DESIGNERS' INFLUENCE ON ATTITUDE CHANGE TOWARDS USER EXPERIENCE (UX) IN A SOFTWARE DEVELOPMENT ENVIRONMENT

by

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ABSTRACT

User Experience (UX), a practice within Human Computer Interaction (HCI), aims to create products that best benefit the end-user by invoking favourable emotions upon interaction as to maintain their satisfaction with the product. In a software development environment, there are four typical stakeholders to consider: UX designers, developers, project management and clients. However, research shows that UX is often not included in software development projects in South Africa. As a consequence, this research is concerned with identifying the challenges and successes of a pro-UX software development company and how the UX Designers of the company had changed their stakeholders' perceptions towards UX. In order to understand these attitude, Personal Construct Theory was used and the Six Principles of Persuasion were used to understand how these attitudes had changed. The generated results provided the basis for a persuasive UX model that was then evaluated by UX-experts in other companies. The results of the expert evaluations provide evidence that the model could help UX designers to change their stakeholders' attitudes towards UX. The study concluded with significant practical implications for UX designers and software development organisations.

Keywords: User Experience (UX), Software Development, Attitude, Persuasion, Behavioural Change

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"Don't fool yourself. Don't think you can be wise merely by being up to date with the times. Be God's fool- that is the true path to wisdom." **1 Corinthians 3:18 – 20 (The Message)**

As I reflect upon the journey I undertook, there are a few people who I would like to extend my thanks to:

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- My dear horse Hermes and cat Benji, who might not have understood my frustrations, but listened anyway.

Chapter Overview

Chapter 1: Introduction

This chapter includes the problem statement and background information.

Chapter 2: Literature Review

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- UCD (User-Centered Design)
- UX, UCD and Agile
- Attitude and Behaviour

Chapter 3: Theoretical Framework

This chapter includes the theoretical framework:

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Chapter 4: Research Methodology

This chapter includes the research methodology used as well as ethical research practices.

Chapter 5: Results

This chapter includes the results of the data collection period as well as an in-depth analysis.

Chapter 7: Conclusion

This chapter includes the results of the data collection period as well as an in-depth analysis.

CHAPTER 1 INTRODUCTION

1.1 INTRODUCTION

The Human Computer Interaction (HCI) community has invested a large amount of research time and effort into the field of 'User Experience'. The research time and effort spent facilitated the move from task-orientated, cognitive concept of usability towards a more emotional, comprehensive and subjective exploration of the responses that are received from people as they use and interact with technology(Isomursu et al., 2012). The field of ICT also shows a change from the idea that technology should support a user's everyday tasks towards an idea that technology products should be integrated into a user's everyday life instead (Kort et al., 2007) as users now require their systems to provide them with a level of satisfaction through their usage, not just their functionality (Yogasara, 2014).

User Experience (UX) is defined as "a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service" (Hassenzahl, 2008). UX is used to improve a product or service that is delivered by a company by way of impacting end users' emotions while interacting with the product or service. UX is implemented in a software system by way of a UX designer or specialist, or team of UX designers. UX designers try to understand the end user and what their goals for the software system will be (Kollmann, Sharp and Blandford, 2009).

Addressing how the user feels while using the system is necessary for achieving software system goals (Plonka *et al.*, 2014). UX therefore also refers to processes that attempt to create software that is usable and that fulfils the needs of the user, such as satisfaction, at the same time (Kuusinen, 2015).

UX attempts to meet the needs of the end user by investigating what the end users' needs are and how to best satisfy these needs. Meeting the needs of users is important as a user who feels positive emotions from using a particular software system may be inclined to use the system again, which can provide repeated income

for the company and thus the need for UX has increased (Jurca, Hellmann and Maurer, 2014). UX has become a vital component in software design (Karapanos, Zimmerman and Martens, 2009). They discovered that a large number of interactive products, or software systems, had been returned. The largest reason for these returns was that the system had not satisfied the users' true needs, despite being fully functional (Karapanos *et al.*, 2009).

1.2 PROBLEM STATEMENT

Despite the benefits of UX to end-users as discussed by Jurca, Hellmann and Maurere (2014), the UX landscape in South Africa has not been actively institutionalised (Pretorius and Calitz, 2014). The institutionalisation of UX in organisations remains at a critical point where organisations have begun to incorporate and accept UX in their project lifecycles, but have no formal definition of a UX designer and the work of a UX designer (Pretorius, Hobbs and Fenn, 2015). In their research, Pretorius, Hobbs and Fenn (2015) found that the current UX designers in South Africa come from a variety of fields, such as graphic design or business consulting due to the fact there is currently no clear formal education path to becoming a UX designer, which they say contributes to the uncertain UX landscape in South Africa.

The 105 respondents to Pretorius, Hobbs and Fenn's (2015) study indicated that the number one challenge presented to these UX designers was a lack of UX buy-in and the promotion of UX in the organisation. This is not a unique problem to South Africa and other research has shown that this is due to differing attitudes towards UX (Kollmann, Sharp and Blandford, 2009); (Law et al., 2009).

The research attempts to understand this lack of UX buy-in and promotion through investigating the attitudes possessed by stakeholders within the UX designers work environment and how these attitudes can be changed to overcome this problem for

current and future UX designers.

1.3   PURPOSE OF THE STUDY

The purpose of this study is to explore the before and after attitudes towards UX implementation in an organisation based on the stakeholders involved in a software system development process. These stakeholders include developers, project management and clients. The attitude of these stakeholders will be evaluated from the perspective of a UX designer. Based on these attitudes, the study aims to understand how a UX designer can then change these attitudes.

By evaluating the attitudes of stakeholders towards UX and determining techniques that can be used to persuade these stakeholders to change their behaviour towards UX, user satisfaction can be achieved in a company. However, in order to achieve this user satisfaction, a UX designer should have a reference tool that easily relates various persuasion methods to their applicable stakeholder. As shown in figure 1, the outcome of this research is to create a reference model for the UX designer in order to then achieve the goal of user satisfaction within a software design environment.

1.4   RESEARCH DESIGN

MRQ: can a UX designer influence an attitude change towards UX in software system development using the principles of persuasion?

Personal Construct Theory

Used as the theoretical basis for the thesis in order to gain an understanding of how an individual constructs their world

The Six Principles of Persuasion

Created by Robert Cialdini, these principles describe different views of how to persuade an invidical to alter their attitude towards something.

The potential to create a persuasive UX model based on the principles of persuasion and understanding how an individual develops an attitude towards UX based on personal construct theory.

Figure 1: Conception sketch of the thesis

Figure 1 illustrates the research design in order to structure the layout of the thesis. In order to answer the main research question of how a UX designer can foster a UX-positive attitude in their environment, Personal Construct Theory and the Six Principles of Persuasion were combined to create a model that will help UX designers to persuade the stakeholders in their environment to adopt a pro-UX

attitude. Personal Construct Theory and The Six Principles of Persuasion will be elaborated on in Chapter 3.

In order to provide an understanding on the specifics of UX, the literature review focuses on describing UX and its associated factors in a manner that is relevant to the thesis and that will aid model creation. The literature review will provide a definition of UX, user-centred design, co-experience and usability testing. In order to understand attitude and behaviour, the literature review provides an explanation on these aspects.

In order to pursue the development of a UX persuasion model, a company (Company X) whose project lifecycle already incorporates UX was observed through the use of participant observation. Through the participant observation, typical stakeholders were identified and used to map the appropriate persuasion principle through an analysis of the observation notes.

In order to determine the usefulness of the model outside of the chosen company, an expert analysis was performed on the model. Experts from other UX-based companies were contacted and asked to compete a detailed questionnaire based on the findings on the model.

1.5   RESEARCH QUESTIONS

This research aims to answer the main research problem of: *how can a UX designer influence an attitude change towards UX in software system development using the principles of persuasion*? Figure 2 is a visual display of the research questions.

Other sub questions include:

1. How did UX designers persuade their internal stakeholders to adopt a positive UX attitude? Which principle of persuasion is most applicable to these groups of people?
2. How did UX designers persuade their external stakeholders to adopt a positive UX attitude? Which principle of persuasion is most applicable to this stakeholder group?
3. Which principle of persuasion is the most used in order to change stakeholder attitudes?
4. What tools and techniques did UX designers use to change stakeholder attitudes? Under which principles of persuasion do these tools and techniques fall under?

MRQ

How can a UX designer influence an attitude change towards UX in software system development using the Six Principles of Persuasion?

SQ1

How did UX designers persuade their internal stakeholders to adopt a positive UX attitude? Which Principle of Persuasion is most applicable to these groups of people?

SQ2

How did UX designers persuade their external stakeholders to adopt a positive UX attitude? Which Principle of Persuasion is most applicable to this stakeholder group?

SQ3

Which Principle of Persuasion is the most used in order to change stakeholder attitudes?

SQ4

What tools and techniques do UX designers use to change stakeholder attitudes? Under which principle did these tools and techniques fall under?

Figure 2: Visual Diagram of the Research Questions

Through the results of the observation and expert analysis, the model provides answers to these questions. The answers of the sub-questions could aid in strengthening the usefulness of the model. The answers to the sub-questions also provide the answer for the main research question and this will determine whether or not the model will be able to serve its intended purpose of being a reference model. UX designers will be able to use the model in any work environment with a variety of stakeholders. The UX designer will be able to take the model and use the mapped persuasion principle and apply it to the stakeholder. While specific tools and techniques will not be given, the principle will give the UX designer a basis from which they can apply a number of tools and techniques that are suited to that stakeholder within the boundary of the principle. An example of this would be if a UX designer is attempting to persuade a developer to adopt an attitude change towards UX and the model states that X principle is applicable to a developer. The UX designer can use principle X as their base to determine a method that is specific to the developer.

1.6   RESEARCH LIMITATIONS

A case study will be performed on a UX-orientated software development company through participant observation in order to determine stakeholder attitudes towards UX. However, due to time restrictions and the nature of participant observation, only one company can form part of case study.

1.7   CONCLUSION

The introduction section provides insight into the content of the thesis. By providing background information on the problem, the context of the problem statement is understood. This leads to the purpose of the thesis, which explains why the problem statement should be answered. The intended research design gives an insight into how the research aims to tackle the issues faced in the problem statement until

eventually the research questions are drafted. This section is concluded by the limitations of the research.

The following chapter will provide an overview of literature in the field of UX.

CHAPTER 2 LITERATURE REVIEW

2.1 INTRODUCTION

This section will explore the current literature relating to UX in software development projects. Some concepts within UX will include hedonics and pragmatics, co-experience as well as user-centred design and usability testing and how they are used in software development projects. Attitude will also be explored in order to gain an understanding into what attitude is and how it is formed so that UX designers will be able to understand and evaluate the attitude of stakeholders towards UX. Finally, persuasion will be reviewed in order to gain an insight into what persuasion entails and how UX designers can use persuasion to change a negative attitude towards UX.

2.2 USER EXPERIENCE (UX)

2.2.1 Introduction

The field of user experience is vast and only the concepts of co-experience in section 2.2.3, agile development in section 2.2.4, user-centred design in section 2.2.5 and interface design and usability testing will be included in this research in section 2.2.5.1 and 2.2.5.2.

2.2.2 What is User Experience?

In order to achieve User Experience, user experience must first be defined. User Experience, or UX, is a term that is used primarily in the human computer interaction, or HCI, environment. An experience can be defined as, "something measurable that can also be communicated in social interactions" (Karapanos *et al.*, 2009) or an, "ongoing-reflection on events." (Hassenzahl, 2008). The definition of UX was long disputed before this definition was decided on. This definition of UX arose from the combined effort of various academics and UX designers to create a UX manifesto (Kort, Vermeeren and Fokker, 2007).

Experience is formed through interaction with something and can be influenced by familiarity or culture (McCarthy and Wright, 2004). A user is a person who will interact with a software product and therefore gain an experience from the usage of this product and will develop either a positive, negative or neutral connotation of the product (Vermeeren *et al.*, 2010). UX is associated with the emotional, affective, experiential, hedonic and aesthetic values (Law et al., 2009) of a system and can be defined as "a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service." (Hassenzahl, 2008). A user interacts with a system through an interface as they use certain functions, such as typing their name into a textbox or finding a specific button (Fleming and Koman, 1998). These interactions, depending on their complexity, can elicit various emotions from a user which constitute the primary evaluative feeling as described by Hassenzahl (2008). These emotions can range from boredom to frustration, happiness to excitement or any other range. The emotional range then determines their experience into positive, negative or neutral towards the system and using similar functions or interacting with a similar system will evoke a similar initial experience due to the familiarity (Karapanos *et al.*, 2009); (Kujala *et al.*, 2011). This definition allows UX to focus on the human-aspects of systems or interfaces, such as emotions felt while interacting with the system or interface and other subjective sides of system use which is the basis of their experience.

UX can be viewed in Hassenzahl's (2008) hedonic/pragmatic model of UX. This model states that people perceive interactive products, such as a system, along two dimensions; pragmatics and hedonics. Pragmatics refer to the system's ability to achieve 'do-goals', which are shown by the example of, 'being able to find an item in an online store' (Hassenzahl, 2007). This definition infers that a pragmatic dimension of UX is a focus on functionality and ability to complete a goal, irrespective of how long, or how many screens need to be navigated or how many clicks through a system that goal takes to be achieved. Pragmatics focus on the functionality and usability of the system in relation to the tasks that the system needs to perform. Hedonics refer to the system's ability to achieve 'be goals', which are shown by the examples of 'finding an item in an online store competently,' or a system being

familiar and relatable (Hassenzahl, 2007). Hedonics focus on the 'Self', such as, 'why does a person want to find and use a particular product on the online store?'. Human needs beyond the basics arise in this space, such as a need for self-expression or growth and change and uniqueness. Hedonics has three different sections; stimulation (novelty and change, personal growth), identification (communication of identity that is relevant to others or simply relatedness) and evocation (provoking memories or creating symbolism) as indicated by Hassenzahl (2007). From this definition, hedonics would be much more influenced by previous user experience due to their desire for a system to be familiar and relatable, thus their positive, negative or neutral attitude towards a system would need to be considered when designing a system or when persuading them to adapt to a system.

Hassenzahl (Hassenzahl, 2007) notes that the hedonic/pragmatic model also assumes that people view these two dimensions to be unrelated. Pragmatics tend to focus on the functionality (usefulness and ease-of-use) (Karapanos *et al.*, 2009) and the simplicity of something, while hedonics focus on the novelty of something. Simplicity suggests the achievement of 'do-goals' such as, 'can I make a phone call?' while novelty suggests the achievement of 'be-goals' such as 'what is the coolness of this phone?' (Hassenzahl, 2007).

In order to judge the quality of interactive products, such as a system, and determine the UX of a system there are two aspects to be considered, goodness and quality(Karapanos *et al.*, 2009). Goodness is primarily influenced by the pragmatic aspects, the usefulness and use-of-use of a system. Goodness will ask questions such as, 'Can I do what I need to do on the system?' or, 'Does the system have the functionality to do x?' where 'x' is an objective to be achieved. Beauty, or quality, is influenced by identification aspects, which is a facet of hedonics. Quality will ask questions such as, 'Can I find the home button as easily as I can on system x?' where 'system x' refers to a system the user has used before. Therefore, the definition of UX can be added to in order to state the following, "a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service.

Good UX is the consequence of fulfilling the human needs for autonomy, competency, stimulation (self-orientated), relatedness, and popularity (others-orientated) through interacting with the product or service (hedonic quality). Pragmatic quality facilitates the potential fulfilment of be-goals." (Hassenzahl, 2008). This definition then suggests that hedonic quality directly influences the core of positive experience and pragmatic quality only indirectly influences it. Finally, aesthetics of a potential system needs to be considered when wanting to creative a positive experience for a user when interacting with a system. A system fulfilling only the functional needs of a user is not enough to create a core of positive experience for the user. In order for a system to create this core of positive experience, the system needs to fulfil the function goals in the most supportive and 'beautiful' or aesthetically pleasing manner while providing user-intuitive elements in the interface.

There are many approaches to applying and evaluating user experience in software development environment. Some of the main approaches include; the measuring approaching, the empathetic approach and the pragmatist approach (Battarbee and Koskinen, 2005); (Forlizzi and Battarbee, 2004); (McCarthy and Wright, 2004); (Wetter-Edman, Vink and Blomkvist, 2018). The measuring approach is used in development and testing environments. This method states that experiences are measured on only emotional reactions to a system. It has various methods associated with it in order to measure these emotional reactions. One method includes focusing on a user's physical reactions, such as facial expressions or skin texture (Picard, 1995). Another method is to translate users' personal goals for the system into specific UX goals that can be tested (Teague and Whitney, 2002). A final method is to take personal reports into consideration (Jordan, 2003). Some criticism of this method is that it is narrow in its definition as it only includes emotions that can be measured through one of the methods described above. The empathetic approach believes that emotional reactions can be measured to evaluate user experience, but that the experience needs to be connected to the needs, dreams and motivations of the individual undergoing the experience (Dandavate, Sanders and Stuart, 1996); (Battarbee and Koskinen, 2005). In order to achieve this, a detailed description and analysis of the user needs to be made so that an

understanding of their wanted experience can be created. Once this desired experience has been created, software and products can then be designed to support this. In this method, UX designers need 'design empathy', which also incorporates the emotions of the UX designers. Batterbee and Koskinen (2005) state that the UX designers need to understand their users' desires and emotions in order to create the most satisfactory experience for users. Finally, the pragmatist approach expands from Forlizzi and Ford's interaction model (2000) and explains that experiences are, "momentary constructions that flow from the interaction between people and their environments" (Battarbee and Koskinen, 2005) and this modelling approach is theoretical. In this definition, experience is constantly occurring and changes states between cognition, sub consciousness and storytelling (Forlizzi and Ford, 2000). A subconscious experience is fully automatic and it is constantly and consistently happening all the time, whether the individual is aware of it or not. A cognitive experience is not automatic, but something that needs input and concentration from the individual. If the subconscious or cognitive experience or moment leaves a meaningful impact on the individual, whether positive or negative, it becomes an actual experience to the user. An experience in this sense is something that has a fixed beginning and ending point (Battarbee and Koskinen, 2005). Finally, a storytelling experience is when stories that the individual is told by others becomes a 'meta-experience', which is a, "collection of individual experiences" as explained by Batterbee and Koskinen (2005).

2.2.3   The Concept of Co-Experience

Batterbee and Koskinen (2005) expanded upon the pragmatist approach first referenced by Forlizzi and Ford (2000) in order to create 'co-experience'. They describe co-experience as the, "experiences with products in terms of how the meanings of individual experiences emerge and change as they become part of social interaction". The concept of co-experience is that experience is not only individualistic, but is shared and changes when they become part of social interaction and that neglecting this phenomenon leads to a limited understanding of user experience. Battarbee and Koskinen (2005) believe that an individual gives meaning to an experience from interacting with their peers and friends and that these

meanings can be changed through an interpretive process that occurs during the interaction encounter. Therefore, an individual can take an experience from their peers and adapt it into their own experience in the form of storytelling, or a peer can influence the outcome of an experience for an individual which could change the experience from positive to negative or vice versa. These processes happen in three general ways; lifting up experiences, reciprocating experiences and rejecting and ignoring experiences. Lifting up experiences focuses on subconscious experience where an individual deems an automatic event to be impactful enough that it is worth mentioning to their peers, which thus makes it into an experience that is socially worthy. Reciprocating experiences are when individuals respond to an experience that they have been told of by their peers and share their own similar experiences or express sympathy. This process of sharing similar experiences or feeling sympathy for the experience gives the experience meaning. Rejecting or ignoring experiences is when an individual shares an experience that they believe is relevant or appropriate to another individual and the individual rejects the experience by expressing annoyance or offence. Therefore, co-experience can greatly impact a user's overall user experience (Bründl, Matt and Hess, 2017) and should be taken into account when systems are developed and when discussing the definition of what user experience is.

2.2.4   User Experience in Software System Development; Agile and its integration with UX.

In order to develop a software system, development companies use different development processes in order to achieve project goals. There are numerous development processes available, such as waterfall, continuous integration, rapid application development and more that have been rendered obsolete (Abrahamsson *et al.*, 2017). These processes can fall into traditional and life cycle approaches and have been adapted to support various needs in projects. A leading software development process used in the mainstream project industry is called Agile Development. Agile Development aims to deliver small sets of software features to customers as quickly as possible in short bursts, called iterations (Da Silva *et al.*,

2012). Agile aims to adjust and respond to unforeseen change in a software development project by using people's innovation, rather than traditional processes (Brhel *et al.*, 2015). In a traditional process, such as waterfall, various stages need to be completed before the project can advance into a different stage. The stages need to be well recorded and as detailed as possible.

Agile techniques and development tend to focus more on the functionality of a system, due to the small iterative deliverables it produces (Jurca, Hellmann and Maurer, 2014) which can be seen as a more pragmatic approach according to Hassenzahl's hedonic/pragmatic model of UX. Agile practices at first seem to contradict the principles of UX, as minimal front-end design work is focused on in Agile, which is seen as vital by UX designers as noted by Jurca, Hellmann and Maurer (2014). However, there are aspects of Agile and UX that complement one another, which forms a link between the two practices. Agile focuses on delivering functionality quickly, but this means that these functionality deliverables can be given to customers to get feedback on a regular basis (Jurca, Hellmann and Maurer, 2014); (Hoda *et al.*, 2017). UX focuses on user feedback in order to refine and create the most effective system for users and since agile provides the basis for quick feedback, the UX can be satisfied despite the lack of front-end design in agile projects. This further strengthens the link between UX and Agile due to the constant and frequent feedback from users that UX designers can use to improve the user interface of the system. Good implementation of UX into an Agile project is necessary in order to meet usability of the software system (Jurca, Hellmann and Maurer, 2014). Due to the fast nature of Agile development, interfaces need to be usable in these quick iterations otherwise very little feedback can be obtained, no matter the amount of functionality (Meingast *et al.*, 2013). If UX is incorporated into the quick phases and iterations, usability goals can be met much sooner and processes can be completed faster (Kollmann, Sharp and Blandford, 2009). The process of incorporating UX in Agile has been thoroughly debated and researched and found that the integration of agile and UX can lead to more successful projects (Ferreira, Sharp and Robinson, 2010); (Williams and Ferguson, 2007).

UX AND AGILE?

User-Centered Design

Interface Design
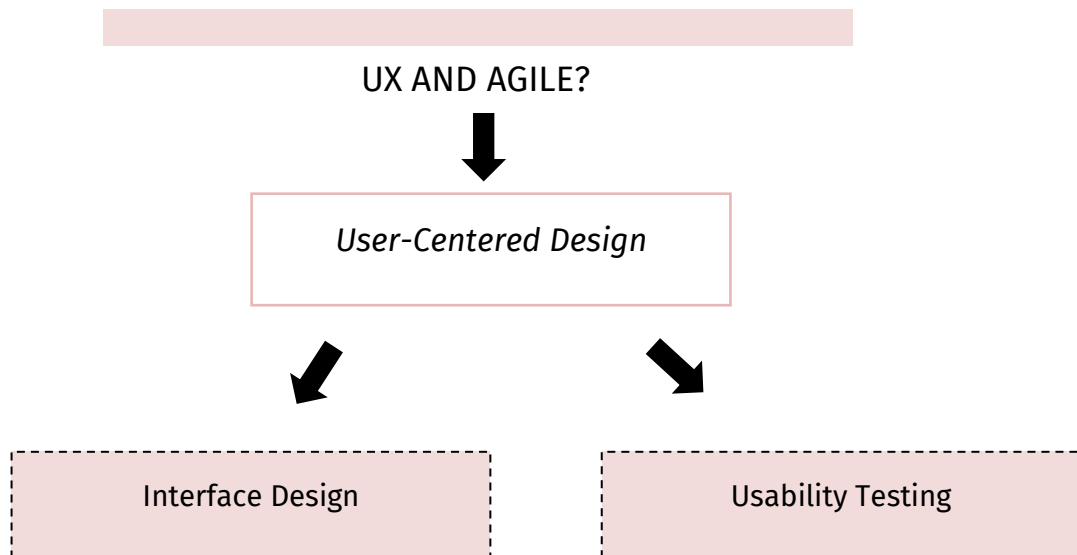
Usability Testing

Figure 3: Diagram showing how UX and Agile are bridged through the use of User-Centered Design

Figure 3 represents how UX and Agile can be combined through the application of UCD attributes of interface design and usability testing.

2.2.5   User-Centered Design

In order to facilitate the successful integration UX into Agile-based projects, a method called User-Centred Design (UCD) can be applied. User-centered design is a term that describes the design process where the end-users of a product or development influence the tasks and activities within the design process (Abras, Maloney-Krichmar and Preece, 2004). UCD makes sure that the end-user's goals and needs of the system are focused on and met by the developed system (Chamberlain, Sharp and Maiden, 2006). When end-users become involved in the development process, the systems created are more effective, efficient and satisfaction and acceptance levels are improved. These factors then reduce schedule and budget constraints.

Before the concept of UCD and Agile can be discussed, the concept of 'design' needs to be understood. 'Design' can be defined as, 'a specification of an object, manifested by some agent, intended to accomplish goals, in a particular environment, using a set of primitive components, satisfying a set of requirements, subject to some constraints,' (Ralph and Wand, 2009). This definition suggests that a 'design' exists to solve a problem, such as a system that meets the needs of the

users. Designers should incorporate creativity into their design solutions in order to increase value to users, which is a principle of UCD, and to foster innovation in technical systems (Carayannis and Coleman, 2005).

There are similarities between UCD and Agile, such as a focus on iterative design phases, an emphasis on user involvement throughout all phases and the significance of team cohesion and goal alignment during the project (Chamberlain, Sharp and Maiden, 2006); (Brhel *et al.*, 2015). These similarities create an opportunity for the alignment of Agile and UCD practices which were shown in an early study by McInerney and Maurer (2005) where they interviewed three UCD experts who worked in Agile-based firms. They found that UCD and Agile generate successful results. Bruun, Larusdottir, Nielsen, Nielsen and Persson (2018) confirmed McInerney and Maurer's (McInerney and Maurer, 2005) findings when they examined the role of UCD analysts in an Agile-based environment.

UCD differs from Agile as it tries to support and understand the user, instead of forcing the user to use the system in a specific and rigid manner (Rubin and Chisnell, 2008) (Chamberlain, Sharp and Maiden, 2006). UCD is driven by consistent and continuous end-user feedback of the system and the iterative refinement of system design concepts and prototypes (Brhel *et al.*, 2015). In their book, *'Handbook of Usability Testing,'* Rubin and Chisnell (Rubin and Chisnell, 2008) note that there are three basic principles of UCD:

1. **An early focus on end users and the activities they perform**: the users and the system design team should always be in direct contact with one another throughout the design project lifecycle. There should be an ongoing consultation process between the designers and the end-users, instead of only short periods of interaction. This consultation process should be a systematic approach that collects necessary information from the end-users through various form, such as interviews.
2. **Evaluation and measurement of system usage**: in this principle, Rubin and Chisnell (2008) emphasize that a system should be easy to learn and use

even in the beginning phases of the system design. This is achieved through obtaining feedback from the users at every stage of system prototyping. This ensures that users can give accurate feedback from the early stages of the project.

3. **Iterative design**: this principle emphasizes that a designer, or design team, should be prepared to redesign and rethink their design at any stage of the project due to feedback. This is done through early testing of conceptual models and design ideas with the users and adapting these based on their feedback. If a designer or design team is not prepared to accept that they may need to rethink their design, then iterative design becomes useless in the project and the chance of failure increases.

These three principles aim to guide the designer before they have even begun to design the system prototypes so that the system project process can proceed with UCD already at the centre of the project. Table 1 offers a summary of the above-mentioned principles.

UCD Principle	*Description*
1. **Early Focus on end users and their activities**	There should be an ongoing consultation process between system designers and end users throughout the project lifecycle.
2. **Evaluation and measurement of system usage**	Feedback from end users should be obtained at all stages of the project lifecycle to ensure that the system is easy to learn and use in all phases.
3. **Iterative Design**	The design team should always be prepared to rethink/redesign the system based on end user feedback.

Table 1: Summary of the User-Centered Design Principles

In order to create an UCD project, a designer can employ a variety of methods to help place the user at the centre of the process (McKenna, Staheli and Meyer, 2015)

(Maguire, 2001). Rubin and Chisnell (2008) and Abras, Maloney-Krichmar and Preece (Abras, Maloney-Krichmar and Preece, 2004) highlighted some of the major methods:

- **Ethnographic research**: this is a research strategy where the designer would immerse themselves within the environment of the user. A designer would observe the users in the environment in which they would use the system, such as at their employment environment. In this observation process, the designer would gather information related to the user such as their goals and activities for the system and the state of their work environment. From this gathered information, the designer can create a detailed profile about the user, personas, scenarios and activity descriptions that the designer and their design team can use to make design decisions throughout the project lifecycle.

- **Participatory design**: as the name suggests, participatory design is when the users become participants of the design and get placed into the system design team as a representative of the end-user. Participatory design places the user into the design process at all times and they can give constant feedback and testing results at any stage of the design lifecycle. It also gives the designers access to the user's knowledge and experiences at all times on which they can base their design decisions. Sometimes this technique is shortened to focused workshops where all members of the project team (designers, developers and end-users) participate on the design for a designated time period.

- **Focus group research:** this is used in the earlier stages of the project. This method can be used in two ways. In one way, the designers explore the characteristics of the proposed end-user of the system in order to confirm if the representative of the end-user is accurate for the conceptualised system. The other goal of focus group research is to discover if the concepts of the system are appropriate for the end-users and in what way the system is good or bad and any improvements that can be made to alter these.

- **Surveys:** surveys help the designer or design team to understand the preferences of a wide user base about an existing or a potential system. It is

used to obtain a large amount of data about a specific population and the goal is to obtain a general solution that applies to larger populations. This method is most often used in the earlier stages of a project and it is important to note that a survey must be conducted in the most linguistically-accurate manner possible to obtain usable results.

- **Walk-throughs:** in this method, the designer or design team has already identified the end-user of a system and what the user's goals are for the system. With this information, the designer envisions the user's typical route through a system and explores how the user will accomplish their goals through this process. Designers and design team members assume different roles and record each other as they make their way through the user's assumed route through the system, making sure to record any difficulties or concerns. It is suggested to bring in a real end-user to participate in this process.

- **Paper Prototyping:** in this method, mock-ups of the proposed system are drawn pieces of paper in order to display screen flow and layout of the proposed system. These mock-ups are then shown to the end-user and they are asked questions on the paper prototypes. By allowing the user to interact with the paper prototypes, vital information can be quickly collected. In this way, a designer can rearrange the design before any sort of development work has begun and less time needs to be spent on rewriting code.

- **Expert or heuristic evaluation:** an expert evaluation of a system involve a review of a system by a specialist who has no affiliation with the project, designer or design team or with the user. The specialist will use accepted usability principles, as shown in table 1, human factors literature and previous experience in order to create a review of the system. This specialist will employ the perspective of the target end-user when creating the review. Often the specialists are experts in their field and thus can give an effective review on the system if it falls within their area of expertise.

- **Usability testing:** this method involves the collection of information while observing the end-users of a system interacting with the system. Usability testing consists of two approaches, one which conducts testing to confirm or

refute a hypothesis and one which incorporates iterative design cycles in the project lifecycle. This method is explained in greater detail further on in the literature review.

- **Follow-up studies:** this method occurs after the system has been released and mainly serves to gather information that can be used to improve the system on its next release or for future systems. This method often gives the most accurate description of a system's usability as the system is already in place at the user's environment and the user is constantly interacting with the system without needing to adhere to any specific tests.

These methods are useful to designers and businesses that are looking to include the user as their central point in the UCD process.

Two aspects of UCD will be looked at in detail. Interface Design (UI) and Usability Testing.

2.2.5.1 User Interface Design

An important factor in UCD, and UX design in general, is User Interface design, or UI design, as the UI is what the user will primarily interact with when engaging with the system (Isomursu *et al.*, 2012). A user considers interface design to be a very important aspect as it is through the interface that they experience and interact with the system (Salvador, Nakasone and Pow-Sang, 2014). Shneiderman and Plaisant (2004) highlighted eight golden rules to designing interfaces in their book, *'Designing the User Interface'.* These eight golden rules were adapted from the book, *'The Design of Everyday Things,'* by Norman Donald (1988) and later revised in 2013. The principles are described as follows:

1. **The goal is consistency***:* Shneiderman and Plaisant (2004)explain that consistency is created when the sequence of actions in various situations occur in the same manner throughout similar systems, or when identical terminology is used in all menus, prompts and messages that are displayed throughout a system. These examples show that consistency is using

reoccurring methods and terminology in order to give users a sense of familiarity and thus create ease of use throughout various systems.

2. **Create universal interfaces for diverse users***: users of a system are not only from diverse ethnic groups and ages, but also have different technological expertise. Some users may be novices, experts or may have never used an information system before. Therefore, a designer needs to acknowledge the needs of these diverse users and design a system for adaptability that can facilitate the transformation of content for these diverse users (Shneiderman and Plaisant, 2004).

3. **Create constant and informative feedback***: Shneiderman and Plaisant (Shneiderman and Plaisant, 2004) emphasize that in a system, for every action the user performs, there should be a reaction from the system in the form of feedback. This feedback can range from modest to major depending on the type of input the user is entering. This feedback can be in the form of messages, notifications, hints or pop-ups depending on the type of input from the user. For example, if a user inputs a field that requires a confirmation, the feedback type can be a major pop-up message, but if a user inputs a field that does not require confirmation, a simple check-mark next to field can suffice for feedback.

4. **Dialogs should be designed to give closure***: users perform an action in a system or interact with a system to accomplish various goals. This process usually has a beginning, middle and end and at the end of their interaction, feedback should be designed to show that the goal has been achieved. Shneiderman and Plaisant (Shneiderman and Plaisant, 2004) give the example of an e-commerce website. A user begins by adding items to their cart after browsing the website and then decides to checkout their items. This leads them to a payment page, the middle process, where they decide on an applicable payment type. Once the payment has been approved, a confirmation page is shown to signify the end of the process. This confirmation page acts as the dialog closure to inform the user that they have achieved their goal, which in this example is buying something from the website.

5. **Take measures to prevent errors***:* a designer should design a system to be as 'user-proof' as possible, as Shneiderman and Plaisant (Shneiderman and Plaisant, 2004) explain, which is a system where users cannot make serious errors. They suggest that designers can grey out areas on the interface where a user cannot interact with or cannot alter or not allow users to enter input that is not appropriate for the field type. If a user does make an error, the system should detect the error and should then offer informative feedback that tells the user what error they made and how to fix the error. For example, a user should not have to retype an entire address if only the house number was entered incorrectly.

6. **Easy reversal of actions***:* while not all interactions on a system can be reversible, as many as possible should allow the user to return to a previous state. Shneiderman and Plaisant (Shneiderman and Plaisant, 2004) state that users can feel anxious if they know that an action cannot be reversed and can thus make unnecessary errors or take longer than needed to complete an action. Ways of implementing this include making buttons that only capture information when clicked so that the user can first review their input before continuing with their interaction. This feature is especially useful when a user is interacting with an unfamiliar system.

7. **Support internal locus of control***:* users who have experience with a system like to feel that they are in charge of the interface that they are interacting with and that the interface is reacting to their input explain Shneiderman and Plaisant (Shneiderman and Plaisant, 2004). A designer should design a system in such a way that makes the users the initiators of an interaction where the system is the responder to their action. A user who feels as though they have no control in their interaction with a system may feel dissatisfied with the system due to this. Examples of taking control away from the user include creating unexpected interfaces, forcing users to input unnecessary and long data, making it difficult for users to find the information they are looking for or simply making it frustrating for a user to achieve their goal.

8. **Try to reduce the load on short-term memory***:* the human mind can only capture and store a limited amount of information in the short-term memory

explain Shneiderman and Plaisant (Shneiderman and Plaisant, 2004), therefore interfaces need to be kept simple and only contain information that is necessary for the user to complete whatever action they need on that interface or to achieve their goal. In order to reduce this load, Sneiderman and Plaisant (Shneiderman and Plaisant, 2004) suggest that multiple-page displays can be consolidated and that sufficient time is allowed when a user needs to perform a sequence of actions.

These eight golden rules should be understood and adapted for the environment that they need to be used in and for the users that the system is designed for (Abras, Maloney-Krichmar and Preece, 2004). However, these principles provide a solid groundwork for designers in order to design and create the best system for their intended end-users.

The UI Design Principles are summarised in table 2.

UI Design Principle	Description
1. **Consistency**	Events that occurred within the system should follow the same sequence, or similar terminology should be used so that users can understand system actions even when they are unfamiliar with or new to the event.
2. **Universal Interfaces**	Users are diverse; some are novice technological users, while others are expert. Users come from diverse cultural and social backgrounds and thus, interfaces need to be designed in such a way that they can facilitate these diverse users.
3. **Feedback**	Feedback should be informative and constant in order to guide a user.
4. **Dialogs**	A system should inform a user when they have completed an action or goal so that the user is given closure that they have successfully or unsuccessfully completed their goal or action.
5. **Error Prevention**	A system should be designed in such a way that a user cannot commit a serious error. All unsuitable actions should be clearly marked and a user should always be informed of their error and how to rectify the error.

6. Easy Reversal of Actions	A user should be allowed to return to a previous point in the system.
7. Internal Locus of Control	A system should be designed in a manner that gives a user control over their actions and the system merely reacts.
8. Short Term Memory Load	The human brain is only capable of remembering a certain number of things within their short term memory. A system should not oversaturate the short term memory in order for a user to be able to complete an action or goal.

Table 2: Summary of the UI Design Principles

2.2.5.2 Usability Testing

An aspect of UCD is usability testing, which remains the most implemented UCD method (Maguire, 2001); (Williams and Ferguson, 2007); (Kollmann, Sharp and Blandford, 2009); (Isomursu *et al.*, 2012); (Salvador, Nakasone and Pow-Sang, 2014). The word 'usable' can be defined as something having the absence of frustration when it is used (Rubin and Chisnell, 2008). In their book, 'Handbook of Usability Testing', Rubin and Chisnell (2008) define usability when, "the user can do what he or she wants to do the way he or she expects to be able to do it, without hindrance, hesitation, or questions" and therefore a product needs to allow a user to achieve their goals in the way they expect to be able to achieve these goals. This definition of usable supports Snheiderman and Plaisant's (Shneiderman and Plaisant, 2004) UI principle of 'internal locus of control' where the user has control over all their actions within an interface. Rubin and Chisnell (2008) explain that in order for a product, or in this case an information system, to be usable it needs to be useful, efficient, effective, satisfying, learnable and accessible. They give a brief description of these attributes:

- **Efficiency**; the speed in which the user can achieve their goal when using the system with appropriate accuracy. This attribute usually involves a measure of time that will be used as the benchmark when testing the usability of the system. An example of this measure includes, "Most users will be able to complete x function within ten minutes" where x can be any function specific to a system.

- **Effectiveness**; this attribute refers to whether or not the system functions and responds in the way in which the user expects it to and how easily the users can use the system in the way they want. This attribute is a quantitative measure that includes an error rate. An example of this attribute is, "90% of users will be able to achieve x function on the first try" where x function is any function of the current system.

- **Satisfying**; this attribute is an individual based and is concern with the user's perceptions, emotions and opinions of the system. These user specific details can be captured in the form of interviews. If a system satisfies a user's needs for that system, then the user is more likely to achieve good results with the

system. An example of how to test how satisfying a system is, is to ask the users to rate the system based on a specific and appropriate scale in comparison to other similar systems.

- **Learnable**; this attribute refers to how well a user can use a system after a period of time. This attribute takes prior experience and training into account when testing for this attribute, but a user should be able to quickly grasp the basics of a system either by themselves or after some training. This can also refer to how well a user can use a system even after a time period of not interacting with the system.

- **Accessibility**; this attribute is a broader term and refers to how users of different capabilities can access and use the system. The system should be able to cater for users with permanent or temporary disabilities.

These attributes all contribute to helping designers create a usable system that will satisfy the needs of the users and form a large part of UCD. Table 3 summarises the usability testing attributes.

Usability Testing Attribute	Description
1. Efficiency	A measure of time that indicates the speed in which a user can achieve their goal on the system using the appropriate accuracy.
2. Effectiveness	The way in which the system responds in the way the user expects the system to respond.
3. Satisfying	The user's perceptions of the system and their emotions when using the system.
4. Learnable	How well the user can use the system after a period of time. This attribute is aware of previous experience, but the user should be able to grasp the core design of the system.
5. Accessibility	How well the system can function for users who have various disabilities.

Table 3: Summary of the Attributes of Usability Testing

It is important to include usability testing as not only does usability testing add to the overall profitability of the system, it also positively impacts the users by providing them with a system that has minimised frustration (Rubin and Chisnell, 2008). Rubin and Chisnell (2008) and Abras, Maloney-Krichmar and Preece (Abras, Maloney-Krichmar and Preece, 2004) explain that there are three main benefits to usability testing that affect the user and the business or organisation:

1. **Informing Design:** this factor manly benefits the users of a system as usability testing's primary goal is to fix usability deficiencies in a system by

obtaining feedback from the end-users so that systems are easy to learn, valuable to their end-users, add to the productivity of end-users and are satisfying to use for the end-users.

2. **Elimination of design problems and frustration:** this factor influences both the end-user and the business. By eliminating end-user frustration when using a system, you increase profitability as it creates a positive relationship between the end-users and the business, it creates an expectation that systems that originate from a specific business are of a high quality and thus builds customer loyalty by showing that the business cares about the goals of their end-users.

3. **Improving Profitability:** this factor influences the business the most and is one of the primary factors for a business to include usability testing. By incorporating usability testing, a business can create a record of benchmarks to use for future reference so that all future systems are already based on a specific usability standard. Usability testing also minimises the cost of service and support calls as less users need support when a system is easy to use or easy to learn. When a system is usable, a user is more likely to recommend the system to their peers which increases the profitability of a system. If a user is satisfied with a system, there is an increased chance of customer loyalty in the sense that the user is more likely to purchase another system from the business. Usability testing gives a business a competitive edge as it becomes a way to separate one system from another. If two systems have the same functionality, then a user will choose the system that is the easiest and best for them to use. Finally, usability testing decreases product risk. Because a system has been tested prior to release, there is much less of a risk of the users being unable to use the system and creating backlash.

These three benefits are summarised in figure 4.

BENEFITS OF USABILITY TESTING

Informing Design	Elimination of Design Problems and frustration	Improving Profitability
Feedback from end users fixes usability deficiencies and creates end user satisfaction.	The elimination of end user frustration	Creates a future-use usability standard for new projects.
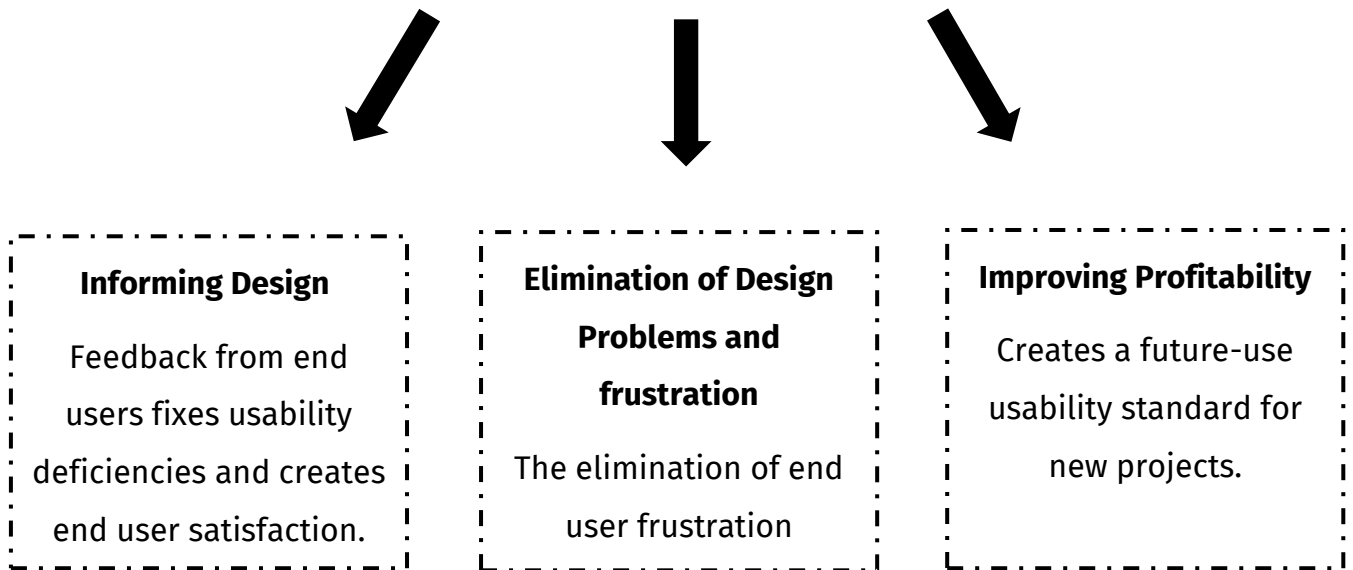
Figure 4: Benefits of Usability Testing

Usability testing has the added benefit of being able to change the design and development process so that it changes people's attitudes about users (Dumas, Dumas and Redish, 1999). This is due to the participants of usability reflecting the real end-users of a system and their feedback alters the design process in ways that may have not been planned. If participants are not the same as the intended end-users, errors and inconsistences will be found later when the real end-users interact with the system due to the designers receiving feedback from the incorrect sources (Dumas, Dumas and Redish, 1999). This was often caused because the traditional software developer was not always known for their social and interpersonal skills and thus they typically solved a functionality problem, but did not pay much attention to the usability of their solution (Rubin and Chisnell, 2008). In previous years, Rubin and Chisnell (2008) noted that designers mostly designed systems that were for users similar to themselves. Thus, the designers felt that they did not need to consult the end-users as they felt they completely understood the needs of the user. Usability testing attempts to alter these mindsets by placing the correct end-user directly in the design process, which is the greater goal of UCD.

However, methods are not the only factors to consider when trying to incorporate UX into Agile systems development. 'People' factors also need to be taken into account, this is the perspectives of both the developers and the UX designers. To successfully integrate the principles of Agile and UX together, two categories need to be considered; bringing people together and coordinating the work practices between developer and UX designer (Plonka *et al.*, 2014). The concept of bringing people together entails creating cross-functional, co-locational teams which are vital to the success of Agile, yet there is a challenge in the communication between developers and UX designers (Plonka *et al.*, 2014). This conflict can be resolved by getting UX designers to integrate with the development team and the development process, such as attending meetings or planning sessions (Plonka *et al.*, 2014). Plonka (2014) discovered that, by integrating UX designers into the development process and exposing developers to design led to improved visibility and transparency of the work that both parties created.

The second category of aligning developer and UX designer work practices includes using techniques from one discipline in the other, by combining agile and UX design processes, such as including UCD in Agile systems development. As UCD is focused on making the user involved in the development process and creates more successful systems, it is logical to incorporate this process into Agile, where iterations happen rapidly and too much back-tracking will lead to schedule delays. In order to successfully complete this integration, UX designers and developers need to be aware of and understand the processes and techniques of the other party(Da Silva *et al.*, 2012). There are a large multitude of UX techniques, such as questionnaires, self-reports and heuristics (Vermeeren *et al.*, 2010). However, not all these techniques can be used and UX techniques that can be used in Agile include personas, discount usability and scenarios as these techniques help to give the developer a constant reminder of the 'people' or users they are developing the system for (Plonka *et al.*, 2014). An example of how UX designer processes and developer processes can be combined is shown by U-Scrum, which adapts scrum, an agile technique, to promote usability which is an aspect of UX (Da Silva *et al.*, 2012).

In order to improve cohesion of UX designers and developers was investigated by Isomursu (2012) where they observed the development and UX teams in Nokia, a global company. Through an interview, the researchers concluded that the following aspects were important to cross-sectional teams: the organization of teams, scheduling design and implementation into sprints, collaboration with the development team and separating UX design from implementation. These aspects are reinforced in the other literature regarding UX and Agile development teams such as organizing teams that comprise of both UX professionals and developers as well as integrating UX and Agile techniques.

By combining the techniques and processes of both Agile and UX together, as well as resolving the communication needs between UX designers and developers can lead to the production of better-designed software systems than those designed by the previously used waterfall approach (Da Silva *et al.*, 2012). The majority of development teams feel that usability and UCD practices bring added value through improvements in the quality and usability of the end system that they have designed (Isomursu *et al.*, 2012).

2.3   ATTITUDE, BEHAVIOUR AND INFLUENCE

Attitude, behaviour and influence will first be defined in section 2.3.1 followed by a discussion on the existing attitudes towards UX in section 2.3.2.

2.3.1   Attitude, Behaviour and Influence

An attitude, which can be positive or negative, is developed by someone towards a certain thing or concept which is affected by experience or preconceived ideas. An attitude is understood as a persons' overall evaluation of an object or concept (O'keefe, 2002). Attitudes are also thought to serve some specific functions, such as securing utilitarian outcomes, ego defence, value expression and social adjustment (Wood, 2000). Attitudes are important to consider as an individual's attitude towards a specific object or system will influence the individual's responses towards the object or system (Ajzen and Fishbein, 1977). Attitudes can be defined as incorrect

when they are maladaptive and have negative behavioural, affective and cognitive consequences (Petty and Cacioppo, 1986). These maladaptive attitudes can cause a person to perceive a person or concept as 'good' when they are actually 'bad', or vice versa, and this incorrect attitude can cause incorrect behavioural consequences. In applying this concept to UX, a person can hold a maladaptive attitude towards UX, which can influence how they respond to a UX designer or any of the UX practices.

A behaviour is a performed action towards an object and behaviour should be consistent with attitude; if an individual has a certain attitude towards something, their behaviour should exemplify this. A person who has a negative attitudes towards something should behave negatively, while if they have a positive attitude towards something, they should behave positively (Ajzen and Fishbein, 1977). From this, Ajzen and Fishbein (1977) argue that there is a high correlation between intention, attitude and behaviour. It is suggested that behaviour is a conscious action of the individual performing the behaviour and it is under the control of the behavioural intention (Feldman and Lynch, 1988). However, some behaviour is considered 'mindless' as stated by Feldman and Lynch (1988) and these behaviours are when little thought process is involved or if the behaviour is a repeated behaviour; such as going to school or work every day. The Theory of Planned Behaviour, composed by Icek Ajzen in 1991 expands on behaviour and behavioural intention. Behavioural intention is a central factor in the theory of planned behaviour as intention is the degree of motivation an individual has towards performing an action or the amount of effort an individual is willing to exert in order to perform an action or behaviour (Ajzen, 1991). The stronger the motivation or the intention is, the more likely the behaviour is to be performed by the individual, but the motivational should be voluntary and the individual should not be coerced into the behaviour, but rather to perform the behaviour wilfully (Ajzen, 1991). This factor can be impacted by previous experience. Behaviour is the action that is performed based on the factors before it (Ajzen, 1991). It is predicted by the factors of attitude, norms, perceived intention (what the intention is expected to be) and behavioural intention as described in the Theory of Planned Behaviour.

Influence attempts to change a perception or notion towards something and can be accepted in three different ways; compliance, identification and internalization (Kelman, 1958). Compliance is when an individual accepts influence due to wanting to attain positive social validation from another person or group. In this way, the individual might not believe in the newly accepted attitude, but they expect to gain specific rewards or avoid specific negative consequences (Kelman, 1958). According to Kelman (1958), identification happens when an individual accepts influence to change their attitude due to wanting to establish or keep a satisfying self-defining relationship with another person or group. In this case, the individual does believe in the newly accepted attitude, but the content of the attitude is irrelevant because the individual desires the relationship. Finally, internalization occurs when an individual accepts influence to change their attitude because they believe that the content of the new attitude is internally rewarding and it aligns with their value system or needs (Kelman, 1958). A UX designers should attempt to influence a stakeholders' acceptance of UX while being aware of these three factors. If a stakeholder accepts UX through compliance, they may only accept UX when they are required to, but not in any other spectrum. If a stakeholder accepts UX through identification, the designers needs to be aware of the relationship between themselves and the stakeholder in order to maintain the positive attitude. A UX designer should attempt to persuade or influence an attitude change through internalization as the stakeholder would not require additional persuasion or observation in order to accept UX as it aligns with their internal values.

2.3.2   Existing Attitudes towards UX

Plonka (2014) evaluated some perspectives of developers towards initial UX designs and their responses gave insight into their attitude towards UX. Many developers felt that the initial designs of UX were unnecessarily detailed and they gave reasons as to why they felt that. These reasons included the fact that pixel-perfect designs can lead to a waste of time, that some issues with the design of a system will in any case only be found once the system is implemented, if designs are pixel perfect then there

can be resistance towards making design changes in order not to disturb the design, that it is better to focus on quality first and then spend time on design and that quality of design can be positively impacted by early input from developers who have knowledge of design guidelines.

There is an existing difference in attitude to UX between UX designers and end-users. End-users tend to only consider the final product as 'UX', while UX designers consider the environmental and emotional aspects of UX (Jääskeläinen and Heikkinen, 2010). This difference can create difficulties for UX designers to convey the importance of good UX work throughout a project due to the end-users' focus on a single aspect, such as the interface (Salvador, Nakasone and Pow-Sang, 2014)

In South Africa, the UX landscape was surveyed in 2015 by Pretorius, Hobbs and Fenn. They noted that a need for user experience was becoming apparent in industry, but that it was immature in terms of formal UX education, usability and user research. 105 UX practitioners were surveyed. In the survey they focus on discovering the work experience of the participants, their education, current UX job titles, salaries and challenges. In order to determine the attitude towards UX, the challenges section will be looked at.

Pretorius, Hobbs and Fenn (2015) reported that five specific challenges stood out the most:

1. UX buy-in
2. Time constraints
3. Lack of skilled UX staff
4. Process challenges
5. Budget

Within these challenges, there were UX-specific factors that contributed to these challenges. There was a lack of user research and usability testing in UX practitioners' workplaces as respondents pointed out that their organisations found

usability testing to add to the time constraints. There is a lack of UX-culture within organisations, which leads to perceptions that usability testing only serves to add to time constraints of a project. This lack of UX-culture in organisations is shown as only 50% of the participants stated that they have formal UX documentation, while only 44% of the participants have some form of UX integrated into their project lifecycles (Pretorius, Hobbs and Fenn, 2015).

These factors seem to display a negative and uninformed attitude towards UX. A lack of UX buy-in demonstrates that organisations do not see the value of UX and is backed by the statement that usability testing is only seen as time consuming and that other UX activities are ignored. Pretorius, Hobbs and Fenn (2015) also found user requirements were not balanced with organisational goals, which implies that the user is not a central focus of organisations.

None of the factors promote a positive UX landscape. However, the authors did note that while there are challenges, the field of UX has grown as many major organisations, such as banks and consulting firms, have begun to include UX-related teams and programmes (Pretorius, Hobbs and Fenn, 2015).

2.4   CONCLUSION

The literature review is a detailed description of all factors that influence the research field of the thesis. By providing an explanation of UX, UX in projects and attitudes, an understanding of the environment of the problem statement is created. The literature review also provides a basis on which the results of the data collection and analysis are reflected upon. This basis includes an understanding and definition of UX, how UX is integrated into Agile projects. UCD forms the binding factor between UX and Agile, specifically in terms of usability and interface design. Finally, attitude and behaviour were explained in order to determine the current view of the UX landscape in South Africa.

The following chapter will give an overview of the theoretical frameworks utilised in this study.

Chapter 1: Introduction

This chapter includes the problem statement and background information.

Chapter 2: Literature Review

This chapter includes all aspects of the literature review:

- What is UX?
- UCD (User-Centered Design)
- UX, UCD and Agile
- Attitude and Behaviour

Chapter 3: Theoretical Framework

This chapter includes the theoretical framework:

- PCT (Personal Construct Theory)
- The Six Principles of Persuasion

Chapter 4: Research Methodology

This chapter includes the research methodology used as well as ethical research practices.

Chapter 5 and 6: Results

These chapters include the results of the data collection period as well as an in-depth analysis.

Chapter 7: Conclusion

This chapter includes the results of the data collection period as well as an in-depth analysis.

CHAPTER 3 THEORETICAL FRAMEWORK

3.1   INTRODUCTION

In order to discern how UX designers can persuade stakeholders to adopt a more UX centred approach, this chapter will present Personal Construct Theory (PCT) and the Six Principles of Persuasion and. When an individual is exposed to something, they develop an attitude towards it. In order to understand how this attitude is created, PCT is used as a lens to understand how an individual (software development stakeholder) makes sense of their world and how they create the 'constructs' within their world. By understanding a software development stakeholder's construct of something, in this case UX, the Six Principles of Persuasion can be used to alter that construct accordingly.

PCT, the concept of persuasion and the six principles of persuasion will be discussed in the sections 3.2, 3.3 and 3.4. A motivation for the use of PCT and the persuasion principles is given in section 3.5.

3.2   PERSONAL CONSTRUCT THEORY

The Personal Construct Theory was created by the psychologist George Kelly in 1955 in response the psychological research field at that time (Slattery, Simpson and Utesheva, 2013). PCT attempts to understand how an individual creates and uses their own personal constructs to understand and interpret the world around them. In addition, it seeks to understand how an individual's personal experiences influence these personal constructs (Tan and Hunter, 2002). This personal construct system can be re-invented over and over again based on an individual's world and experiences and can either be well designed or badly designed (Embacher and Buttle, 1989). Hassenzahl and Wessler explain how this theory works in their paper, 'Capturing Design Space From a User Perspective: The Reparatory Grid Technique Revisited' by stating that an individual may look at two cars and decide that they are different. Therefore the individual will create personal constructs that differentiate the two vehicles, such as fancy or conservative (Hassenzahl and Wessler, 2000). From

this example, Hassenzahl and Wessler (2000) explain that the personal constructs that the individual creates gives an understanding into the individual's perceptions and concerns and the attributes that the individual used to differentiate the two vehicles gives an insight into the vehicles.

PCT attempts to understand these personal constructs by expanding on a base theory and eleven corollaries. This basic theory states that, "a person's processes are psychologically channelized by the ways in which he anticipates events" (Kelly, 1970) and that the individual is an event and thus has processes that express their personality (Slattery, Simpson and Utesheva, 2013). The eleven corollaries are based on the base theory and after these corollaries, there are applicability limited notions, such as guilt, anxiety, hostility, decision making and creativity that are derived from them (Kelly, 1970). The eleven corollaries will be listed and explained and then an explanation of the notions will follow. The eleven corollaries as designed by George Kelly (1970) are:

1. **Construction Corollary:** this corollary incorporates an individual's prior experience of an event and how they use this experience to predict how to react to a future event. However, Kelly (1970) explains that these events are not perfectly reoccurring and thus an individual needs a construct that allows them to create similarity between events in order to know when to use this predetermined reaction. This construct also needs to allow an individual to realise how the events are different, although they are similar.

2. **Individuality Corollary:** this corollary explains that while two individuals may experience the exact same event, their perception and interpretation of the event will always be different in some manner, whether it is vastly or not. Kelly (1970) states that two individuals would never likely have the same construction over a particular event and that their two constructions may never form a logical relationship if the two constructs were compared.

3. **Organization Corollary:** an individual may create many personal constructs based on their environment and will thus create a way to organise these constructs in systems that are flexible depending on the situation (Tan and Hunter, 2002). An individual will arrange or organise their constructs into

systems so that they may move from one construct to another in a logical fashion. This process may be done by assigning a priority ranking to constructs or by creating relationships between certain constructs so that when one occurs, they know which construct will occur next. Kelly (1970) states that this corollary is what causes an individual to make their commitments take priority over an opportunity as their commitment has a higher status in their organisation corollary.

4. **Dichotomy Corollary:** this corollary states that a construct is rigid with no room for change, a construct is 'black and white' and has no leverage for any shades of grey in-between explains Kelly (1970). A construct is a differentiation between two things, thus they cannot be similar. This is due to the fact that a corollary is not based on nature, but on the individual who created them and these constructs are not a representative for something in the same manner of a flag or symbol of some kind. Kelly (1970) states that the constructs are then reference axes, such as those used in mathematics that an individual uses to plot an event on and thus understand the event. These references axes thus help an individual locate an event and then understand that event and help an individual to expect and decode a future event.

5. **Choice Corollary:** in this corollary it states that if a person makes use of their personal constructs within their environment, then they will make choices that improve and develop their created personal constructs. Kelly (1970) states that an individual may do this by defining or expanding upon a construct based on how important and useful that construct is to the individual. An individual defines a construct by defining how the construct is applied to something or how things are linked with each other. An individual expands their construct by finding new manners or methods in which to apply the construct. No matter whether the individual defines or expands their constructs, when they make a choice it involves only the individual's actions. Kelly (1970) states that, "the choices that men make are the choices of their own acts, and the alternatives are distinguished by their own constructs."

6. **Range Corollary:** an individual only has their own environment on which to create constructs and experience events and thus constructs are finite and can only cater to a finite range of events. An already created construct can only assist an individual for a finite number of events and cannot apply to every single possibility of events. Through experience, an individual may create a construct that applies very successfully to a specific set of events, but if that range of events was expanded, the construct would have less and less success as more variables are applied and unexpected occurrences happen.

7. **Experience corollary:** as an individual ventures through various events, they create experiences of the event and an individual's construct system varies and changes as the individual then applies these experiences to understand similar events that occur. Kelly (1970) explains that, "the unit of experience is a cycle embracing five phases; anticipation, investment, encounter, confirmation or disconfirmation, and constructive revision" . The constructs are then affected in three different ways; the construct may change its position in the individual's construct system, the individual may apply a different distinction to the construct or the construct's relation to the individual's other constructs could be changed. Kelly (1970) further explains the first way of change through an individual moving to another suburb. In their new suburb, their neighbours will have different mannerisms and through experiencing these new actions, the individual may change their perception of them from, 'unfriendly' to 'friendly' or vice-versa. To describe the second way of change, Kelly (1970) states that instead of changing an action from unfriendly to friendly, the individual may begin to associate the action as friendly due to their new environment, even if it is not friendly. To describe the third way of change, Kelly (1970) states that through their experiences in their new suburb, they may change their definition on what the term 'friendly' actually is and what it means to the individual. It is in this corollary that the notion of hostility exists.

    a. **Hostility:** the experience corollary explores how an individual may change their constructs based on the experience they receive from

events and this process may be arduous, especially if a core construct is involved in the change process. If the individual is unable to adapt this construct based on the modulation corollary then the individual will experience a form of hostility. When facing this hostility, they may direct this hostility to another individual in order to resist changing their construct, especially if the change occurred due to failure. Therefore, PCT and Kelly (1970) define hostility as, "the continued effort to extort validational evidence in favour of a type of social prediction which has already proven itself a failure".

8. **Modulation Corollary:** the experience corollary explains how experiences affect an individual's constructs and the modulation corollary explains the extent to which these experiences will influence an individual's constructs. The extent to which an individual's construct system allows for reinterpretation will determine the impact of the experience on the construct system. If an individual's construct system is not open to unexpected or novel events or experiences then it may fail to alert the individual that they have encountered a new event. This corollary is also affected by an individual's openness to consider the value of new or novel events.

9. **Fragmentation Corollary:** the corollaries create an expected course of constructs or a construct system that an individual will employ in order to interpret current or future events. However, Kelly (1970) states that these systems may be inferentially incompatible with one another in the sense that a contradictory action may be taken despite previous actions being consistent (Tan and Hunter, 2002). Kelly (1970) explains this by using the example of an individual using an action of love then moving to an action of jealousy which then leads to an act of hate. Love and hate are seen to be two contradictory actions and the individual may be referred to as irrational.

10. **Commonality Corollary:** this corollary incorporates the extent to which one individual's construct system and how they employ it is similar to another individual's own construct system. While the construct systems might not be similar event-wise, the psychological processes behind the constructs may be similar. This corollary does not indicate that the two individuals have

experienced the exact same events and that their construct systems are even remotely similar, but that their processes in creating the constructs are similar and this relies on their construction of experience; how do they psychologically define and interpret an experience and how similar this process is. Therefore, Kelly (1970) states that although two individuals have not experienced the same events and have experienced events that are vastly different, they may end up with similar construct systems based on how they interpreted their events.

11. **Sociality Corollary:** the sociality corollary explains that while an individual's personal constructs are not always similar to another's, if the individual understands the constructs of another, the two individuals will be able to interact well with one another (Tan and Hunter, 2002). Kelly (1970) explains that the individual may not be able to accurately predict how the other individual developed their constructs, what events and experiences they were a part of, but may infer the processes that the other individual went through in order to develop their constructs. It is in this corollary that the notion of guilt is placed.

    a. **Guilt:** Kelly (1970) believes that a true definition of guilt can be found within the sociality corollary. In previous literature, guilt is usually ascribed as some form of punishment to an event, a negative emotion. In a PCT sense, guilt is defined as, "the sense of having lost one's core role structure" (Kelly, 1970). Kelly (1970) then defines a core structure as, "a basic referent of life itself. Without it a person has no guidelines for staying alive". Within the sociality corollary, when an individual feels guilty, they have lost their understanding of others.

Through these constructs, an understanding of an individual's world can be formed. Within the context of UX, if a UX designer understands an individual's constructs, they can adapt their strategies based on this to create successful outcomes. If a UX designer can find the correct persuasion technique to interact with the experience corollary to influence the choice corollary, then they can expect an attitude change. Figure 5 depicts the eleven corollaries of PCT.

Personal Construct Theory

The way an individual constructs their understanding of their universe

Sociality Corollary: if two individuals' constructs are similar, they will interact well.

Construction Corollary: how prior experience influences future events.

Individuality Corollary: the difference between two individuals' experience of the same event

Commonality Corollary: the similarity between two individuals' construct systems.

Organization Corollary: the organization of an individual's constructs.

Fragmentation Corollary: despite possessing an expected course of action, an individual may take a contradictory action

Dichotomy Corollary: the rigidity of a construct.

Modulation Corollary: the extent to which experiences affect an individual's constructs.

Choice Corollary: the development/evolution of a corollary based on use.

Experience Corollary: the five phases of creating an experience.

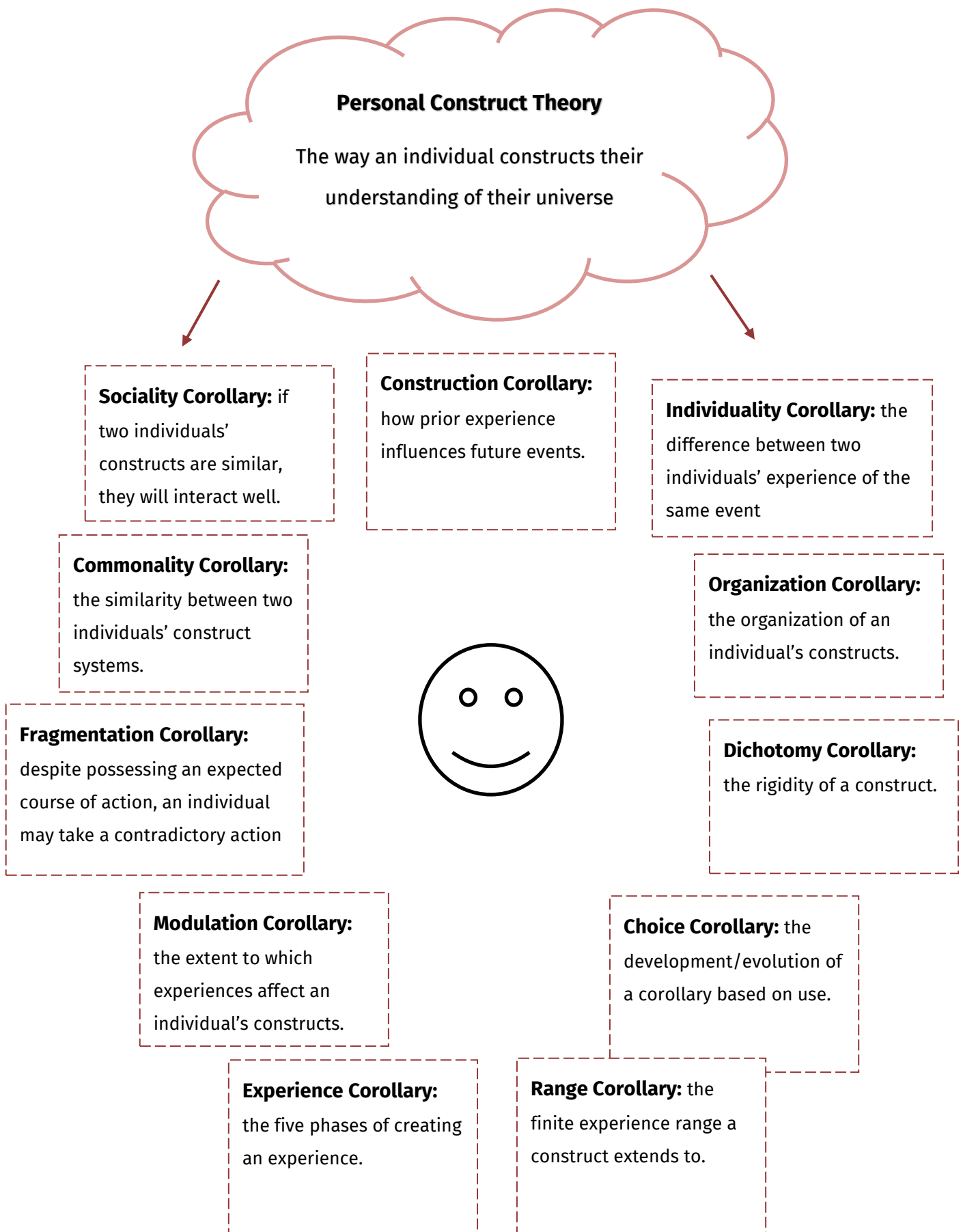**Range Corollary:** the finite experience range a construct extends to.

Figure 5: Diagram depicting a summary of the Personal Construct Theory corollaries

3.3   WHAT IS PERSUASION?

Persuasion involves, "changing a persons' mental states, usually as precursors to behavioural change" (O'keefe, 2002). O'keefe (2002) also states that persuasion is associated with fundamentally changing an attitude towards an object or concept. This can include a change in the valence of an attitude, such as whether an attitude towards something was positive or negative. Persuasion can also be seen as attempting to alter an attitude or behaviour without force or deception (Harjumaa and Oinas-Kukkonen, 2007) and as such, persuasion attempts to change the way an individual feels or act towards a particular thing. This change causes persuasion to be classified as a form of influence (Harjumaa and Oinas-Kukkonen, 2007). In the past, persuasion was a communication process that involved an individual sending a persuasive message to the individual that they were trying to persuade in order to change that individual's attitude or behaviour towards something. Harjumaa and Oinas-Kukkonen (2007) note that an important factor of persuasion is that the final decision to change the behaviour or attitude lies with the individual that is being persuaded. If an individual is forced to alter their attitude or behaviour, then it is not persuasion as persuasion attempts to alter the fundamental mental state towards the object of persuasion. If an individual is forced to alter their attitude or behaviour towards something, their mental state towards that object does not change and they may regard it with even more negativity. In order to alter attitudes and behaviours, persuasion relies on symbolic strategies that elicit emotion from the individual that is being persuaded. Examples of persuasion in IT involve online shopping websites that attempt to persuade a user to buy a certain item using website banners or e-mails sent to the user (Slattery, Simpson and Utesheva, 2013).

In their paper, 'Persuasion Theory and IT Design' published in 2007, Harjumaa and Oinas-Kukkonen (2007) state that there are three types of persuasion:

1. **Interpersonal persuasion:** this type of persuasion is when two individuals interact with one another. One individual is the one trying to the persuade and the other is the one that is being persuaded. This type of persuasion can

occur through both verbal and non-verbal forms of communication and behaviour.

2. **Computer-mediated persuasion:** this type of persuasion occurs through an electronic means of some sort, such as e-mails, instant messaging or social media for example. It still has an element of interpersonal persuasion as an individual still has to send the persuasive e-mail, instant message or social media post. An example of this type of persuasion is an individual writing a persuasive blog post that explains their attitude towards a particular thing with the intent to persuade others to adapt the same attitude as them.

3. **Human-computer persuasion:** this type of persuasion deals with the larger field of HCI and is concerned with how people are persuaded when they interact with a computer. As computers are not autonomous, it is difficult to discern who is the individual trying to persuade the other. However, Harjumaa and Oinas-Kukkonen (2007) explain that in recent research, it has been shown that there are patterns of social communication between an individual and a computer in the form of user agents. User agents are applications that have been designed to interact with individuals, such as web browsers, media players or any form of plug-in that assists in retrieving web-related content for the user.

It can occur that a technique that is applicable within interpersonal persuasion is not applicable in human-computer persuasion, and thus an individual needs to consider the type of persuasion they need according to their environment and its context (Slattery, Simpson and Utesheva, 2013). A digital object is fundamentally different to a traditional medium as digital objects can be unpredictable and can change without notice due to the nature of the digital environment, whereas a traditional medium, such something hand-written, is often regarded as static and unchanging (Slattery, Simpson and Utesheva, 2013).

As UX is concerned with the emotions a user experiences when interacting with a system, human-computer persuasion is applicable. However, for a UX designer to persuade an individual to initially accept UX, interpersonal persuasion and computer-mediated persuasion would be applicable. Forms of interpersonal persuasion could

include the six principles of persuasion as listed below that the UX designer can use to alter an individual's attitude towards UX. Computer-mediated persuasion that a UX designer can use combines the six principles of persuasion with an applicable technology to the principle to use in order to change an individual's attitude towards UX. The UX designer could then use a form of human-computer persuasion to further persuade the individual of the benefits of UX once the primary persuasion has been completed.

3.4   PRINCIPLES OF PERSUASION

The principles of persuasion include reciprocation, consistency, social validation, liking, authority, scarcity and knowledge is power (Cialdini, 2001). These six factors are likened to innate human behaviours and can therefore help in creating a positive response towards a certain object or in this context, UX. By using one of or a combination of these principles, these innate human behaviours can be persuaded to change towards the manner in which the individual exercising these principles wishes. Figure 6 summarises the principles of persuasion before each of these principles will be discussed in more detail.

How can an individual persuade another to change an attitude?
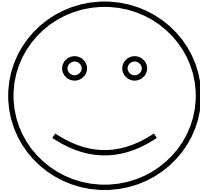
The Six Principles of Persuasion

1 – Reciprocity

If you do something for someone else, they will feel obliged to return the gesture.

2 – Consistency

If you can get someone to do something once, the desire to appear consistent will persuade them to repeat the action.

3 – Social Validation

If many others are doing something, someone is more likely to do it.

4 – Liking

If a person is liked, then they are more likely to persuade another to do something.

5 – Authority

A person is persuaded by someone who is in a higher position or is an expert.

6 – Scarcity

Something is seen as more desirable if it appears to be limited.

Figure 6: Diagram summarising the Six Principles of Persuasion

3.4.1 Principle of Reciprocity

This principle states that a person feels obliged to give back, or reciprocate, what they have received, whether it was expected or not (Cialdini, 2001). According to Cialdini, this principle appeals to a social norm in human behaviour, which is what makes this principle effective as a form of persuasion. It is demonstrated when an organization first gives gifts, i.e. free samples of something, to a person before requesting them to buy a product or donate to the organization. A person begins to feel indebted due to the effort and thus feels the need to reciprocate in some manner or form and this increases the chance of the person donating to the organization or buying a product.

Another aspect of this principle is known as, 'reject then retreat,' or, 'reciprocal concession,' (Slattery, Simpson and Utesheva, 2013). In this aspect, an organization makes a large request and upon rejection of this large request, concedes to a smaller request. This concession creates feelings of reciprocation as the organization is willing to lower their request, therefore a person may feel that they could reciprocate by altering their previous rejection.

3.4.2 The Principle of Consistency

This factor appeals to a person's desire to be and to appear to be consistent (Cialdini, 2001). In this principle, a person is convinced to agree to a small commitment and then later asked to agree to a bigger commitment. Due to the person previously agreeing to the smaller commitment, the person's desire to appear consistent is what persuades them to agree to the greater commitment. This principle can also be shown by convincing a person to make a public agreement to something, such as asking for an RSVP to an event. As the person has already made the RSVP, they will feel obligated to attend the event in order to appear consistent.

3.4.3 The Principle of Social Validation

The principle of social validation is concerned with social acceptance and the influence of group decision-making and group action. By demonstrating that a significant number of other people have already complied with an action or decision, a person can be persuaded to comply with the same action or decision (Cialdini, 2001). Examples of this principle in society are shown when products are packaged with phrases such as, 'Chosen by Experts,' or similar phrases that demonstrates the product's superiority. A person can also be persuaded by the principle of social validation when they are shown how their peers have responded to a certain thing and will thus feel as though they need to respond in the same manner, which is seen as socially acceptable.

3.4.4 Principle of Liking

Cialdini (2001) describes the principle of liking to be a, "feeling of connection between people" which is associated with the words, 'affinity', 'rapport' and 'affection'. In essence, this principle exemplifies the fact if a person is liked by someone, that someone is more likely to agree to a request from that person (Cialdini, 2001). In order to best explain this principle, Cialdini (2001) used the example of Tupperware Corporation and their home party programs, where a salesperson will invite their friends to a demonstration of the Tupperware products. The Tupperware Corporation found that customers were more willing to buy their products from a liked friend, rather than a random salesperson.

Other aspects of this principle include physical attractiveness, similarity, compliments and cooperation (Cialdini, 2001). Physical attractiveness causes a superficial liking towards someone when other factors are not yet known, such as personality or intentions. Compliments refer to praise. If a person is praised by another, their liking towards that person is positively influenced, even if they are untrue or inaccurate (Cialdini, 2001). Similarity involves creating a recognizable connection between two people, such as saying, "I am also a researcher, so would you help or donate to my cause?" Due to the connection, a liking is created as the asker is, 'just like me'

(Cialdini, 2001). Finally, cooperation involves making another person feel as though they are on the, 'same side' as another person, which creates the liking connection (Cialdini, 2001).

3.4.5   The Principle of Authority

This principle involves the use of authority figures or objects in order to persuade a person, such as using academic, business or social credentials or using object authorities, such as wearing a suit, to make yourself appear to be more authoritative to your audience. This is due to people believing that true authorities have greater insight on topics they are unknowledgeable about (Cialdini, 2001).

Authority can be manifested in a number of ways, such as by using the crest of a well-known organization, IBM or Google for example, on your product or using a phrase such as, "Four out of five IT professionals choose this product!" (Slattery, Simpson and Utesheva, 2013). An individual perceives IBM or Google to be knowledgeable on certain topics and therefore trusts that the product is better than a product without IBM or Google's branding.

Authority can also be shown in the extreme. During an experiment investigated by Milgram in 1963, it was seen that authority figures could persuade participants to cause pain to someone using electric shocks simply through their perceived authority (Slattery, Simpson and Utesheva, 2013). There was no negative to not following the perceived authority figure's instructions, but the participants still listened to them and acted according to the principle of authority.

3.4.6   The Principle of Scarcity

The final principle of persuasion relies on rareness, the limitedness or the exclusivity of a product in order to persuade people to use or buy the product. A product or opportunity is seen as more desirable the less available it is (Cialdini, 2001). This is

demonstrated by the use of phrases such as, "For a limited time only!" or, "Only X amount available!", where X represents that the artefact is finite and tries to persuade a person to get the artefact before X amount is gone (Cialdini, 2001). Another example of this is to age restrict something, such as in gaming where more violent games are given age 16 or 18 restrictions. These restrictions give a sense of exclusiveness and encourage under 16s or 18s to want to play the specific game (Slattery, Simpson and Utesheva, 2013).

Not only objects are affected by scarcity, but information can also be affected by the principle of scarcity. Information can be as important as an object or software product. If someone knows what the next greatest innovation is or predicts a potential unexpected change in a market and they are the only ones to know about this, they can use that information as a scarcity persuasion principle to a company that would be interested in the information.

3.5 MOTIVATION FOR THE USE OF PERSUASION PRINCIPLES AND PCT

The six principles of persuasion detail six ways in which a person can persuade another person to accept or use an artefact. These principles have been used successfully in a traditional, or non-digital, manner for an extended amount of time (Cialdini, 2001). Therefore, it stands to reason that these persuasion principles can be used in a digital environment. While the artefact has differed, the basis of the persuasion principle has remained the same. The persuasion principles pay attention to human nature and influencing that human nature more so than the type of artefact.

PCT gives insight into the mind of an individual and how they experience and make sense of their environment. The eleven corollaries attempt to explain and detail the various constructs that an individual may create in order to make sense of their environment. Through the eleven corollaries a UX designer can understand the constructs that an individual may possess and the construct that the individual has

created in regards to UX. Slatterly, Simpson and Utesheva (2013) originally linked the six principles of persuasion to PCT in their paper, 'Online Persuasion as Psychological Transition' and specifically stated that the choice corollary would be fundamental to online persuasion. However, this thesis attempts to expand upon this suggestion in regards to incorporating attitudes and behaviour which link to the experience corollary as well. The experience corollary is likely to affect the choice corollary. If the experience of the individual can be changed so that their UX construct is viewed as positive, then their choice corollary will automatically provision for either expanding or defining the UX construct. Therefore, PCT will provide a UX designer will a solid basis in understanding an individual's mental processes so that they can effectively use the six principles of persuasion to influence these constructs.

In this research, the aim is to help UX designers or leaders to influence software development project stakeholders to accept UX as part of the project process. This influence is not wholly dependent on the digital artefact itself, but on changing a mindset or influencing human nature, therefore the six persuasion principles are appropriate. If a mindset is persuaded to change, then the beliefs toward to persuaded object should also change. If the beliefs have been changed, then the attitudes and behaviour towards the object should remain consistent according to the belief. The influence ties directly to PCT as if the UX designer can leverage the experience corollary of an individual to change their construct of UX, then the construct will influence their behaviour and attitude towards UX. This construct change should be more of a permanent change and the individual will most likely keep the construct due to the nature of how the experience corollary affects constructs. From this point, the choice corollary can be influenced to increase the positivity of the individual's UX construct so that the individual may then influence others.

It is important to create this UX-positive attitude due to the emerging importance of UX in software development projects. If a user is presented two identically functioning systems, A and B, but they find that B offers them a better experience,

they will logically use system B. Therefore, UX offers a unique competitive advantage to companies and should be adapted into all software development projects. A satisfied user also means less development time and less time handling usability issues after the product has been released.

From a basic view, the six principles of persuasion seem to have a link to the stakeholders in a UX designer's work environment. In a typical environment, stakeholders include UX designers, developers, mobile developers, project managers and clients. One or more of the principles can be applied by the UX designers to each of these stakeholders. The principle of liking and reciprocity can be applied by the UX designers to their co-workers, namely the developers and mobile developers. If the UX designers can make themselves likeable to their co-workers, then the principle of liking applies. If the UX designers can demonstrate how UX improves the lives of not only the end-users, but that of their co-workers then the principle of reciprocity applies. In the case of project management, the principle of consistency and liking can apply. If the UX designers can use the principle of consistency to persuade project management to include UX in one project and then show the benefits of UX, project management will be more inclined to consistently always include UX. In the case of clients, the principles of social validation and scarcity apply. UX designers can demonstrate how a client's peers incorporate UX or show evidence from previous UX successes to persuade a client to accept UX in their project. A UX designer can also use scarcity to include UX by leveraging on the fact that UX is currently not widely used, thus making the client a forerunner. Therefore, the six principles of persuasion are applicable to a UX designer and their environment and are appropriate to use in the context of this study.

The six principles of persuasion also have a link to user experience in general. In the literature review, the concept of co-experience was detailed and expanded upon. The principle of social validation, liking and authority, to an extent, can be linked to co-experience. The principle of social validation and liking directly deal with using

liked or respected individuals to persuade another individual. In the case of social validation, if a respected individual or company has already prescribed to UX and shares their positive experience of UX with an individual or company that has not, this shared experience can influence the non-UX individual or company to assimilate the shared experience as their own, thus changing their perspective on UX or prompting them to want to experience UX themselves. The principle of liking shares a similar concept. If a liked individual shares their positive UX experience, co-experience dictates that the individual they are sharing with can assimilate this positive experience as their own and this can change their attitude towards UX even if they have not previously experienced UX.

UCD, interface design and usability testing are also explored in the literature review. The principle of reciprocity and consistency can apply to these concepts. One benefit of usability testing is that it can create a positive image towards a business that they reliably and consistently deliver usable and quality systems. The principle of consistency appeals to an individual's need to appear consistent. As UX incorporates usability testing, if a company can persuade a customer to use their system that has the incorporated usability testing and the performance is satisfactory to the client, the principle of consistency states that the customer will feel more inclined to use more of the company's products in the future. It can also be shown that if a company is persuaded to incorporate UX and sees the benefits of all its applications, they will be more inclined to be consistent in their usage of UX in future systems.

The principles also link to PCT. As explained earlier, the six principles can be used to influence an individual's constructs as stated in PCT, specifically the experience and choice corollary. The six principles become a method to influence these constructs, which results in an attitude change towards the UX construct that an individual has created. Therefore, the theory used in this thesis tie together well in order to create a coherent relationship between UX, the principles and PCT. Co-experience is also influenced by PCT as co-experience can be used to leverage the

experience corollary. If an individual's social environment is pro-UX, this positive shared experience of UX will influence their experience corollary and the individual's attitude towards UX will slowly adapt to the pro-UX environment.

Finally, UCD and usability offer more tangible and financial UX results that can be used as persuasion to adopt UX in software development environments. The principles associated with these two concepts have already been mentioned, but they offer more incentives to business-orientated individuals and are therefore appropriate as a method to change attitude towards UX.

Therefore, the use of PCT, the principles of persuasion and all other mentioned factors have been explored and have been shown to have a relationship which will aid UX designers in persuading stakeholders to adopt an attitude change towards UX in their environment.

3.6 CONCLUSION

The theoretical framework intends to explain the theories that have been used in order to guide the research. This guidance is required in order to provide a base on which to analyse the data on so that it can produce measurable results. A detailed explanation of PCT and the Six Principles of Persuasion was given in this section in order to explain the relevance of these two theories to the problem statement and the research questions.

The following chapter will explain the research methodology followed in completing this study.

Chapter 1: Introduction

This chapter includes the problem statement and background information.

⬇

Chapter 2: Literature Review

This chapter includes all aspects of the literature review:

- What is UX?
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⬇

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Chapter 7: Conclusion

This chapter includes the results of the data collection period as well as an in-depth analysis.

CHAPTER 4 METHODOLOGY

4.1 INTRODUCTION

This section introduces the research methodology and data collection methods that was used in the investigation. The research design section details the research philosophy and research strategy that was utilised. Sampling and data collection are also included in this section, which details the target population as well as data gathering techniques that have been used.

For the research, an interpretivist research philosophy was used in conjunction with a case study as the research method. Data was gathered through participant observation. The researcher immersed herself in a UX organization's environment to observe and question the interactions, relationships and processes that occurred. The observations and responses were used to answer the research question proposed in section 1.5. Figure 7 displays the process that was followed.

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│                     │
│  Research Philosophy: │
│                     │
│   **Interpretivism**  │
│                     │
│                     │
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          │
          ▼

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   Research Strategy

     **Case Study**

   Mid-term, Contemporary
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   Data Collection 1

  **Participant Observation**

  Observation of a pro-UX company

  *Results create initial Persuasive UX Model*
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
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   Data Collection 2

     **Questionnaire**

  Expert evaluation of initial Persuasive UX model

  *Results create final Persuasive UX Model*
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
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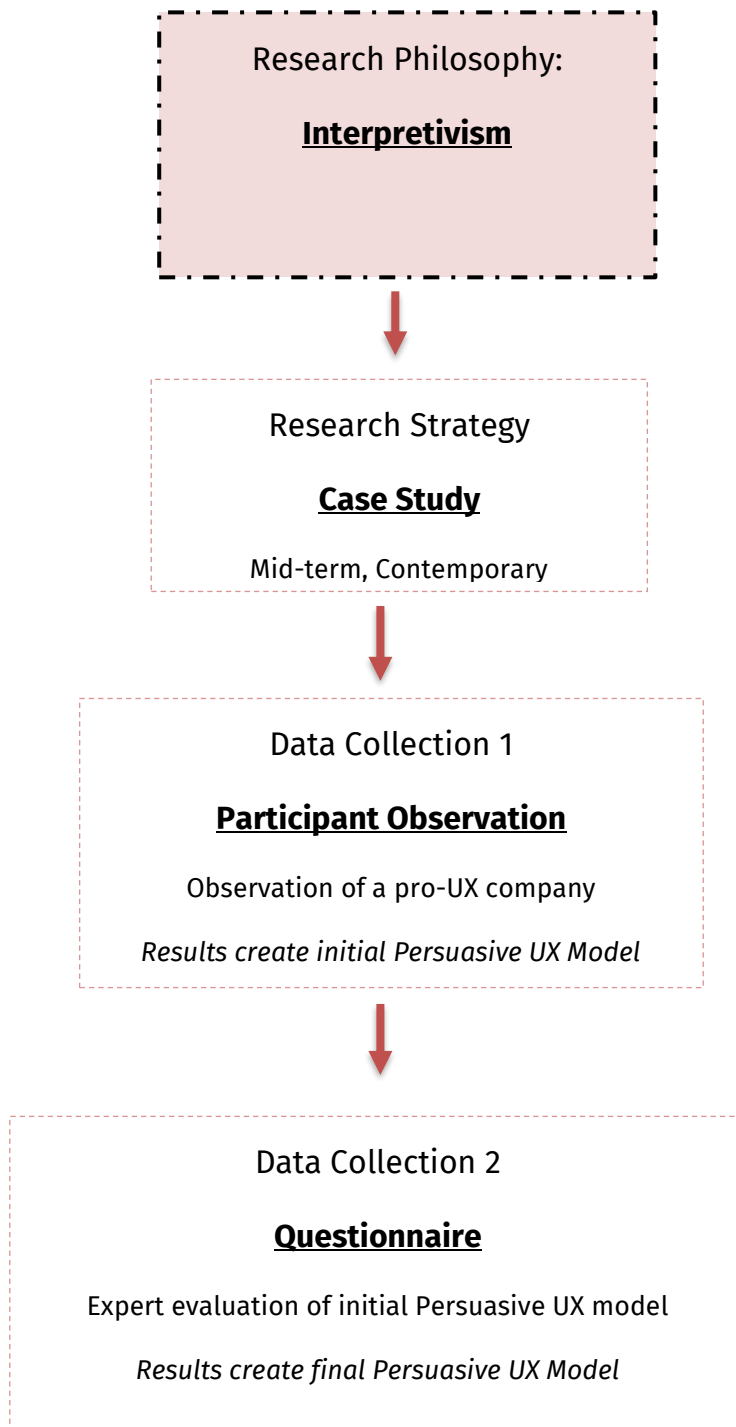
Figure 7: Diagram Summarising the Research Methodology of the Thesis

4.2 RESEARCH DESIGN

A research design consists of the philosophy adopted by the researcher and the research strategy followed. Each of these aspects will be discussed in the sections to follow. The research philosophy in section 4.2.1 and research strategy in 4.2.2. Participant observation is detailed in 4.3 and data collection is discussed in 4.4. Content analysis is described in section 4.5 and ethics is detailed in 4.6.

4.2.1 Philosophy

The research philosophy that was used in this research project is interpretivism. Interpretivism focuses on the actions of people, as well as the reasoning behind these actions (Walsham, 1995). Interpretivism aims to explore and understand how people perceive their reality (Oates, 2005). Oates (2005), also states that interpretivism attempts to create a detailed and vivid understanding of a circumstance of how people make sense of their reality and how these perceptions of reality change over time. Goldkuhl (2012) states that the main purpose of interpretivism is to work with pre-existing subjective meanings in the social world so that they can be understood and used for theorising.

Other research philosophies include positivism, critical research and pragmatism. These research philosophies are valued and tested in the research field, but are unsuitable to the aim of this research. Positivism attempts to measure quantifiable things that do not change as they are observed (Healy and Perry, 2000), while critical research is an attempt at disrupting a power balance (Oates, 2005). This research study focuses on the intentions of people; UX designers, developers, clients and project managers and what these peoples' attitudes towards UX are. These factors are thus more concerned with the actions of people and the reasoning behind these actions, which are features of interpretivist research.

Interpretivism is better suited for qualitative research. Qualitative research first occurred in social science research and qualitative research methods were, "designed to help researchers understand people and the social and cultural

contexts within which they live." (Myers, 1997). Qualitative research focuses on aspects that are not numerical by nature, such as words or images as these can lose social and institutional context when they are quantified (Myers, 1997). These aspects also include stories and emotions of people and communities. As participant observation and a case study are planned as the data collection method and research strategy, interpretivism and qualitative research are better suited. Participant observation deals with immersing yourself into a selected environment. Through this immersion, the stories, emotions and relationships of the individuals in the observation environment are noted and recorded for analysis. A case study determines the environment in which the participant observations takes place in. Therefore, qualitative research is more suited to this study than quantitative research, which is focused on numerical or quantifiable aspects. Words and emotions are not necessarily quantifiable; therefore, qualitative research supports the need to understand the methods of persuasion that were used by UX designers of Company X to persuade an attitude change.

This research study aims to explore attitude and behaviour towards UX and then the Six Principles of Persuasion will be analysed and their importance to attitude and behavioural change will be mapped. The results were be explored and the attitude changes mapped to the six principles were analysed from a UX designer's perspective. These mapped principles were then placed into an easy-reference model that a UX designer can use for future projects. In order to determine the validity of the model, a questionnaire was sent to UX experts for an evaluation of the model. The model was then adapted based on their feedback.

4.2.2 Research Strategy

The research strategy that was used for this thesis is a case study. A case study is appropriate for this research as a case study, "looks at the chosen case within its real life context and focuses on all the factors, issues, politics, processes and relationships that constitute the messiness of the real world" (Oates, 2005) in order to understand the nuances present in a singular setting (Eisenhardt, 1989). This

definition provides that a case study looks at a unique circumstance or instance and attempts to create a descriptive insight into that case and its relationships and processes that occur within the case (Noor, 2008). From a case study, a researcher can gain deep and meaningful insight into a particular scenario and this insight can help a researcher to find unexpected interactions, relationships or explanations (Hays, 2004) With a case study, all factors can with the scenario be explored and understanding of these factors can be divulged. The definition of a case study relates well to PCT (Personal Construct Theory), attitudes, behaviour and the Six Principles of Persuasion. Attitude and behaviour are strongly influenced by the environment in which they belong. As a case study seeks to understand a particular context, it is appropriate to use for the purpose of this research as Flyvbjerg (2006) strongly believes that case study research is a sufficient method for research in social scenarios.

The case study will be mid-term and contemporary in nature. The allotted time for this thesis is two years, thus a mid-term status is given. The allotted time will enable the researcher to find the factors, issues, politics, processes and relationships within the chosen case study scenario. The time will be used to investigate the research problem thoroughly and identify the relationships between the stakeholders in the case study; the UX designers, developers, project managers and clients. An exploratory case study will aid in identifying the attitudes towards UX and ties in well with the Six Principles of Persuasion and PCT. In order to identify the relationships between the stakeholders, participant observation will be used.

4.3   PARTICIPANT OVERVIEW

4.3.1   Target population

The target population is the UX designers, developers and project managers of the South African based company, which will be named 'Company X' as well as UX designers outside of the company. The company comprises of about 20 personnel, which includes teams with UX designers, developers (both mobile and desktop) and

project management. Client attitudes will be discovered through interviews with the company stakeholders.

4.3.2 Company X's Profile

The company chosen for the case study is a software development company situated in South Africa. For the purposes of this research, they will be named 'Company X'. Company X employs about 20 personnel involved in UX, development and project management.

Upper management did not initially support UX's inclusion in their project lifecycle. Upper management attended a UX lecture and the content of the lecture changed their perspective on UX. They hired a UX designer and began to include UX in their projects. Through this inclusion, they noted that they produced better projects and eventually the UX designer was included in client meetings and project planning sessions. Now upper management is completely pro-UX and tries to include UX on all new projects.

Company X was chosen as an attitude change occurred through hearing of UX and its benefits, which lead to the incorporation of a UX division. The nature of this attitude change is pertinent to the research and that was the deciding factor on why Company X was chosen for this instance of a case study.

4.3.3 Sample size

A sample size of 20 employees of the company was observed. These employees include UX designers, developers and project management. They were observed whilst completing their daily tasks in and were also ethnographically interviewed on some of their behaviours during the observation. For expert evaluation of the developed model, a sample size of 10 were observed. These participants were purposefully sourced from referrals of UX professionals in the industry.

4.4 DATA COLLECTION

4.4.1 Survey method

Participant observation in an ethnographic setting will be used as the survey method. This method is often attributed to the interpretivist research philosophy as well as qualitative research. This method is attributed to being appropriate for gathering data on interactions and relationships (Mackellar, 2013). Mackellar (2013) also states that participant observation can help researchers to understand the relationships between target groups.

Participant observation begins when a researcher selects a social setting in which to investigate and proceeds to gather data by asking things such as ethnographic questions (Mackellar, 2013) or immersing themselves in the setting and preforming observations on the target groups. Mackellar (2013) explains that the process of participant observation needs the researcher to become a 'participant' in the chosen environment and make vivid observations of themselves and the other participants, or target groups, in the environment to the point where the researcher adapts themselves as a member of the environment.

This method allows the researcher to enter into the business's environment in order to observe the relationships between target groups as well as the processes that occur. Observation is a good data gathering tool in a corporate setting in order to observe people and their tasks, while participant observation creates an appropriate environment so that the researcher will not be invasive in their observations. There are five different types of involvement; complete, active, moderate, passive and non-participation(Mackellar, 2013). Which of these levels of involvement the researcher assumes will need to be made clear to the participants before the observation period begins.

Participant observation is well suited for the research as the researcher aims to enter an organization's environment and observe the stakeholders within. These

observations will be focused on the relationships between the stakeholders as well as the processes that these stakeholders follow. These relationships and processes need to be observed in order to understand the existing attitudes towards UX using the Theory of Planned Behaviour and participant observation will provide an effective means of data collection. The method is also suited towards qualitative research as it complements the aim to understand relationships and interactions While participant observation will be the primary source of information, the researcher may ask the participants questions, as shown in the preliminary observation questions, in the form of a semi-structured interview.

Participant observation is used in circumstances where behaviours can be described as complex, difficult or embarrassing or where an understanding of human behaviour is required(Mackellar, 2013). As the field of HCI is involved with understanding human behaviour towards computers and observing their interactions with these computers, participant observation is well suited towards the overall field of HCI.

The questionnaire is a secondary data gathering method. The questionnaire will be sent to UX professionals outside of the Company X's work environment in order to compare the results of the case study with the results of individuals outside of the company. The purpose of the questionnaire is to expand the research beyond that of the case study in order to determine whether or not the challenges and achievements faced by the Company X are present in other software development environments.

4.4.2 Measurement

In order to successfully gather data, certain goals need to be identified before partaking in participant observation. The researcher needs to definite set aims to achieve in order to direct the questions that will be asked during the observation process.

An observation without purpose will result in unnecessary data that cannot be used in the thesis, thus the researcher must be aware of certain factors. These factors include discovering the attitudes towards UX by the various stakeholders within the organization as well as why they have these attitudes. Once these factors have been defined, the researcher can compare these responses with observations in order to identify any correlations or conflicting data.

4.4.3 Pre-testing

The aims of the research as well as potential questions will be discussed with a UX academic professional in order to determine validity and usefulness of questions. These questions were then reviewed by another academic professional for coherency, relevance and language before it was sent to participants.

4.5 ANALYSIS

Content analysis was used for the research. Content analysis is used to analyse written, verbal or visual communication messages (Cole, 1988). As an analysis method, content analysis allows the researcher to gain an enhanced understanding of data that can be used to examine theoretical issues (Elo and Kyngäs, 2008). Elo and Kyngäs (Elo and Kyngäs, 2008) state that the aim of content analysis is to gain a, "broad description of the phenomenon and the outcome of the analysis is concepts or categories describing the phenomenon." Elo and Kyngäs (Elo and Kyngäs, 2008) also state that one of the purposes of these concepts is to create a model. Content analysis is primarily used in quantitative research (Graneheim and Lundman, 2004).

The research was used to create a model through the observation of communication messages of the stakeholders in Company X. The observation was undertaken in order to gain a deep understanding of the phenomenon that occurred in Company X that created the pro-UX attitudes of Company X's stakeholders. The observation was recorded as a written document that was then analysed and interpreted to create the

initial Persuasive UX Model. After this was performed, the written results of the expert evaluation were analysed to understand the phenomena that occurred in the experts' organisations. Thus, content analysis was best suited to the purpose of the research and aided in the generation of the Persuasive UX Model.

4.6   ETHICS

This section describes the researcher's approach to ethical research and the process that was followed to obtain ethical clearance. Each of these aspects will be discussed in the sections to follow.

4.6.1   Ethics in Research

Ethical behaviour is an important factor in the field of research. Ethics can be described as the discernment between right and wrong or norms for what constitutes acceptable or unacceptable behaviour in a society (Resnik, 2011). These ethical norms are a continuous development throughout an individual's life based on their social and cultural surroundings and as such there are many ethical disputes in society in general (Resnik, 2011). Resnik describes ethics as, "a method, procedure, or perspective for deciding how to act and for analysing complex problems and issues." This definition is in regards to the disciplines that study standards of conduct, such as universities or any institutions that are involved in research. These universities and institutions have thus developed standards of ethical behaviour that align with their research goals and these standards of behaviour aid those who are involved with the university or institution to coordinate their actions and behaviour describes Resnik (Resnik, 2011).

Ethical norms and codes of behaviour in universities and research institutions are vital. Resnik (Resnik, 2011) explains why these ethical norms are important:

1. **Norms promote the aims of research:** research aims to deliver information that adds value, knowledge and truth to a field in a manner that is as error-free as possible. Ethical norms help to support these aims by promoting the

avoidance of fabrication and misrepresentation of information so that no harm is caused as the field of research involves the participation of various members of the public that are part of various disciplines.

2. **Ethical norms promote values that are essential in collaboration:** due to the fact that research involves the participation of various members of the public, ethical norms encourage individuals to be truthful and fair. This is due to ethical norms creating rules for aspects such as authorship, copyright and confidentiality.

3. **Ethical norms ensure that researchers are publicly accountable:** due to the rules for aspects mentioned above, the public can hold researcher's accountable for the actions in their research and be aware that research will follow a certain standard as depicted in these rules.

4. **Ethical norms help build public support for research:** research often requires funding in order to achieve predetermined goals and objectives. Due to ethical norms creating various rules and guidelines, it encourages the public to support and fund research initiatives.

5. **Ethical norms impact societal moral and social values:** due to the fact that researchers need to follow ethical rules and guidelines, society at large is impacted based on the nature of the research. If products and services are created with an ethical mindset, then they will impact those who use them in the same manner.

These factors highlight why ethical codes of conduct for behaviour are important in the field of research as they benefit not only the researcher, but the society in which the research is conducted as well.

Research can occur in both physical and digital locations. Due to the advancement of the internet, a researcher may use this as a platform to gather data. If a researcher wishes to use this platform, they should adhere to some guidelines stated by Oates (Oates, 2005);

- A researcher should treat online participants the same as they would in an offline context.

- If using a specific website, the researcher should adhere to the information policies on these websites.
- A researcher should update themselves on established and emerging ethical codes of conduct for internet research.

While the internet can be a vast source of information, a researcher should always be conscious of these guidelines when using the internet as a tool for data generation.

The University of Pretoria adheres to these ethical principles presented by Resnik. Due to this, it can be ascertained that if research has been approved by the ethical committee, it will adhere to an accepted ethical standard.

4.6.2 Ethical Clearance and Informed Consent

Before the observation can begin, ethical clearance must be obtained from the University of Pretoria. Only once this clearance is obtained may the data collection process begin.

In order to gain ethical clearance, the researcher must submit their informed consent form as well as their observation guide, found in Appendix A. Ethical clearance was obtained from the University of Pretoria's Economic and Management Sciences Faculty's Ethical Committee in April 2018, as well as in June 2018 when the data collection questionnaire was slightly altered. The informed consent form was never altered. The informed consent form is a special document that is provided by the University of Pretoria to researchers. On this document a researcher needs to make their participants aware of their rights as a participant as well as highlight information about the research and what the participant's information will be used for. This document is required for research to be accepted at the university and for any thesis to be reviewed and graded.

The right to informed consent is one of the five rights a participant to a research work has (Oates, 2005), however the letter of informed consent that must accompany the research must state all the rights a participant has during the research. These rights, as defined by Oates (2005) are:

1. **Right not to participate:** an individual does not need to participate in the research if they do not want to and a researcher needs to accept the individual's decision. A researcher should not force an individual to participate in their research even if the research is affected by their non-participation.

2. **Right to withdraw:** a participant may withdraw from the research at any point in the research process. They may withdraw even if prior consent was obtained. A participant may also refuse to partake in certain sections of the research, despite taking part in other sections.

3. **Right to give informed consent:** the participants needs to be made fully aware of all of their rights during the research process. They also need to be made fully aware of all aspects of the research process, such as; the purpose of the research, what is expected in the research, the researcher themselves, whether or not they will receive any form of expenditure or compensation for their participation in the research and how their information will be used in the research. This information should be included and detailed in the informed consent letter that is given to participants and they should be allowed to query the researcher if any of the information is unclear. Contact details of the researcher's superior or institution should be made available so that the participant may contact them if required.

4. **Right to anonymity:** the participant has the right to hide their identity and location in the researcher. The researcher must take the necessary precautions to protect the participant's information if they have expressed a need for anonymity and can do this by using an alias or disguise for the participant in the research.

5. **Right to confidentiality:** a participant has the right to the confidentiality of their information. A researcher must adhere to this and strive to protect the participant's information and not allow the information to be used in any other context, whether it is in research or not.

These rights align with the principles stated in the previous section and a researcher should strive to make a participant aware of their rights. A researcher's research could be withdrawn or found to be flawed if they do not make a participant aware of their rights or coerce individuals into participating in their research.

Informed consent must be given before any research or data gathering is initiated, otherwise the data will be considered useless. In regards to ethics concerning questionnaires, the participant must be aware of their rights when answering questions. A participant may at any time withdraw from the questionnaire without consequence. Informed consent must also be obtained through the use of a consent question asking the participant's permission to use their answers in the research.

4.7 CONCLUSION

The Research Methodology chapter informs the research design of the thesis. The research philosophy and strategy are highlighted and explained so that their relevance may be understood. Data collection is detailed in this chapter as well so that it is understood where the data to answer the problem statement and research questions will be sourced and how it will be sourced.

The next chapter will discuss the results of the data analysis of the participant observation.

Chapter 1: Introduction

This chapter includes the problem statement and background information.

Chapter 2: Literature Review

This chapter includes all aspects of the literature review:

- What is UX?
- UCD (User-Centered Design)
- UX, UCD and Agile
- Attitude and Behaviour

Chapter 3: Theoretical Framework

This chapter includes the theoretical framework:

- PCT (Personal Construct Theory)
- The Six Principles of Persuasion

Chapter 4: Research Methodology

This chapter includes the research methodology used as well as ethical research practices.

Chapter 5 and 6: Results

These chapters include the results of the data collection period as well as an in-depth analysis.

Chapter 6: Conclusion

This chapter includes the results of the data collection period as well as an in-depth analysis.

CHAPTER 5 DATA ANALYSIS AND RESULTS PART 1 – CASE STUDY OBSERVATION

5.1   INTRODUCTION

This section of the thesis discusses the results of the data collection. In this section, the observation notes will be synthesized into a coherent format that clearly describes the results and will be included in their applicable sections.

The results will be split into two major sections; findings and analysis. Findings will be split into four sub sections, one for each stakeholder identified in the Company X. The results of the observation for that specific stakeholder will be noted and then the principle of persuasion most applicable to that stakeholder will be analysed based on the data. The results of the interviews during the observation will also be included in this section and will be combined with the observation notes to create a flowing and consistent depiction of the scenario.

The analysis section will aim to answer the questions of this thesis and will take results of the findings section to accomplish this objective

Figure 8 displays a visual representation of the results of the observation. Figure 8 shows the user journey that each stakeholder in Company X experienced from their initial attitude towards UX, the principle that caused their attitude change and the reasons of their resulting positive attitude. The first circle represents their initial attitude towards UX which can be neutral (signified by the ?), positive (signified by the +), or negative (signified by the -). The client stakeholder are from the external environment and therefore has a varied initial attitude towards UX (signified by the ?+-). The client stakeholder's attitude is represented through the perspective of the UX designer of Company X. The principle of persuasion that caused their attitude change describes the most prominent principle but it is not exclusive. The text that

follows describes the most impactful benefit that UX brought to that stakeholder. The final circle represents the stakeholder's attitude towards UX after experiencing UX.

Company X Stakeholder UX User Journey

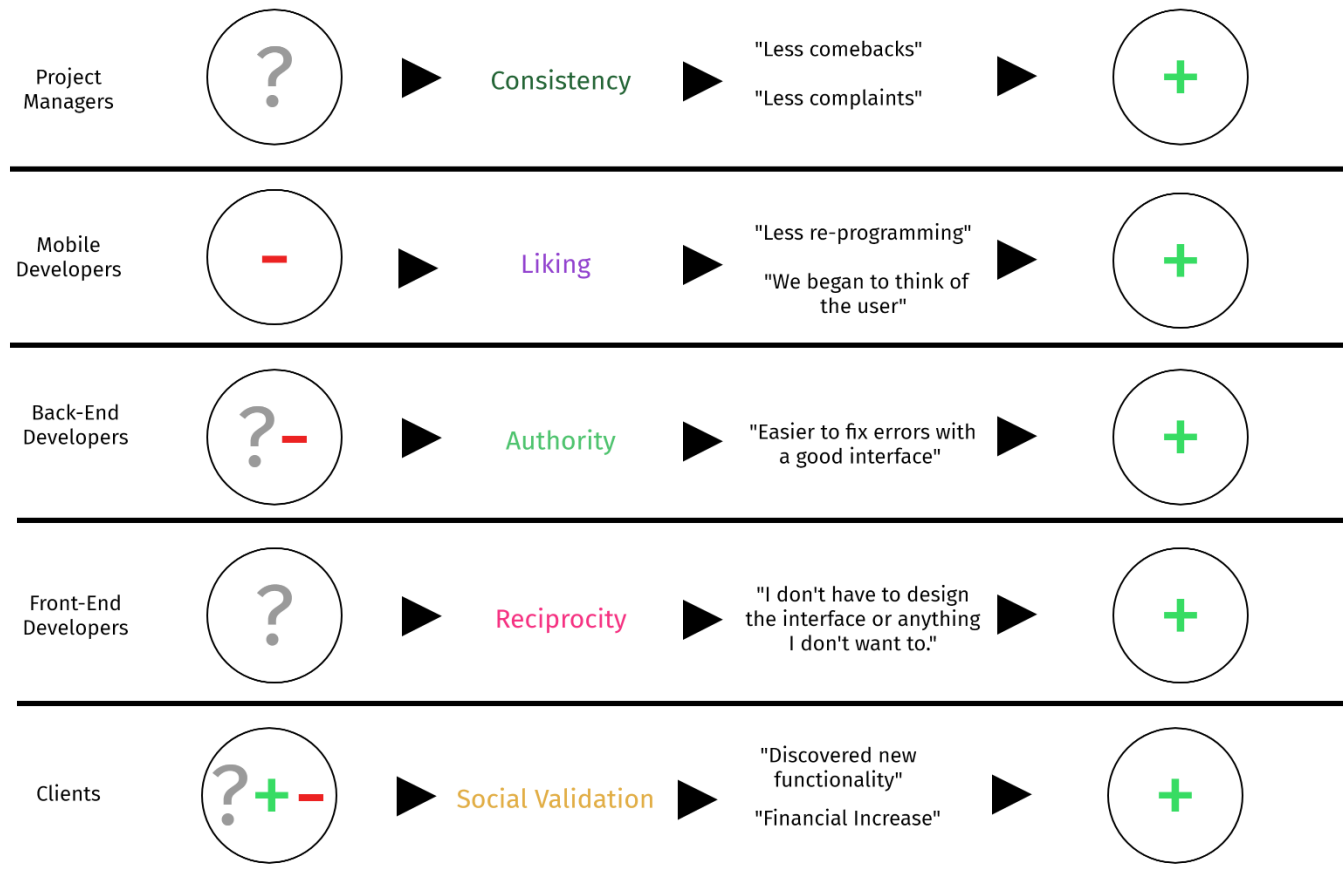| Project Managers | **?** | ▶ | Consistency | ▶ | "Less comebacks" "Less complaints" | ▶ | **+** |
Mobile Developers	**–**	▶	Liking	▶	"Less re-programming" "We began to think of the user"	▶	**+**
Back-End Developers	**?–**	▶	Authority	▶	"Easier to fix errors with a good interface"	▶	**+**
Front-End Developers	**?**	▶	Reciprocity	▶	"I don't have to design the interface or anything I don't want to."	▶	**+**
Clients	**?+–**	▶	Social Validation	▶	"Discovered new functionality" "Financial Increase"	▶	**+**

Figure 8: Company X Stakeholder User Journey

5.2 FINDINGS

5.2.1 Introduction

This section describes the data findings of the ethnographic observation as well as the interviews performed during the observation period. The results of the observation have been separated into sections detailing the overall workflow of Company X's project development lifecycle and then a description of work performed by each stakeholder, denoted by the name of the stakeholder. This has further been split into sections that differentiate between UX Designers and then other internal stakeholders; mobile developers, back-end and front-end desktop developers and the project manager. This classification of stakeholders is given based on the internal structure of Company X and does not represent the structure in other software development companies. The analysis team mentioned in figure 7 and in the section below is a team made up of individuals from the other stakeholder groups, such as a project manager, a UX designer and a desktop developer.

In the UX designer section (section 5.2.3), an in-depth description of the UX designers' work activities will be given as both a summary and a detailed description. The background of each UX designer will be discussed as well as how they found themselves in UX and finally their challenges and success in relation to UX will be discussed. In the challenges and successes section, their methods of persuading all internal and external stakeholders will be detailed.

In the stakeholder sections (5.2.4, 5.2.5, 5.2.6), a detailed analysis and description of the stakeholder's role and typical work will be given as well as their UX background and UX attitude. The UX attitude section will include both before and after attitudes. The before attitudes include how they felt about UX before working at the Company X and their initial reaction to UX. The after attitudes refer to their stance on UX after working with dedicated UX designers and in UX-incorporated projects and why this mindset shift occurred.

Company X's work environment is unique in that it is UX-friendly. Top management of the company subscribes to the idea of UX and will always automatically include UX in the project plan when taking on a new client or project in the company. When a new employee joins the company, they are introduced to UX even if they are not directly involved with the process. As top management is already a UX supporter, the UX designers of Company X are only tasked with persuading their other stakeholders within their environment; clients, mobile developers, back-end developers and project managers. They are also active in trying to change the current attitude towards UX to create a more positive and accepting one in their general work environment.

5.2.2   Typical Workflow of a Project

The Company X's work process in a typical software development project is as follows and can be seen visually in figure 9:

1.) Client submits project request/Request is tendered
2.) Analysis team reviews the project request
   a. If they accept the request, step 3 follows.
   b. If it they deny the request, they have a follow-up meeting with the client and the process begins again.
3.) The project is discussed with the employees and a brief overview is given
4.) The project is sent to the UX team
5.) The UX team creates mock-ups of the proposed system and reviews these with the client
   a. If the client approves the mock-ups, the project proceeds to step 6
   b. If the client does not approve the mock-ups, they are re-done.
6.) The UX team sends the mock-ups to the development team; either mobile developers or back-end and front-end developers.
7.) The completed processes of the system are sent for quality assessment (QA)
   a. If QA approves the system, the project proceeds to step 8
   b. If QA does not approve the system, the project goes back to step 5
8.) The system is verified against all requirements as stated in the project request

a. If all requirements have been met, the project proceeds to step 9

b. If not all the requirements have been met, the project returns to step 4

9.) The system is delivered to the client

Step 1 – Project Request

Step 2 – Project Analysis

Step 2b – Project Renegotiation

Step 2a – Project Acceptance

Step 3 – Project Planning

Step 4 – Project sent to UX Team

Step 5 – UX team creates system mock-ups

Step 5b – Mock-up redesign

Step 5a – Client Approval

Step 6 – Mock-ups get sent to Development

Step 7 – Completed processes sent to QA

Step 7b – QA Disapproval

Step 7a – QA Approval

Step 8 – System Verification

If the system is approved, the system is delivered. If it isn't, then the project begins at step 4 again.
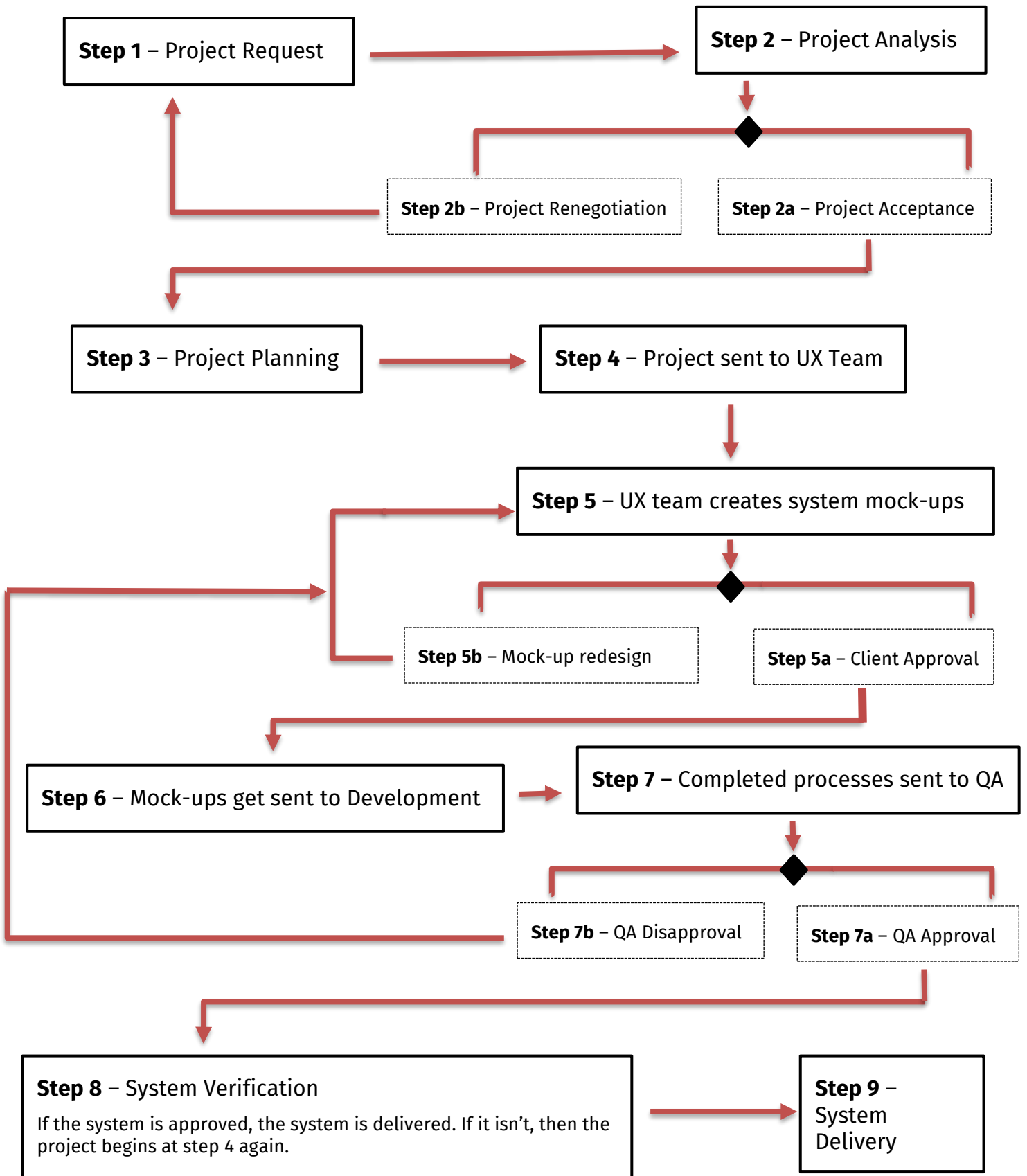
Step 9 – System Delivery

Figure 9: Flow Diagram of the company's typical workflow during a project.

During the entire project lifecycle, a project manager monitors each phase and increases or decreases deadlines based on work output. The project manager also decides which sections of a project are more important than others or which need to have priority according to the project schedule. During intensive schedules, some steps in the process can be skipped. In the unlikely event of an impending deadline, step four is skipped and the UX team is reshuffled into the various development teams in order to meet deadlines. This is not a typical case however. In other atypical situations, development can be contacted first and then UX is pushed to the side for the duration of the project. The UX team hopes to eradicate these unlikely situations completely and make UX a constant priority in projects.

5.2.3   UX Designers

In the Company X, the UX designers were a team of three individuals who worked on all projects simultaneously. In a typical development project, the UX team is tasked with creating mock-ups and screen layouts of the proposed system in order to create a functional, user-friendly, user-determined and aesthetically pleasing system.

The following sections will detail the typical work of the UX designers in section 5.2.3.1 and 5.2.3.2. Section 5.2.3.3 will discuss their UX background and 5.2.3.4 will discuss their challenges and successes of UX.

5.2.3.1   Typical Work Summary

The UX designers are involved in various phases during a typical project. In a normal scenario, they will receive the project requirements after it has been analysed by the analysis team in the Company X. The lead UX designer usually forms part of the analysis team.

They will then begin to conceptualise the design of the development project by using guesswork along with the project requirements to determine what the goals of the project are. This is due to clients not always providing full documentation. The designers stated that this was a common problem in projects as the clients, *"… can be really vague and unsure of what they actually want from the system."*

Once they have determined the goals of the system, they will begin to focus on the intended design of the project. In this stage, they will determine what the proposed system must satisfy in terms of the user experience and begin to develop various mock-ups of the system's layout. While they are creating the mock-ups, they send the completed ones to the mobile developers or desktop developers or both, depending on the project requirements. This process continues until the system is completed, quality tested, verified against all requirements and delivered to clients.

5.2.3.2   Detailed Typical Work

Throughout the company's typical project lifecycle, the UX team do various tasks and use various computer programs, such as Adobe Photoshop or InVision, in order to complete processes in the lifecycle. This section will describe and detail the tasks and programs used by the UX designers in order to finish a process. The UX designers made it clear however that the goal of all their activities was to create a system that would encourage a partnership between themselves and the client so that the system was a constantly evolving user experience that they monitored and adjusted based on the data they received. In this manner, they could adapt the system based on user needs. If a partnership is created between themselves and the client, the client tended to involve them in other projects and ventures. Table 4 provides a summary of the UX designers typical work.

The UX designers classified their tasks into categories; prototyping (5.2.3.2.1), designing (5.2.3.2.2), implementing (5.2.3.2.3) and monitoring (5.2.3.2.4).

Project Lifecycle Phase	Description
Prototyping	This is the first task given to the UX designers. The UX designers will analyse the approved project request to determine system goals. A user journey is then created in order to guide the layout and skeleton design. These mock-ups are then sent to the client. If the client approves the initial design, they are made more detailed and sent to development. Development can leave feedback on the mock-ups. The UX designers will sometimes create multiple mock-ups and obtain feedback to determine the best layout.
Designing	Once the best mock-up prototype has been chosen, the UX designers expand on the design. In this, they match the design to the client. They will apply all client colours, font and branding to the design. These enhanced designs are then compared to design principles in order to determine aesthetics and functionality. Finally, the final design to re-evaluated by the client.
Implementing	This phase occurs when designs have been approved both internally by the project team and externally by the client. The designs are now compared to set design standards, such as checking consistency between all screens in terms of colour usage and button placement. Change can occur in this phase. As screens are developed by function, the developers may find that a certain function on the screen is implausible. Therefore, the UX designers need to go back and re-evaluate the design. This phase continues until the system reaches Quality Assurance (QA). QA can also request changes. Depending on time and budget constraints, eye-tracking will be performed on the completed system.
Monitoring	This is the final phase of the company's project lifecycle. However, despite it being the last phase, it is an on-going phase. This phase does not always occur and is dependent on the client relationship that the company has. If there is an agreeable relationship, the company will monitor the implemented system to track end-user usage and trends. In this manner, the UX designers can find out exactly what actions the end-users are using the system for. Often this leads to additional functionality or even a complete system revision to accommodate these new actions.

Table 4: Table displaying a summary of the UX Designers' typical work flow

This is the first task that the UX designers do. In this task, they analyse the information given to them by the analysis team and the client requirements. As mentioned previously, often the client requirements are vague and a lot of guesswork is involved in order to determine the goals and purpose of the system. This is performed by the lead UX designer. Once they have analysed and determined the goals of the system, a user journey is plotted. A persona is created for this user journey and this is based on either a business rule or statistics from previous projects. They create a normal course of events diagram for their chosen user in order to help plan a logical layout of the system and the sequence of screens. Once this task is completed, another team member begins to develop a design layout based on certain questions; is the system for Windows, Mac or Android? Should the system run on multiple platforms? Depending on the answer, they use different design guidelines specific to the platform as there are standardised sets of guidelines for each platform that should be adhered to. If there is any uncertainty, the designers refer to the UX design community via a program called Slack, which allows for communication between specific groups from all over the world.

Once the design layout is created, a team member will begin to create skeletons of the proposed system. Sometimes they will receive a pre-existing system that needs to be modified and then the skeleton already exists. Pre-existing skeletons present a challenge as they often use unfamiliar elements and need to be realigned with the Company X's standards. Thus, the UX team prefers to create their own rather than work from other's work.

After the skeletons have been created, the team begins to create simple layouts of the screens needed in the system. These screens are shown to the clients in order to obtain feedback and correct any issues before the screens are made more detailed and sent to development. Sometimes a client will see these screen mock-ups as the finished version and will be unhappy with the result and the UX designers will need to explain the purpose of the screens. Some clients do not see a need for

these screen mock-ups and the UX team will then create interactive prototypes or videos to try and convince the client of their usefulness. It is however time-consuming.

Once the screen mock-ups have been approved, the UX team adds in more detail and publishes the more detailed mock-ups to a website called Invision. Invision is a prototyping website in which screens can be uploaded and arranged to create interactive prototypes that anyone within a project can comment on or give feedback on. They use Invision in order to create multiple prototypes using the screen mock-ups. These are then analysed to see which prototype gets the user to their destination the quickest and most efficiently. Oftentimes flows are swapped in order to create the most optimal path. All members of the project team are allowed to comment on the various prototypes through Invision and the UX designers take the feedback provided from various stakeholders to refine the many prototypes into one efficient prototype.

When the prototype is chosen, the screens are sent to both front-end and back-end developers. Oftentimes, a section of screens will be approved and sent to development while another section of screens is reviewed in order to save on time.

5.2.3.2.2 Designing

In this phase, the prototype has been chosen and the UX designers are now able to 'flesh out' the design; such as colour coordinate with the client's company colours and style guide, refine screens based on feedback and create full links and connectivity between screens.

After the prototype is chosen, the UX designers begin 'completing' the prototype by following the client's style guide. Usually, clients will have predetermined style elements such as brand colours and typography which the UX designers now

incorporate into the design. This process can be time-consuming depending on the complexity of the client's styles and pre-existing products.

The principles of design are also evaluated in this phase. While the design is often meant to be aesthetically pleasing, the designers need to make sure that it is functional and follows the required design principles so that it is also usable by the end-users. In this phase, functionality vs. beauty is very relevant as often something can look beautiful or fun, but it is impractical to implement based on the functionality of the system.

As designs are finalised, they are once more evaluated by the client before the front-end developers begin to create the interfaces. The clients are usually satisfied with the overall completed design and usually only make small style changes. The front-end developers then create the interfaces as the screens are completed and work with the back-end developers in order to make sure that all processes link with one another. Sometimes the UX designers will take on the role of a front-end developer if time constraints are apparent.

5.2.3.2.3 Implementing

In this phase, all designs have been approved by both the company and the client and the final system is created.

The UX designers in this phase make sure that all design principles have been adhered to once both back-end and front-end developers have finished sections of the system. Consistency is key in this phase as the designers check to see if things such as colours and font are the same throughout, the layout is correct and that nothing violates the agreed upon designs.

Sometimes changes to the design will happen in this phase. It can occur that something the UX designers created is implausible to develop given the tools available or time remaining. In these scenarios, the UX designers will re-design the screen in order to still be as functional as before despite the limitations. This is a rare scenario for the company but can occur if new technologies are being used or an unfamiliar system is being developed. Usually the UX designers are conscious of what can and can't be done by the development team of the company and design accordingly.

This phase continues until the system has been completed. The last task to occur in this phase is quality assurance (QA) testing. Sometimes QA can request changes to the system design if they find that something does not fit client requirements or if they feel will not give the expected user experience. Depending on time constraints, usability testing may be conducted on the system with tools such as eye-tracking to find any flaws or unexpected occurrences in the system and to find if the end-users are able to use the system for its intended purpose. However, such usability testing is rarely able to be utilised due to deadlines, which is something the UX designers wish to change.

5.2.3.2.4 Monitoring

This is the final phase in the project's lifecycle and if correctly implemented, is an on-going process. This phase is however not always an accepted part of the project depending on the relationship between the Company X and their client.

As mentioned previously, Company X wishes to create partnerships with their clients instead of contracts. With these partnerships, it allows them greater access to the completed system and on-going support. Most of their clients agree to this proposal, but some clients do not. In this phase, the UX designers use a software application called Hotjar to monitor their implemented systems. Hotjar is an interactive mapping program which specialises in analytics of a particular website. These analytics

include tools such as heatmaps, recordings, polls and surveys in order to evaluate the usefulness and usability of a website. From these analytics, the UX designers can see if the system is being used as they intended and they can ask questions such as:

- Are the main buttons being used?
- Do the users seem confused?
- Are they clicking a lot?
- What pages are the most accessed? Are these supposed to be the most accessed pages?
- Are they using the pages we thought they would use? How do we make them use those pages or should we change the layout?

From the answers to these questions and similar, they can create an improved version of the system.

This phase helps the UX designers if a pre-testing phase was not possible due to various reasons.

From this phase, the UX designers at Company X have managed to alter two of their products to suit the needs of the users that were only visible once the projects were in a live environment. In both instances a website was created. In one of these scenarios they found that users searched for the client's contact information and navigated to the 'contact us' section more than read about the client's services and general information and thus they were able to redesign the homepage of the website so that the contact information of the client was more easily accessible. In this case it was found that the client gained more enquiries and appointments for their services as users could find this information easier. In the second case, the client had intended for the website to be purely informational about the organization and their staff. Through monitoring, the UX designers found that users were more interested in finding out staff information and creating appointments for the staff members than about the organization's information. With this, they were able to

redesign the website to incorporate an online scheduling platform which increased productivity and organization for their clients.

In one more example of monitoring, the UX designers were able to create a partnership between two of their clients due to the similarity of their businesses. This was due to the UX designers being able to see a pattern in the information presented by users of both systems and through creating partnerships between Company X and their clients. They use these examples, the three cases, as methods to convince their clients of the importance of UX in a project if the client is either negative or uncertain towards UX and its incorporation into a project lifecycle.

5.2.3.3   UX Designer Experience Background

There are three employees who specifically make up Company X's UX team. Their team structure is relatively simple with one of them leading the team and the other two placed in supporting roles. All of them developed into a UX role and did not specifically study to be a UX designer nor did they intend to be involved in UX. Table 5 presents a summary of the UX designers' UX background and attitude.

5.2.3.3.1   Lead Designer

The lead designer of the team started as a front end-developer that built websites for various companies. To them, UX helps to fill a niche in determining the purpose of a website or system. They formally took on a UX title at the Company X.

"I developed into this role. I started as a front-end developer and built websites and frameworks. Through this I evolved into a UX role. I want to get more involved with the business side of things as you get more information to do proper UX."

Their primary team task is to help define business and system goals and believes that UX helps companies in this particular aspect. They believe that UX is not an individual, but a team aspect and believes that working with the development team is

vital to the success of a project. They also believe that too many people are uneducated on UX and that many people call themselves 'UX designers' when they build websites or work purely on front-end development.

5.2.3.3.2 Designer A

Designer A was a front-end developer who got more into UX through various projects they pursued. They obtained a diploma in web design and worked for a company that built websites when they heard about UX. However, despite knowing of UX, they had never implemented UX into any of their projects before. It was only once they had begun working at Company X that they became involved in UX and began to see the importance and value of UX.

5.2.3.3.3 Designer B

Designer B is a recent university graduate with a computer sciences degree. They did not intend to work in UX after university, but has since found that UX, *"Allows me to express my opinion into the design of a system, which a normal developer role wouldn't. I like to be able to have a say or be bossy."*. Through working at Company X and with designer A and the lead designer, they have seen the value of UX and now greatly enjoys implementing UX principles in their work.

UX Designer	UX Background	UX Attitude
Lead Designer	Started as a front-end developer who developed frameworks for business. This is where they discovered UX.	UX helps them to fill a niche in determining system purpose. Their main frustration is that people who aren't UX designers call themselves that.
Designer A	A previous front-end developer who discovered UX through various projects. They had never implemented UX before working at the current company.	Working at the current company helped them to realise the importance of UX.

| Designer B | A recent graduate who did not intend to work in UX. | UX allows them to express their opinion. |

Table 5: Summary of the backgrounds and attitudes of the company's UX Designers

All three find that their different backgrounds contribute to the success of their UX skills as it allows them to use different mindsets when designing. As they understand a different perspective of their project design, they can keep that in mind when they create an interface.

5.2.3.4 Successes and Challenges of UX

While Company X is eager to incorporate UX into their projects, it is not always as easy due to the lack of knowledge around UX when it comes to their clients. All three designers agreed that their biggest challenge is proving the value of UX to the client and that people have the wrong ideas on what UX actually is and its role in a project.

On many occasions, a client would not know what UX is and therefore not want to include it into their project and thus the designers need to spend a lot of time to convince the clients to incorporate UX.

"It's annoying that UX is not taken seriously. You have to prove so much just to get someone to take a chance on UX."

UX is usually the first aspect to be pushed aside when deadlines are due and this fact annoys the UX designers as they wish to be proud of what they do or what they create and want to add their unique value to development projects. Therefore, they need to be creative in order to get clients to agree to give UX a chance. They find this process exciting as, *"There's so many possibilities and it helps you to think out of the box to get them to listen to you."*

One way in which they do this is to use evidence of the successes of UX within their completed projects. They use these as examples of the value UX brings, such as the time they revamped a website based on user data and created more website traffic for the company or when they created business value for two of their clients by joining their two services together. Another way they convince a client to try UX is to create videos that detail how to use certain features and this visual explanation helps to push the idea of UX to the client as the video 'looks pretty' and thus is one of their convincing methods. The UX designers also try to show the innovation UX can bring to their projects, which ties in with their video explanations for specific features.

Through these methods they have managed to convince various clients to apply UX in their projects and have not yet had any client express regret at the application of UX.

5.2.4   Mobile Developers

The mobile developers at Company X are involved with developing and creating mobile applications. In a typical scenario, they are given approved screen layouts from the UX designers and they then code the functionality behind the designs. The mobile development team consists of around ten developers who work closely with both the UX designers and desktop developers.

Section 5.2.4.1 will discuss the typical work of the mobile developers. 5.2.4.2 and 5.2.4.3 will detail their UX background and attitude towards UX.

5.2.4.1   Typical Work

The mobile developers are a focused team. They usually do not work on other aspects of a project besides mobile development due to time constraints or skillsets. In a project development lifecycle, the mobile development team begins their work once they have received screen layouts or designs from the UX designers. These are usually shared on their Invision platform so that feedback can be easily recorded.

The mobile developers will typically work on more than one screen; one dedicated to the current code they are working on and another screen dedicated for research in case a particular code solution does not work. There is both an Android device and an iOS device in the mobile development lab so that the developers can assess their work on both platforms when coding. These devices are shared between the team and the team usually asks one another in case of any coding errors, but never about the design of the screen layout.

Sometimes clients can cause functionality issues. Clients can request features or requirements that are impractical or that need to be done in a specific way and the mobile development team then need to try and prove to the client why their request

or requirement is impractical. This can sometimes take a lot of time and resources, especially if a client is set in their ways.

5.2.4.2 Mobile Developers' UX Background

The mobile developers mostly seemed to come from previous software development companies where UX was not apparent. They stated that they came from companies that already had pre-defined 'ideas and things' that they were unable to change. The companies cared more about functionality rather than design and they did not see the monetary value in UX or changing their practices. The mobile developers agreed that this was because there is very little mention of UX in South Africa and they personally had never interacted with UX until coming to work at Company X.

They agreed that they had been design-conscious to an extent despite the lack of UX in their previous employment environments.

"It was hard to develop something that looked nice on mobile when clients didn't care for mobile. The final design could look really bad but the clients didn't care to change it. It still matched the standards, but images could be pixelated for example."

5.2.4.3 Mobile Developers' UX Attitude

As mentioned in the previous section, the mobile developers all came from companies that had no UX exposure or no standpoint on UX. When they came to the Company X, it was a new experience for them to learn to work with and include UX in their projects. Due to their previous employment environments, they had an ambivalent attitude towards UX. They cared more that their software solutions were technologically functional and met requirements rather than usable and pleasant for users to use. However, through working at Company X, their perspective on UX changed.

Initially, the mobile developers would get annoyed at the UX designers as, *"The designers can sometimes think 'too pretty' and not practical."* In cases like these the mobile developers would then tell the UX designers that the design or design element was impractical, which could lead to schedule issues if the designs had already been approved as then the design would need to be adjusted and sent for re-approval. This re-approval process could become complicated if the client had already approved the design and thus had certain expectations. These scenarios were not common however and since the UX designers had a programming background and understood the logic and basic of programming, these issues very rarely occur due to the UX designers designing within boundaries.

On other occasions, the UX team could change certain things on a design without consultation or without prior warning; such as changing an icon or logo. In instances like this, the mobile development team becomes dependent on the UX designers for the updated elements and this could cause schedule issues. However, throughout various projects these issues were worked on and the mobile development team and UX designers created a working team dynamic. In the present work environment, they rarely ever run into any issues and this was mostly due to the mobile developers appreciating that the UX designers had a programming background and would design with the capabilities of the company's technology in mind which therefore makes it easier for the mobile designers.

After completing projects that had UX applied throughout the project lifecycle, the mobile developers saw that fewer client and user complaints were made after the project was delivered, which meant less work for them to fix. Through these projects and their interaction with the UX designers, they began to realise that their way of coding that changed.

"Even though we aren't designers, we still think about user experience when we code. We try to think from the user's perspective and we've started to do it without realising it due to our experience with the designers."

The developers will ask themselves questions such as;

- Will the user know to double tap here?
- Will this animation confuse the user?
- Should this function require a long hold or a short press?

When they began to think about the user more, they began to understand the UX designers and the role of UX more. However, *"We still need the UX guys. We don't think about the full picture, but they do."* For example, the mobile developers said that in a typical case they primarily care that something reacts, and therefore does what is needed, but not the 'how' it reacts and how this reaction influences the user despite being more aware of their programming's influence on user experience. In stressful conditions and impending deadlines, they will usually concentrate more on functionality than user experience; for example, as long as a particular element is on the screen, such as a button, it does not matter that it is misaligned or in the wrong position or the wrong colour. However, they did express that they wished UX would not be the discarded in these stressful occasions as often it creates follow-up work for them.

All of the mobile developers agreed that after working Company X and being constantly exposed to UX they see the value of UX and wish that more companies would consider implementing UX in their projects. They believe that UX designers are vital to an organization and should be a specialized team instead of simply teaching developers to be more aware of an end-user's experience. The mobile developers unanimously agreed that because the UX team had programming experience and designed with this in mind, it created a positive outlook towards UX and the mobile development team became more willing to incorporate UX into their own programming without needing to consult the UX designers.

Table 6 gives a summary of the presented information relating to the UX background and before and after attitudes towards UX from the mobile developers. The before

attitude relates to the stakeholder's UX attitude before working at Company X, while the after attitude relates to their UX attitude after working at Company X.

Stakeholder	UX Background	UX Attitude - Before	UX Attitude - After
Mobile Developers	Varied, but mostly non-apparent in their previous work environments. Software companies have pre-defined ideas and notions that are difficult to change.	Annoyance at the UX designers due to impracticality of their designs when programming.	As they completed more UX-included projects, they began to notice that there were fewer complaints and re-programming. Has led to mobile developers incorporating UX in their own programming environments. This change was due to UX designers having programming experience and began designing interfaces with this in mind, which made it easier for the mobile developers. An understanding and mutual relationship was formed between the mobile developers and UX designers.

Table 6: Summary of the background and UX attitudes of Mobile Developers

5.2.5   Desktop Developers

The developers at the Company X consist of 10 employees who focus on building the back-end functionality, structure of a software solution and the actual code behind the interfaces the UX team creates. This work includes building new projects for clients, receiving already created code from clients and having to learn how it operates in order to improve it or correcting any errors that can occur in already released software developments. This consists of both back-end and front-end developers.

The developers' typical work will be discussed in 5.2.5.1 while sections 5.2.5.2 and 5.2.5.1 will detail their UX background and attitude towards UX.

5.2.5.1   Typical Work

The work of the back-end developers is split primarily into three sections; 1.) creating new projects, 2.) receiving existing software projects and improving them, and 3.) fixing any errors or bugs found in already released software projects.

In the first scenario, creating new projects, the project follows Company X's typical workflow. The back-end developers receive the new project requirements from management or the UX designers and begin to create the structure of the new system. Usually the requirements are sent to the UX designers first to create screen layouts that need to be approved before development can begin, but sometimes the development team can begin on basic structure based on the functional requirements alone of the system. If they are sent the functional requirements first, the development team has more guesswork to accomplish before they can begin writing their coding structure. They will typically map-out a system structure amongst themselves that will include factors such as data structure and format and data storage and how these factors will interact with one another and exactly what data is required for the system. If they receive screen layouts first, it makes their work easier as the screens should determine what data requirements are needed for each system function and thus the back-end developers only need to determine how to display and store that data.

Front-end development is included in back-end development as a section within the development team. The front-end developers are back-end developers who are more interested in front-end, but are fully capable of back-end work. In a typical scenario, while the back-end developers are creating and structuring code, they will already begin to create the designed screen layouts. This will not happen immediately as they require a 'skeleton' or basic code structure from the back-end section in which to structure their front-end design on. This scenario happens when the development team is sent the screen layouts instead of functional requirements. If the development team receives functional requirements, the front-end section will first help with system and data structure while waiting for screen layouts.

The development team primarily interacts with each other only when needed. This occurs when there is an error or bug that they do not understand and will therefore ask one another. They will query management if a requirement is unclear or if client-stated business rules are impractical. They will typically not query the screen layouts of the UX designers due to screens already being approved by both clients and management.

In cases where they are given an already created system to improve, the development team will spend time to familiarize themselves with the code structure or programming language in order to work on the system. This can sometimes create problems when the language is unfamiliar to them or the structure is difficult to understand. In this circumstance, schedule delays can happen if the code is particularly difficult and none of the developers have prior experience with it.

5.2.5.2 UX Background

The majority of the back-end development team originates from previous organizations that did not include UX in any of their software development projects. Back-end is typically associated with making software development systems look 'pretty', but rather making sure that they had all the required functionalities.

"I never had to take UX into consideration at my previous employment because sometimes there was never a front-end even. I never had to care about designs."

In their previous employment, their companies would simply have 'developers', but no distinction between them such as back-end, front-end and mobile developers. None of the developers were expected to be 'designers' of any kind and none of them seemed interested in taking on a 'design' role within their organization. In some of these cases, the back-end developers would be forced to be front-end developers as well, despite having no interest in it. This was due to companies having no distinction between back-end and front-end development and expecting their developers to take on either role when needed. When they began working at Company X they were able to expand their role beyond development and classify themselves as back-end, front-end or as a mobile developer as they pleased.

The front-end developer had experienced UX before due to their freelance style employment before working for the company. They had never implemented UX principles before and had mostly focused on completing a project in order to move onto their next project. They had never received complaints before, therefore felt that UX was not necessary in their own work. Other front-end developers stated that they simply preferred interface design to pure back-end coding, but still not enjoy thinking of user experience. They had an idea of a screen and they created the screen based on the idea without referring to specific design principles.

5.2.5.3 UX Attitude

Due to the nature of the back-end developers' previous employment, they had no real knowledge of UX and what it entailed. They had chosen a career in development due to wanting to 'solve problems' through programming and the creation of software development systems but were not concerned with the visual aspect of how their software development system solved the problem, only that it

functionally solved the problem. They stated that they had previously thought that anything design related was a 'frilly thing' that they did not need to be concerned with. In other circumstances, they disregarded aesthetics for efficiency and often found that a 'pretty' system was not efficient or functional. One developer remarked that they had only worked on very low-level programming, in electrical engineering, in the sense that their software systems did not even have a front-end of any kind and they therefore never had to care about design or user experience. In another developer's experience, they had never even seen the front-end of their back-end code. In one other developer's previous experience, they only saw or interacted with the front-end of their coded software system when they needed to test a function they created. Some of the developers even had a slight resentment towards front-end design due to being forced into a front-end role in their previous companies when they did not want to be involved in design of any kind.

For front-end development, the adaptation of UX was smoother. As stated before, they had heard of UX and UX principles, but had simply never implemented them before. UX was not something they deemed necessary in order to earn an income as clients only seemed to care about the visual aspect of their designs. Did the design look pretty? If the answer was yes, then most clients were satisfied and did not feel the need to cater to user experience. Some of the other front-end developers stated that although they liked the design aspects of software development, they did not like to think of the exact designs but instead wanted to replicate a static design onto a software platform.

When the developers began to work at Company X, all of the developers agreed that they had a positive attitude shift towards UX due to the nature of UX at Company X. Initially they incorporated UX due to management being UX positive, but as they were involved in more and more projects the benefits of UX began to shift their view even more. This shift occurred as their job was made easier thanks to having a dedicated UX design team. The UX designers would take on the aesthetics and 'design' role and this created interfaces that were easy to error-correct.

As the UX designers are tasked with creating the software system's look and feel and screen layout, the pure back-end developers, *"… would have to worry about styling the interfaces and making things look pretty."* They can focus on the sections of work that they enjoy, such as problem solving. Since UX designers design the screens as one of the first tasks in the project lifecycle, the front-end developers do not need to concern themselves with choosing colours, deciding on text styles, determining the most effective screen mapping or any other design principles, but could instead focus on aspects like replicating the designs.. The UX design team at Company X helped the developers by taking on the roles that the developers did not enjoy at their previous employments and allowed them to focus on the aspects of programming that they did enjoy.

The UX team also improved the developers' user experience. By designing screen layouts in such a way that it would provide the optimal user experience, it also created an optimal experience and layout for error correction. The developers found that it was much easier to find bugs due to detailed error messages and information structure on a screen. This makes error solving and bug fixing much quicker and efficient and the developers are able to get back to other work and errors.

The developers also found that they had become 'audience aware', just as the mobile developers had begun to think about their end-user as they programmed their software systems. They had begun to think of how their coding sections would be utilized by the end-user and would often change sections of code if they believed it would benefit the end-user more to structure it in a different way. This had a cascading effect on the front-end designers as the coding structure, or skeleton, that they would base their front-end code on became easier to use and build upon which improved project efficiency and schedule. This also further improved error correction and bug fixes.

The developers all agreed that a UX team is important for not only project success, but inter-company success. They agreed that UX designers are a vital aspect and are needed in an organization due to the benefits they create within a software development project due to their experience with the Company X UX team.

Table 7 summarises the UX background of the back-end and front-end developers as well as their before and after UX attitudes once they began working at the company.

Stakeholder	UX Background	UX Attitude - Before	UX Attitude - After
Back-End Developers	No real knowledge of UX from work at their previous employment. Not interested in any visual-based design at all.	No real opinion of UX. They had never needed to think of it. They cared more about system functionality. They did not believe that UX 'solved problems.' Some had resentment towards the idea of UX as they had been forced into a front-end role when they wanted to be back-end.	The UX designers improved the life of the back-end developers due to improving their user experience. Having a dedicated UX team allowed back-end to be back-end and none were forced into a front-end role.
Front-End Developers	Varied. Some of the front-end developers had known about UX, but had never implemented it due to it not being a critical success factor. Others simply created the interface they had in mind without giving thought to the end-user.	Some front-end developers were ambivalent to UX while others felt like it was too much effort to cater for end-users to such a degree when the system did as needed.	The UX designers allowed the front-end designers to follow a pre-created layout that incorporated their feedback but they did not have to do anything related to the user.

Table 7: Summary of the background and UX attitudes of both Back-end and Front-end Developers

5.2.6 Project Manager

In Company X's work environment, the project management division is in charge of project scheduling, creating project tasks, goals and milestones, client liaison and following up on all given tasks to the developers, mobile developers and UX

designers. Project management currently consists of one project manager who oversees all of the stated tasks and activities.

The project manager's typical work is detailed in section 5.2.6.1 while their UX background and attitude towards UX is discussed in sections 5.2.6.2 and 5.2.6.3.

5.2.6.1 Typical Work

In a typical scenario, the project manager's task list is arranged into different phases; scheduling, task and goal creation, task and goal follow up, client liaison and conflict management.

In the scheduling phase, the project manager is tasked with creating an appropriate work schedule for all current and on-going projects within Company X. This schedule includes making sure that all deadlines for every project are well thought of and mapped accordingly so that there are no clashes or over-use of resources. This process can be difficult when clients try to change project timelines or create scope creep. The developers, UX designers and mobile developers also need to be consulted during this phase to find out if certain deadlines are possible so that nothing is promised to the client that cannot later be delivered.

Task and goal creation involves creating the various tasks, goals and milestones that need to be completed in a project. The tasks and activities are given to the developers, mobile developers and UX designers in order to complete at scheduled times or as an entire deliverable. The project manager tries to divide tasks fairly and according to each employee's skillset, but sometimes employees are given activities that may be out of their scope due to time or resource constraints. The project manager will also set goals for projects, such as, 'the screen layouts for the login function need to be completed in three days so that the developers can begin coding.'. Milestones are determined by the scope and time period of each project and therefore change per project.

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Task and goal follow up is when the project manager routinely checks in with the developers, mobile developers and UX designers to determine their progress with their given tasks and activities. This is done to adhere to the schedule set out in a previous phase. If the tasks and activities are going according to the set out schedule, then no intervention is required by the project manager. However, if the tasks and activities are delayed due to various reasons, the project manager needs to intervene. This intervention is done by either redistributing work, requesting overtime work or adjusting the schedule. These things can create stressful scenarios within the company which can affect deadlines. Sometimes the project manager will need to meet with clients in order to renegotiate the project schedule or scope in order to alleviate schedule pressure. This can cause problems or mistrust from the client, especially if the schedule has already been adjusted.

The project manager's final task is to liaise with the client on all aspects of the particular software development project. This can include 1.) setting up the initial project meeting to determine system requirements, 2.) meeting with the client to finalise a project schedule and budget and 3.) creating additional meetings for any ad-hoc purposes and 4.) facilitating any form of communication with the client. These ad-hoc purposes can include clarification on system requirements, schedule and budget adjustments, contract renegotiation or for any project suggestions. Communication can be facilitated through means such as telephone calls or e-mails where the project manager will answer any queries the client may have where a meeting is not required.

The project manager also handles any conflict within the various project teams. Conflict can arise from any means; deadlines, work tasks or personal issues. The project manager did state however that they feel that most of the conflict stems from a lack of teamwork on occasion. They felt that project members often only completed their task and did not consider the effect of their task on someone else's task. They did acknowledge that this is a common problem and not specific to Company X.

5.2.6.2   UX Background

The project manager had worked at companies before their employment at Company X. In their previous employment, UX had been non-existent. They had not been exposed to UX in any form before their employment at Company X. They did however state that the process of project management at the Company X was better than at their previous employments and was in part due to UX.

"There are a lot less comebacks in Company X because of UX. People complain less about how they use their system and we have to provide less 'graphical support'. The process is much better here because we don't get many requests to change things because users don't understand, which helps customer satisfaction."

5.2.6.3   UX Attitude

Due to their previous employment having a non-existent UX division, the project manager had no initial attitude, or they had a neutral attitude towards UX when they began their employment at the Company X. As stated earlier, the project manager did acknowledge that the project management processes are much better at the Company X and this was in part due to the implementation of UX.

Due to their primary interaction with the client, the project manager often detects the differences between projects with fully integrated UX processes versus those with only partially integrated UX processes. The projects that are fully UX integrated get much less requests to change things due to a lack of understanding from the users. This provides a greater overall customer satisfaction as clients and end-users are not constantly calling or requesting for technical support for aspects such as misunderstanding a screen, finding a function and other similar problems. The project manager stated that, *"When UX is apparent, you can change your interface depending on what users are actually doing… instead of what you or the clients intended for the end-users to do."*

Initially, project management did not see the immediate value of UX and would not go out of their way to try and include UX in budget and schedule planning. The UX designers would push to get UX included and eventually project management began to include UX. But due to UX consistently delivering good results in the form of less comebacks and complaints, project management began to change their attitude towards UX.

After experiencing UX, the project manager tries to persuade clients to automatically include UX in their projects. It is often the case that the client does not understand what UX is or has an inaccurate idea of what UX is. This can include thinking that UX is just the 'pretty stuff' and is therefore unnecessary if a client only needs a back-end focused system. If the UX designers have created mock-ups or simple wireframes to help convince the client to include UX, the clients can confuse these with the real software development product and not just an example. The clients then often get pedantic about elements such as colours or wording and the project manager will need to explain the difference between the mock-ups and the final deliverable. Sometimes a client will not want to see UX as a billable function on their invoice. The project manager stated that this had caused problems and large fights between the Company X and the client when the client saw that they would be billed for UX on their invoice. In cases like this, the project manager would try to include the bill for UX in another aspect of the invoice.

Table 8 displays a summary of project management's UX background as well as their before and after attitudes towards UX.

Stakeholder	UX Background	UX Attitude - Before	UX Attitude - After
Project Managers	UX had been non-existent at their previous work environments. Thus, they had no experience of UX whatsoever.	Due to never having experienced UX in a project before, they had a very neutral attitude towards UX.	The UX designers improved project complaints and comebacks. Due to the implementation of UX, project management has an easier time with clients and delivered software products. They will now always try to include UX in projects, even when the client has stated they are not interested.

Table 8: Summary of the background and UX attitudes of Project Management

5.2.7 Clients

The client section does include individual client typical work descriptions due to the nature of how client-project relationships occur at the company. A client is part of the UX designers' and the company's external environment.

Some of the client situations were explained in the UX Designers section above, and will be expanded on where applicable. Clients will be described by their typical UX background in section 5.2.7.2 and attitude towards UX in section 5.2.7.3.

5.2.7.1 UX Background

The UX backgrounds of the Company X's clients are varied. Some clients have been aware of UX and others have not. The clients who were aware of UX were either accommodating towards the UX designers or they had a misconception of UX and thus did not see the value in UX. These misconceptions were varied. Some thought UX was graphic design and was only during the interface design phase of the project. Some believed it was unnecessary and was only a waste of money and did not want UX to be included on their invoice. As mentioned in the project management section, UX would then be included in the invoice under a different section due to the nature of the company's work flow. Some clients had a vague idea of UX but it came from the wrong sources, such as from a graphic design company and thus also had the idea that it only dealt with interface design and making the system look 'pretty.'

This varied background has made it difficult for the UX designers to communicate with clients as they are unsure of what to expect from clients and how to convince them to incorporate UX.

5.2.7.2 UX Attitude

The UX designers found that attitude towards UX was spilt between: negative, neutral and positive. Those who had a neutral attitude towards UX were those who had or had not heard of UX and did not mind UX being included if it did not delay the schedule or overly increase the budget of the project. The clients who had a negative attitude towards UX generally were interested much more in functionality of the system and completing the system as quickly as possible. These are clients who refused to see UX on their invoice. The clients who were positive towards UX happily worked with the company and it was usually these clients who agreed to the partnership with the company at the end of the project so that the UX designers could monitor the system once it had been implemented. Some clients had heard of

UX being used at partner or rival companies and thus wanted UX implemented in their system for competitive advantage.

In order to deal with these diverse attitudes, UX designers designed a variety of methods. Their first success came when a UX positive client had agreed to the inclusion of UX and their system was implemented. The client received less comebacks and complaints and through the monitoring of the system, the UX team was able to inform the client that end-users were using the system for unanticipated actions. The client then agreed to modify the system to incorporate this new action and the efficiency of their system increased as well as the profit of their business. The success of this project allowed the UX team to use it as a benchmark as well as a way for them to show future clients the usefulness of UX.

The UX team was then able to create a collaborative relationship with their initial UX positive client and another client which led to a linkage between the two systems.

In another success story, a client had been UX neutral. However, while they were neutral, they did not specifically want the suggestions that the UX team gave them. In order to keep the UX budget, the UX team designed according to the client's specifications and created an informational website that had an additional consultation booking sub-functionality. The client also agreed to a partnership with the company. After implementing the website, the UX team monitored end-user usage and found that end-users primarily accessed the website in order to utilise the booking system. The UX team then informed the client and were able to modify the system to make the booking the main function of the website and the informational section became the sub-function.

These two successes then lead to the UX team being able to persuade many other clients to incorporate UX into their projects. By showing the new client these successful systems, the new client was much more receptive towards UX as they believed it would also create the same value for their project.

Another method that the UX team would leverage was the fact that UX was in its infant-stage in South Africa and thus the client's competitors would not have applied it yet, making them first-movers in the field. This tactic worked for some clients who wished to gain an advantage or who wanted their system to feel 'special' because it had something that their competitors did not.

In one project the UX team worked with a client who was completely negative towards UX, despite the team creating detailed mock-ups and system videos to explain the usefulness of UX. The system was created for the client, but no partnership was formed between the client and the company. The team admitted that they did not enjoy working on the project as they had to take on either back-end or front-end development roles and thus they were not proud of the project. As they were able to show more clients their success stories and as UX has become more wider known, these types of scenarios occur less and less.

From these examples, it is shown that most clients have experienced only positive effects from the use of UX and this then changed their attitude towards UX or kept their attitude positive. UX added value by allowing for system efficiency and increased profitability. UX also allowed for added functionality to be discovered that was previously not noticed. Therefore, most clients had discovered the value of UX from working with the company. Table 9 displays a summary of the clients' UX background as well as their before and after attitudes towards UX.

Stakeholder	UX Background	UX Attitude – Before	UX Attitude – After
Clients	Varied. Some clients had heard of UX before, some hadn't and some were ambivalent towards UX.	The clients are classified into one of three types: UX negative, UX neutral or UX positive. Depending on the type of project or prior experience of UX, the clients were either willing to allow UX to be on the project, happy to include it or completely resistant towards UX.	UX added value to most of the client systems by either making it that the completed systems received less complaints, by adding a financial increase or by discovering new functionality that had previously not been thought of. Therefore, most clients developed a UX positive attitude if they were UX neutral or negative and those clients with UX positive attitudes strengthened their attitude.

Table 9: Summary of the background and UX attitudes of Clients

5.3 THE PERSUASIVE UX MODEL

5.3.1 Introduction

The conception of the model began once the findings of the ethnographic observation had been complied. As the data was analysed and noted, patterns arose within each stakeholder's UX attitude section. These patterns seemed to relate to a specific or multiple Principles of Persuasion. These principles were then mapped to

their respective stakeholders in sections 5.2.3.1, 5.2.3.2, 5.2.3.3 and 5.2.3.4 and the reason for the mapping is explained.

The model was mapped in section 5.3.3.

5.3.2 Discovery of Principle/Stakeholder relationship

In order to show this mapping, tables 6, 7, 8 and 9 will be combined into table 10 on the following page.

Stakeholder	UX Background	UX Attitude - Before	UX Attitude - After
Mobile Developers	Varied, but mostly non-apparent in their previous work environments. Software companies have pre-defined ideas and notions that are difficult to change.	Annoyance at the UX designers due to impracticality of their designs when programming.	As they completed more UX-included projects, they began to notice that there were fewer complaints and re-programming. Has led to mobile developers incorporating UX in their own programming environments. This change was due to UX designers having programming experience and began designing interfaces with this in mind, which made it easier for the mobile developers. An understanding and mutual relationship was formed between the mobile developers and UX designers.
Back-End Developers	No real knowledge of UX from work at their previous employment. Not interested in any visual-based design at all.	No real opinion of UX. They had never needed to think of it. They cared more about system functionality. They did not believe that UX 'solved problems.' Some had resentment towards the idea of UX as they had been forced into a front-end role when they wanted to be back-end.	The UX designers improved the life of the back-end developers due to improving their user experience. Having a dedicated UX team allowed back-end to be back-end and none were forced into a front-end role.
Front-End Developers	Varied. Some of the front-end developers had known about UX, but had never implemented it due to it not being a critical success factor. Others simply created the interface they had in mind without giving thought to the end-user.	Some front-end developers were ambivalent to UX while others felt like it was too much effort to cater for end-users to such a degree when the system did as needed.	The UX designers allowed the front-end designers to follow a pre-created layout that incorporated their feedback but they did not have to do anything related to the user.
Project Managers	UX had been non-existent at their previous work environments. Thus, they had no experience of UX whatsoever.	Due to never having experienced UX in a project before, they had a very neutral attitude towards UX.	The UX designers improved project complaints and comebacks. Due to the implementation of UX, project management has an easier time with clients and delivered software products.

			They will now always try to include UX in projects, even when the client has stated they are not interested.
Clients	Varied. Some clients had heard of UX before, some hadn't and some were ambivalent towards UX.	The clients are classified into one of three types: UX negative, UX neutral or UX positive. Depending on the type of project or prior experience of UX, the clients were either willing to allow UX to be on the project, happy to include it or completely resistant towards UX.	UX added value to most of the client systems by either making it that the completed systems received less complaints, by adding a financial increase or by discovering new functionality that had previously not been thought of. Therefore, most clients developed a UX positive attitude if they were UX neutral or negative and those clients with UX positive attitudes strengthened their attitude.

Table 10: Summary of all Stakeholder UX backgrounds as well as UX attitudes before and after

Table 10 provides easy access to all stakeholder UX-related information. By comparing the UX before and after attitude, it can be seen that a pattern occurs in order for the before and after attitudes to be so different. This pattern is what was linked to the appropriate Principle of Persuasion. Some of the principles have been mapped on a 'closest-fit' basis where the mapping is not fully true to the principle's definition, but enough of the criteria is met to create a relationship between the two. These criteria will be expanded on in the appropriate section to explain the choice of principle.

Figure 8 provides a graphical description of the Principles of Persuasion for easy reference in this section. It will later be displayed as a legend on the Persuasive UX Model.

Table 10 and figure 8 should be used together to understand the mapping of the Persuasive UX Model displayed later in this section.

1. Reciprocity
This principle states that a person feels obliged to give back, or reciprocate, what they have received, whether it was expected or not (Cialdini, 2001).

2. Consistency
This principle appeals to a person's desire to be and to appear to be consistent (Cialdini, 2001).

3. Scarcity
This principle of persuasion relies on rareness, the limitedness or the exclusivity of a product in order to persuade people to use or buy the product. A product or opportunity is seen as more desirable the less available it is (Cialdini, 2001).

4. Social Validation
This principle is concerned with social acceptance and the influence of group decision-making and group action. By demonstrating that a significant number of other people have already complied with an action or decision, a person can be persuaded to comply with the same action or decision (Cialdini, 2001).

5. Liking
This principle exemplifies the fact if a person is liked by someone, that someone is more likely to agree to a request from that person (Cialdini, 2001).

6. Authority
This principle involves the use of authority figures or objects in order to persuade a person. This is due to people believing that true authorities have greater insight on topics they are unknowledgeable about (Cialdini, 2001).

Figure 10: Graphical description of the Principles of Persuasion

5.3.2.1 Mobile Developers

The before attitude of the mobile developers was one of annoyance as seen in table 10. The after attitude is a much more welcoming attitude. The mobile developers and the UX designers created a mutual and understanding relationship when the UX designers began to cater to the programming needs of the mobile developers. As the UX designers had programming knowledge and experience, they designed with the mobile team in mind and thus the mobile team incorporated UX into the designs and were more receptive to the UX designers.

This displays a liking relationship. As the UX designers has begun to use their programming knowledge, the mobile developers began to like the UX designers more. Therefore the appropriate principle is **the Principle of Liking.**

The Principle of Liking states that if a person is liked, they are more likely to persuade the person they are liked by. The UX designers became more liked by the mobile developers, therefore they were persuaded to incorporate due to this liking. It can be argued that the Principle of Reciprocity can be applied, however the mobile developers did not change their attitude based on this. Reciprocity can be applied because the UX designers did begin to design more with their programming knowledge at hand, thus 'doing' something for the mobile developers, this only made the mobile developers like them more. From this it can be seen that it was the liking aspect that mattered more to the mobile developers than the reciprocal nature of their relationship and it was because of this that the Principle of Liking was selected as the most appropriate principle.

5.3.2.2   Developers

This section will be split between back-end and front-end developers as different principles were found to apply to the two groups.

5.3.2.2.1 Back-End Developers

Back-end developers' initial attitudes towards UX were ambivalent as they had no real experience with UX nor did they have any knowledge on UX due to never needing to cater for screen design of any kind. The attitude change came about when they saw that UX improved their own user experience when they needed to fix any errors. This caused the back-end development team to see the value of UX through the UX designers' knowledge of UX that even changed their personal experience with their own design.

As the UX designers managed to improve the back-end developers' own personal experience when using a system that they had programmed, the UX designers were shown to be knowledgeable and insightful about real user experience. The appropriate principle for this stakeholder is **the Principle of Authority.**

The Principle of Authority states that persuasion occurs because of a person of authority in a certain field initiates the attitude change due to their position or knowledge. In this case, the back-end developers had no knowledge of UX and thus the UX designers became authority figures, or experts, to them and were persuaded because of experiencing the benefits of their knowledge. The back-end developers then began to believe that the UX designers had a greater understanding and believed in them to apply UX into more projects.

5.3.2.2.2 Front-End Developers

In the case of front-end development, there are two different types of before attitudes; neutral and partially negative. For those that had a neutral attitude, they did not see the real benefit of UX yet despite knowing of UX. The application of UX had not affected their income in any manner, therefore why should they include it? For those that had a partially negative attitude felt that UX was too much work when the system had the required functionality. They did not see the value of improving the end-user's experience. In both cases, the front-end developers did not want to include UX or be in charge of UX in any kind of manner. Some had been forced into a UX-type role when all they wanted was to program an already created design into an interface instead of create it themselves.

When they came to work at the company, the UX designers took over the sides of front-end development that they did not like; the so called 'UX' aspect of screen design. The UX designers designed the screens and handled the specifics of it so that the front-end developers could create the screen on the system instead of creating it themselves. In turn, the attitudes of the front-end developers changed into

a UX-positive attitude instead of a neutral or negative attitude. The principle that best suits this, is ***the Principle of Reciprocity.***

The Principle of Reciprocity states that a person will feel inclined to do something for you if you first do something for them, whether it is expected or not. In this scenario, the UX designers took over interface design from the front-end developers and in return, the front-end developers became more positive towards UX. While the front-end developers did not offer anything tangible in return, their attitude change towards UX helps the UX designers to include UX in future projects as the developers will be more open to incorporate UX in their designs.

5.3.2.3   Project Management

Project management had no experience of UX before coming to work at the company and this had a very neutral before attitude towards UX. This was due to working in previous environments that did not care for UX.

Project Management did not initially see the value of UX due to their previous experience and thus did not make any special effort to include it if there were schedule and budget constraints. Through working at the company and working with the UX designers, they began to see the value of UX as projects that they had included UX in, had less complaints and comebacks than those that they had not included UX on. This in turn made project management's work much easier as they spent less time fixing errors and more time on new clients and projects.

In this scenario, the most applicable principle is ***the Principle of Consistency.*** The principle of consistency states that someone is persuaded by targeting a human's inherent nature to appear consistent. Project management initially had no experience of UX, but the UX designers had gotten them to include UX on an initial project when they might not have included it and from that they had felt the need to include it again. It was through this inclusion that project management began to notice a

pattern in projects that UX versus projects that did not have UX. The projects with UX had less complaints and comebacks compared to those without. While it is not a perfect fit to the principle, by getting project management to consistently include UX as part of a project lifecycle, they were able to show the value of UX to project management.

While it could be inferred that the Principle of Liking is apparent, neither project management nor the UX team stated that it was due to a better relationship between the two teams that changed project management's attitude towards UX.

5.3.2.4 Clients

The UX backgrounds of clients is very varied, but they were classified into UX negative, neutral or positive. Some clients had heard of UX and were interested in applying it, while others had no real opinion on it and were willing to incorporate it if it would not drastically increase schedule or budget. Other clients were very UX positive due to experiencing it before, seeing it implemented in partner or rival companies or simply due the idea of it. Some clients were completely UX negative.

The UX designers dealt with these clients in different ways. They used the results of the UX-positive clients to influence those who were UX neutral or negative. By showing off the success story, they managed to persuade the clients that UX would be of value in their systems. They also persuaded clients by implementing a form of social pressure; by explaining to the client that their competitors or partners were beginning to implement UX, the client would often feel inclined to keep up with their partners or rivals. Another persuasion technique they used was to tell clients that UX would give them competitive edge as none of their competitors currently implemented it and thus they would be the first.

Through using these methods, the UX designers were able to change the UX negative and neutral attitudes into UX positive attitudes most of the time. There were only a few cases where they were not able to persuade a client.

From the previous description, two different principles can be mapped. In one case, the UX designers used success stories and social pressure. Due to the success stories sometimes relating to the client, as in the case of the company managing to forge a partnership between two of their clients, it has been included as part of the social climate. For this, *the principle of Social Validation* is applicable.

The principle of Social Validation is concerned with group decision-making and group action, ie: 'My peers are doing X, therefore I should too.' In the above example, the success stories helped clients to see that their partners and rivals were incorporating UX and therefore felt that they should too. In other cases, the UX designers would use the success stories of examples of how many other clients were incorporating UX, giving the current client the idea that it was a new social trend.

The other principle that is applicable is *the Principle of Scarcity.* It was stated that in some cases the UX designers would use the fact that UX was still new and developing as a persuasion point. If the client incorporated UX before their rivals, they would gain competitive edge as they would be the only one, or one of the few, companies that had UX in their systems.

The Principle of Scarcity leverages the rareness of an object or thing in order to persuade a person to use it or adapt an attitude. Due to an object being seen as more desirable when it is rare, the clients felt inclined to include UX.

5.3.3 Model Creation

Based on the results of the previous section, table 11 was created in order to display a quick view of the stakeholder and their mapped principle.

Stakeholder	*Principle of Persuasion*
Mobile Developers	Principle of Liking
Back-End Developers	Principle of Authority
Front-End Developers	Principle of Reciprocity
Project Management	Principle of Consistency
Clients	Principle of Social Validation
	Principle of Scarcity

Table 11: Summary of Stakeholders and their appropriate Principle of Persuasion

The information from table 11 was then used to create the model. Each principle was then assigned a colour, as seen in figure 10.
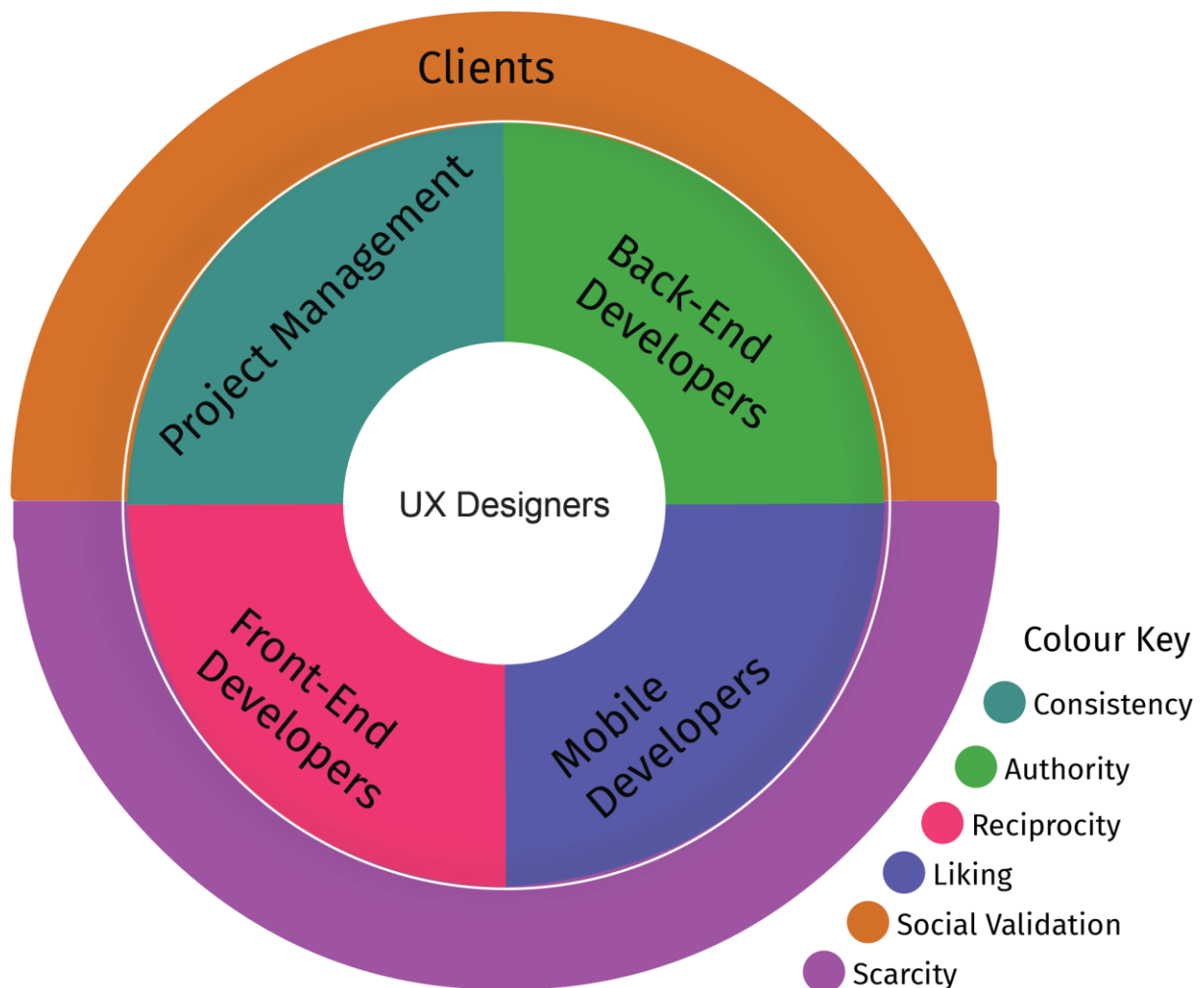
Figure 11: The Persuasive UX Model

Figure 11 represents the first model created from the results of table 11. The model is shown as three circles, meant to represent the internal and external environments of the UX designer. The UX designer is placed in the middle as they are the stakeholder who are trying to persuade their internal and external environments. Project Management, Mobile Developers, Front-End Developers and Back-End Developers make up the UX designers' internal environment as they are part of their working environment. Clients make up the external environment as they are not directly or consistently in the UX designers' working environment

The intention of this model was to create a reference base for any UX designer. By giving a UX designer in any other workplace this model and a brief explanation of the

principles, they would be able to leverage the model to suit their work environment. In this way, the method of persuasion did not matter as long as the method aligned with the principle stated in the model. The Principles of Persuasion offer this flexibility as they do not lock the user into using only one or two methods to persuade someone, but instead give a base in which a variety of methods can be used. For example, with the Principle of Liking, it does not matter how the UX designer gets the mobile developer to like them, only that they should devise a way accomplish it. This gives a UX designer the freedom to adapt a method to suit their situation as all humans are unique as explained by PCT. A singular method will not always work on different individuals due to the nature of PCT and how they have created their constructs of their universe. By giving the UX designer freedom to determine their own methods, they are able to adapt the method as needed.

5.4 CONCLUSION

Chapter five discussed the results of the participant observation at Company X. Through a detailed analysis of the observation results, a Principle of Persuasion was mapped to a stakeholder. This created the initial Persuasive UX Model which will be evaluated by experts in the chapter six.

The next chapter will discuss the data analysis of the expert evaluations on the initial Persuasive UX Model.

CHAPTER 6 DATA ANALYSIS AND RESULTS PART 2 – PERSUASIVE UX MODEL REVIEW

6.1 INTRODUCTION

The initial Persuasive UX Model was created from the results of a case study which only dealt with one company, an expert analysis process was carried out through the use of a detailed questionnaire. The questionnaire was sent to twenty experts in the field of UX in South Africa from different companies. Ten answered the questionnaire.

The experts' team structures will be discussed in 6.2 while their UX inclusion for all their stakeholders are detailed in 6.3. The revisions to the model are shown in sections 6.4 and 6.5. The discussion in section 6.6 compares the model to the findings of chapter two.

6.2 TEAM STRUCTURE

The experts were asked if their company had a structure that was similar to that of the case study company's internal environment, which is a team division consisting of:

- UX Designers
- Development (Back-End and Front-End)
- Mobile Developers
- Project Management

Eight experts stated that they had the same division structure as the case study company.

Two experts explained that their team structure was much more cross-functional than that of the case study company. Their structure thus included:

- UX Team
- Design Team
- Project Owners
- Developers

Despite the different structure, there are some similarities. The UX team could be classified as the same as the UX designers of the case study company while the design team would be a combination of front-end developers and graphic designers. The case study company currently does not employ any dedicated graphic designers and the UX designers are expected to take on that role if needed. While the third expert's company does not include project management, they have project owners who are in charge of a specific project instead of having a team to manage all the projects. They also do not have a dedicated mobile development team. Another expert stated that they did not separate their developers into desktop and mobile, only into front-end and back-end. One expert did not elaborate on their structure.

6.3   UX INCLUSION

All of the experts answered that their company had already included UX into their project lifecycle. Their UX inclusion was as follows:

1. Expert 1: *'Roughly five years.'*
2. Expert 2: *'Seven years.'*
3. Expert 3: *'Varies.'*
4. Expert 4: *4-6 months as it is still early days and a lot of work still needs to be done.'*
5. Expert 5: *'Three years. We started developing software in 2015 and the initial products took too long to deliver and frequently did not meet client expectations. We have applied UX principles in the past two years and seen significant change. We can always improve our UX approach but it has already helped a lot.'*
6. Expert 6: *'We have achieved incorporating UX into our projects for some time now.'*

7. Expert 7: *'Eighteen months. We only recently started incorporating UX into our organisation.'*
8. Expert 8: *'A year.'*
9. Expert 9: *'Two years.'*
10. Expert 10: *'It is still a work in progress. We have traditionally been functionality-centric but have learnt that any user of the system is important and how they interact with the system has merit. In our industry this has become a differentiating factor and needs focus and attention. In essence, we've set ourselves a goal to become a leader/standout in UX.'*

All of the experts stated that they were currently incorporating UX in their projects. Some have included UX for a number of years, while others have only recently begun to include UX.

Based on the experts' company structure, they were asked how they had managed to convince each of the structure groups to include UX. The fourth expert did not give an in-depth description of the UX-attitude of their organisation's stakeholders.

6.3.1 Project Management

The first, fifth, sixth and seventh experts stated the following in regards to persuading project management:

- *"evidence-based evangelism, such as a return on investment."*
- *"Evidence on how it can influence the profit margin."*
- *Evidence based solutions go a long way to give credible insights into UX design and the value it can add as a separate entity. Implementing analytics into existing projects to prove and iterate interfaces based on analytics-derived insights also helps."*
- *"It is difficult to persuade, I believe this is something that needs to be driven from the top-down and project plans need to set out UX as a crucial step as part of the project plan. Alternative approach could be past projects and to*

show the delight from clients where UX was incorporated and successfully contributed to the project."

These methods that were used, are similar to the case study company's use of success stories in order to convince clients to include UX in projects. This was used as part of the Principle of Social Validation in the case of clients, however it can also be part of the Principle of Consistency. The experts stated they used return on investment as an evidence-based persuasion method. This implies that they have previous work which they referred to where there was a case of return on investment, which thus implies that UX has been included before. The Principle of Consistency focuses on an individual's need to appear consistent before others and by reminding project management of previous project successes where UX generated a return on investment, the principle is applied to keep UX included in projects.

The second expert stated that,

- *"I did not persuade them as they had already started involving UX in digital customer channel projects when I joined the company. But it often happens that you need to remind stakeholders of the value of customer-centricity when they're busy making business decisions."*

From this, it is seen that the expert did not need to persuade project management due to joining a company that already incorporated UX. However, they were involved with reminding project management that it was important to include UX. These reminders were subjective to their company due to the perceived value of customer-centricity within their environment. Based on this, there is some similarity to the case study company. The UX designers used the Principle of Consistency to persuade project management to incorporate UX. In the case of the expert, the Principle of Consistency is used to retain the inclusion of UX when dealing with project management. As project management had already agreed to the inclusion of UX, they would use this consistency, the value of customer-centricity, to keep UX included while business decisions were made.

This reinforces that the Principle of Consistency is appropriate for project management.

The third expert, who follows a different company structure, stated that there was, *"No need to persuade project owners. It is company policy that UX is core, the project owners will not proceed with work unless it has been through the UX and Design team."*

Their statement shows that their company follows a similar structure to that of the case study company, where the UX designers are the first access point to the project work. From the statement it can be inferred that the Principle of Consistency is apparent as UX is consistently included in all projects, to the point where work will not begin unless UX and the design team have seen it first.

The eighth expert stated that, *"Understanding the needs of today's consumers. There is no longer a distinction between what is a business/mobile/consumer focused application. All users are human and systems no matter their function or platform need to be designed with this in mind."* Their answer refers to cultivating a user-centred design mindset within organisations, but they do not make reference to a specific principle.

The ninth and tenth experts had the following to say:

- *"It should be a company strategy. Top down approach."*
- *"To be part of strategy and design internally. This should be formalised that it is never overlooked or taken light. It should be sort of a mandatory step in the process. To be involved in scoping sessions with customers."*

The answers from these two experts show a link between UX and overall company structure. The way to persuade project managers to incorporate UX is to make UX part of company procedure and policy. This could relate to the Principle of Authority, however it does not fit the description exactly as expert UX knowledge is not being leveraged to perform the attitude change.

From the answers of these experts, it can be seen that the Principle of Consistency is applicable to persuading project management or similar. The Principle of Social Validation could also be applied in specific cases. Table 12 displays a summary of the experts persuasion of UX to project managers.

Expert		Project Managers
	1	Consistency
	2	Consistency, Social Validation
	3	Consistency
	4	N/A
	5	Consistency
	6	Consistency
	7	Consistency
	8	N/A
	9	Authority (weak)
	10	Authority (weak)

Table 12: Summary of Experts' Persuasion of UX to Project Managers

6.3.2   Developers

For this section, both back-end and front-end developers are combined into a single 'development' role due to the feedback of the experts. It is only in the case of the third expert that front-end development is a part of their design team, which will be catered for in their section. Mobile development will also be included in this section due to the closeness of the mobile development team and the back-end and front-end development teams in the experts' companies.

6.3.2.1   Back-End and Front-End Developers

The first, sixth and eighth experts stated the following:

- *"By empowering them collaboratively to understand that they are also part of UX design stakeholders."*
- *"Including them in research and getting them to give input will help them to understand the implications and value UX adds to their projects."*
- *"Developers by nature only do what is told, they are creative when it comes to coding but not in understanding or expanding upon the requirements set by design. People more often that not do not realise that design is an integral part of every day life. The more a UX designer can re-iterate that point the better."*

From their statements, it can be said that there are similarities between their company and Company X. 'Empowering them collaboratively,' is what the UX designers of the case study did in order to persuade the front-end developers to include UX. By taking over the work that they did not want to do, they enabled better collaboration in the case study company which was related to the Principle of Reciprocity. The experts did not expand on the influence of back-end development, but the Principle of Consistency could be applied as well. As explained in the project management section, reminders could be considered a method of this principle. In this case the reminder is that, 'they are also a part of the UX design stakeholders,' which implies that they have been a part of/have agreed to this stakeholder group before, which is in line with the Principle of Consistency. Consistency applies to the other statements as including developers in research could serve as 'reminders'. 'Doing what they are told,' can apply to Consistency. The developers will consistently include UX as it something they are required to include.

The second expert had the following to say, *"Our developers have a good sense of what users like, but sometimes you still need to fight for good user experience when the team wants to start cutting corners to deliver stuff sooner."*

From their statement, it is shown that the developers have already gained a user-centric sense when they develop. This expert unfortunately joined the company after the company had gained a pro-UX attitude and thus did not know how developers had initially been persuaded to adopt UX. However, from their statement it can be inferred that the Principle of Authority is present, which is aligned with back-end

developers on the Persuasive UX Model. The expert has to exercise their knowledge and expertise of UX and its effects in order to keep UX included when development wants to deliver sooner due to schedule or budget constraints. The developers take their expertise into account and thus do not cut UX out during deadlines. Therefore, while the Principle of Authority may not have been the principle that initiated the attitude change, it is the principle that maintains the attitude change.

The third expert reiterated that there was, *"no need to do anything. Developers will not do any work unless UX and Design has completed the work required for them to start."* Their answer implies the Principle of Authority as the development team trusts the UX designers and design teams' expertise to the point that they will not work on a project until those two stakeholders have told them to begin. The fifth expert also implies the Principle of Authority as they state, *"a UX approach is more effective than any other methods to development."*

The remaining experts stated had the following statements:

- *"Explain that if UX is incorporated then there will be less maintenance calls routed to developers. They can focus on projects and not be stuck with technical support calls. Another way is to listen to their concerns and provide suggestions rather than to dictate."*
- *"Back-end developers need to stay as far away from UX as possible. If they had their say, then not a single person would utilise systems because they would be too cumbersome."*
- *"Back-end is traditionally not pro-UX."*

From these statements, it can be interpreted that the organisational structure of these expert companies differs from Company X. The expert answers seem to show a lack of team integration and that the developers only do what they are told or if upper management tells them. This does not apply to a specific principle as no attitude change occurs.

6.3.2.2 Mobile Developers

The first and ninth expert mentioned that their mobile developers and development team work closely together, despite different being part of different teams. They remind mobile developers that they are "*also part of UX design stakeholders"* and that they are*, "an integral part of team and design."* From the development section, this referenced the Principle of Consistency. When asked if the Principle of Liking helped them to re-persuade the mobile developers according to the model. They agreed that the UX team was liked by the mobile developers and were more recipient to requests from them as a result. It was then queried if the same was relevant for the development team, as the same method was used to persuade them. The experts agreed.

The second and eighth expert also reiterated again that the mobile developers would also not begin work until the UX designers and the design team had informed them to begin and that persuasion was, *"not really needed."* As with the back-end and front-end developers, this implies that the Principle of Authority is present again. When asked if the Principle of Liking is present, the second expert stated that is was not particularly present, however their team and work structure worked very well and there was no animosity between any of the teams. From this, it can be stated that in the second expert's company, there is a general respect and liking towards the UX designers and Design team as the other stakeholders are content to wait until work is assigned to them, despite deadlines.

The remaining experts stated that mobile developers were no different to desktop developers and their answers remained the same as those for the desktop developers. Table 13 is a summary of the experts persuasion to the various developers.

Expert	Front-End Developers	Back-End Developers	Mobile Developers
1	Consistency Liking	Consistency Liking	Liking Consistency
2	Authority Liking	Authority	Liking Authority
3	N/A	Authority	N/A
4	N/A	N/A	N/A
5	Authority	Authority	Authority
6	Consistency	Consistency	Consistency
7	N/A	N/A	N/A
8	Consistency	Consistency	Authority
9	Consistency	Consistency	Consistency
10	N/A	N/A	N/A

Table 13: Summary of Experts' Persuasion of UX to Developers (Back-End, Front-End, Mobile)

6.3.3 Clients

The persuasion of clients to adopt a UX-positive attitude by the experts and their companies is analysed in this section. However, only one of the experts dealt with the clients directly and had any impact on their adoption of a pro-UX attitude. The second and third experts had no interaction with the clients.

In order to persuade clients, the first, fifth, seventh and eighth experts stated that they do this by:

- "*Showing them how improving the UX of products will strengthen their financial efficiency, growth and protect revenues, customer satisfaction and brand image.*"

- *"Showing evidence how the project will be more successful and the product will be more effective. A better quality product."*

- *"Previous case studies and projects. I've found clients typically prefer to buy low-risk and if you can showcase the value it has had on previous projects and that it will reduce their risk on a failed outcome they will be willing and open to pay more. Clients mainly focused on costs, thus incorporating UX as part of project will be more expensive from a project perspective, however maintenance and support fees will be significantly less."*

- *"If you don't have good UX then no one would want to use your product. Think of the Danes and their love for design and experiences. They are not ranked the happiest nation on earth for nothing. They have incorporated design and UX into their everyday lives."*

These statements references success stories that serve as examples of how UX has improved the financial efficiency, growth and protect revenues, customer satisfaction and brand image of other companies and thus how it would be expected to affect their own. This falls in line with the Principle of Social Validation as it was used to aid the case study company.

The sixth, ninth and tenth experts stated that:

- *"Why would clients need to be persuaded? Clients should experience seamless interaction without the need for knowledge of how the solution was built."*

- *"Clients should not have a choice in this. Part of the team that develop the system."*

- *"Approach should be targeted at product first and with accurate and detailed guidance on what is the industry standard. Most clients will listen without objection if a UX designer speaks with authority, not only from an experience point of view, but coupled with an understanding of the subject matter."*

These statements relate to the Principle of Authority. The tenth expert's statement directly references the fact that UX designers should use their expertise on UX to persuade clients. The other two statements state that clients should not have a choice on whether or not UX is included as the delivered system should be the

persuasion. UX designers should exercise their expertise to create this seamless integration.

None of the experts mentioned the Principle of Scarcity. Table 14 is a summary of the experts persuasion of UX to clients.

Expert	Clients
1	Social Validation
2	N/A
3	N/A
4	N/A
5	Social Validation
6	Authority
7	Social Validation
8	Social Validation
9	Authority
10	Authority

Table 14: Summary of Experts' Persuasion of UX to Clients

6.4   PERSUASIVE UX MODEL REVISIONS

In order to successfully review the results of the model analysis, the results of table 12, 13 and 14 were compiled into table 15 on the next page.

Expert	Project Managers	Front-End Developers	Back-End Developers	Mobile Developers	Clients
1	Consistency	Consistency Liking	Consistency Liking	Liking Consistency	Social Validation
2	Consistency, Social Validation	Authority Liking	Authority	Liking Authority	N/A

3	Consistency	N/A	Authority	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	Consistency	Authority	Authority	Authority	Social Validation
6	Consistency	Consistency	Consistency	Consistency	Authority
7	Consistency	N/A	N/A	N/A	Social Validation
8	N/A	Consistency	Consistency	Authority	Social Validation
9	Authority (weak)	Consistency	Consistency	Consistency	Authority
10	Authority (weak)	N/A	N/A	N/A	Authority
	Consistency	Consistency Liking	Consistency Liking	Liking Consistency	

Table 15: Summary of Experts' Persuasion of UX to All Stakeholders

From table 15 it can be seen that while the experts mostly agreed with the original mapping of the Persuasive UX Model, there were some changes to consider

6.5 REVISED PERSUASIVE UX MODEL
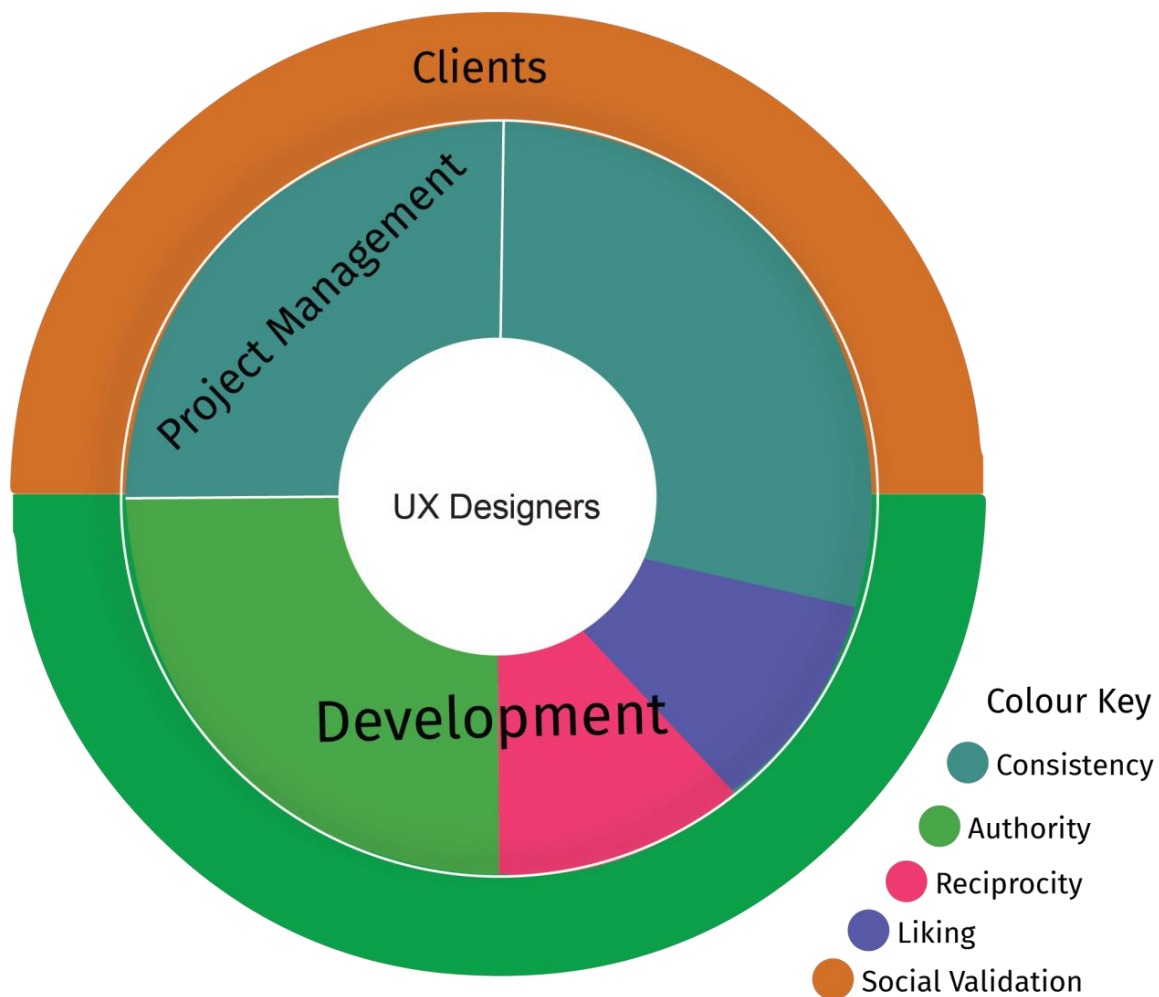
Figure 12: The Revised Persuasive UX Model

Figure 12 displays the revised Persuasive UX Model based on both the results of the case study company observation as well as the expert review of the model.

Project Management has remained the same while the development and client sections have been impacted. Instead of segregating development, they were all placed under the 'development' title as the experts mentioned that their team division was not as clear cut as that in the case study company. The Development section now displays that the Principle of Consistency is the most applicable due to it taking

the most space, followed by the Principle of Authority and then the Principle of Reciprocity and Liking taking equal amounts of space. The client section saw the removal of the Principle of Scarcity and the addition of the Principle of Authority due to the application of authority in the experts' organisations.

The revised model also shows that the Principle of Consistency seems to be the most applicable principle to use in a UX designer's internal work environment, followed by Authority.

6.6   DISCUSSION

6.6.1   Introduction

The discussion will take the findings of chapter five and six and compare them with the literature discussed in chapter two. This process is undertaken in order to reaffirm the existing literature or to discover new concepts. Due to the fact that the research contains two data analysis and findings chapters, the discussion will be split into two sections. The first section (6.6.2) will detail the results of the observation and the initial Persuasive UX Model. These results will be compared with PCT and attitude, behaviour and intention. The second section (6.6.3) will focus on the results of the expert evaluation and the final Persuasive UX Model. The evaluation will be compared with agile, the Six Principles of Persuasion, UCD, usability testing, interface design and co-experience.

6.6.2   Initial Persuasive UX Model

It was stated in Chapter 3 that the experience and choice corollary of PCT would be investigated in order to create an attitude change towards UX. By observing the before and after attitudes of the various stakeholders in the Company X's environment, the effect on the experience and choice corollary can be seen.

An attitude, which can be positive or negative, is developed by someone towards a certain thing or concept which is affected by experience or preconceived ideas. An attitude is understood as a persons' overall evaluation of an object or concept (O'keefe, 2002). This description of an attitude is similar to the description of a construct. A construct gives an understanding into an individual's perceptions of something and the attributes they assign to that thing, in this case UX (Hassenzahl and Wessler, 2000). From the comparison of these two definitions, it can be said that an individual's attitude towards UX will be consistent with their construct of UX.

During the observation, each of the stakeholders held an initial UX construct, or attitude towards UX, as described by the UX designers of Company X:

- **Mobile Developers** – slightly negative
- **Back-End Developers** – neutral
- **Front-End Developers** – neutral to slightly negative
- **Project Manager** – neutral
- **Clients** – varied

These attitudes describe the stakeholders' initial UX construct as described by PCT. The mobile developers and some of the front-end developers would have had a negative UX construct, which would have made their behaviour towards UX negative. The back-end developers, project manager and some clients had a neutral initial UX construct. The observation results showed that clients' UX construct was varied. This initial negative or neutral behaviour was shown through the observation. For example, front-end developers did not want anything to do with UX before they began working at Company X.

In order to influence this construct, the UX designers leveraged the experience corollary. The experience corollary is described by, "as an individual ventures through various events, they create experiences of the event and an individual's construct system varies and changes as the individual then applies these experiences to understand similar events that occur (Kelly, 1970)." The UX designers of Company X caused all the stakeholders to experience a different view of UX. As this experience was positive, the experience corollary caused the stakeholders' UX construct to change in a positive manner which then influences an attitude change.

This attitude change shows how the experience corollary was affected due to its new environment. Where previously all of the stakeholders had been in environments where UX was a non-factor, they were now in an environment where UX was pushed to be included. This change in the UX construct represents an overall attitude change to UX that could only be reversed if the stakeholder leaves to a UX negative environment as described by the experience corollary.

It is also shown that the choice corollary is affected as mentioned in previous research (Slattery, Simpson and Utesheva, 2013). The choice corollary is responsible for the way in which person makes use of their personal constructs within their environment, that will then influence them to make choices that improve and develop their created personal constructs (Kelly, 1970). Kelly (1970) states that an individual may do this by defining or expanding upon a construct based on how important and useful that construct is to the individual. It was seen that as the stakeholders' UX construct changed to a positive one through the experience corollary, how the stakeholders began to adapt their UX construct. They began to improve their UX construct and developed it further in a positive manner according to the choice corollary.

This positive expansion of the UX construct can be seen when the developers stated that they had begun to incorporate UX in their own coding. The mobile developers said that they began to place themselves in the user's perspective when they coded. This was done without prompt from the UX designers and displays the development of the UX construct.

This expansion of the UX construct could not have occurred if UX designers had not first leveraged the experience corollary to create a positive UX construct. Therefore, the experience corollary should be included. This inclusion should be reinforced because the choice corollary can also expand or define a negative construct. If the stakeholders had kept their negative or neutral UX constructs and only the choice corollary was exercised on the construct, then the stakeholders could've developed an even more negative UX construct.

Thus, PCT gives an insight into the processes that occur during an attitude change and how this attitude change affects the stakeholders' future attitude.

6.6.3   Proposed Persuasive UX Model

The results of the persuasive model evaluation in chapter six give insight into how the Principles of Persuasion have a positive association with agile software development and UCD, specifically usability testing and interface design. These factors will be reviewed under how they formed part of each Persuasion Principle in sections 6.6.3.1, 6.6.3.2, 6.6.3.3, 6.6.3.4, 6.6.3.5 and 6.6.3.6. The findings display how the Principles of Persuasion reinforce what is currently in literature in terms of agile and UCD.

6.6.3.1   The Principle of Reciprocity

This principle was initially applied to front-end developers. The principle leveraged off of the fact that UX designers took over the task of interface design from the front-end developers. An interface is an end-user's direct link to system interaction and is thus vital in a system. The UX designers used the Reciprocity principle to persuade the front-end developers to adopt a positive UX construct as seen in the observation.

The Principle of Reciprocity can also be applied to end-users. If an interface gives a user a good experience, they will feel inclined to continue using the system or even using other systems created by the same company.

6.6.3.2   The Principle of Consistency

The initial Persuasive UX Model assigned the Principle of Consistency to project managers. The success stories used only referred back to the fact that UX was consistently applied in previous projects that turned out to be very successful. The Principle of Consistency remains the most appropriate principle as it aids project management to achieve goals of project 1.) time, 2.) cost, 3.) desired performance level, 4.) resource utilisation and 5.) customer acceptance (Kerzner and Kerzner, 2017).

Consistency was also found to apply to all developers. Developers in agile project environments often need to respond to inconsistent requirement changes and deliver products quickly (Highsmith and Cockburn, 2001). Developers in agile environments also need to remember the relationship between themselves and their end-users and clients (Abrahamsson *et al.*, 2017). The Principle of Consistency applies to this developer, end-user and client relationship as it was used to remind developers of their role in providing a good UX.

Through the process of the observation and the expert evaluation, the utilisation of the Principle of Consistency was found to be different to that of the initial definition. The Principle of Consistency was mostly used to maintain a UX positive attitude and can be applied to the choice corollary of PCT.

6.6.3.3 The Principle of Authority

Initially this principle only applied to back-end developers, however through the expert evaluation it was found to apply to all parts of development. The Principle of Authority and usability testing can be linked together. The Principle of Authority allows the developers to be persuaded by a UX designer's expertise in usability testing to help overcome these requirement changes to deliver functional products. It can also be seen that the Principle of Authority gives UX Designers to chance to implement usability testing in an environment where they were previously unable to. Usability testing was found to have similarities to agile as both factors focus on iterative design phases, user involvement throughout all phases and the significance of team cohesion and goal alignment during the project (Chamberlain, Sharp and Maiden, 2006) (Brhel *et al.*, 2015). The Principle of Authority can allow for these similarities to be seen and understood by other stakeholders, mostly developers.

This principle was also found to apply to clients. Some of the experts stated that clients should not have a choice to include UX or not and that a UX designer should speak with such authority that a client has no room to second guess the inclusion of

UX. This reasoning can be tied to the Principle of Authority as the principle leverages expertise and knowledge as the method of persuasion. Therefore, a UX designer should use their knowledge and expertise of UX to persuade clients to the extent that clients have no choice but to include UX in spite of their current UX construct.

6.6.3.4 The Principle of Social Validation

This principle primarily applied to clients. Clients' UX construct was mostly influenced by social validation. The UX designers of both Company X and the expert organisations used success stories to influence clients. These success stories can be seen as a factor of co-experience. Co-experience is described as, "experiences with products in terms of how the meanings of individual experiences emerge and change as they become part of social interaction" (Battarbee and Koskinen, 2005). By sharing the success stories of other clients with the current clients, the current clients now were now able to experience the success of previous projects. This shared experience would also leverage the experience corollary to aid the change of clients' UX construct.

6.6.3.5 The Principle of Liking

This principle was found to only apply to mobile developers in Company X. There was a strong association between this principle of the mobile developers, which is why it was still included in the revision of the Persuasive UX Model due to its link to agile development.

Agile development focuses on close team relationships and working environments (Abrahamsson *et al.*, 2017). The Principle of Liking refers to persuasion through an individual's 'like' for another individual. In order to have close team relationships, there should be a degree of 'liking' between members of the teams in order to foster positive working environments. The Principle of Liking can be applied in these situations to create these positive team relationships and environments that are required in agile environments.

6.6.3.6 The Principle of Scarcity

The principle was not found to have much influence in either the observation of Company X or the expert evaluation and thus was removed from the Persuasive UX Model.

The removal of the principle from the model can be attributed to the fact that while UX is not always integrated in South Africa, it is not a new concept (Pretorius, Hobbs and Fenn, 2015). The Principle of Scarcity entails the 'rareness' of a thing or concept and that rareness is seen as desirable. UX is not a rare or unknown topic in South African and Pretorius, Hobbs and Fenn (2015) stated that UX was at a, "critical stage." This critical stage does not imply rareness therefore the Principle of Scarcity is not fully applicable.

6.7 CONCLUSION

The discussion section explained the impact of the data analysis and findings on existing literature. It was found that PCT and attitude had a strong correlation to each other and could be used to explain the attitude change that occurred in Company X. The Principles of Persuasion were compared to agile, UCD and co-experience and a positive relation was found between them. The Principle of Consistency related to almost all stakeholders and a new use for the principle was discovered through its use in both Company X and the expert organisations. The Principle of Reciprocity and interface design could be leveraged together to persuade not only developers, but end-users as well. Authority was found to enable usability testing in agile environments. Social Validation and co-experience explained why success stories influenced clients. The principles of Liking and Scarcity were found to have a minimal influence on any of the literature discussed in chapter two.

The following chapter will discuss the conclusion of the research and reflect on the objectives of the study.

Chapter 1: Introduction

This chapter includes the problem statement and background information.

Chapter 2: Literature Review

This chapter includes all aspects of the literature review:

- What is UX?
- UCD (User-Centered Design)
- UX, UCD and Agile
- Attitude and Behaviour

Chapter 3: Theoretical Framework

This chapter includes the theoretical framework:

- PCT (Personal Construct Theory)
- The Six Principles of Persuasion

Chapter 4: Research Methodology

This chapter includes the research methodology used as well as ethical research practices.

Chapter 5 and 6: Results

These chapters include the results of the data collection period as well as an in-depth analysis.

Chapter 7: Conclusion

This chapter includes the results of the data collection period as well as an in-depth analysis.

CHAPTER 7 CONCLUSION

7.1   INTRODUCTION

The final chapter discusses the results of the previous chapters and their ability to answer the research questions set out in Chapter 1. The main aim of the thesis was to answer the questions illustrated in figure 13.

MRQ

How can a UX designer influence an attitude change towards UX in software system development using the Six Principles of Persuasion?

SQ1

How did UX designers persuade their internal stakeholders to adopt a positive UX attitude? Which Principle of Persuasion is most applicable to these groups of people?

SQ2

How did UX designers persuade their external stakeholders to adopt a positive UX attitude? Which Principle of Persuasion is most applicable to this stakeholder group?

SQ3

Which Principle of Persuasion is the most used in order to change stakeholder attitudes?

SQ4

What tools and techniques do UX designers use to change stakeholder attitudes? Under which principle did these tools and techniques fall under?
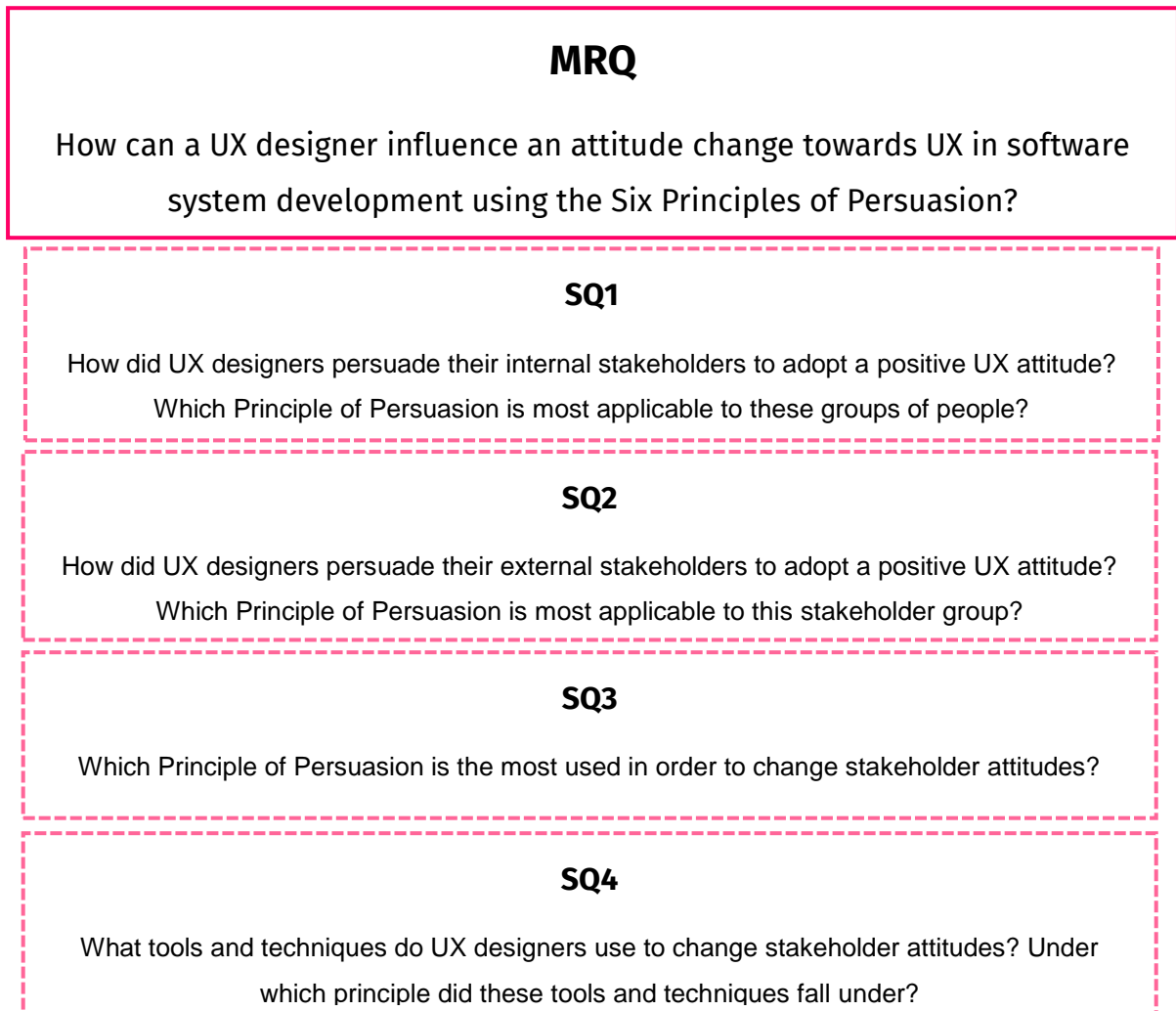

Figure 13: Main and Sub Research Questions

The sub-questions will be answered first (sections 7.2, 7.3, 7.4, 7.5) in order to determine if the main research question (7.6) is answered. For easy reference, the Persuasive UX Model will be placed on the next page as figure 14.
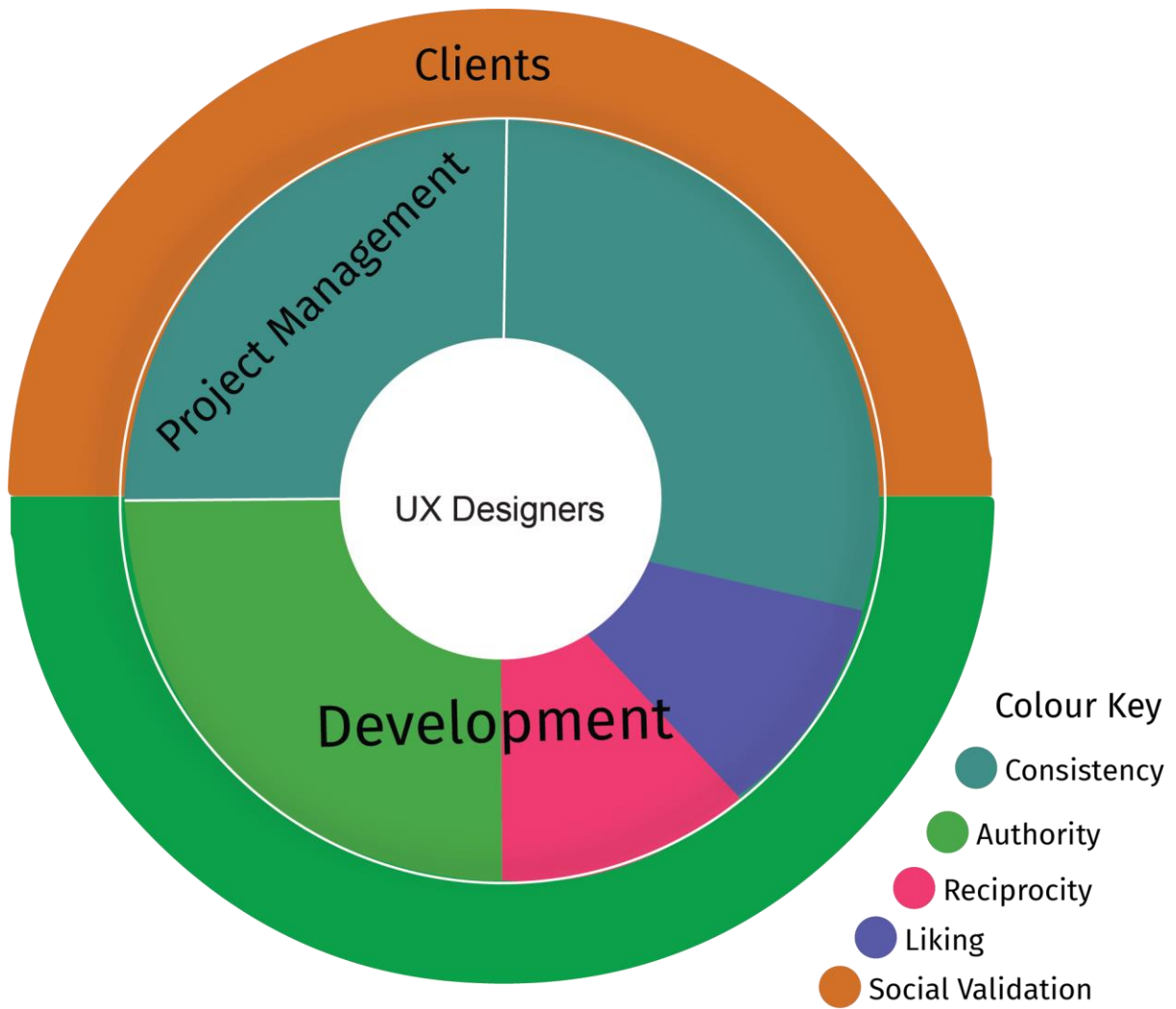
Figure 14: The Revised Persuasive UX Model.

7.2 SUB-QUESTION ONE

SQ1

How did UX designers persuade their internal stakeholders to adopt a positive UX attitude?

Which Principle of Persuasion is most applicable to these groups of people?

Firstly, the internal stakeholders identified are:

- Project Managers
  - This stakeholder group includes any individuals who are in charge of a project or who make decisions regarding the project.
- Developers
  - This stakeholder group includes all forms of development, such as back-end Developers, front-end Developers and mobile Developers.

These stakeholders were identified in chapter five and six. During the observation, developers were split into front-end, back-end and mobile developers but after the expert evaluation in chapter six, they were combined into developers due to the structure of the experts' organisations.

From looking at the Persuasive UX Model, it can be seen that the Principle of Consistency is most applicable to Project Managers. The Principle of Consistency appeals to an individual's desire to be and to appear to be consistent as stated by Cialdini (2001). As shown through the results of the observation and the expert analysis, UX designers had persuaded project management to adapt a UX-positive attitude by relating to the fact that UX had occurred in previous projects. The Principle of Consistency was also found to aid the goals of project management as described by the discussion section of chapter six.

While this is may seem like an annoyance, by constantly reminding project managers what they had done before, UX Designers showed the value of UX. Projects that included UX had less complaints, fewer comebacks and created a

greater return on investment and this is what prompted the attitude change. Therefore, the Principle of Consistency allowed UX designers to show the value of UX to project management.

For development, there are four principles that can be applied. These principles include the Principle of Consistency, Liking, Reciprocity and Authority. As seen from the coloured sections of the model, Consistency and Authority were the two most successful principles in fostering an attitude change. Similar to project managers, the Principle of Consistency was used to remind development that they had previously incorporated UX into projects and that they are, *"also part of UX design stakeholders"* as quoted by the first expert in the expert analysis. This then prompted development to also see the value of UX and caused them to foster a user-centric attitude when it came to development. The Principle of Consistency was also found the reinforce the principles of agile. In chapter six it was explained that agile focused on the relationships between developers and end-users. As the UX designers used consistency to remind developers of their involvement in UX, it reinforced the focus on end-users.

Authority was originally only assigned to back-end development in the first version of the model, but after the results of the expert analysis it was shown to apply to all stakeholders within development. The developers saw UX designers as experts and knowledgeable in their field. This particularly related to usability testing. The Principle of Authority states that people are persuaded by someone who is seen as an expert in their field due to the belief that these experts have greater insight on the topic. If developers view UX designers as knowledgeable, they will be willing to include usability testing which will then aid the iterative phases of agile design. In the case of Company X, none of the developers have ever incorporated UX before in their previous employments and therefore the UX designers were seen as experts in their field. In the case of the experts, one mentioned that work did not even begin on a project until the UX team had given the various stakeholders their work. From these

results, Authority was deemed to apply to all stakeholders within the development group.

Finally, the Principles of Liking and Reciprocity were relevant. These two principles were found to be used exclusively in the Company X's environment. The experts stated that there was no particular link to them and the development team. They are still included in the model due to their exclusive use in the Company X and differing company structures between them and the experts' companies. The Principle of Liking was found to have a relation to agile, despite not being specifically noted in the experts' organisations.

Therefore, the answer to sub-question one is that UX designers used the Principle of Consistency on project managers in order to persuade project management to incorporate UX. Through this principle, the value of UX was experienced by project management which prompted them to adopt a UX-positive attitude. UX Designers primarily used the Principle of Consistency and Authority to persuade developers to incorporate UX. Through this principle, development experienced the value of UX to the point of adopting a user-centric attitude when developing software for clients.

7.3   SUB-QUESTION TWO

> **SQ2**
>
> How did UX designers persuade their external stakeholders to adopt a positive UX attitude?
> Which Principle of Persuasion is most applicable to this stakeholder group?

The external stakeholder identified is:

- Stakeholders
  - An individual or business that sponsors a project.

As shown by the Persuasive UX Model, clients were persuaded by two principles; Social Validation and Scarcity. From the results of the expert analysis, only one expert had contact with the clients and therefore this section is the least reviewed. However, the expert that did have client interaction reiterated that the Principle of Social Validation had the most impact on changing clients' attitude towards UX.

Social Validation is concerned with social acceptance and how the decisions of a group affect the decisions of an individual in order to comply with that group. UX designers leveraged this principle through the use of success stories in order to convince clients to incorporate UX. The success stories formed part of Social Validation as they were used as examples to show clients what other clients had done and how it had impacted them, which would influence their decision making. This fostered a UX-positive attitude as clients were shown how many of Company X's other clients were incorporating UX, some even in the same industry, and the benefits they were reaping as a result. Some of these results included increased revenue and customer satisfaction. Therefore, Social Validation is applicable to this stakeholder group.

The Principle of Social Validation can also be linked to 'co-experience' as mentioned in the literature review. Co-experience is defined as the, "experiences with products in terms of how the meanings of individual experiences emerge and change as they become part of social interaction." The concept of co-experience is that experience is not only individualistic, but is shared and changes when they become part of social interaction (Battarbee and Koskinen, 2005). As UX has become part of the social interaction by other companies, especially peer companies or companies in the same industry, the positive experience that these other companies experience prompts the targeted company to change their meaning of UX.

The Principle of Scarcity was applied in the Company X as another method of persuasion. Due to the relative novelty of UX, the UX designers of Company X would make the clients feel as though they had a rare advantage over their competitors

who had not included UX. However, UX is not a new concept in the South African landscape as discussed in chapter six. Therefore the Principle of Scarcity was removed from the Persuasive UX Model.

Therefore, sub-question two can be answered as follows; UX designers persuade clients to adopt a positive UX attitude through the Principle of Social Validation and Scarcity. By showing clients the other companies that had included UX and their benefits as well as leveraging the desirability of the new-ness of UX, clients adopted a UX-positive attitude.

7.4 SUB-QUESTION THREE

SQ3

Which Principle of Persuasion is the most used in order to change stakeholder attitudes?

The Principle of Persuasion that was most used was the Principle of Consistency, however only in the case a UX designer's internal environment, i.e. project management and development.

The Principle of Consistency was the only principle applied in the case of project management and was used throughout all development team types.

Interestingly, it was not the principle itself that caused the attitude change, but the principle was the catalyst to the attitude change. The actual attitude change occurred when both project management and development saw the value of UX, but only after they had been persuaded through the Principle of Consistency to incorporate UX.

7.5 SUB-QUESTION FOUR

<table>
<tr><td>

SQ4

What tools and techniques did UX designers use to change stakeholder attitudes? Under which principle did these tools and techniques fall under?

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</table>

While the goal of the thesis was not to find specific tools and techniques, but to allow for a flexible persuasion baseline on which to create tools and techniques, a method was mentioned by the UX designers.

This method was the use of success stories as examples to persuade various stakeholders to incorporate UX and to adopt a pro-UX attitude. These success stories should include a measure of financial increase as well as an increase in end-user satisfaction. This method primarily fell under the Principle of Social Validation but could be used in the Principle of Consistency

7.6 MAIN RESEARCH QUESTION

<table>
<tr><td>

MRQ

How can a UX designer influence an attitude change towards UX in software system development using the Six Principles of Persuasion?

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Based on the results of this research and the answers to the sub-questions, the main research question can be answered as follows:

A UX designer can influence an attitude change towards UX in software system development using the Six Principles of Persuasion. The generation of the Persuasive UX model proves this as the Six Principles of Persuasion were used in Company X to change the attitudes of the stakeholders towards UX. These principles were mapped to specific stakeholders and then evaluated by external experts who confirmed and added to the results.

This attitude change is possible due to the effect of the persuasion principles on the experience corollary as described by PCT. By changing the stakeholders actual UX construct, the attitude of the stakeholder was altered to a positive one.

7.7   REFLECTION

The process of completing a study can be done in a variety of ways and the end result is often different to the intended initial design. The research design of the study is reflected upon in this section. In order to complete the research, two theoretical frameworks were utilised; Personal Construct Theory and The Six Principles of Persuasion. They were selected to answer the research question of how a UX designer can influence an attitude change towards UX. The nature of an attitude and an attitude change are psychological, which is why Personal Construct Theory was chosen. Due to the deep insight it gives on an individual and their mind, it was appropriate to understanding their current UX 'construct' and how this construct was changed through their experience corollary. Thus, a way to understand an attitude was found. The Six Principles of Persuasion became the catalyst to the attitude change, or the construct adaptation. Therefore, PCT and the Six Principles worked well together in understanding and creating an attitude change.

An interpretivist case study of a pro-UX company was performed as the primary source of data collection. Due to the already personal and psychological nature of the research, interpretivism was the best option. A case study provided deeper insights into the minds and constructs of specific individuals which is needed in order to fully understand an attitude change. As participant observation was used, interpretivism was best suited at understanding and finding meaning from the observation. Content analysis required to discover the fit of the Principles of Persuasion, which positivism or any other research philosophy would not have suited. One aspect that could be improved would be to have a second observation phase at the company at a later stage, or at another company in order to compare

results. Despite that, a deep insight into UX attitudes was still gained and the results of the expert analysis seemed to validate this.

The net result of the thesis was the creation of a model that would aid UX designers to persuade an attitude change in environments where there is not a positive UX attitude. The first version of the model was made based solely off of Company X. The initial model proved to be slightly inaccurate after the results of the expert analysis. If geographical, time and logistical factors could be remedied, it would be interesting to test the model in a live environment.

A limitation of the thesis is that there could be lack of expert reviews of the model. However, this was due to time constraints more than a lack of resources, as unfortunately many UX experts have tight schedules. Another limitation to be noted is the inherent subjectivity of human nature which could influence the usefulness of the model.

7.8   CONTRIBUTION AND FUTURE WORK

The intended end result of this thesis was to produce a model that would enable UX designers to persuade the stakeholders in their internal and external environments to adopt a pro-UX attitude. In chapter one, Pretorius, Hobbs and Fenn (2015) stated that the number one problem in the South African UX landscape is the lack of UX buy-in. This research sought to bring a solution to that problem with the introduction of the Persuasive UX Model. UX is a component in the overall field of human-computer-interaction, or HCI, as focuses on creating better information systems for end-users. These end-users are often not the clients of software design projects. UX designers are however concerned with these users more than the clients as these users are the ones who will interact and gain either a positive or negative experience with the designed information system. Therefore, it is these users that need to be thoroughly considered when the information system is being designed and developed.

In today's modern technological structure, end-users are being provided with more and more choice in terms of the applications and systems they use. End-users are no longer restricted to only one information system for their purposes but now have many that all achieve the same purpose. Therefore, companies need to achieve competitive edge in some manner other than functionality. UX and UX designers are focused on providing end-user satisfaction and positive interaction experiences while using technology. This satisfaction and positive interaction experience can provide a competitive edge when functionality is abundant. This also creates a niche for UX designers in companies where this competitive edge is needed or it creates the opportunity for UX to emerge in companies where it was not previously considered.

There are three types of contributions; practical, theoretical and methodological.

The practical contribution that the research brought was the actual Persuasive UX Model that can be used by UX Designers in industry as a way of solving the problem of UX buy-in identified by Pretorius, Hobbs and Fenn (2015). A UX designer can use the model as a tool in their working environment. The model provides a flexible base for a UX designer to persuade their stakeholders. For instance, they can use the Principle of Consistency to develop an individualistic method that will apply to developers or project managers. This does not force the UX designer to be stuck to a specific method or technique.

A practical recommendation that the research produced was to incorporate the use of the experience corollary when implementing UX as a company standard. If your employees are forced to adopt UX without changing their UX construct through the experience corollary, then the employees' UX construct may remain negative. The choice corollary then dictates that the construct will become more and more negative the more they are forced to incorporate UX.

The theoretical contribution of the research is an expansion of Slatterly, Simpson and Utesheva's (Slattery, Simpson and Utesheva, 2013) initial work where they combined the choice corollary of PCT with the Principles of Persuasion and UX. The research suggests that the experience corollary needs to be considered when using the Principles of Persuasion to alter an individual's actual UX construct. By altering this construct through the experience corollary, the attitude is changed. The choice corollary can then be used to continuously develop the positive UX construct.

The Persuasive UX Model also mapped specific Persuasion Principles to specific stakeholders in an organisation. The principles of Authority and Consistency were applied to project managers and developers while the Principle of Social Validation was applied to clients. The model not only provides the starting point for an attitude change, but can also be used to keep an attitude change. As with the Principle of Consistency, it was found that it acted as a method of reminding stakeholders of their UX-inclusion and persuaded them to keep their UX-positive attitude despite already agreeing to UX before. Therefore, future UX designers can also use the model of a way of sustaining a positive UX-attitude.

The research provided a methodological contribution to the field of UX. The research used participant observation to produce a model that was then expertly evaluated to improve the accuracy of the model. This type of combination has not widely been used before, especially when developers are concerned.

By giving UX designers a tool that they can use to persuade an attitude change towards UX, they can adjust themselves or their strategies in order to gain an acceptance towards UX in the early design phases of a project so that it can be incorporated throughout the project. This provision will then create a better designed system that is more compatible with end users, which will promote project success and give their organizations a competitive edge as forerunners in an emerging UX environment. By establishing themselves as a forerunner, the company is able to gain early loyalty towards any of their future products. UX is a vital component in a

project development lifecycle and by giving UX designers a tool to persuade the stakeholders within their environment to accept and adopt UX, more satisfactory systems will be produced and placed into other organizations which can affect society as a whole.

Future work can include:

1. An expansion on the model to being tested in a live environment.
    a. In order to prove the model's validity, a live experiment could be performed in a work environment where UX has not been accepted yet and a UX designer needs a method of inclusion. This might be difficult to produce as the appropriate company would need to be found and would need to be willing to form part of the experiment.
2. More Principle specific tools and techniques can be added to the model.
    a. While the aim of the model was to provide a flexible basis for a UX designer to create their own appropriate methods in order to persuade an individual. However, as seen in the case of Social Validation, success stories were the method that occurred in not only Company X but the expert companies as well. Thus, more principle specific methods could be added as a starting point for future UX designers.

7.9   CONCLUSION

The purpose of this thesis was the answer the question of whether or not a UX designer could influence an attitude change towards UX using the Six Principles of Persuasion. This question was successfully answered and the results generated a model in order to aid UX designers to influence an attitude change in their work environment and to sustain this attitude change. The model was also able to answer all sub-questions set out in the thesis.

In order to create this model, an in-depth interpretivist strategy was followed. This strategy allowed for a detailed understanding to be created of the Company X in

order to determine if the Principles of Persuasion were present in a UX-positive work environment. It was discovered the principles were present and had been used to influence an attitude change and through the expert analysis, it was found that the principles also helped to sustain the UX-positive attitude. This influenced the model and the Revised Persuasive UX Model was created as the end-result.

The strategy and the design of the thesis was reflected on and found to be appropriate for that the thesis tried to achieve and was appropriate for accomplishing the thesis goal. The contribution of the thesis was evaluated and the possible future work was detailed.

The field of UX is complex and still slightly underdeveloped in South Africa, UX designers can hopefully propel the advancement of UX through the use of the Revised UX Model so that future systems can be created by a user-centric project team.

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APPENDIX A INFORMED CONSENT LETTER

Research conducted by:

Ms K Coleman (13013425)

Dear Participant

You are invited to participate in an academic research study conducted by Ms K Coleman, a Masters student from the Department of Informatics at the University of Pretoria.

The purpose of the study is to determine the attitude and behaviour of various stakeholders towards User Experience, or UX, in a software development environment. This questionnaire should only take 15 minutes of your time.

Please note the following:

- Please be assured that the observations will be treated with the utmost confidentiality. Your identity cannot be exposed based on the answers you give. The identities of the respondents will not be published or released to anyone. This questionnaire has no intention to discriminate against any person or group.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences. No data is recorded.
- The results of the study will be used for academic purposes only and may be published in an academic journal. On request, we will provide you with a summary of our findings.
- Please contact my study leader, Dr. Marie Hattingh or Mr. Jacques Brosens, if you have any queries, questions or comments regarding the study. They are available at marie.hattingh@up.ac.za and jacques.brosens@up.ac.za. You may also contact myself, Ms K Coleman, at kalley.coleman@up.ac.za

Please participate in this questionnaire even if your title within your company is not formally noted as a 'UX Developer'. This questionnaire can be taken by any individual who promotes or leads UX in their work environment.

Thank you for taking the time to participate in this study.

_____

Ms K Coleman
        Date

APENDIX B ELIMINARY OBSERVATION QUESTIONS

Some preliminary observation questions that the researcher will ask during interviews in the observation period:

1. What is your role in the company?
2. What is your understanding of UX? And what is your personal feeling towards UX?
3. Is your opinion influenced by your UX co-workers? (N/A to UX designers)
4. What are client's usual reactions towards UX in your experience? Do you think this reaction is justified?
5. Have your worked at previous companies? If yes, did they have a specific UX division?
6. In regards to question 5: What impact did UX make at your previous workplace if UX was included?
7. Do you feel that UX is necessary? Why?
8. Do you feel as though you could perform the tasks of the UX designers? (Specific to developers)
9. Do you ever have any problems with the UX designers? Or any frustrations? (N/A to UX designers)
10. Do you feel as if UX designers are necessary to a project's success?
11. How do you think the UX designers could get clients to accept UX more?

The following questions will be asked to the UX designers:

1. What do you believe is the current state of UX?
2. What is your client's usual reaction towards UX? Is it mostly negative or positive? Did you expect this reaction?

3. If the reaction is negative, do clients explain why they do not want to include UX?
4. What do you think is a client's biggest motivation to include/reject UX?
5. Do you ever try to convince clients to include UX? If so, how? Is this ever successful?
6. Do clients ever change their mind about UX in either a positive or negative way during the course of the project?
7. What do you believe is the most influential factor in your client's decision to include or not include UX? Such as previous experience or experiences from other companies?
8. What do you feel needs to change in order to make UX more widely accepted?
9. How do your non-UX focused co-workers feel about UX in your opinion?

These questions will be used as baseline questions. The answers to these questions may lead to further questions that are not covered above and will be noted accordingly. Not all questions may be asked depending on the information collected during the participant observation period.

APPENDIX C PROJECT PLAN

YEAR: 2017

June   -   26th Hand in of project proposal.

July

                              -   Create final observation questions
                              -   Finalize letter of informed consent
                              -   Submit documents to ethical clearance committee

August

                              -   Explore articles
                              -   Discuss project with supervisor

September   -   Discuss observation dates with company

October   -   Add more data to literature review

YEAR: 2018

January   -   Submit ethical clearance.

February   -   Receive ethical clearance. Resubmit if needed.

March   -   Begin observation.

April   -   Send questionnaire to UX professionals

                               -     Begin data analysis

May   -   Analyse questionnaire data

June   -   Consolidate data and begin write-up.

July   -   Finalise results chapter and begin conclusion.

August   -   Edit thesis.

September   -   Final edit and hand in.

This depicts an ideal schedule. Time has been allowed that if any mishaps occur, there is room for slack. The research study is intended to be completed by September 2018.

APPENDIX D QUESTIONNAIRE

Notes on the questionnaire

This questionnaire will be sent to UX professionals in South Africa in order to determine the similarity of UX practices in other businesses to the business that will be observed as a benchmark in my study. The questionnaire will determine whether or not the UX environment at Company X is experienced by other UX professionals in different environments. The results of the questionnaire could also be used as success stories/learning points to help other UX designers influence an attitude change.

A letter of informed consent will be sent with this questionnaire, informing the participant of their rights as a participant. The letter has been attached.

The questionnaire should only take 30 minutes to complete. It will be presented as a Google Forms sheet that can be completed electronically.

Questionnaire

1) Do you understand your rights as a participant of this questionnaire and agree to answer the questions that follow? (Yes/No)
2) How long has your company incorporated UX into their projects?
3) Does your company adhere to the following division structure; Project Management, Developers, UX Designers and Mobile Developers as teams within the company?
4) How did you as a UX Designer persuade project management to incorporate UX into projects?
5) How did you as a UX Designer persuade the developers to incorporate UX into projects?
6) How did you as a UX Designer persuade the mobile developers to incorporate UX into projects?
7) How did you as a UX Designer persuade clients to incorporate UX into projects?

8) If your company does not have this team division, how is work spilt amongst your project team?

9) In regards to question 8, how did you convince your co-workers to include UX in projects in this scenario?