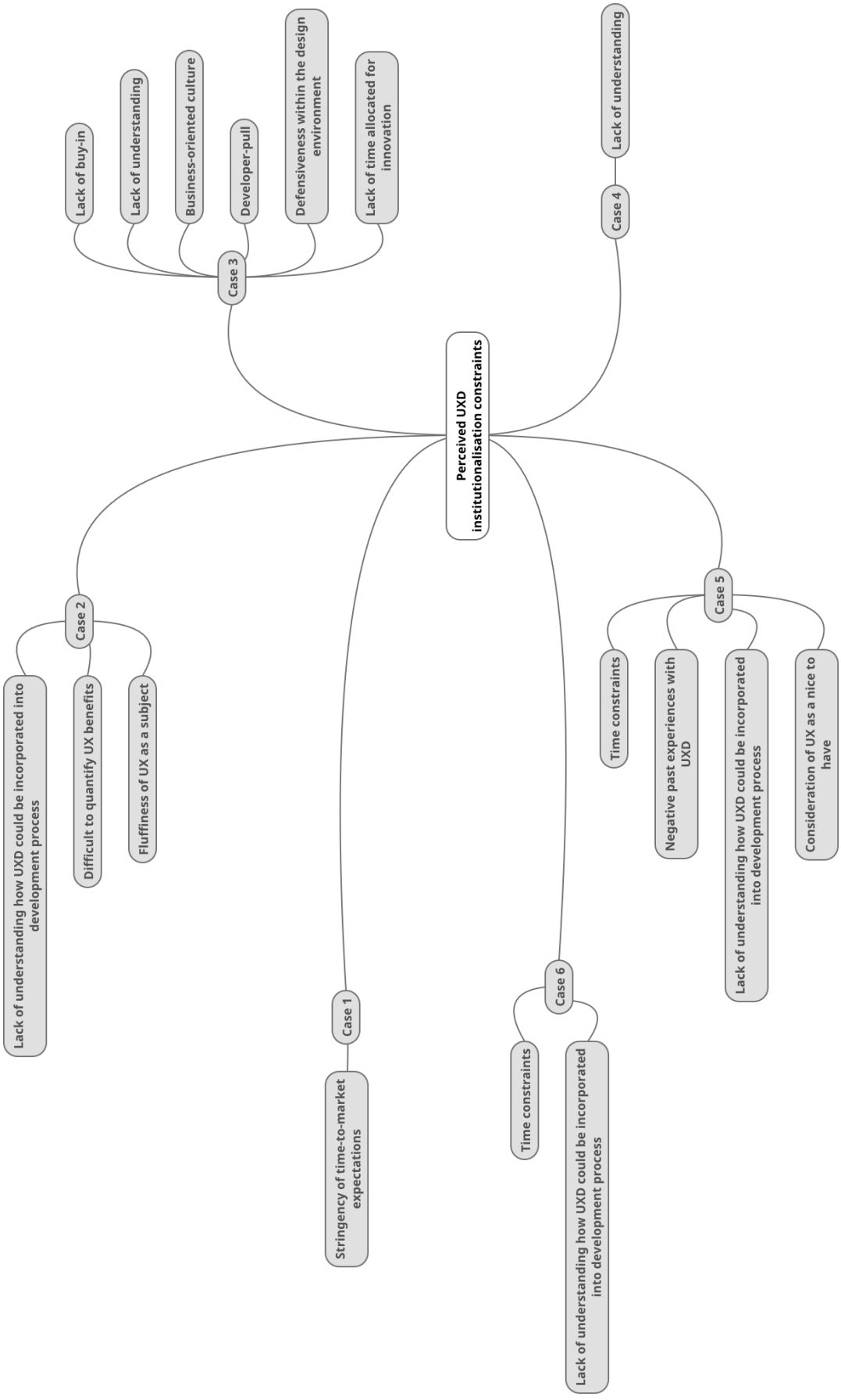

Software outputs
Case 1
Customer facing
Custom development
Multiple devices and platforms: USSD, Web, SMS
Case 2
Employee and customer facing
Off-the-shelf software with ERP integration
Desktop and web applications
Case 3
Employee facing
Custom development
Desktop and web applications
Case 4
Customer facing
Custom development
Desktop, web, and mobile applications
Case 5
Customer facing
Custom development
Multiple devices and platforms: USSD, Web, SMS
Case 6
Customer and employee facing
Custom and off-the-shelf software
Desktop and (responsive) web applications

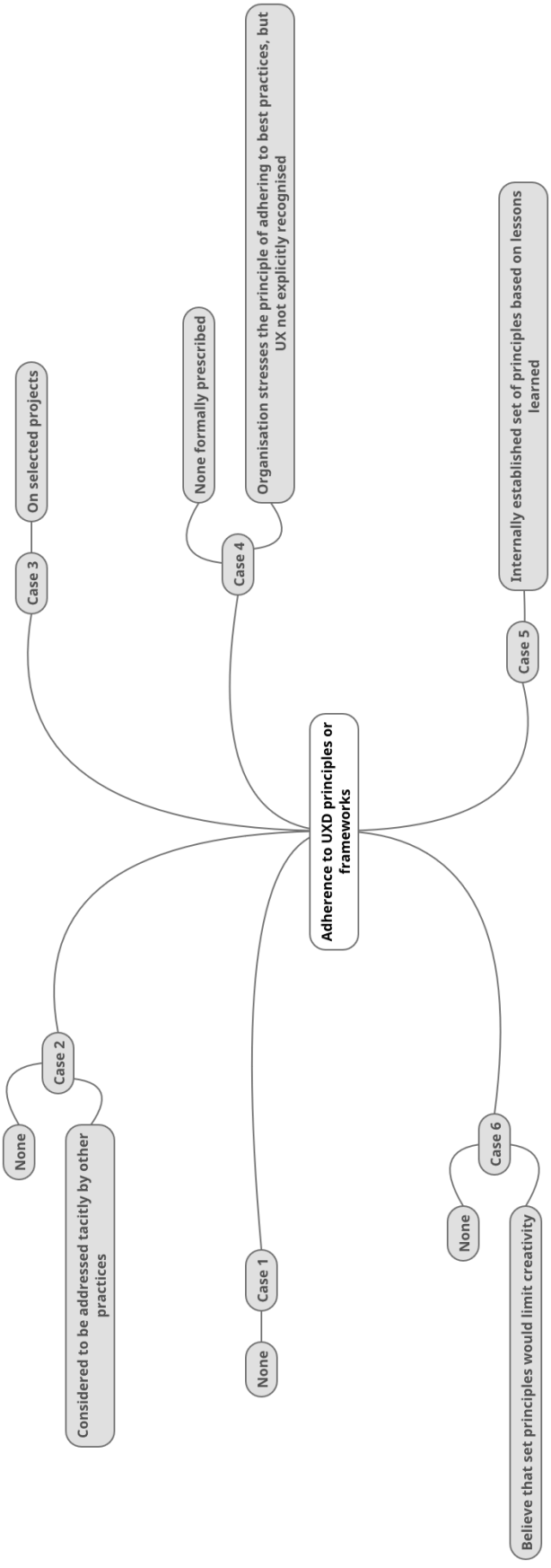

ISDM
Case2
Philosophy: Sequential/ Waterfall
Methodology: Structured systems analysis and design
Case 1
Philosophy: AGILE
Methodology: Lean
Case 6
Philosophy: AGILE
Methodology: Custom based on SCRUM
Case 3
Philosophy: AGILE
Methodology: SCRUM
Case 4
Philosophy: AGILE
Methodology: Custom based on SCRUM
Case 5
Philosophy: AGILE
Methodology: Kanban

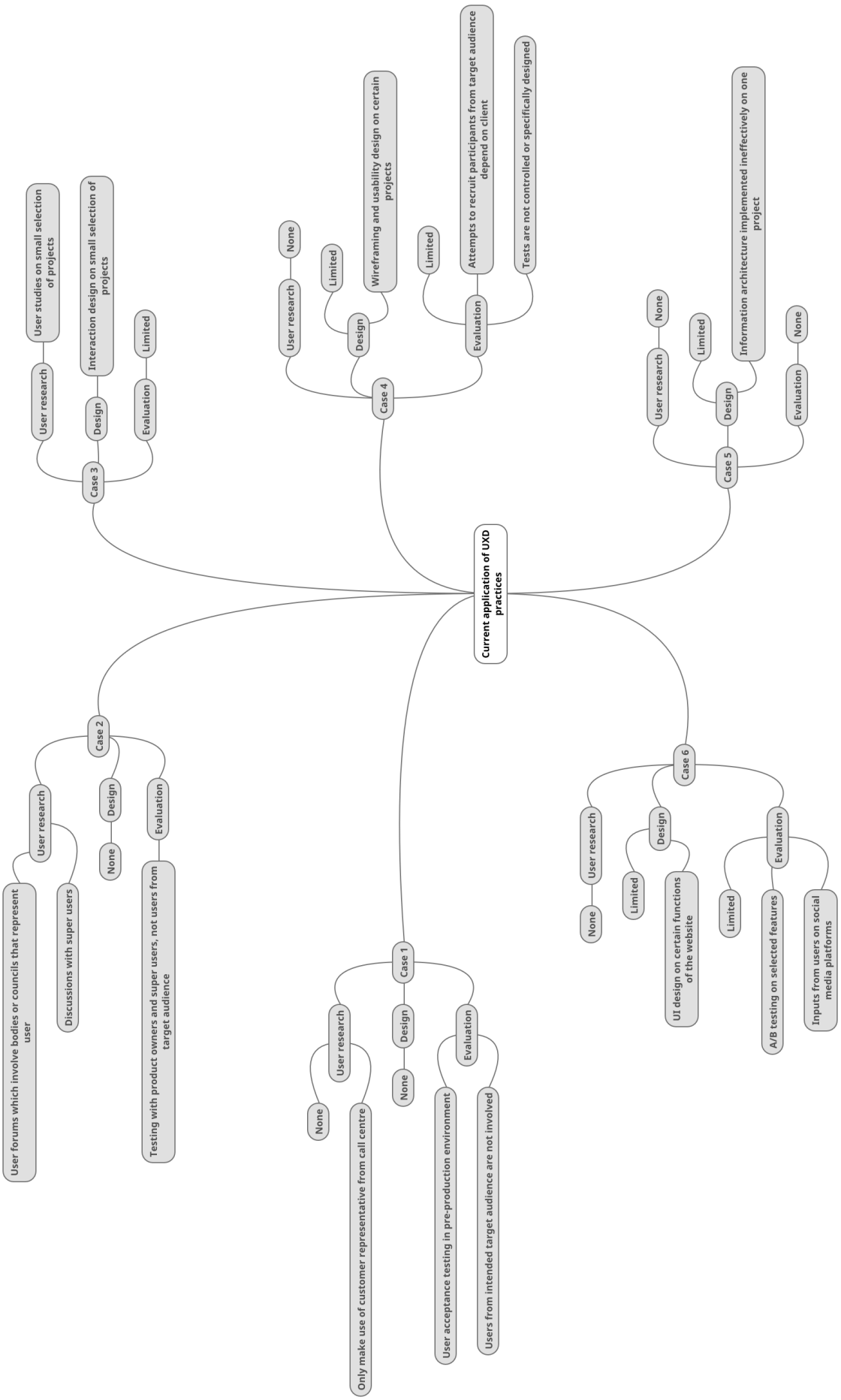

Understanding of UXD concepts
Case 1
Usability
Effectiveness of software
UX
Level of comfort
Consistency with literature
Inconsistent
Case 2
Usability
Effectiveness
UX
Efficiency
Consistency with HCI/UXD literature
Inconsistent
Case 3
Usability
Discipline within UX
Time and effort required to complete tasks
User satisfaction
UX
Holistic experience made up from set of perceptions and sensed interactions
Consistency with literature
Consistent
Case 4
Usability
Ease-of-use and seamless functioning of software
UX
Look and feel
Consistency with literature
Partially consistent
Case 5
Usability
Ease of use
UX
Resultant perceptions
Consistency with literature
Consistent
Case 6
Usability
Simplicity
UX
Look and feel
Consistency with literature
Partially consistent

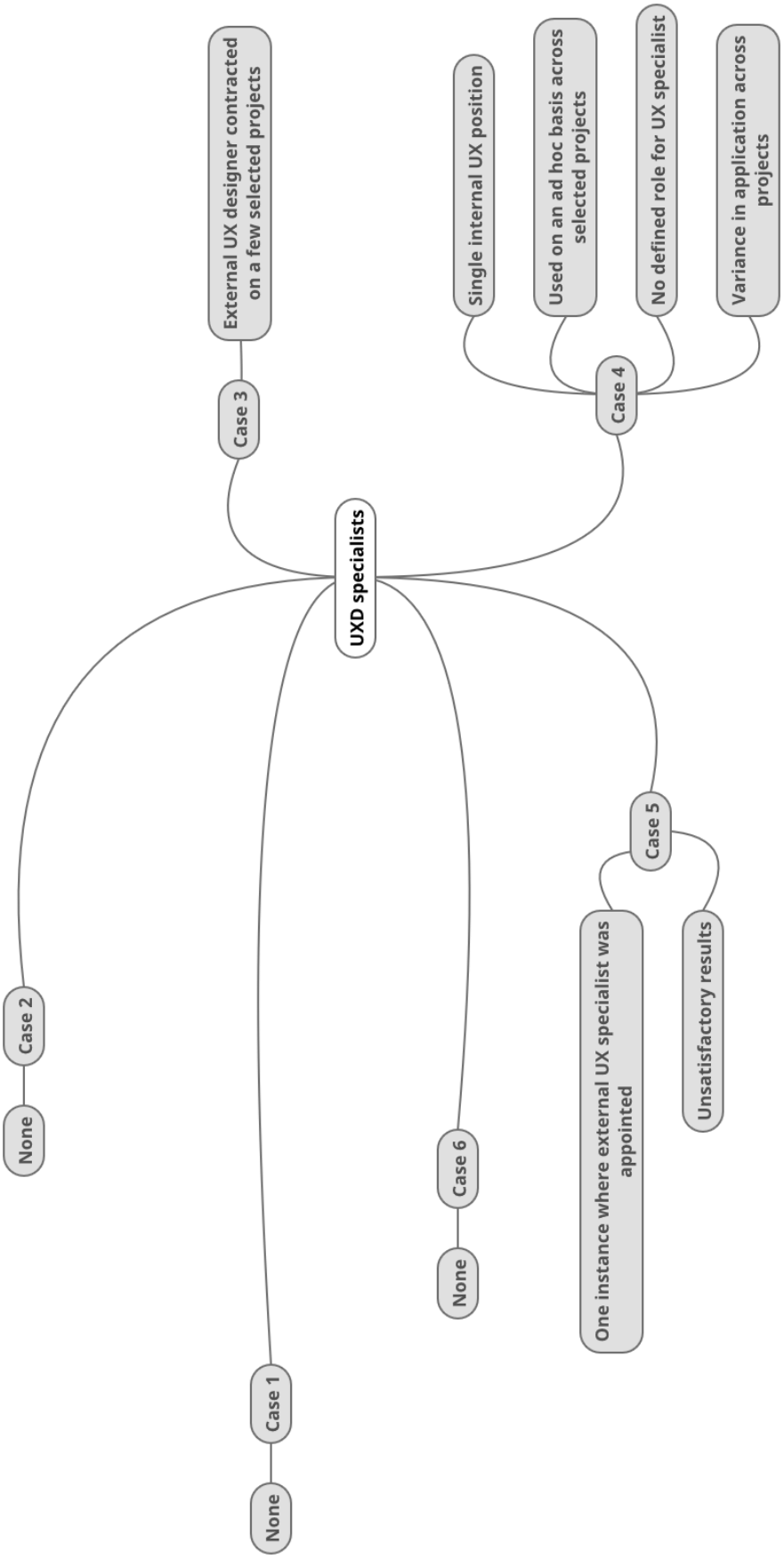

Interviewee's satisfaction with produced solutions
Case 1
Not satisfied
Products good enough considering timelines
Case 2
Partially satisifed
Control typically sits with product sponsors
Case 3
Not satisfied
Case 4
Partially satisfied
Bound by client requirements
Case 5
Not satisfied
Case 6
Satisfied
Metrics not related to user satisfaction, but rather business objectives

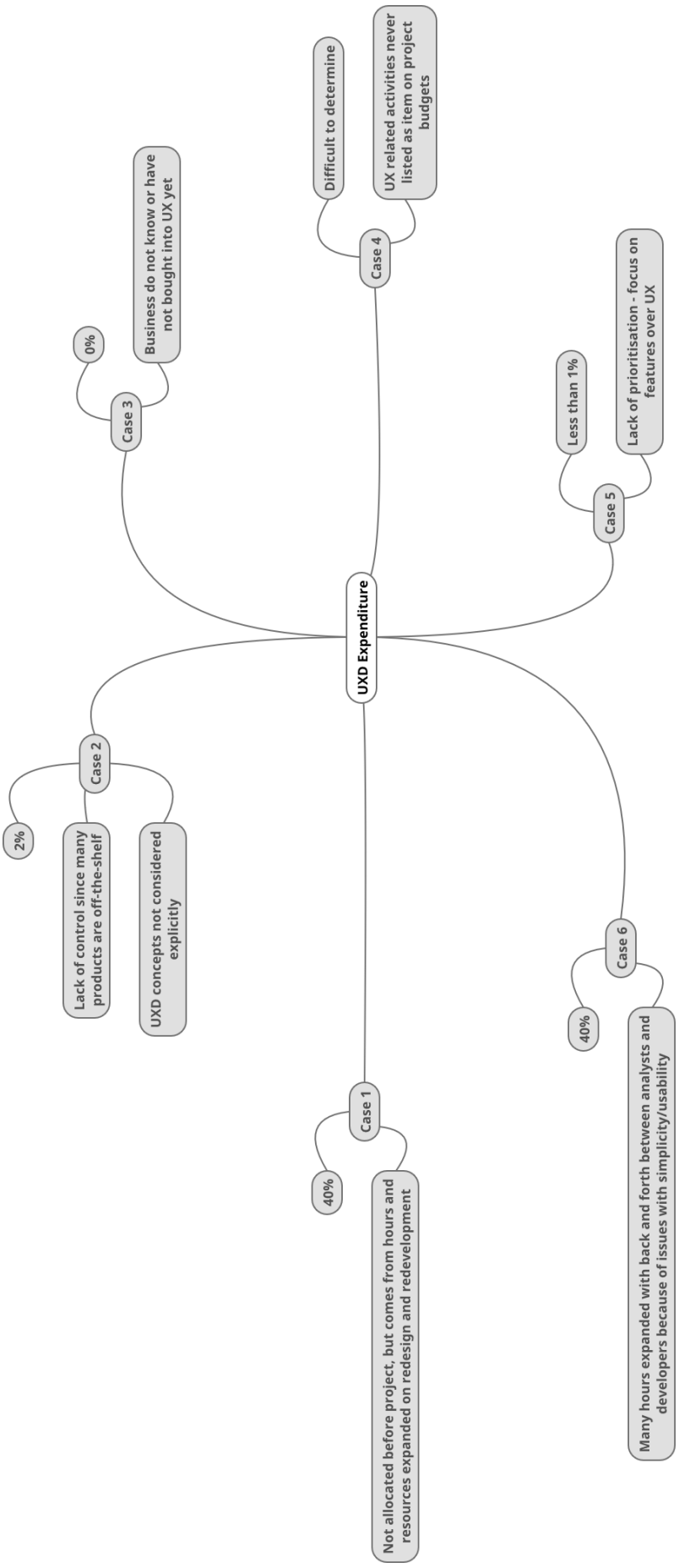

Perceived UXD benefits
Case 1
Customer loyalty
Risk identification and aversion
Case 2
Avoid mistakes
Ensure usefulness
Case 3
Appropriately address users' needs and expectation
Early identification of flaws and defects
Save time and money by avoiding rework
Reduction in user issue report calls
Case 4
Support in dealing with variety of platforms and devices
Heightened emphasis on user expectations (important for 'millennial' workforce)
Case 5
Improved quality of products
Save time and money by avoiding rework
Case 6
Happier users
Simpler and more consistent user interfaces
Improved design insights

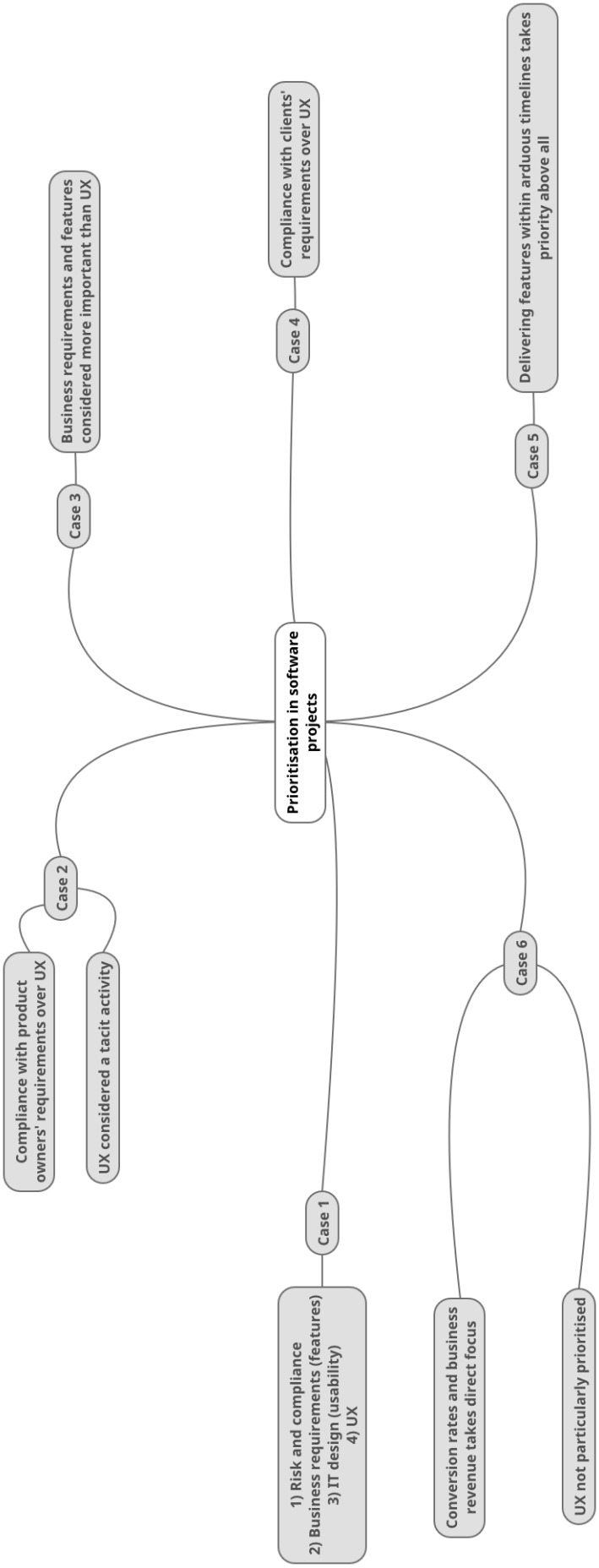

Perceived UXD institutionalisation constraints
Case 1
Stringency of time-to-market expectations
Case 2
Lack of understanding how UXD could be incorporated into development process
Difficult to quantify UX benefits
Fluffiness of UX as a subject
Case 3
Lack of buy-in
Lack of understanding
Business-oriented culture
Developer-pull
Defensiveness within the design environment
Lack of time allocated for innovation
Case 4
Lack of understanding
Case 5
Time constraints
Negative past experiences with UXD
Lack of understanding how UXD could be incorporated into development process
Consideration of UX as a nice to have
Case 6
Time constraints
Lack of understanding how UXD could be incorporated into development process

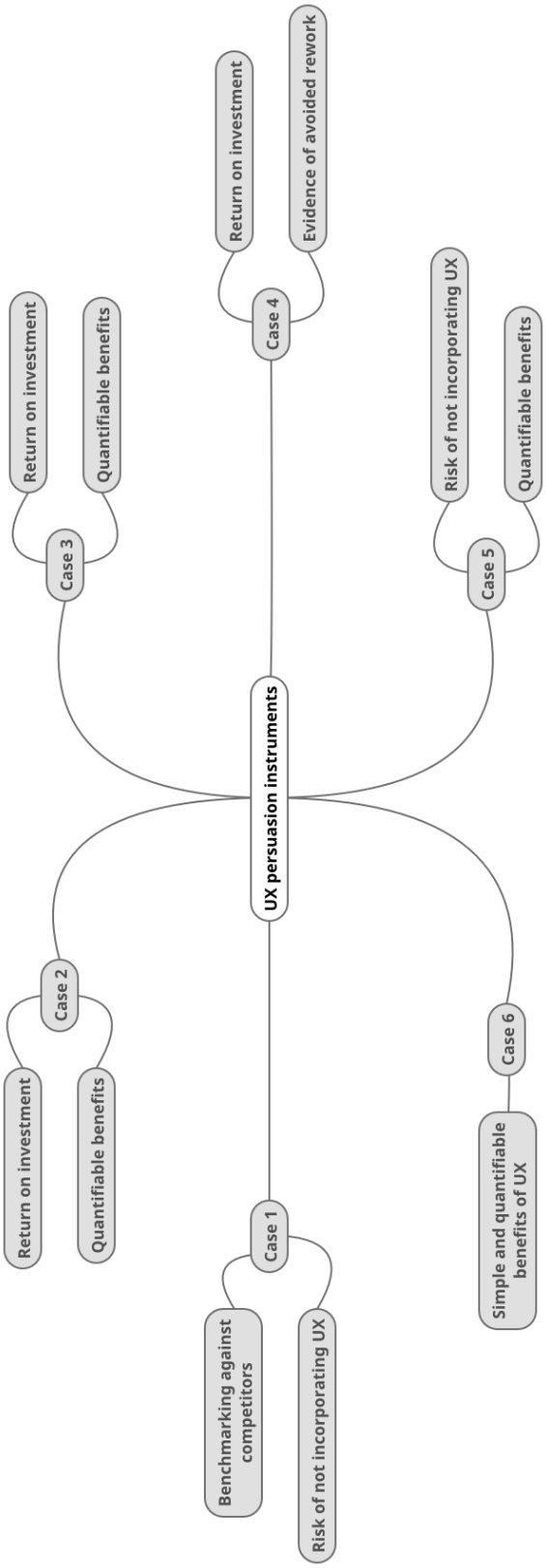

Adherence to UXD principles or frameworks
Case 1
None
Case 2
None
Considered to be addressed tacitly by other practices
Case 3
On selected projects
Case 4
None formally prescribed
Organisation stresses the principle of adhering to best practices, but UX not explicitly recognised
Case 5
Internally established set of principles based on lessons learned
Case 6
None
Believe that set principles would limit creativity

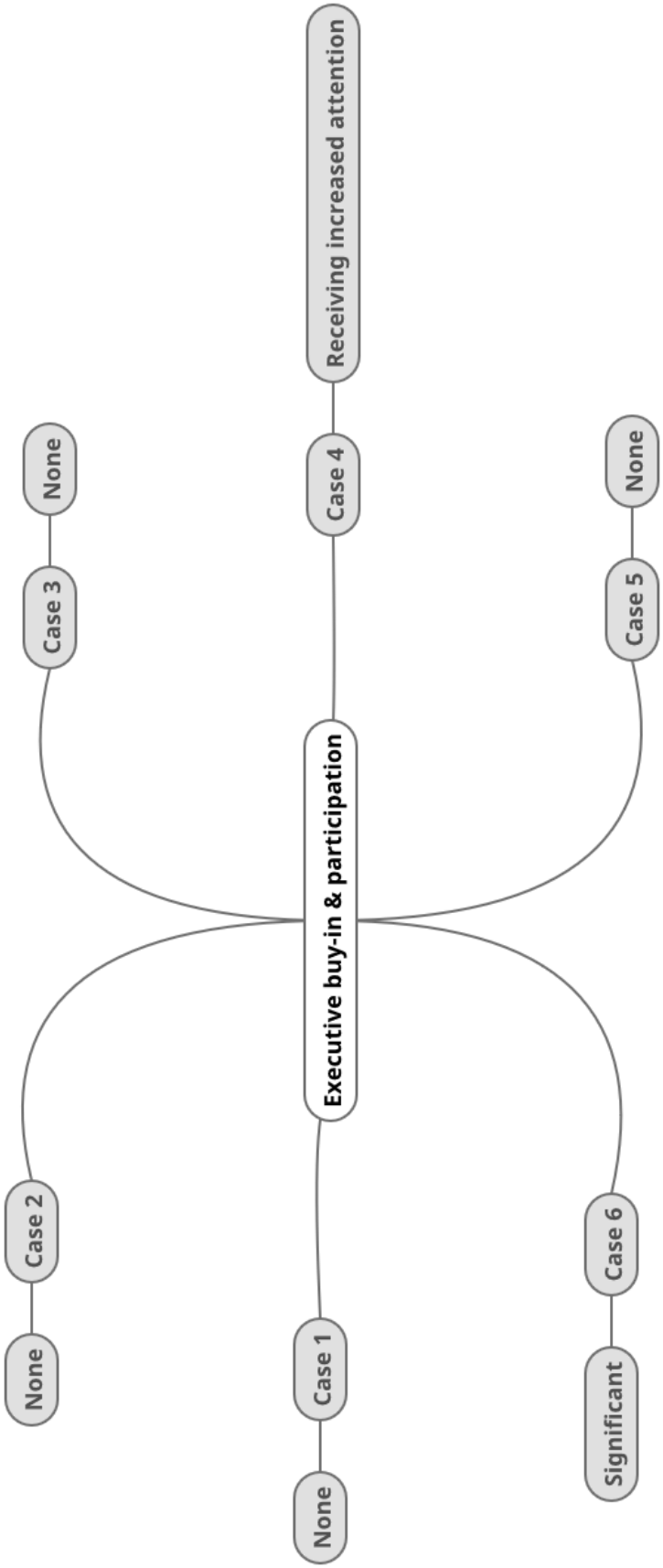

Current application of UXD practices
Case 1
User research
None
Only make use of customer representative from call centre
Design
None
Evaluation
User acceptance testing in pre-production environment
Users from intended target audience are not involved
Case 2
User research
User forums which involve bodies or councils that represent user
Discussions with super users
Design
None
Evaluation
Testing with product owners and super users, not users from target audience
Case 3
User research
User studies on small selection of projects
Design
Interaction design on small selection of projects
Evaluation
Limited
Case 4
User research
None
Design
Limited
Wireframing and usability design on certain projects
Evaluation
Limited
Attempts to recruit participants from target audience depend on client
Tests are not controlled or specifically designed
Case 5
User research
None
Design
Limited
Information architecture implemented ineffectively on one project
Evaluation
None
Case 6
User research
None
Design
Limited
UI design on certain functions of the website
Evaluation
Limited
A/B testing on selected features
Inputs from users on social media platforms

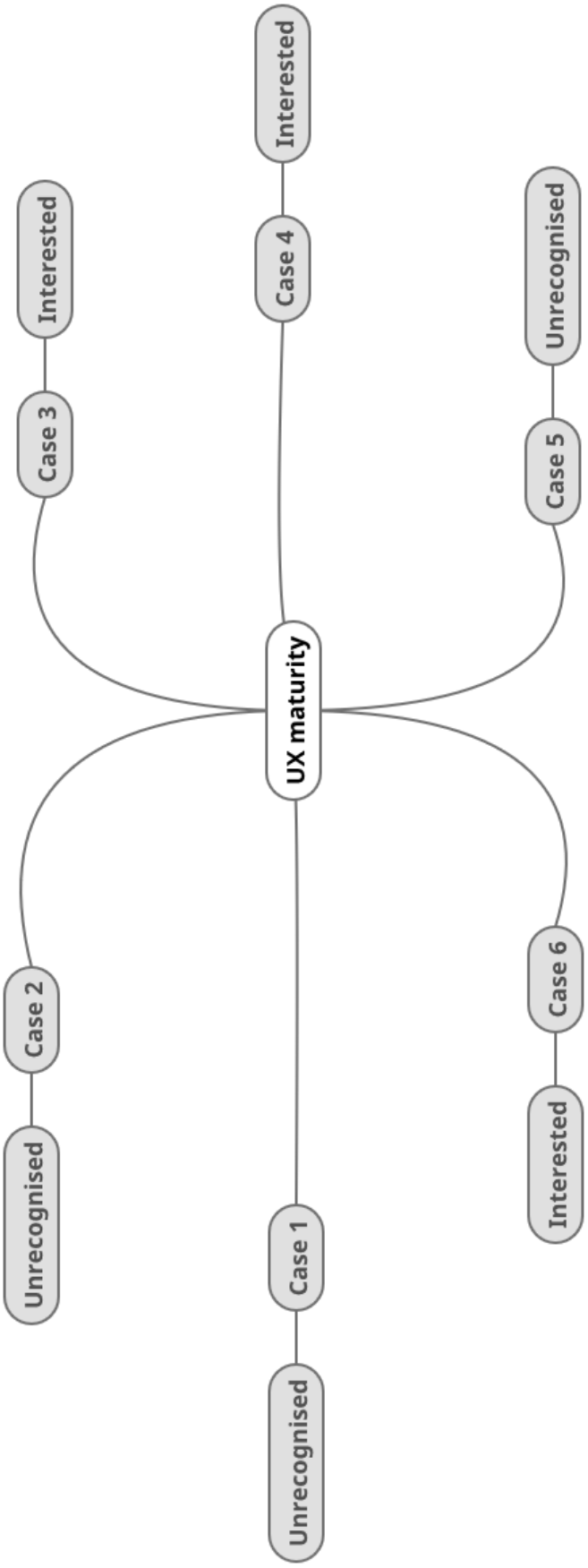

UXD specialists
Case 1
None
Case 2
None
Case 3
External UX designer contracted on a few selected projects
Case 4
Single internal UX position
Used on an ad hoc basis across selected projects
No defined role for UX specialist
Variance in application across projects
Case 5
One instance where external UX specialist was appointed
Unsatisfactory results
Case 6
None


UXD Expenditure
Case 1
40%
Not allocated before project, but comes from hours and resources expanded on redesign and redevelopment
Case 2
2%
Lack of control since many products are off-the-shelf
UXD concepts not considered explicitly
Case 3
0%
Business do not know or have not bought into UX yet
Case 4
Difficult to determine
UX related activities never listed as item on project budgets
Case 5
Less than 1%
Lack of prioritisation - focus on features over UX
Case 6
40%
Many hours expanded with back and forth between analysts and developers because of issues with simplicity/usability


Prioritisation in software projects
Case 1
1) Risk and compliance
2) Business requirements (features)
3) IT design (usability)
4) UX
Case 2
Compliance with product owners' requirements over UX
UX considered a tacit activity
Case 3
Business requirements and features considered more important than UX
Case 4
Compliance with clients' requirements over UX
Case 5
Delivering features within arduous timelines takes priority above all
Case 6
Conversion rates and business revenue takes direct focus
UX not particularly prioritised


UX persuasion instruments
Case 1
Benchmarking against competitors
Risk of not incorporating UX
Case 2
Return on investment
Quantifiable benefits
Case 3
Return on investment
Quantifiable benefits
Case 4
Return on investment
Evidence of avoided rework
Case 5
Risk of not incorporating UX
Quantifiable benefits
Case 6
Simple and quantifiable benefits of UX


Executive buy-in & participation
Case 1
None
Case 2
None
Case 3
None
Case 4
Receiving increased attention
Case 5
None
Case 6
Significant


UX maturity
Case 1
Unrecognised
Case 2
Unrecognised
Case 3
Interested
Case 4
Interested
Case 5
Unrecognised
Case 6
Interested