A Model for Managing User Experience

By

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Thesis

Submitted in fulfilment of the requirements for the degree

Philosophiae Doctor

in

Information Technology

in the

FACULTY OF ENGINEERING, THE BUILT ENVIRONMENT

AND INFORMATION TECHNOLOGY
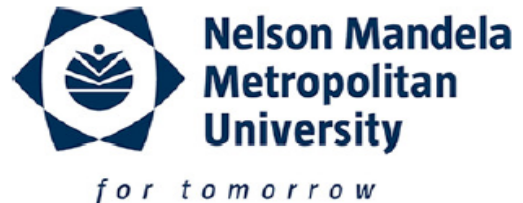
of the

NELSON MANDELA METROPOLITAN UNIVERSITY

Promoter: Prof D. Van Greunen

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December 2013

DEPARTMENT OF ACADEMIC ADMINISTRATION

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DECLARATION

In accordance with Rule G 4.6.3, I, Job Mashapa with student number 208059773, hereby declare that the above stated thesis for the degree Philosophiae Doctor: Information Technology is my own work and that it has not previously been submitted for assessment to another University or for any other qualification.

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ACKNOWLEDGEMENTS

Colleagues: I will write another thesis if I am to mention you all by name; your support meant a lot. Thank you to all who have contributed and have been part of my life during the academic journey. I stand to provide that hand of support when you need one.

NMMU: The Research Capacity Development Department at Nelson Mandela Metropolitan University for the financial support.

Government of Republic of Zimbabwe: You had confidence in me, believed in me and invested in me to be a true ambassador for the nation. The financial support you provided me with will undoubtedly be of benefit to the nation.

New innovative products are being designed while the user interface of existing products is constantly being revamped to give them a new look. All this is an effort to bring a satisfactory interacting experience for the user. However, in most cases users do not feel that they experience that benefit. The introduction of a new product, or the enhancement of the functionality and user interface of an existing product, often faces criticism and brings resistance to the acceptance and usage of the product by the users. Therefore, the change in user interface or introduction of new products does not only affect the business processes but also the lifestyles of the users, as well as their overall user experience. One of the most important components for the success of any product is a positive user experience. User experience refers to the subjective feeling of the user that results from their interaction or intention to interact with a product in order to perform a specific task in a specific environment. When the user interface and functionality of a product match the expectations of the users and make the users effective and efficient, feel safe and attain some level of self-worth from using or possessing the product, their interaction with the product becomes more satisfactory. User experience practitioners are in agreement that a change to the user interface influences the user experience of the people when interacting with the product; hence it affects change in the user experience of the people. A vast body of literature exists on the methods for evaluating user experience as well as on the principles that are aimed at guiding the design of products for a positive user experience. However, there is a lack of a means to manage this change in user experience that results from the changes in the features of the user interface or the product functionalities. This inadequacy opens up the potential for integrating change management principles in order to manage user experience. However, existing change management principles do not address the user experience aspects when managing change.

Following the above premise, this study focused on the development of a model for managing user experience: the User Experience Management Model (UXM^2). The UXM^2 infers its components from the disciplines of user experience and change management. Its uniqueness is seated in its people-centred approach that aims to effect a free-will change in the individuals towards a long-term positive user experience. The proposed model further aims to promote the voluntary acceptance of a product, which is contrary to the mandatory change that is guided by the policies of the organization, as discussed in the study.

The UXM^2 was developed from a thorough argumentation of literature on user experience and change management. The components that were required for development of the model were identified from literature, and were evaluated for their relevance by means of academic publications in subject domain international conferences. The academic publications underwent double-blind peer review with subject domain experts. The model was evaluated for its relevance and potential applicability through interviews and discussions with subject domain experts. The subject domain experts consist of user experience practitioners and academic professionals in the domain of HCI. The subject domain experts also evaluated the model by means of an evaluation tool comprising of a Likert scale rating of the proposed components and related activities for managing user experience.

The target users of the UXM^2 are user experience practitioners and product developers who aim to promote a sustainable long-term positive user experience for the people interacting with their products. The UXM^2 is aimed at being used for the design of products that are meant for institutional use, personal use, mandatory use and optional use. It is believed that adoption of the UXM^2 will promote acceptance of the product by users, with an associated sustainable positive long-term user experience.

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CHAPTER 7

ACM	Association of Computing Machinery
CM	Change Management
HCI	Human-Computer Interaction
ICTs	Information and Communication Technologies
UI	User Interface
UCD	User-Centred Design
UX	User Experience
UXFD	User Experience Factor Diagram
UXLC	User Experience Lifecycle Chart
UXM^2	User Experience Management Model
UXMR	User Experience Management Requirements

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1.1. BACKGROUND

There is an increase in the proliferation, adoption and usage of Information and Communication Technologies (ICTs). ICTs have become entrenched in the lifestyles of people as a building block in the modern society (Chukwu & Nneka, 2012; Carter, Thatcher, Applefield, & Julius, 2011). Over recent years there has been a paradigm shift in the focus of the development of ICT products. The focus has shifted from development of only the functional aspects to the inclusion of a consideration of the aspects of usability and user experience (McNamara & Kirakowski, 2006).

This shift brought about the birth of the discipline of Human-Computer Interaction (HCI). Human-Computer Interaction is defined by the Association of Computing Machinery (ACM) (1996) as follows:

> "*A discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them*".

The field of HCI advocates for the development of products that meet the pragmatic and hedonic qualities as expected by the users (Hassenzahl, 2007). Such qualities assure that the product is useful, usable and associated with a positive user experience (Rogers, Sharp, & Preece, 2011).

In this study, a definition of user experience is adapted from the synthesis of definitions proposed by Mashapa, Chelule, van Greunen & Veldsman (2013); Sutcliffe (2009) and Roto, Law, Vermeeren, and Hoonhout (2011), and is defined as:

> *The subjective response of a user that results from his / her expectation before interacting with a product, during interaction with a product and after interaction with a product to achieve a specific goal in a specified context.*

The user experience of people using a specific product is mainly influenced by the attributes of the user (their predispositions, expectations, needs, motivations or moods), qualities of the product (its functionalities, look and feel and usability) and the context in which the product is used (Hassenzahl and Tractinsky, 2006; Law, Vermeeren, Hassenzahl, and Blythe, 2007; Obrist, Meschtscherjakov, and Tscheligi, 2010; Forlizzi and Ford , 2000; Arhippainen, 2009). Hence, a

change in the attributes of the user, product or context subsequently causes a change in the user experience.

Developers of products increasingly comprehend the importance of developing products for a positive user experience. As such, the user interfaces of existing products are continuously being improved and innovative user interfaces are being developed in order to provide a positive user experience. It is therefore important that products should be designed to suit the attributes of the users. Furthermore, they should be adaptable to suit the context in which they are used in order to promote a sustainable user experience.

A product that meets or exceeds the expectations of the user provides a positive user experience, while one that fails to comprehend the expectations of the users result in a negative user experience (Van Greunen *et al.*, 2010). User experience can therefore be either negative or positive (Roto, 2007).

Despite the improvements in user interfaces, the users are often frustrated and left struggling with the changes to the user interfaces (Chambers and Scaffidi, 2010; Jacob, 2010). Often, whenever the user interface of a product is changed, users would prefer a bad but familiar user interface to a better but unfamiliar one (Constantine, 2004). The new user interfaces fail to satisfy the expectations and mental models of the users (Marcus, 1997; Whitten and Tygar , 2005).

A change in the user interface of a product (or the introduction of a new product) influences the user experience (Van Greunen *et al.*, 2010). When users interact with the new user interface or new product they get to discover and reflect on the quality of their experience. As the users discover and reflect on their experience with the product, they undergo a process of user experience development. The development of user experience is not a once-off event, but a process involving various transitional phases over time spans of product use (Kujala, Roto, Vaananen-Vainio-Mattila, Karapanos, and Sinnela, 2011; Abbasi, Lew, Rafique, and Li, 2012). These transitions in user experience development need to be managed in order to achieve a sustainable long-term positive user experience. Therefore, this study introduces change management approaches to manage the user experience.

Creasey (2007) defines change management as follows:

> *"The process, tools and techniques to manage the people-side of change to achieve the required business outcome".*

This definition of change management is adopted in this study. The aim of this study is to manage the feelings of people as a result of the change in the user interface a product, also the introduction of a new product. Such change brings a change in the user experience of the people hence an adoption of managing the feelings of the people contrary to managing organizational change. The processes, tools and techniques for managing the feelings of the people are therefore examined by means of literature analysis.

Various models aimed at managing change and guiding implementation of change are available in literature, as discussed in Chapter 4. An analysis of the existing change management models revealed that most of these models focus on managing change in organizations while neglecting the feelings of the people who are the recipients of the change. This makes the existing models inadequate for the management of user experience. Thus, aspects of existing change management models will be adapted and employed to manage the process that people undergo in the development of user experience.

The aim of this chapter is to outline the purpose and flow of this research.

Section 1.2 outlines the problem description and rationale of the study. This is followed by the specification of the research questions (section 1.3) and research objectives (section 1.4). Thereafter, the scope and the context of the research are described in section 1.5. A discussion of the research approach is presented in section 1.6. Following this, the ethical considerations to be observed in this research are discussed in section 1.7. The chapter culminates with the layout of the chapters in the thesis.

1.2. PROBLEM DESCRIPTION AND RATIONALE OF STUDY

The problem has been formulated from a synthesis of the background on user experience and change management, and is described next.

1.2.1. Problem description

Information and Communication Technology products are being designed with the objective of providing a positive user experience (Koskinen, Karvonen, & Tokkonen , 2013). The need to design products for a positive user experience results in changes to the user interfaces, interaction and navigation styles of the products. However, most users are conservative and are resistant to the changes implemented (Constantine, 2004). Therefore, a change in the user interface or an introduction of new features of the product carries the risk of causing the products to be rejected, or to fail to provide a satisfactory user experience (Vahs, Koch, & Kielkopf, 2010). As mentioned earlier, a change in the user interface of a product influences the user experience. The user experience changes as the people discover and reflect on the features of the product while they interact with it. Users are in most cases not happy with the changes (Plewes & Thizy, 2012). The new products and changes in the user interface of existing products are subsequently not easily accepted or used, because they fail to create a sustainable long-term positive user experience.

The problem that exists is that changes to user interfaces fail to accommodate the expectations of the user, hence falling short on promoting a sustainable long-term positive user experience. This claim raises the need to manage the change in the user experience of the people.

User experience practitioners and product developers acknowledge that a positive user experience is vital for the acceptance and usage of products. They develop applications with the intention of improving the user experience (Lu, Chen, & Chen, 2012). A large body of literature exists, with guidelines on how to design products for a positive user experience together with the methods and techniques for evaluating user experience (Law, van Schaik, & Roto, 2013; Mendel, 2013; allaboutux[1]). Agreements exist in the user experience domain that a change in the user interface of a product results in a change in the user experience of the people. Furthermore, user experience practitioners and academics acknowledge that the user experience evolves over time (Kujala *et al*., 2011). However, criteria for managing the user experience and guiding the designers of products are lacking. Also, user experience practitioners are not successful in

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[1] www.allaboutux.org

introducing products in a manner that does not hinder the attainment of a positive user experience.

The change in user experience resulting from the introduction of new products or improvement of the user interface of existing products is a process that needs to be managed to ensure that a positive user experience is attained. Change management principles promise to be helpful in managing the change in user experience that result from the newly introduced features or user interface of the product. Literature is awash with models that are aimed at guiding and managing the implementation of change (Hiatt, 2006; Mento, Jones, & Dirndorfer, 2002; Kotter & Cohen, 2002). An analysis of these models revealed that most of the change management models are aimed at managing change in organizations, while neglecting the management of the user experience of the people to which change is introduced. At the time of conducting this research, no evidence was found of any existing criterion that is aimed at managing user experience, both in theory and in practice.

The problem described here provides the rationale for undertaking this study.

1.2.2. Rationale for the study

The purpose of this study is to develop an artifact for managing user experience, namely the User Experience Management Model (UXM^2). The dimension of managing user experience in this stud differs from that of managing user experience teams and managing the process of designing products for user experience. Furthermore whenever user experience is mentioned in this study it refers to the experiences of the people contrary to user experience as a discipline. The proposed User Experience Management Model is aimed at promoting a sustainable long-term positive user experience for the people using ICT products. The scope of managing user experience in this research refers to the process of being able to sustain a long-term positive user experience, even when the user interface of an existing product is changed or when a new product is introduced. User experience sustainability in this regard refers to the ability to maintain a seamless user experience despite changes in the user interface or features of the product. This dimension of the management of user experience makes the study unique and different from the management of user experience teams, as addressed by Lund (2011).

The following basis of reasoning has provided a foundation for the formulation of this research:

- ➢ A positive user experience is essential for the adoption and usage of ICT products;
- ➢ The use of ICTs have become ubiquitous, and people want to benefit from the use thereof;
- ➢ If ICT products are properly aligned to the needs of the users and are providing a positive user experience, they have the potential of becoming tools for socio-economic development.
- ➢ There is a need to understand the factors that influence user experience in order be able to develop products that are appropriate for use, and that are suitable for the purpose for which they are intended; and
- ➢ The development of products that promote a sustainable long-term positive user experience gives the product developers a competitive advantage over their rivals, hence providing an opportunity to increase market share.

The rationale of this study is to develop the UXM^2 that serves to provide product design directions that aim at the management of the user experience of the people, in order to promote a sustainable long-term user experience.

Given this motivation for the study, the following problem statement has to be addressed in order to ensure that the proposed UXM^2 will be able to deliver the envisioned solution to the described problem.

1.2.3. Problem statement

Problem statement

There lacks a model for managing user experience in order to promote a sustainable long-term positive user experience.

The following research questions were derived from the problem statement:

1.3.   RESEARCH QUESTIONS

Primary research question

What are the components of a model for managing user experience?

The primary research question is supported by the following sub-research questions:

Sub-research questions

1. *What are the factors that influence user experience?*
2. *What are the requirements for managing user experience?*
3. *What are the benefits of this model for managing user experience?*

1.4.   RESEARCH OBJECTIVES

In order to answer the stated research question and provide a solution to the described problem, the following research objectives were developed:

Primary research objective

To develop a model for managing user experience.

The following sub-research objectives will help to achieve the stated primary objective:

Sub-research objectives

1. *To determine the factors that influence user experience;*
2. *To identify the requirements for managing user experience; and*
3. *To establish the benefits of the user experience management model.*

1.5.   THE SCOPE AND CONTEXT OF RESEARCH

Human-Computer Interaction (to which user experience belongs) is a multifaceted field (Rozanski & Haake , 2003). The scope and delineation of the research is discussed next.

1.5.1. Scope of the study

Figure 1.1 shows the scope of this research.
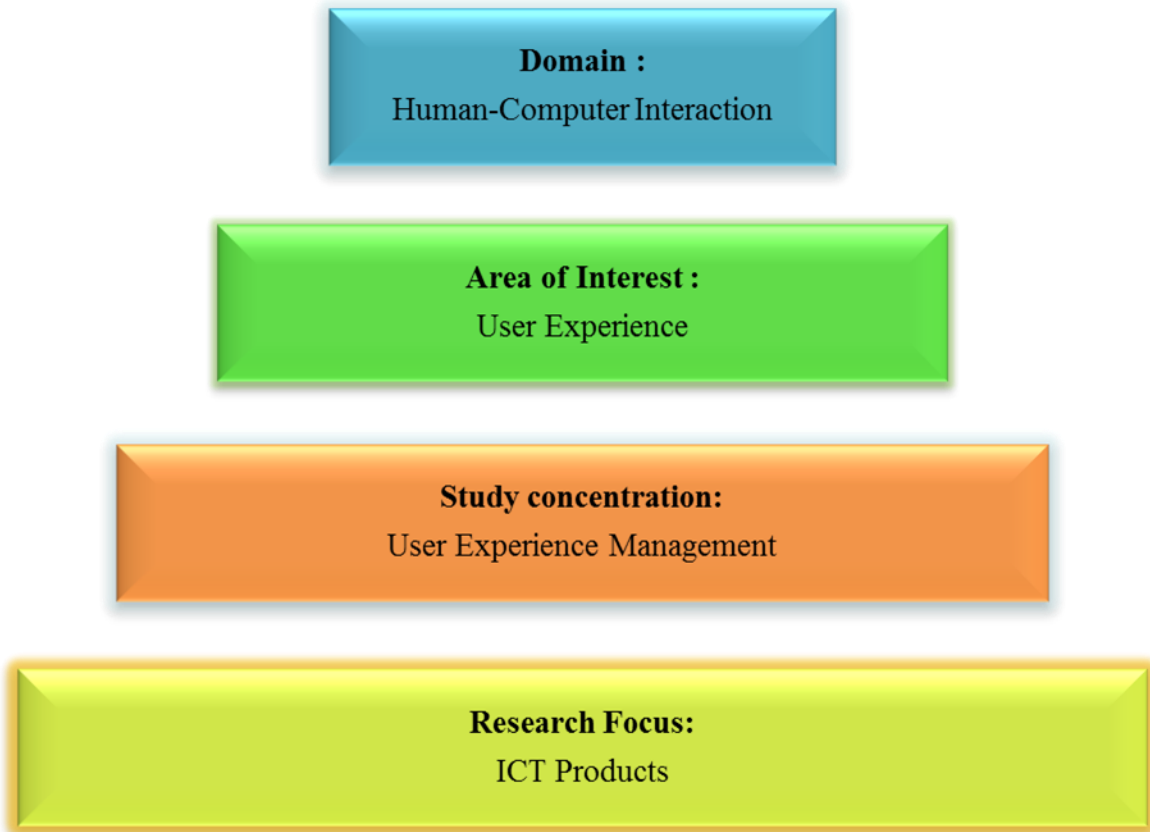
Figure 1.1: Scope of the study

This research lies in the Human-Computer Interaction (HCI) domain, with a particular interest in user experience. The latter deals with a number of aspects including design for a positive user experience and evaluation of the user experience. This study will add a new dimension to the field of user experience, namely management of the user experience. Every product or service has a user experience. As such, it becomes cumbersome to try and address user experience without being specific about the product. This study explicitly focuses on managing the user experience of the people using ICT products.

1.5.2. Delineation

This study falls within the HCI domain that is comprised of various fields. The focus of this research is user experience, with a precise area of interest in the management of the user experience. Management of user experience requires a study that cuts across topics such as behavioural psychology, marketing, cultural studies and many others. However, this study borrows from the principles of change management in order to manage the user experience. The study acknowledges the evolutionary nature of user experience, and therefore adopts change management principles to direct the phases that people go through when managing user experience. The proposed model is aimed to be used in the management of the user experience of any ICT product, regardless of whether the product is targeted for institutional or personal use, mandatory use or optional use. However, the study only focuses on managing the feelings of the people resulting from their interaction with the product instead of the organizational policies that are aimed at forcing people to abide by and use the products. The model aims to promote acceptance of a product by free will, regardless of the existence of policies within organizations.

This study promotes a sustainable positive experience of the users of ICT products, which is contrary to the management of user experience teams in an organization. The concept of user readiness is mentioned in the study, but the scope of this research does not include an in-depth study of the factors that influence user readiness. Also the study excludes the criteria for measuring user readiness. The study provides techniques for making the user experience sustainable. However, the concept of measuring the sustainability of user experience is beyond the scope of this study. Furthermore the scope of this study does not address the aspects of measuring the maturity of user experience, and it excludes issues pertaining to the methodological processes of designing for positive user experience. Furthermore, the practical implementation and use of the model is excluded from this study, as that would require longitudinal research which is not permissible within the academic time frame.

1.6.   RESEARCH METHODOLOGY

Research is defined as a scientific or scholarly investigation into a phenomenon with the intention of finding, reporting and creating new artifacts and contributing new knowledge (Heyvaert, Maes, and Onghena, 2013; Winter and Munn-Giddings, 2013).

This study takes on a design science research paradigm towards the development of the artifact for managing user experience, the User Experience Management Model (UXM^2). The study follows an interpretivist research philosophy, and it is mainly supported by an inductive qualitative approach. A quantitative approach in form of frequency count of Likert scale ratings was also employed. Quantitative data was collected in order to substantiate credibility by circumventing the biases of the researcher's opinions on the data collected. The study employs argumentation of literature as the research strategy. Hence, using a systematic research process that employs multiple techniques and procedures for collecting data promotes better data triangulation, which improves the credibility of the results.

The following data collection methods were used:

➢ Literature study;
➢ Expert reviews by means of interviews with subject domain experts;
➢ Double-blind peer review feedback on academic publications that were submitted to subject domain international conferences on HCI; and
➢ Validation by subject domain experts, who completed a validation tool in form of Likert scale ratings.

A detailed explanation of the research process that was followed is presented in Chapter 2.

1.7. ETHICAL CONSIDERATIONS

The articulated ethical values were upheld throughout the research process, thus adding to the rigor of the research process. These values include, for example, fair and honest dealings with research participants and stakeholders. The participants voluntarily consented to participate in the research. They were informed of their rights to privacy, and of the fact that their data will be presented anonymously. The participants in this study were asked to sign an informed consent form before the interviews were conducted (c.f. Appendix A.1). It was also communicated to the participants that, although they were encouraged to complete the interview sessions, they were allowed to withdraw from the study at any time. None of the participants involved in the research were minors or belonged to any category that required special ethical considerations, therefore no ethical clearance was required for the study. In addition, the aims of the research were clearly

communicated to the participant and that the data that were collected were solely used for the purpose of the research.

Another ethical dimension considered in this research is the researcher's honesty in the presentation of research findings. The researcher did not manipulate the data in any way in order to satisfy the desired conclusion or to accommodate the researcher's biases. Academic integrity in acknowledging other people's contributions and reporting adverse findings was observed throughout the research process.

1.8. LAY-OUT OF THESIS

This research is divided into eight chapters. Chapter 1 introduces the work, and gives an outline of the whole research project. It presents an overview of the problem relevance, research questions, research objectives, scope of the research, research methodology and potential contribution of the research. Chapter 2 addresses the mode of inquiry that was followed by describing the research design and methodology. The research process is discussed and justified from the perspective of satisfaction of the expected objectives. Chapter 3 aims to answer the first sub-research question by outlining the factors that influence the user experience, while Chapter 4 answers the second sub-research question by providing the requirements for managing the user experience. The UXM^2 is presented in Chapter 5, which outlines the approach that was used to develop the model. In Chapter 6 the evaluation of the proposed model is discussed, and the results of the evaluation are presented. Chapter 7 presents the applicability of the UXM^2, based on the results of the evaluation. The study is concluded in Chapter 8 with an outline of the significance of the study and possible future research.

Figure 1.2 shows the outline of chapters.

INTRODUCTION	**Chapter 1** **Introduction**

PART A **RESEARCH** **DESIGN**	**Chapter 2** **Research Design and Methodology**

PART B **REQUIREMENTS** **IDENTIFICATION**	**Chapter 3** **User Experience**	**Chapter 4** **Managing Change - Managing User Experience**

PART C **THE CONCEPTUAL** **MODEL**	**Chapter 5** **User Experience Management Model**

PART D **EVALUATION**	**Chapter 6** **Model Evaluation, Results and Analysis** **Chapter 7** **Applicability of the User Experience Management Model**

PART E **THE EPILOGUE**	**Chapter 8** **Conclusion**

Figure 1.2: Outline of chapters

CHAPTER 2: RESEARCH DESIGN AND METHODOLOGY

INTRODUCTION

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Introduction

PART A :RESEARCH DESIGN

Chapter 2
Research Design
and Methodology

PART B: REQUIREMENTS IDENTIFICATION

Chapter 3	Chapter 4
User Experience	Managing User Experience

PART C:THE CONCEPTUAL MODEL

Chapter 5
User Experience
Management Model

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2.0.   INTRODUCTION

The purpose of this chapter is to motivate and describe the process that was followed in conducting this study. An outline of the systematic methodological approach that was followed to find appropriate answers to the research questions is discussed. Such a systematic and organized procedural approach to research expects to generate results that are both credible and relevant to solving the problem under study (Knox, 2004).

Section 2.1 highlights the multidisciplinary nature of Human-Computer Interaction (HCI) and presents a discussion on the characteristics of the research paradigms in HCI. In section 2.2 the design science paradigm is motivated as the appropriate research paradigm, based on the research questions of this study and the characteristics of design science. Section 2.3 establishes the overall research process by outlining the research philosophy, approach, strategy and data collecting methods that are to be followed in order to develop the model. The procedure that was followed during the development of the model, based on the selected research strategy, is discussed in section 2.4. The means of validating the model are discussed in section 2.5. An outline of the ethical considerations follows in section 2.6, and a summary of the chapter is provided in section 2.7.

2.1.   RESEARCH PARADIGMS IN HUMAN-COMPUTER INTERACTION

Human-Computer Interaction (to which user experience belongs) is a field that incorporates various domains, such as computer science, cognitive psychology, engineering, user-centred design and ergonomics (Rozanski & Haake, 2003). The diverse nature of HCI requires a mode of inquiry that transects the different disciplines. As the name suggests, research in the HCI field has the goal of investigating how the interactive products affect the people that are using them. Human-Computer Interaction research therefore seeks to improve the designs of interactive products to make them pleasing to use and to be of value to people, organizations and society (Myers, 1998).

This section introduces the research paradigms in HCI namely Design Science, the Traditional Scientific Approach and the Engineering Approach. An investigation into the theoretical backgrounds of each of the research paradigms forms the basis for choosing the appropriate research design and methodology.

2.1.1. Design science

The *Design Science* approach involves the creation of artifacts and artificial systems in order to solve an identified problem (Hevner, March, Park, & Ram, 2004;Venable, Pries-Heje, & Baskerville, 2012). The rationale behind design science is to focus on how a product intends to function, and how it can be modeled and evaluated through the creation of artifacts (Kuechler & Vaishnavi, 2008). The researcher acquires both knowledge and understanding of the phenomena under investigation through the "*build" and "evaluate*" processes. This process yields possible solutions to the observed problems (March & Smith, 1995). According to Carroll and Kellog (1989) design science requires knowledge to be assimilated qualitatively from deep, explanatory theories of how humans interact with machines. In HCI, artifacts have contributed significantly to the development of new theories, exploring user-centred design processes as well as interaction design processes (Carroll and Kellogg, 1989).

Design science is a branch of IS research that focus on the development of purposeful artifacts created to address identified business needs related to information and communications technology (Weber, 1987). It involves the analysis of the use and performance of designed artifacts to understand, explain, and, very frequently, to improve on the behavior of the social system that the artifacts become a part of. Such artifacts include constructs, algorithms human/ computer interfaces, system design methods, models, frameworks, management policies, and full system instantiations (Gregor & Hevner, 2011).

2.1.2. Traditional science

The traditional science approach employs a positivist research view. It focuses on gathering quantitative data by using empirical methods for building and evaluating simulation models based on observable measurements (Pather and Remenyi, 2005). Traditional science research aims to examine how things are, based on observable facts which can be seen, heard and touched. The researcher collects data through observations and experiments, and by formulating and testing hypotheses prior to empirical enquiry. In HCI, this approach produces knowledge that enables the researchers to derive at deductive and inductive explanations about the empirical experimental findings (Nachmias & Nachmias, 1992). The traditional science approach allows

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researchers to understand the relationship between variables and enables the prediction of outcomes.

2.1.3. Engineering approach

This approach predominantly borrows its aspects from both the design science and traditional science approaches. The researcher observes existing solutions with the intention of refining them into better solution proposals (Nishida, 2007). A set of applicable solutions will be measured, analyzed and evaluated based on the proposal. The process is iterated until the product is ready for use and no further improvements are needed. The engineering approach emphasizes what people actually do or what they can do in practice, rather than focusing on imaginations of what they are supposed to do (Wood, Daly, Miller, & Roper, 1999). The approach suggests the combination of case studies, observations and experiments in order to understand the domain of study. The engineering approach considers the social context, and appreciates that not all problems in software engineering are solely technical but are rather human-oriented. Thus, it seeks to understand human-computer related problems and to bring improvement to the way in which humans interact with devices.

The purpose of this study is to develop an artifact, which is a model for managing the user experience. It has been observed that, at the time of undertaking this study, there is no such model in existence. A thorough literature survey was conducted using keyword search like user experience management, sustainable user experience and managing change in user experience. The literature survey did not yield to any results related to the proposed UXM[2]. Furthermore, user practitioners in the user experience domain were consulted of their awareness on the proposed concept of managing user experience and none of the practitioners indicated to be familiar with such. Based on the purpose and nature of the study, it adopts a design science paradigm. The motivation for the selection of the design science paradigm is presented in section 2.2.

2.2. MOTIVATION FOR DESIGN SCIENCE

The purpose of this study is to develop a solution for an existing problem, i.e. specifically for the following unsolved problem:

> *"There lacks a model for managing user experience in order to promote a sustainable long-term positive user experience."*

The stated problem is an information systems problem, as it relates to the acceptance and use of information system artifacts by individuals within organizations and the community at large. User experience practitioners focus on designing for user experience and evaluating the user experience while neglecting to manage the change in user experience over time. This stated problem has been identified from a review of literature, and in conjunction with the observations and consultation with practitioners in the user experience domain.

Design science research aims to build and evaluate artifacts that are intended to bring solutions to identified problems. The approach to solving the problem consists of investigating a wide range of knowledge bases (study of existing theories), inquiry with domain experts (prospective users of the artifact) and triangulation of the findings. It involves undertaking a rigorous validation of the initial conceptualization in order to have an appropriate artifact that aims to solve the identified problem. The artifacts that are produced can be in form of constructs, models, methods, or instantiations (Hevner *et al.*, 2004).

The purpose of this research is to provide a solution to the stated problem by developing a model for managing user experience. This research is therefore both descriptive and prescriptive, with the intention of providing user experience practitioners and product developers with a set of techniques and guidelines for managing user experience. Importantly, the goal of the research is to promote a sustainable long-term positive user experience. Sustainability refers in this context to the capability to maintain a positive user experience despite changes in the user interfaces of the product or the introduction of a new product. It means that the model is likely to be valuable for information systems enabled socio-economic development, because it allows for promotion of the acceptance and use of interactive products as well as for the assessment of the impact of the process of managing user experience.

The following section motivates the appropriateness of the use of the design science paradigm in this research, based on the characteristics of design science and the objectives of the research.

2.2.1. Mapping objectives of research to characteristics of design science

Hevner *et al*. (2004) suggested the seven guidelines of design science. In this research, these seven guidelines stand as typical characteristics that position how the research (including the process and the product) satisfies each of the guidelines and therefore motivates the appropriateness of employing the design science research paradigm.

Table 2.1 illustrates how this study fits the design science research paradigm.

Table 2.1: Motivating design science

Guideline	Description	Research motivation
Design as an artifact	Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.	The artefact to be produced is a model, the User Experience Management Model (Presented in Chapters 5 and 7). Its viability is the claim that it can be be applied to solve the problem of managing the user experience.
Problem relevance	The objective of design-science research is to develop technology-based solutions that are important and relevant so solve business problems.	The problem that has been identified is that: *"There lacks a criterion for managing user experience in order to promote a sustainable long-term positive user experience"*. Literature study and practical observations in the user experience domain confirmed the lack of a criterion for managing user experience as a relevant problem which is still unsolved both in academic publications and practice (Chapters 1, 3 and 4). The proposed User Experience Management Model aims to provide the means for promoting and cultivating a positive user experience when new products are introduced or the user interface of existing products are improved.
Design evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.	The model is tested for internal and external validity using argumentation and expert reviews with domain experts. (Described in Chapter 2 and Chapter 6)
Research contributions	Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.	The primary contribution of this research is the User Experience Management Model; the other contributions of the research are presented in Chapter 8.
Research rigour	Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.	Research rigour has been achieved through a thorough research process and triangulation of findings from the literature study (Chapters 1, 3 and 4) as well as review of the model and its components by domain experts. The rigorous methods used to develop and evaluate the model are presented in Chapters 5 and 6.
Design as a search process	The search for an effective artifact requires utilization of available means to reach desired ends while satisfying laws in the problem environment.	The study follows a systematic methodological research process and triangulation of findings. Research process consists of defining the research paradigm, philosophy, strategy and data collection methods (Described in Chapter 2).
Communication as research	Design-science research must be presented effectively to both technology-oriented as well as management-oriented audiences.	The framework is presented to an academic audience in the form of conference presentations and proceedings for the purpose of adding to the knowledge base. The model was also communicated to domain experts for evaluating its validity and applicability. A set of interviews on use-case scenarios of the model and validation tool were used in order to simulate the applicability of the model in real use. The details of the evaluation process are presented in Chapter 6. It has been discussed in Chapter 2 that the practical application of the model is beyond the scope of this research.

It is depicted in Table 2.1 that the nature of this study, the research objectives and the research process that was followed makes design science an appropriate paradigm. The next section describes the overall research process that was adopted to address the stated research questions and to satisfy the desired research objectives.

2.3. RESEARCH PROCESS

The design science research paradigm has been presented and motivated to be appropriate for this study. An exposition and understanding of the research paradigm is fundamental to the establishment of the research process that is to be followed in answering the stated research questions. Yin (2008) defines a research process as methodological activities that map research questions and objectives to empirical data from which conclusions can be drawn. According to Leedy & Ormrod (2001), a research process is a systematic process of collecting and analyzing information with the objective of increasing the understanding of the phenomenon under investigation in order to bring a solution.

The aim of this study is to develop an artifact that is aimed at managing user experience; the User Experience Management Model (UXM^2). The relevant components of the UXM^2 are first explored and later used to develop the model. Figure 2.1 shows a blueprint of the processes of design science research, that serve as the foundations of the steps that were followed to develop the UXM^2 presented in Figure 2.2.

2.3.1. Flow of research

The flow of this research follows the steps of the design science research process proposed by Kuechler and Vaishnavi (2004), as presented in Figure 2.1.
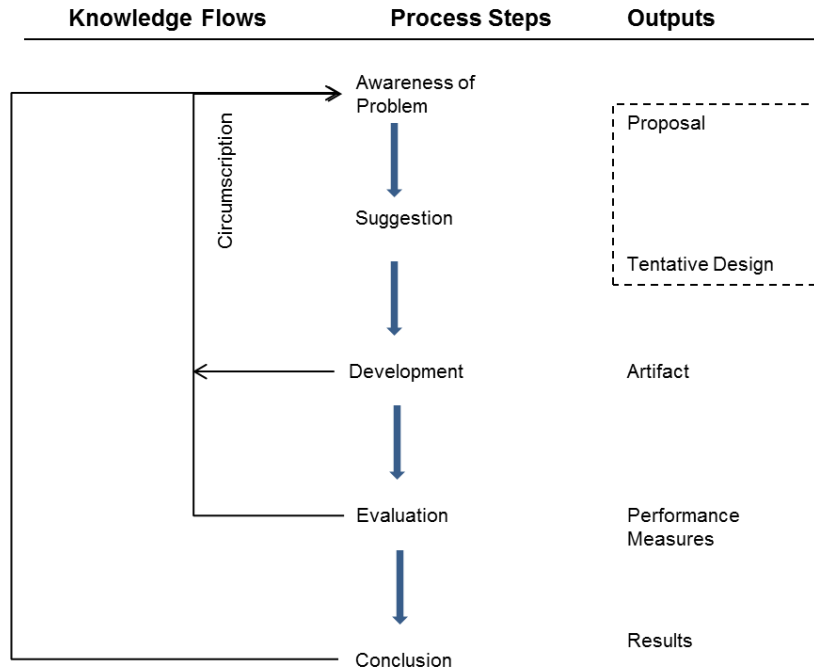
Figure 2.1: Design science research process (Vaishnavi & Kuechler, 2004)

The design science research process starts with an awareness of the problem. This is brought about through review of literature and observation of the phenomenon in practice. Once the problem has been exposed and the researcher has been made aware of it, the next step will be to identify suggestions that have the potential of resolving the problem. These suggestions are drawn from the domains that are found to be relevant to bring a solution to the problem. Based on the suggestion, an artifact is then developed and evaluated as a solution to circumvent the identified problem. Finally, the artifact is presented in order to illustrate its potential benefits.

Figure 2.2 shows how these steps of the design science research process are applied in this study.
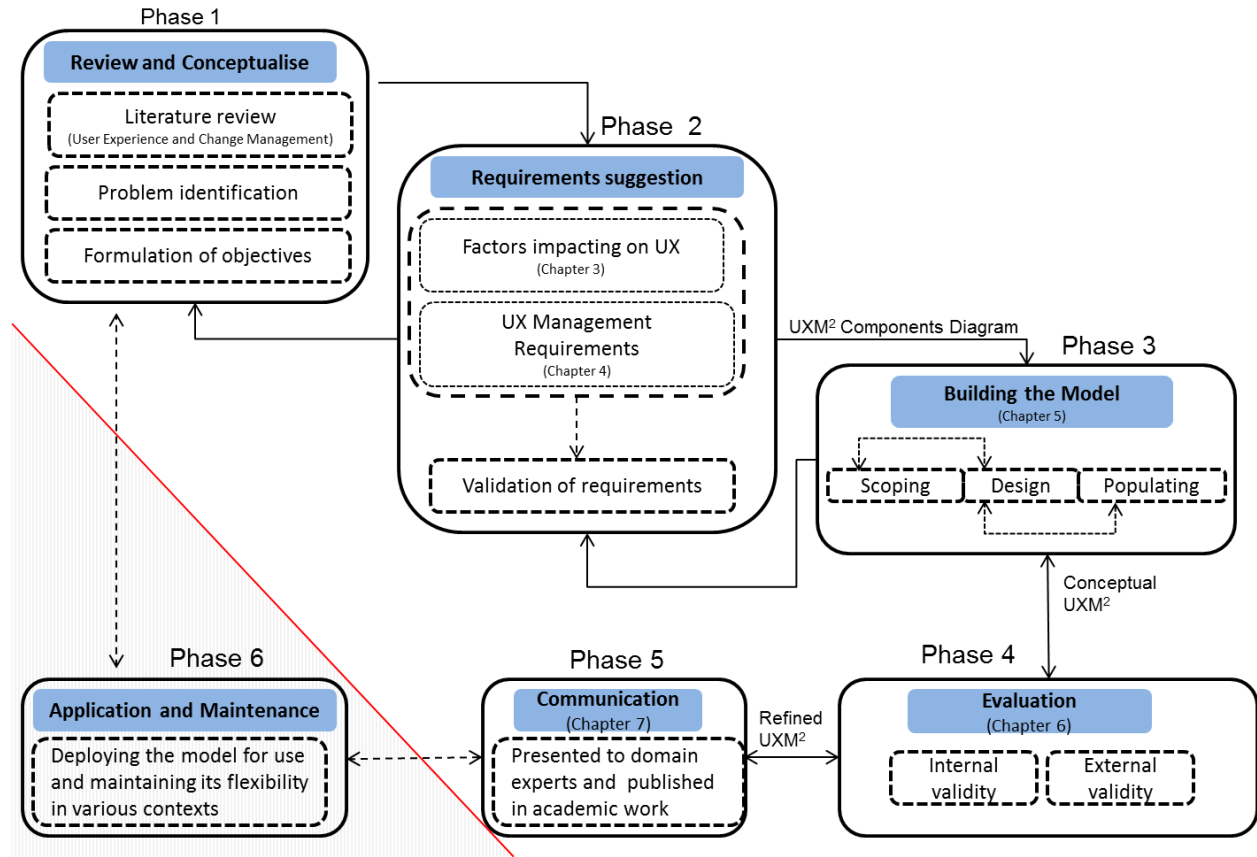
Figure 2.2: Research phases for this study

Phase 1: Review and conceptualization

A red line has been used to denote that the proposed model will not be deployed for use in real use. This is due to the fact that application and maintenance requires a longitudinal time frame for research which is not permissible with in the academic period allocated for this research.

Firstly, this research consists of a *review and conceptualization* of the literature on topics of interest, namely user experience and change management. Literature from user experience and change management is explored in Chapters 3 and 4 respectively. The objective of phase 1 is to analyze existing literature, contextualize the problem domains and identify gaps that exist and that this study aims to address. It has been identified that, while there are a number of theories and frameworks around user experience and change management, none specifically addressed the question of managing the change in user experience as new products are introduced and the user interfaces of existing products are improved. The problem statement and research objectives

were therefore formulated based on this review and conceptualization phase. The research design of this study is based on the following problem description, problem statement, research questions and research objectives.

Problem description

There is a lack of a model for managing user experience. As such, most new products and products with improved user interfaces do not easily get accepted and used, because they fail to create a sustainable long-term positive user experience.

This problem description is further refined to the following problem statement:

Problem statement

There lacks a model for managing user experience in order to promote a sustainable long-term positive user experience.

In order to address the stated problem the following research objects were developed:

Primary research objective

To develop a model for managing user experience.

The following sub-research objectives will help to achieve the stated primary objective:

Sub-research objectives

1. *To determine the factors that influence user experience;*
2. *To identify the requirements for managing user experience;*
3. *To establish the benefits of the user experience management model.*

Phase 2: Requirements suggestion

The second phase, *requirements suggestion,* is based on the claim that ideas (including theories, models and measures) from the disciplines of user experience and change management have the potential to aid in solving the identified problem. However, the concepts from the user experience and change management disciplines are not readily transferable. They need to be contextualized and formalized into artifacts, which then need to be evaluated against specific

criteria. The theories from these topics are analyzed and positioned as the components that are required to manage user experience.

The outputs from this step are the User Experience Factor Diagram (UXFD) presented in Chapter 3, and the User Experience Management Requirements (UXMR) Framework presented in Chapter 4. The UXMR Framework and UXFD serve as the foundational components that are required for the design and development of the desired artifact, the User Experience Management Model (UXM^2). These suggestions are evaluated for relevance and appropriateness through expert reviews. A description of the evaluation of these suggestions is presented in Phase 4.

Phase 3: Building the model

Phase 3 aims to develop the conceptual artefact of the UXM^2. The problem that has been identified is that there is a lack of a criterion for managing user experience, both in literature and in practice, as mentioned in phase 1. The requirements for managing user experience were identified and suggested in phase 2. Thus, the objective of phase 3 is to contextualize the suggested requirements in order to propose a conceptual model for managing user experience. The output of the building phase is the User Experience Management Model (UXM^2). The components for developing the conceptual UXM^2 are based on the requirements that were suggested in phase 2. The process of developing the UXM^2 is presented in Chapter 5.

Phase 4: Evaluation

The conceptual model has to be evaluated for internal and external validity (Becker, Knackstedt, & Poeppelbuss, 2009). Phase 4, *evaluation,* serves the purpose of outlining the procedures for evaluating and refining the model. The model is evaluated using argumentation of literature as well as reviews by subject domain experts. The expert review exercise consists of feedback from subject domain experts by means of interviewing the experts, receiving feedback on academic publications and evaluation of the relevance of the model using a validation tool that was provided to the experts. Results of the model validation are presented in Chapter 6. The final version of the UXM^2, based on its applicability, is presented in Chapter 7.

Phase 5: Communication

Phase 5 of the research involves *communicating* the model. The model is communicated to the subject domain experts and academic experts in order for them to evaluate it. The purpose of the evaluation is for the experts to assess the relevance of the suggested components, as well as the usefulness, validity and applicability of the model. The model is presented to experts in the academic audience through publications in internationally recognised conferences on HCI. The model is also presented to subject domain experts in order for them to determine the usefulness and applicability of the model, with respect to their interpretation of how it would be used in real situations.

Phase 6: Application and maintenance

The 6th phase, *application and maintenance,* involves practical use of the model. The application and maintenance phase intends to apply the UXM^2 in a live product development project and to adjust the components of the model to suit the specific context within which it will be used. Alterations to the proposed model will be made as and when necessary, in order to make it applicable to the specific project. This phase is time consuming, since it requires implementation of all the components of the model in order to demonstrate its applicability, and to get feedback for its maintenance. This section has been greyed out on the diagram to indicate that it is beyond the scope of this study, due to time limitations. However, an attempt will be made to determine the potential validity and applicability of the model without actual implementation thereof. This will be done by presenting the domain experts with scenarios that mimic the use cases of the model. The experts will then be asked to comment on how applicable and useful they perceive the model to be. The comments that are obtained from the experts will be used as feedback to guide the maintenance of the model.

In order to systematically follow the stated phases of research, this study follows the Research Design Funnel developed by Funchall (2012), as illustrated in Figure 2.3.
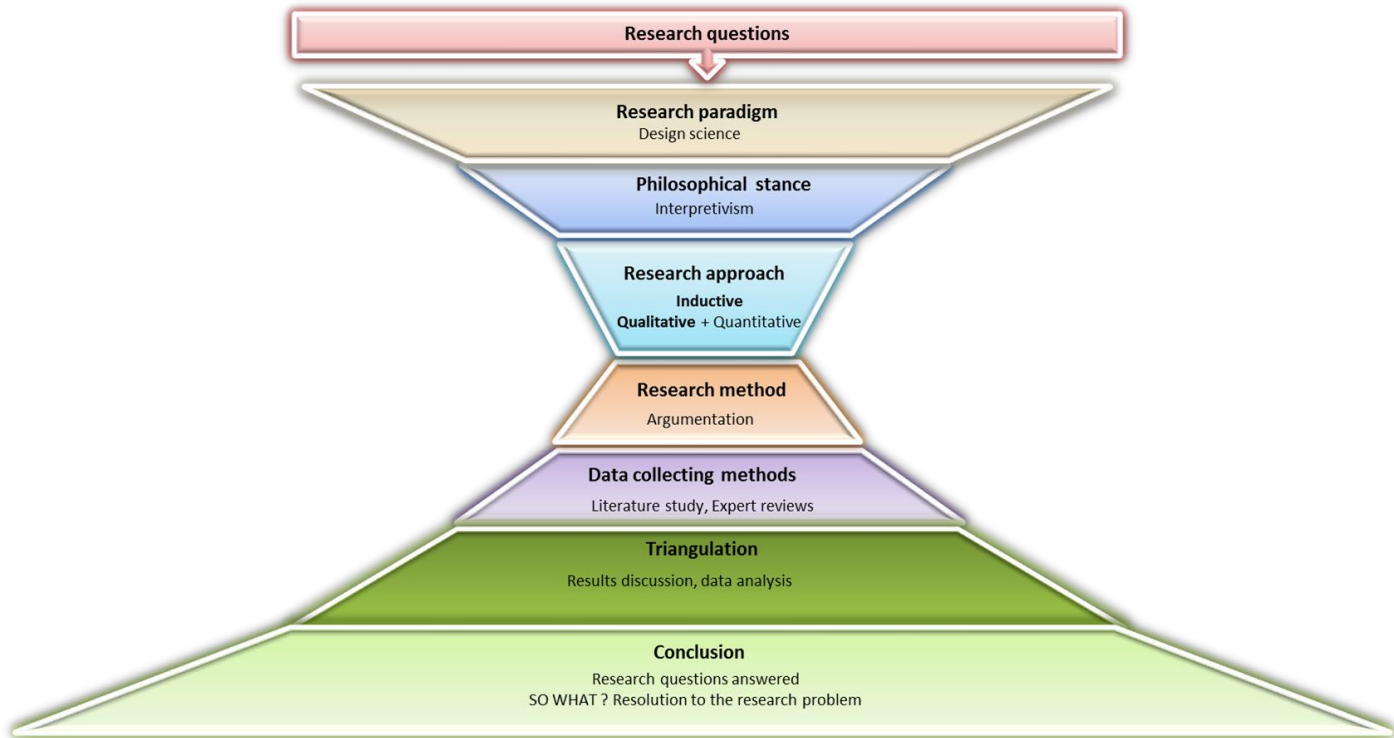
Figure 2.3: Research process (Adapted from Funchall, 2013)

A motivation for the choice of design science as the research paradigm has been presented in section 2.2. The sections of the "research funnel" are discussed next.

2.3.2. Research philosophy

TerreBlanche and Durrheim (1999) defined a research philosophy as a "lens" through which a researcher views the phenomenon under study. Therefore, the research philosophy provides basic guidelines on how knowledge may be acquired in research, hence guiding data collection and analysis (Oates, 2008; Levin, 1988). Mertens (2004) postulated four main research philosophies, namely positivism, interpretivism, realism and pragmatism. These four philosophies will be discussed in this project. The philosophies differ in the assumptions of the researcher with respect to the epistemology, ontology and methodology (Burrell & Morgan, 1979).

Positivism

Positivistic researchers emphasize the discovery of causal relationships between dependent and independent variables through hypothesis testing. They make the assumption that the world is

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composed of a static external reality, that is governed by natural scientific laws (Wardlow, 1989). The objective of positivistic research is to describe, predict, prove or disprove measurable variables (Krauss, 2005). Positivistic research is mainly quantitative (Glesne & Peshkin, 1992). The approach begins with hypotheses and theories. The researcher uses deductive reasoning, based on the numerical measurements to prove or falsify the proposed hypotheses.

A positivistic philosophy is not favoured for this research, based on the fact that the objective of the research is to develop a model artifact for managing user experience. User experience is subjective and related to how people feel, thus not governed by any scientific laws. Developing a model for managing user experience therefore requires a philosophy that comprises a qualitative approach to building and evaluating an artifact in order to solve the identified problem.

Interpretivisim

Interpretivistic research takes the perspective that the world is comprised of people with different experiences, beliefs, attitudes and values. Researchers aim to study the subjective meanings of the values, beliefs and social aspects of the phenomena under investigation. The researchers develop a deep and sympathetic appreciation of human and cultural activities and their experiences (Smith & Heshusius, 1986). An understanding of such a composite reality requires that human attributes be studied in terms of their context, in order to understand the reason for their observed behaviour. Interpretivistic research deals with qualitative data and employs an inductive reasoning strategy in order to draw conclusions about the research findings (Glesne & Peshkin, 1992). It employs an inductive ideology and allows questions to emerge. A better understanding is attained as the researcher becomes familiar with the research context. This philosophical paradigm seeks to develop theories by describing and interpreting the perceptions and preferences of the people within the context of their interaction, rather than by using quantifiable measures. Its objective is to describe meanings, understand definitions by members of the situation and examine how objective realities are produced in order to provide a solution to the observed problem.

Based on the subjective nature of user experience, a study on managing user experience requires a deep understanding of the people with respect to their values, beliefs and experiences while using interactive products. The purpose of this study is to develop a model for managing user

experience, and as such requires development of theories with respect to the perceptions and preferences of the people that are interacting with the products. An interpretivistic stance is found to be an appropriate candidate philosophy for this study, because its ontological, epistemological and methodological assumptions coincide well with the characteristics of design science and the objectives of this research.

Realism

Realism as philosophical position takes the stance that entities are in real existence, despite our perception or how we form theories about them (Bhaskar, 2011). While positivism concerns a single, concrete reality, and constructivist interpretivism embraces multiple realities, realism concerns multiple perceptions about a single, mind-independent reality (Healy & Perry, 2000) 2000). Realism presumes that a reality exists, but that it cannot be fully or perfectly apprehended also that there are differences between reality and the perceptions of people about reality (Guba , 1990). Realism assumes that knowledge about a phenomenon can be acquired scientifically. It exists as an intermediate between positivism and interpretivism, due to the fact that realism researchers acknowledge that hidden social factors have an influence on the behaviour of an entity and the researcher has the responsibility to expose any hidden factors. The aim of realism research is thus to identify and verify underlying generative mechanisms or structures that give rise to actions and events that can be experienced in the empirical domain (Wollin, 1996). The generalisations derived from realism research thus concern a probabilistic truth, rather than an absolute truth.

The process of managing user experience is subjective and consists of multiple subjective realities that can be apprehended by user observations, user testing and designing the products for positive user experience. Considering the objectives of this research, the nature of user experience and the design science research guidelines, realism is not appropriate for this study since it concerns the identification and verification of generative probalistic realities.

Pragmatism

Pragmatism is a philosophy of common sense that deviates from justifying or falsifying the objectives of positivistic research, but rather aims to facilitate the capacity to solve human

problems (Powell , 2001). Researchers adopting this philosophy share the belief that inquiry is continuous, and they recognize the subjective nature of human reactions as people face problems and attempt to solve them (Shields , 1998). A philosophy of pragmatism involves multiple realities based on the research objectives that have to be achieved, and the researcher can adopt both subjective and objective views of an occurrence under observation (Saunders, Lewis, & Thornhill, 2009). The primary concern when following a pragmatist position in the empirical world, is actions. Recognition of human actions (what people do) is a fundamental way of letting the social world become meaningful. Researchers employing pragmatism should therefore recognize the actions performed by the people in order to solve the human problems (Goldkuhl, 2004).

The objective of this research is to develop a model for managing user experience. Pragmatism does not fully encourage the process of developing artifacts or new theories, since they do not focus on methods but emphasize the research problem. Pragmatism will therefore not be considered as an appropriate philosophy for this study.

2.3.3. Research approach

A research approach guides the researcher to make inferences about the findings and to draw meaning from the results, based on the perspectives of the research investigation. In this study the research approach is based on two variables, namely logic of reasoning of research and the researchers' perspective on the nature of research. Logic of reasoning refers to whether research is deductive or inductive, while qualitative or quantitative aspects define the perspectives on the nature of research.

Inductive reasoning

Inductive reasoning follows a "bottom-up" approach by starting with the specifics and then generalizing the findings (Lichtman, 2006). The researcher begins with specific observations and measures, and begins to detect patterns and regularities within a phenomenon. The researcher then progresses to formulate some tentative hypotheses to be explored, and finally develops general conclusions or theories (Porter, 2005). Qualitative researchers generally adopt this kind of reasoning.

Deductive reasoning

Deductive reasoning flows in a "top-down" approach. The reasoning of the researcher commences with a general conceptual framework (for example, a theory), which develops towards a more specific hypothesis to be confirmed (i.e. accepted or rejected) (Schaeken, 2000; Saunders *et al*., 2009). Deductive reasoning takes a general premise and deduces particular conclusions. Thus, the researcher makes use of known facts in order to draw a conclusion about a specific situation. This method of reasoning is most common to quantitative research. It uses experiments and measurements to quantify and generalize the acceptance or rejection of a theory.

Figure 2.4 presents a comparative illustration of inductive versus deductive reasoning.
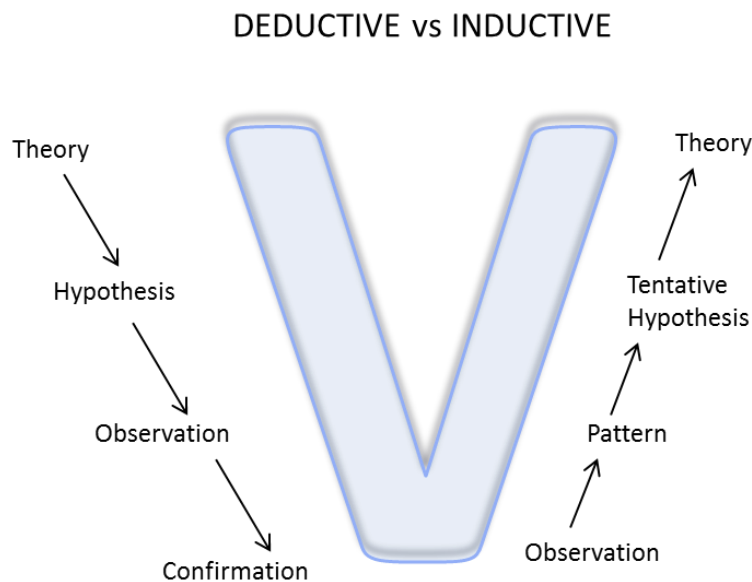
Figure 2.4: Logic of research (Adapted form (Trochim, 2008)

This study aims to develop a model for managing user experience. This purpose is achieved by observing the factors that influence user experience, analyzing patterns on how user experience evolves over time and then building a conceptual model for managing user experience. The objectives of the research as well as the subjective nature of the study justify the appropriateness of inductive logic for this study.

Quantitative research

Quantitative research emphasises the collection of measurable numerical data to explicitly describe and interpret a phenomenon (Babbie & Mouton, 2005; Trochim, 2006). Statistical analysis methods, ranging from elementary arithmetic calculations to mathematical models, are used to summarize findings. Relations and patterns between variables can be drawn and concluded from these findings Creswell (2009).

The mode of inquiry followed in developing the UXM^2 is literature study and model review with domain experts. There are no statistics or numerical modelling involved in the aggregation, interpretation and validation of the components of the UXM^2. The whole process of designing the model is subjective. As such, this study will not employ a quantitative approach.

Qualitative research

Creswell (2009) defines qualitative research as a means of knowledge acquisition through investigating and understanding how individuals or a community ascribe to a set of problem(s) they encounter. Qualitative approach is often exploratory with the objective of gaining an insightful understanding of a complex situation by observing participants in their context. This leads to the development of theory from the ground up – inductively.

The process of inquiry involves determination of the common occurrences and asking probing questions based on the problem observed. Data are then collected in the contextual settings of the participants and analyzed inductively. Findings are reported by building from particulars to general themes in order to derive meaning from the data (Leedy & Ormrod, 2005).

Creswell (2007) identified several characteristics of qualitative research, of which the following were selected to justify the choice of qualitative research:

➢ Researcher as key instrument: The researcher has to collect data either through a data collection tool or by interaction with the subjects. A literature study that was guided by research questions and objectives, together with interaction with user experience practitioners, was used to gather contextual information to help explain the phenomena under study.

- ➢ Multiple data sources: The data were obtained from literature studies, informal interaction and observation of user experience practitioners, academic publication reviews and focus groups with domain experts.

- ➢ Inductive data analyses: The UXM[2] was developed inductively, based on observations. The development process involved recursive building and process evaluation.

- ➢ Interpretive inquiry: The researcher, using inductive logic, studied the relevant literature (c.f. Chapters 3 and 4) and endeavoured to interpret and describe the components of the model.

An inductive qualitative approach employing little aspects of quantitative approach is therefore adopted in this study.

2.3.4. Research strategy

A research strategy is defined as a general plan and the overall approach of how the researcher goes about answering the set research question(s) (Oates, 2008; Saunders *et al*., 2009). A good strategy is driven by the research objectives and questions, and plays a fundamental role in determining the methods of collecting data. It also serves to delineate the focus and boundaries of the study (Marshall & Rossman, 2006). The research strategy should be harmoniously selected to match other attributes of the study such as the research paradigm, philosophy and approach. However, Saunders *et al*. (2009) emphasizes that research strategies are not mutually exclusive and a mixture of research strategies can be used in a study, if found to be appropriate for the study being conducted.

A summary of various research strategies is presented in Table 2.2. The presented research strategy have been selected based on the extent to which it is believed go along with the selected research paradigm, the chosen research philosophy and research approach. The researcher's belief and selection of the research strategy is guided by the outline of the relationship among various research philosophies, research approaches and research strategies postulated by (De Villiers, 2005).

Table 2.2: Overview of research strategies

Research strategy	Brief description
Action research	Aims to develop a solution to a practical problem by involving the community to participate in research. The researcher influences the participants by introducing interventions in iterations. New knowledge is gained and improved during the iteration cycles (Chiasson, Germonprez and Mathiassen , 2009; Oates, 2006).
Case study	Explores a single entity or phenomenon bounded by time and activity. Collects detailed information through a variety of data collection methods over a sustained period of time (Yin, 2008)
Experiments	Experiments are a classical form of research" aimed at testing theories and demonstrating relationships between variables for factual prediction and control" (Saunders et al., 2009).
Argumentation	A strategy that aims at developing new theories by employing logic of reasoning on existing theories. The researcher responds to existing knowledge by making claims and identifying discrepancies in the existing knowledge either by accepting or refuting the existing knowledge through use of reasoned discourse (Lapakko, 2009; Metcalfe & Powell, 2000).
Ethnography	Ethnographers spend significant time in the field observing the research subjects, to develop an in-depth understanding of the culture, interactions and beliefs of the people, their commonly faced challenges, their frustrations, what they like most, and risky parts of their everyday life (Myers, 1999).
Grounded theory	It is a rigorous and detailed strategy that aims to inductively develop theories from a vast amount of data through systematic iterative cycles of data collection, analysis and coding (Strauss & Corbin 1998).
Surveys	The researcher aims to get insight into the opinions, attitudes and preferences of the people by selecting a sample of respondents from a population and administering a standardized questionnaire to them (Saunders, et al., 2009, Oates, 2008).

The research strategies introduced in Table 2.2 are discussed next.

Action research

Action Research is an interactive inquiry strategy that seeks to develop a solution to a practical problem (Chiasson, Germonprez, & Mathiassen , 2009). The researcher works together with the research subjects with a particular objective in mind. He or she influences change in the current situation by iteratively introducing new practices in cycles, so as to monitor and evaluate the results (Oates, 2006). The action research intervention cycle consist of reflection-, planning-, action- and observation phases (McNiff & Whitehead , 2002). The influence of the activities of each cycle is therefore observed and acts as input into the next cycle.

Action research aims to provide value to the community participating in the research while practically contributing to the development of a theoretical knowledge framework. (Baskerville, 1999). The main purposes of action research are to empower the research subjects through collaborative participation, to bring about social change and to enable knowledge acquisition (Zuber-Sketitt, 1992).

Managing the user experience involves creating awareness, establishing a desire, imparting knowledge and ability and also sustaining the user experience. Considering such interventions,

action research seems to be a proper and applicable strategy for this study. However, action research will not be used due to the fact that the output model of this study will not be practically implemented. This result from the time constraints of the study, as discussed in the steps followed in conducting this research (c.f. Figure 2.2).

Case study

According to Yin (2008), a case study is an in-depth investigation of an observation or occurrence within a specific context, which may reveal hidden evidence within a real-life phenomenon. Dul and Hak (2008) add that a case study may investigate a single case or multiple cases for comparison purposes. The purpose of case studies is to gain an intensive understanding of why the things are the way they are, and of the causes of such occurrences in the case under investigation (Yin, 2008; Oates, 2006). Thus, the strategy involves choosing a representative sample of the case to be investigated. The selected case should have a significant resemblance with a particular population, family or institution to which it belongs. Findings from case studies are useful in generating hypotheses, and for generalizing and inferring solutions to similar cases (Hofstee, 2006).

Yin (2008) and Stake (1995) posit that when conducting a case study, one should follow the following steps in order to yield credible results:

   i.   Determine and define research questions and objectives;

  ii.   Select the cases and determine appropriate data gathering and analysis techniques;

 iii.   Prepare to collect the data;

 iv.   Collect data in the field

  v.   Evaluate and analyze data;

 vi.   Report on the findings.

These steps support the characteristics of the case study as described by (Van der Merwe, Kotze, & Cronje, 2005). The authors state that the researcher has little control in a case study. It

involves application of the contemporary with real-life context, aims to explore a single entity bounded by time and activity and finally aims to study a life cycle.

The aim of this research is to develop a model for managing user experience. The envisaged model builds on existing literature and does not require a time and activity bounded exploration of entities. The study does not cover the application and practical use of the model; a case study would have been appropriately applied during the model application and maintenance phase. Thus, the case study strategy will not be used for this research.

Argumentation

Metcalfe and Powell (2000) suggest argumentation as a possible research strategy that is suited to the research of information systems. They claim that a well-conducted argumentation process in research improves the quality and credibility of research results, which in turn persuades audiences to accept the interpretation and conclusion of the phenomena being investigated (Smaling, 2002).

Lapakko (2009) defined argumentation as an inductive, process-based research strategy that directs the construction of convincing conclusions based on the claims that result from reasoned discourse. The strategy is commonly used by interpretivists since it does not expect objective conclusions from one individual, but rather dialogue and shared debate, to expose subjective worldviews. The purpose of argumentation is to establish the benefits of a claim by considering evidences that support it, as well as the alternatives that may provide a more comprehensive understanding. According to Walton (2009) an argumentation strategy involves four tasks, namely: identification, analysis, evaluation and invention. These tasks concur with the three parts of argumentation research suggested by Toulmin (1958) and Lapakko (2009). The suggested parts are claim, evidence / support and assumptions / warrants (Lepakko, 2009; Toulim, 1958). The identification task involves investigation by the researcher into existing knowledge bases in order to develop an understanding of the phenomena and to derive a claim. Claims are the facts that the researcher identifies as discrepancies in existing knowledge. The researcher therefore conducts a gap analysis and identifies missing aspects that have to be addressed in the research. The task of the analysis phase is to find implicit evidence of data in support of the claim. During evaluation, the comprehensiveness of the evidence is assessed to determine whether or not it

supports the claim. It is also determined whether or not there are enough assumptions stated to define situations where the claim is valid and applicable. The invention task communicates the new theories as conclusions of the argumentation process. The characteristics of argumentation, as discussed below, confirm it to be an applicable research strategy for conducting this research.

Firstly, the stated task and parts of argumentation blend with the characteristics of the chosen research paradigm, *design science* (c.f. Table 2.1), and the steps for conducting this research (c.f. Figure 2.2). Argumentation seeks to investigate a practical problem with the objective of developing new theory as a solution. This goes well with the design science paradigm as well as with the objective of this study, which is to develop a model for managing user experience. It seeks to identify shortfalls in existing literature, from which a claim is then established. This task is in harmony with the problem identification phase and the development of a problem statement for the research. The task of analysis in argumentation tallies with the requirements suggestion step of designing the UXM^2. Literature is analysed in order to determine the requirements for managing user experience. Similar to the model validation step, argumentation requires evaluation of the evidences as well as the assumptions used to support the claim.

Secondly, argumentation is mostly used in interpretivist research. The strategy is therefore appropriate for addressing the subjective nature of user experience. In addition to this, argumentation follows an inductive approach and is mainly used to gather qualitative data. It suits the stated research approaches, since managing user experience requires a qualitative approach. Finally, the intervention task of argumentation is in harmony with communicating the output of this study, that is, the User Experience management Model (UXM^2).

Ethnography

Ethnographic research has become a useful tool in the social sciences. This research strategy employs inductive inquiry aspects from the disciplines of social and cultural anthropology. In ethnographic research, the researcher is required to spend a significant amount of time fully immersed in the lives of the research subject with the objective of interpreting their social world (Myers, 1998). The researcher gains an understanding of the case under investigation by determining the meaning that the participants assign to the case (Orlikowski & Baroudi, 1991). This strategy emphasizes the placement of the research domain in its social and cultural context.

The strength of ethnography, as a research method, lies in the extent to which the researcher gets involved in the lives of the study area. Ethnographers spend significant time in the field "seeing it happening", in order to develop an in-depth understanding of the beliefs of the people, the common challenges they face, their frustrations, what they like most, and the risks that are part of everyday life (Olivier, 2008; Myers, 1999). Its time consuming nature and the requirement for deep expertise by the researcher are the major drawbacks of ethnography. During data gathering, the researcher observes the situation without any presumption, and views everything as a new aspect of interest.

Ethnography will not be used in this study because of its time consuming nature. Ethnography requires a longitudinal time span which is not permissible for the allocated time for this study. Also, designing the model for managing user experience does not require immersive interaction with the research participants.

Grounded theory

Grounded theory is an explorative research strategy that attempts to develop theories through systematic grounding, analysis and conceptualization of data (Glaser & Strauss, 1967; Patton, 2002)

Grounded theory employs an inductive approach that focuses on systematic and creative analysis of large volumes of raw data from a variety of sources in order to develop a theoretical account of the general features of a phenomenon (Martin & Turner, 1986).

There is a continuous interactive cycle of data collection and analysis with the objective of categorizing concepts and properties among variables as well as their interrelationships (coding) (Strauss & Corbin, 1998). The codes are extracted from text, as opposed to commencing the research by developing a leading hypothesis. The codes are categorized into similar concepts in order to assimilate them into meaningful concepts for building theories. The iterative process of data collection and analysis continues up to a point when no new insights surface. At this point, the theory is maturely established. This strategy clearly identifies appropriate data collection sources, explores possible constraints and justifies their appropriateness based on the research questions.

Grounded theory will not be used in this study because it is grounded on iterative literature survey until no new insights surfaces. Managing user experience requires a thorough investigation of the factors that influence user experience. The factors that influence user experience may not be fully explored using literature survey only; it requires other sources such as observing the users and user testing. Also, grounded theory does not provide bases for evaluating the internal and external validity of the model using other sources apart from continuous survey of literature.

Surveys

A survey is a deductive-reasoning inclined research strategy that aims to gather quantitative data (Saunders *et al*., 2009). This definition is adopted in this study, and whenever the word survey is used it refers to a quantitative survey. Individuals that are chosen to represent a community are asked standardized questions (Hutton, 1990). The questions can be either structured interviews and/ or structured questionnaires. The representative sample must be knowledgeable about the research area and must be willing and able to communicate on behalf of the entire population (Hofstee, 2008). It is the best strategy for inquiring about the opinions, attitudes and preferences of people. Its benefits include its efficiency in collecting information from a large number of respondents, its flexibility in factual elicitation and the standardization that makes data analysis easy. Surveys are easy to administer and less costly. They involve administration of questions to individuals or groups. Thus, surveys are useful in generating data that are independent of context and data that can be statistically analysed.

A quantitative survey will not be applicable since it is used to collected quantitative data, which will not be applicable in this research project as the model design process requires a qualitative approach.

2.3.5. Data collection techniques

This section provides an overview of all the data collection techniques that are employed to answer the research questions in the study. The data collected in this research are categorised as either primary or secondary data. The techniques for collecting data are discussed next.

Literature study

The source of secondary data is the literature study, which includes any material from published journal articles, books and conference proceedings.

A literature study is used to determine the following:

➢ The factors that influence user experience; and

➢ Requirements for managing user experience.

The purpose of the literature study is to guide the building of a conceptual framework upon which the research is developed. An in-depth study of the literature pertaining to user experience and change management is conducted. The theoretical findings form the basis of the gap analysis, the problem identification as well as potential solutions to the problem. The established gap, the problem identified and potential solutions motivate the selection of the components to be included in the user experience management model. Thus, the components of the model for managing user experience are obtained from a synthesis of the relevant literature.

Expert Reviews

Primary data were used as evidence to substantiate the claims that were obtained from the secondary data. This study used expert reviews, by means of feedback from subject domain experts, as the source of primary data. The subject domain experts consisted of academic professors in the field of HCI as well as of user experience practitioners. Feedback from the experts was obtained through interviews and by asking them to complete a model evaluation tool. Feedback on the appropriateness and relevance of the proposed components of the model was obtained from comments based on academic publications, that were submitted to international conferences during the course of the study.

Expert reviews were used for the following purposes:

➢ To evaluate the appropriateness and relevance of the proposed components of the model;

➢ To evaluate the usefulness and applicability of the proposed conceptual model; and

> To determine the perceived significance and contributions of the UXM[2].

Details of the expert review process are provided in Chapter 6 (c.f. sections 6.2.2 and 6.2.3).

2.3.6. Data analysis and triangulation

An analysis of the overall results of the research, conclusions and recommendations is used to address the main research question and to satisfy the primary research objective. A combination of argumentation of literature, review of academic publications and expert review of the model through interviews are used to provide answers to the secondary research questions. Data analysis is done by applying convergence triangulation, in which multiple sources for data collection and multiple measures for data collection are employed (Miles & Huberman, 1994). Guion, Diehl, and McDonald (2011) define triangulation as the process of analyzing qualitative research from multiple perspectives in order to examine the validity of the findings. Triangulation serves the purpose of increasing confidence, credibility and validity in research data (Creswell, 2012). It also provides a platform for creating innovative ways by means of which to understand a phenomenon from which unique findings can be revealed (Thurmond, 2001). Using data from more than one source has the benefit of adding credibility and value to the findings of the research (Weinberg & Driscoll, 2006).

There are basically four types of triangulation (Denzin, 1970):

> **Data triangulation***: Different sources of information are used to increase the validity and reliability of the research. Participants with the characteristics that satisfy the desired attributes of the research are purposively sampled to provide the required data;

> **Investigator triangulation:** Several different researchers are involved in the study and the analysis process of the research findings. The different researchers make use of the same method to carry out the research;

> **Environmental triangulation**: The research is conducted in different contexts, i.e. different locations, settings, and seasons. The objective of environmental triangulation is to identify the factors of environment that influence the problem that is being researched; and

➢ **Methodological triangulation**: Methodological triangulation involves the use of multiple qualitative and/or quantitative methods to investigate the phenomenon that is being researched.

In this study, data triangulation is used to combine the findings that are gathered through literature study, review of academic publications and expert review interviews. Convergence triangulation will increase the credibility and validity of the results of this qualitative study (Weinberg & Driscoll, 2006).

Data analysis in interpretive research serves to produce an understanding of the interaction of specific systems within their contexts. Analysis in interpretive studies is strengthened by the explanation of the phenomena based on the interpretation of data. Myers (1998) discusses some modes of analysis that are associated with interpretive research. The author postulated hermeneutics as a way of understanding the meaning of data or text analogues. The most fundamental principle of hermeneutics is the circular structure of understanding, as it relates to some or other phenomenon. Klein and Myers (1999) proposed a set of principles by which to conduct and evaluate interpretive research, which are based on the philosophical perspective of hermeneutics. These principles mostly apply to studies of this nature, and will also be used for data analysis. The principles for conducting and evaluating interpretive field studies are presented in Table 2.3.

Table 2.3: Summary of principles for analysing interpretive field research (Klein and Myers, 1999)

Fundamental principle	Description
Hermeneutic Circle	This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.
Contextualization	Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.
Interaction Between the Researchers and the Subjects	Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants.
Abstraction and Generalization	Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.
Dialogical Reasoning	Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision.
Multiple Interpretations	Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it.
Suspicion	Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants.

The principles presented in Table 2.3 were observed during data analysis and interpretation. The findings obtained from expert reviews are systematically grouped into similar concepts, and related as the topics are discussed. The findings from literature and expert review results are therefore interpreted so as to derive and validate the usefulness and applicability of the UXM^2.

Table 2.4 illustrates the mapping of research questions, research objectives and data collection methods to the respective chapters and the expected outcome.

Table 2.4: Research process mapping

Research question	Research objective	Chapter	Data colleting technique (s)	Expected outcome
What are the components of a model for managing user experience?	To develop a model for managing user experience.	5 and 7	Literature study, focus groups, expert reviews.	User Experience Management Model
What are the factors that influence user experience?	To identify the factors that influence user experience.	3	Literature study, expert reviews.	User Experience Factor Diagram
What are the requirements for managing user experience?	To determine the key requirements for managing user experience .	4	Literature study, expert reviews.	User Experience Management Requirements (UXMR) Framework
What are the benefits of this model for managing user experience ?	To outline the contributions of the user experience management model.	8	Results analysis, conclusion and recommendations.	Significance and contribution of the User Experience Management Model

The main research question seeks to identify the components of a model for managing user experience. These components of the UXM^2 are presented in Chapter 5, and a refined version of

the model is presented in Chapter 7. The components were identified through literature study and validated through review of academic publications and interviews with experts. The second research objective aims to identify the factors that influence user experience. Literature study and academic publication expert reviews were the major sources of data for identifying such factors. The outcome of this objective is the User Experience Factor Diagram (UXFD) that is presented in Chapter 3. Chapter 4 aims to determine the requirements for managing user experience. The requirements are presented through the User Experience Management Requirements (UXMR) Framework. The requirements for managing user experience were determined by means of a literature study and were validated through double blind peer review of an academic publication in a paper presented at a domain specific international conference on Human-Computer Interaction. The usefulness and potential applicability of the UXM^2 are presented, based on the analysis of results from expert review interviews. An outline of the contributions and significance of the UXM^2 is discussed in Chapter 8.

The overall research process followed in this research was presented in the previous sections. The next section discusses how the argumentation strategy has been applied in this research.

2.4. ARGUMENTATION REPORT FOR DESIGNING THE USER EXPERIENCE MANAGEMENT MODEL

Argumentative research can be thought of as a dialogue where the researcher finds facts for building new theories from the existing body of knowledge (Lapakko , 2009). Table 2.5 presents the different types of dialogue, as postulated by Walton (2009).

Type of dialog	Initial situation	Goal of researcher	Goal of dialog
Persuasion	Conflict of Opinions	Persuading the other party	Resolving or clarifying issue
Inquiry	Need to have proof	Find and verify evidence	Proving or falsifying hypothesis
Negotiation	Conflict of Interests	Get what you most want	Determining reasonable settlement which both parties can live with
Information-Seeking	Need information	Acquire or give information	Exchanging information
Deliberation	Dilemma or practical choice	Co-ordinate goals and actions	Deciding the best available course of action
Eristic	Personal Conflict	Verbally hit out at opponent	Revealing deeper basis of conflict

This reseach seeks to find information on managing user experience and to deliberate on the means of managing user experienece. There exists a dilemma on how user experience can be managed because information pertaining to this aspect is lacking, both in litreature and in practice. Thus, information on managing user experience is aquired and guidelines for managing user experience are provied.

Toulim's model suggests the critical components of argumentative research to be as follows:

> ➢ **Claim:** The standpoint that establishes the existence of a problem worthy of solving;
> ➢ **Evidence / data:** Facts from existing data or observations that support the claim;
> ➢ **Assumptions/ Warrant:** Statement of beliefs made by the researcher, that is aimed at bridging the gap that was identified between the existing data and the claim;
> ➢ **Rebuttal:** Statements delineating the scenarios / conditions under which the claim is valid.

Argumentation report supporting the development of the User Experience Management Model (UXM^2) is designed, following the Toulmin Model of Argument (Toulmin, 1958).

2.4.1. Claim

The claim made in this research is defined based on the following statement:

Many products fall short on usability and fail to create a positive user experience, as a result thereof that the user readiness of the people using interactive products remain lagging (Launder, 1995; Van Greunen, van Der Merwe, & Kotze, 2010; Mashapa & van Greunen, 2010).

At the time of writing this thesis, there is no model for managing the user experience of people using interactive products. Following this premise, a claim is made that a model for managing user experience has the potential of improving the user experience of the products, hence improving the user readiness and promoting a long-term positive user experience of the people using the products.

2.4.2. Evidence / data

The evidence supporting the non-existence and as well as the potential benefits of the model for managing user experience is presented in Chapters 3 through to 8. In summary, there exist a lot of models aimed at guiding the design for user experience and user experience evaluation methods. User interfaces are continuously being improved with the objective of improving the user experience. Also, user experience practitioners concur that a change in the user interface affects the user experience and that user experience changes over time. However, there is currently no model or criteria aimed at managing the change in user experience. The development of user experience is a process that involves change, and it has to be managed. Literature is awash with models for managing change. However, the existent change management models neglect the user experience side of the people, as many of the models are aimed at managing change in organizations. Such evidence justifies the need to have a model for managing user experience.

2.4.3. Assumption / warrant

The assumption made in this study is therefore that techniques for managing change may be employed to managing user experience. Thus, the model for managing user experience integrates aspects of both change management and user experience, so as to bridge the identified gap and subsequently promote a long-term positive user experience.

2.4.4. Rebuttal

The delineation and restrictions for the claim is defined by the fact that the model is not going to be implemented and tested in practice. It is validated of its usefulness, relevance and applicability through literature argumentation, academic publications and reviews with the expected users of the model.

2.5. MODEL VALIDATION

In order to ensure that the artifact, the User Experience Management Model (UXM^2), is both useful to practitioners (relevant) and contributing to the body of knowledge (rigorous), it must undergo stringent evaluation and justification. The model validation process aims to establish the relevance and rigor of the identified model constructs and content, in order to assess how well they satisfy the needs of the target audience and solve the identified problem.

The model must satisfy two goals: internal and external validity. Internal validity refers to the extent to which the proposed model satisfies its purpose. That is, evaluating the relevance and appropriateness of the components of the proposed model and the extent to which they wholly represent the domains in question (Ray, 2003). Thus, in this study internal validity aims to evaluate the degree to which the requirements of the model are applicable to the management of user experience. The model should be entirely represented by components from the domains of interest, which is change management and user experience.

External validity evaluates the applicability of the model to other people and situations, based on generalization to situations with similar parameters and domains. Therefore, internal validity entails assessing how the UXM^2 will be of use across managing the user experience and promoting a sustainable long-term user experience. In order to be useful, the model must be acceptable to the intended users in terms of its components (for example scope and outputs) and its benefits.

Both internal and external validity must be met for this model to be rigorous and as such likely to contribute the body of knowledge.

Table 2.6 presents the characteristics of each of the evaluation methods prescribed by Hevner *et al*. (2004), from which an appropriate method of evaluating the UXM^2 is chosen.

Table 2.6: Possible evaluation methods in design science research (Adapted from Hevner *et al*., 2004)

Evaluation method	Description	Motivation for or against the method
Observational	**Case Study:** Study artifact in depth in business environment.	The UXM^2 has not been employed in real practice, therefore case study is not possible.
	Field Study: Monitor use of artifact in multiple projects.	This requires the study to be conducted over a longitudinal time period and a significant amount of resources also a deep access to the research subjects. The makes field study not to be ideal an ideal candidate.
Analytical	**Static Analysis:** Examine structure of artifact for static qualities (eg complexity).	Not possible since the study is sorely qualitative.
	Architecture Analysis: Study fit of artifact into a technical IS perspective.	This method is not appropriate for a theoretical model
	Optimization: Demonstrate inherent optimal properties of artifact or provide optimality bounds on artifact behaviour .	The artifact, UXM^2 does not contain any optimal properties, thus method is not applicable .
	Dynamic Analysis: Study artifact in use for dynamic qualities (eg performance).	Method requires establishing performance criteria for optimization, this making it inappropriate for the study.
Experimental	**Controlled Experiment:** Study artifact in controlled environment for qualities (eg. usability).	Experiments will not satisfy the qualitative nature of the artefact.
	Simulation: Execute artifact with artificial data.	No artificial data will be provided , hence the study may not be simulated.
Testing	**Functional (Black Box) Testing:** Execute artifact interfaces to discover failures and identify defects.	Not applicable since the model does not contain interfaces for testing defects or failures.
	Structural (White Box) Testing: Perform coverage testing of some metric (eg. execution paths) in the artifact implementation.	This approach suffers from a lack of a suitable metric for evaluating something as abstract as a model.
Descriptive	**Informed Argument:** Use information from the knowledge base (eg relevant research) to build a convincing argument for the artifact's utility.	This is a promising candidate: Evidence can be generated to validate the usefulness of the model and also to validate its generalizability and relevance of the components from literature and focus groups and experts' knowledge bases. The results would also provide feedback to further refine the framework.
	Scenarios: Construct detailed scenarios around the artifact to demonstrate its utility.	Scenarios will help in the validation of the model. They allow practitioners to weigh the claim against the evidence provided; this way indefensible generalisations can be drawn.

The User Experience Maturity Model (UXM^2) is evaluated using descriptive methods. Existing theories from literature as well as feedback from experts and focus group discussions are used as evidence to support the declared claim and to build convincing arguments for the usefulness and relevance of the model. Detailed scenarios with characteristics that suit the usage of the model are constructed to mimic the context in which the model is used. The scenarios used are modeled from research questions and are used to guide focus group discussions to demonstrate the utility of the model. The scenario describes a case, and the focus group participants are asked to discuss the applicability of the model based on the scenario.

The scenarios are based on the following two cases:

> **Development of a new product**: Expert review participants are asked how they will apply the model to cultivate a sustainable long-term positive user experience and user readiness when a new product is being introduced into the market;

> **Improvement of a products user interface and functionality:** This scenario involves promoting a sustainable long-term positive user experience and the readiness of people for the introduction of an enhanced version of an existing product. The new product may have new functionalities and / or an improved user interface. In this case, the model is validated in terms of its applicability to deal with any user resistance to the improved version.

Thus, expert review interview participants were presented with scenarios describing each of the cases and they were asked to apply the model in order to determine its applicability.

2.6.   ETHICAL CONSIDERATIONS

Throughout the research project, the articulated ethical values were upheld, adding to the rigor of the process. These values included, for example, fair and honest dealings with research participants and stakeholders. The participants voluntarily consented to participate in the research and were informed of their rights to privacy and the fact that their data would be presented anonymously. None of the participants involved in the research were minors or belonged to any category that required special ethical considerations, therefore no ethical clearance was required for the study.

Another ethical dimension that was considered in this research is the researcher's honesty in the presentation of research findings. The researcher would not manipulate the data in any way in order to satisfy a desired conclusion or to accommodate the researcher's biases. Academic integrity in acknowledging other people's contributions and in reporting adverse findings was observed throughout the research.

2.7. SUMMARY

This chapter commenced by introducing the research paradigms in HCI. Based on the nature of this study, design science research was chosen and motivated to be the applicable paradigm for the study. An interpretivistic philosophy, employing a qualitative inductive approach, was selected. The use of argumentation strategy was motivated and a literature study and expert reviews were selected as the data collection methods. Data analysis techniques were described briefly, followed by an argumentation report outlining how the strategy would be employed in the study. The criterion for validating the model was discussed. The last section in this chapter described ethical issues and considerations for the study.

The implementation of the research process that was outlined is applied in the chapters that follow.

CHAPTER 3: USER EXPERIENCE

| INTRODUCTION | | 3.0. INTRODUCTION |
| Chapter 1 Introduction | | |

INTRODUCTION

Chapter 1
Introduction

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Chapter 2
Research Design
and Methodology

PART B: REQUIREMENTS IDENTIFICATION

Chapter 3

User Experience

Chapter 4
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Chapter 5
User Experience
Management Model

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Chapter 6
Model Evaluation,
Results and Analysis

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Chapter 8
Conclusion

3.0. INTRODUCTION

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3.2. DEFINING USER EXPERIENCE

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3.6. FACTORS THAT INFLUENCE USER EXPERIENCE

3.6.1. User Experience Factor Diagram (UXFD)

3.7. SUMMARY

3.0.   INTRODUCTION

The purpose of this chapter is to introduce user experience, but also to lay a conceptual foundation to guide the process of answering the secondary research question that states:

> *What are the factors that influence user experience?*

In order to answer the stated research question, this chapter commences with an introduction that outlines the emergence of user experience (section 3.1), followed by a definition of user experience in section 3.2. Thereafter, the importance of user experience is discussed. The elements of user experience and phases of user experience are explored in sections 3.4 and 3.5 respectively. A consolidation of the factors identified to have an influence user experience is presented in section 3.6. The chapter contributes to the body of knowledge by presenting a holistic approach to determining the factors that influence user experience by proposing a User Experience Factor Diagram (UXFD). Thereafter, the chapter culminates with a summary.

3.1.   EMERGENCE OF USER EXPERIENCE

The purpose of this section is to introduce how the concept of user experience came to be, by tracking the paradigm shift in the focus of the design of ICT products. This focus has gone through progressive change. There has been a notable shift in the trend of designing ICT products from designing for functionality through to designing the products for user experience (McNamara & Kirakowski, 2006).

Early designers of ICT products focused on what the product should entail, and only delivered on the desired functionality (Moallem, 2007). The designers did not consider the needs of the users for efficiency, effectiveness, human cognitive factors, ergonomics and the interfaces through which the users interacted with the devices (Plewes & Thizy, 2012). By then, the development of a product that addressed the required functionality was an issue of importance to developers.

Thereafter, the focus shifted from an emphasis on functionality to also considering aspects of usability (Godwin, 1987). A system may have all the required functionality, but may still not be usable or vice versa. The focus of the usability approach is the design of products that contain the rightful functionality that is needed by the users to do their tasks, as well as products that are easy to use, easy to learn and pleasant to interact with (Ovaska, 1991). As such, usability focuses

on the effectiveness, efficiency and satisfaction of the users during their interaction with a product to perform a specific task in a specified context of use (Dix, 2010).

In the current era, designers are faced with the challenge of designing for positive user experience (Wright, McCarthy, & Marsh, 2001). This goes beyond the development of products with the desired functionality and usability; it focuses on providing a captivating interaction experience to the users (McNamara and Kirakowski 2006; Hassenzahl and Tractinsky 2006). The emphasis is on designing products that invoke positive emotions, feelings and opinions of the users, which is defined as the internal state of the user by Hassenzahl & Tractinsky (2006). The internal user states result from expectation and experiences of the users interacting with a product to perform a task in a specified context of use (Law, Vermeeren, Hassenzahl and Blythe 2007). A product that meets the expectations of the users provides a positive user experience (Roto 2007; Roger, Sharp and Preece 2011).

Figure 3.1 illustrates the paradigm shift in the focus of the design of ICT products.
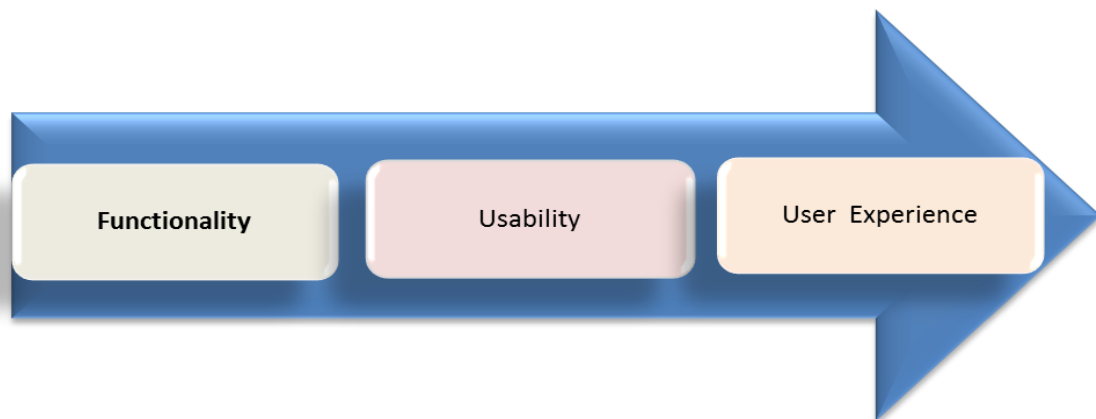
Figure 3.1: Trend in the focus of product design (Researcher interpretation of literature)

The above narration traced the paradigm shift in the focus of the design of ICT products. It has been noted that development of a system for functionality and utility alone is not enough. A system must fit the task needs and requirements as well as the emotional aspects of the users (Bevan, 1999). A product has to be usable for the users in order to find it effective, efficient and satisfactory. Usability consists of ease of learning and interacting with a product, ease of use, ease of remembering, task efficiency and user satisfaction (Lauesen & Younessi, 1998). User experience goes beyond the functionality and usability aspects of a product. It includes the

subjective feelings of the user that develops as a result of the functionality and usability aspects of a product (Dillon, 2001; Roto *et al*., 2011).

The current study focuses on managing user experience. User experience is a multifaceted domain encapsulating the product's functionality, utility usability and aspects of user emotions that develop from interacting with a product. The next section seeks to explore what user experience is.

3.2. DEFINING USER EXPERIENCE

Information and communication products have become ubiquitous in the lifestyles of people. Despite this ubiquity, users often have unpleasant experiences during their interaction with the products (Shneiderman, 2002). Users often find the ICT products boring, disappointing, frustrating, confusing and annoying to interact with (Ayyagari, Grover, & Purvis, 2011; Weil & Rosen, 1997). Such negative feelings define a negative user experience. A positive user experience is described when the user feels happy, interested, amused and pleased during their interaction with a product (Rogers *et al*., 2011).

Figure 3.2 shows some of the related words postulated by Harrison (2008), and used to describe user experience.
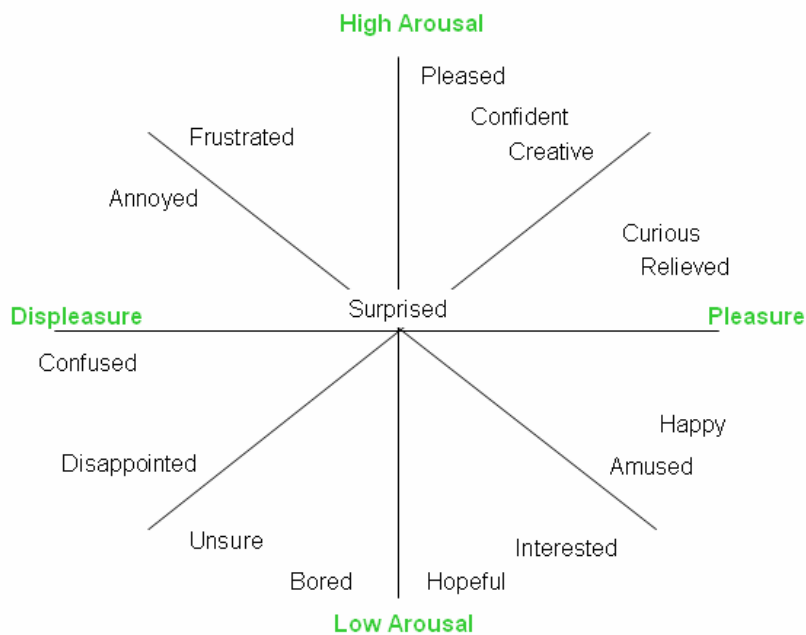
Figure 3.2: Words describing user experience (Harrison, 2008)

Harrison (2008) describes user experience based on the levels of pleasure / displeasure and degree of user excitement resulting from the interaction with a product. The higher the excitement and more pleased the user is, the greater the user experience. On the opposite axis is a negative user experience, which follows when a user is displeased and experience low excitement from interaction with a product.

Roto (2006) describes user experience based on the level to which the expectations of the users are satisfied. The description is presented diagrammatically in Figure 3.3.

+ Expectations exceeded:
Positive user experience

0 Expectations met:
 Acceptable, Neutral user
experience

- Expectations not met:
  Negative user experience
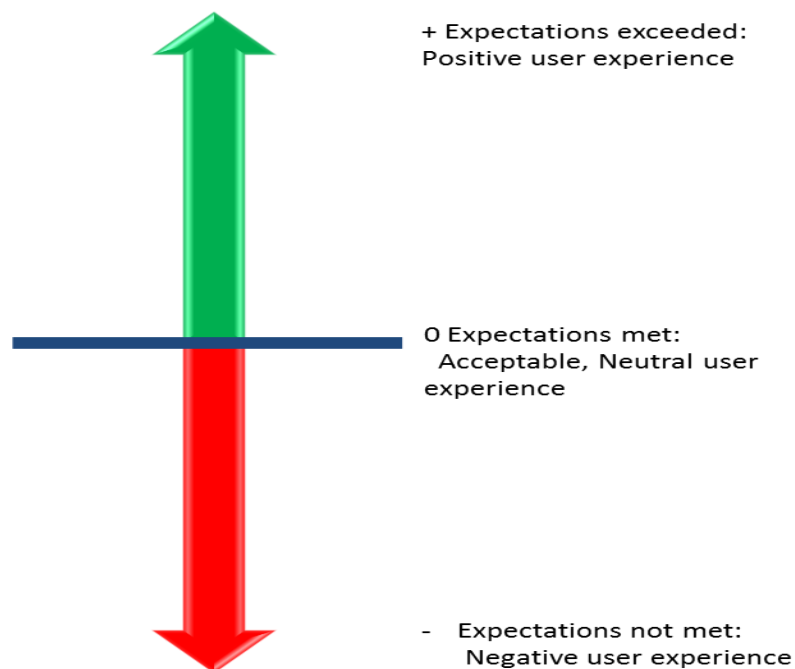
Figure 3.3: User experience based on expectations (Roto, 2007)

Every user has some expectations before using a product. When the user expectations are exceeded from their interaction, it results in a positive user experience. A neutral user experience follows when the expectations are met; otherwise failure to meet the expectations of the user results in a negative user experience.

Combining the above descriptions, user experience is described as follows for the purposes of this study:

> *A function of the magnitude of the extent to which the expectations of the user are satisfied and the degree of emotional excitement of the user that results from interaction or intent to interact with a product.*

The greater the degree to which the expectations of the user are met, and the greater the level of user excitement, the more positive the user experience. A product that fails to excite its users and meet their expectations gives a negative user experience. The words discussed above are used to describe user experience. However: *what is user experience?*

Several authors came up with differing definitions for user experience (allaboutux.org). Hess (2009) attempted to define user experience by eliminating what it is not. Such an approach justifies the complexity of understanding user experience. Van Greunen *et al.* (2010) and Hess (2009) agree in clarifying that user experience is not restricted to human-computer interactions but relates to the quality of a user's interactions with any artifact, including household utensils, business services, utility tools and software designs. There exists a variety of perspectives in defining user experience, which is mainly attributed to its multidimensional nature (Forlizzi and Battarbee, 2004; Law *et al.*, 2009).

To begin with, Roto (2007) distinguishes user experience from experience. She mentions the following distinguishing facets between the two:

➢ User experience involves a system, artifact or service while an experience does not require any product. A walk admiring nature is an experience, but not user experience.

➢ There must be some interaction or anticipated interaction between the product and user for user experience to be created. On the contrary, an experience does not involve any interaction. Seeing and smelling a product result in experiences, but not in user experience.

A definition of user experience should therefore reflect a user's interaction or intent to interact with a product. Also, the interaction should happen in a specific context with the user having the objective of accomplishing a specific task (Roto, 2007).

Table 3.1 shows an analysis of a sample of existing definitions of user experience.

Table 3.1: Definitions of user experience

Author	Definition	Comment
ISO (2010)	A person's perceptions and responses that result from the use or anticipated use of a product, system or service.	This definition does not mention context of use, and the specific task of the user.
Hassenzahl andTractinsky (2006)	A consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organizational/social setting, meaningfulness of the activity, voluntariness of use, etc.).	This definition lacks in specifying different phases of user experience.
Harrison (2008)	The feelings of the user resulting from anticipated, momentary, summative and reflective interaction with an artifact in a specific context.	This definition left out specifying that user experience task dependent.
Sutcliffe (2010)	Users' judgment of product quality arising from their experience of interaction, and the product qualities which engender effective use and pleasure.	This definition is inadequate because it does not consider the context of use, phases of user experience and the specific tasks of the users.
Garrett	User experience is not about the inner workings of a product or service. User experience is about how it works on the outside, where a person comes into contact with it.	The definition leaves out the context of use, tasks of the user and the phases of user experience.

This analysis of the selected definitions highlighted some of the inadequacies of the existing definitions. The following definition of user experience is proposed for this study:

The subjective response of a user that results from his / her expectations before interacting with a product, during interaction and after interacting with a product to achieve a specific goal in a specific context.

The proposed definition of user experience reflects that user experience consists of anticipated experience, a momentary snapshot during interaction, episodic user experience and post-usage user experience. Such an approach implies that user experience can be studied over a period of time as users respond to interaction. The present takes the stance that user experience is not just instantaneous feelings that come and vanish, but that it goes through a series of developments over time. The purpose of this study is therefore to develop a model that is aimed at managing and sustaining a long-term positive user experience. The importance of user experience is discussed next.

3.3.   USER EXPERIENCE -WHY THE FUSS?

The acceptance, usage and adoption of a product go beyond its pragmatic "do-goals" capabilities. It encompasses the hedonic "be-goals" attributes of the product (Hassenzahl, 2007). Thus, the functional features of a product should be supported by a usable and aesthetically

pleasing user interface that is appealing in terms of positive user experience as well as emotional attachment.

The importance of designing for positive user experience can be viewed from an organizational perspective as well as from the perspectives of the users. Figure 3.4 illustrates the value of great user experience from the perspective of the organization (in blue), and from the perspective of the user (in orange).
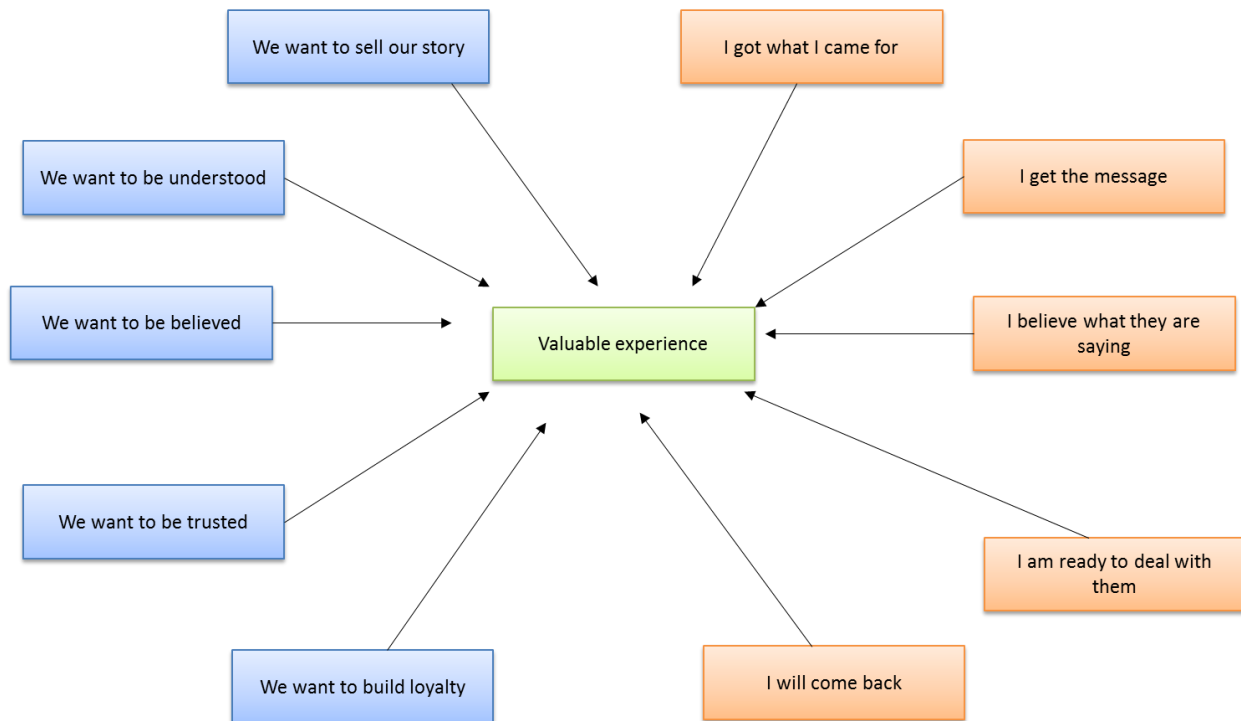
Figure 3.4: Valuable user experience (Reiss, 2013)

Designing products that are appealing for a good user experience ensures that the organization gains a competitive advantage over its rivals. Their product is best understood by its users. A product with good user experience instills trust, belief and loyalty to the brand. From the user's perspective, a good user experience captivates the users and attaches them to use the product. The end user gauges the usefulness of any interactive product, based on its user interface. Good user interface design enables ease of task completion and user satisfaction (Mashapa & van Greunen, 2010). Thus, a positive user experience is important in promoting product acceptance and in building a base of loyal and satisfied users.

In managing user experience, the user experience practitioners and product developers need to know the factors that influence user experience, the phases users undergo in developing user experience and the current (as-is) level of user experience of the people using their products. Such an understanding helps to manage the user experience and the process of designing products for improved user experience. The purpose of this study is to develop a model for managing and cultivating a sustainable long-term positive user experience. In order to achieve such, one has to look at the elements of user experience, the phases of user experience and the factors that influence user experience. The elements of user experience are discussed next.

3.4. ELEMENTS OF USER EXPERIENCE

The purpose of this chapter is to identify the factors that influence user experience. It is important to understand the elements that form the building blocks of user experience, in order to be able to identify the factors that influence user experience. An understanding of the building blocks of user experience is of importance in managing and designing products to improve the user experience (Roto, 2007). A synthesis of the definitions of user experience, as discussed previously, determines the following to be elements of user experience;

- ➢ User;
- ➢ System / product;
- ➢ Context of use; and
- ➢ The task.

Many authors have highlighted the elements of user experience to be the user, system / product and context of use (Forlizzi and Ford, 2000; Arhippainen, 2009; Roto, 2007). However, this study proposes a fourth element of user experience, namely "the task".

The relationship between the user, system / product and context is presented in the following figures, as postulated by the various authors.
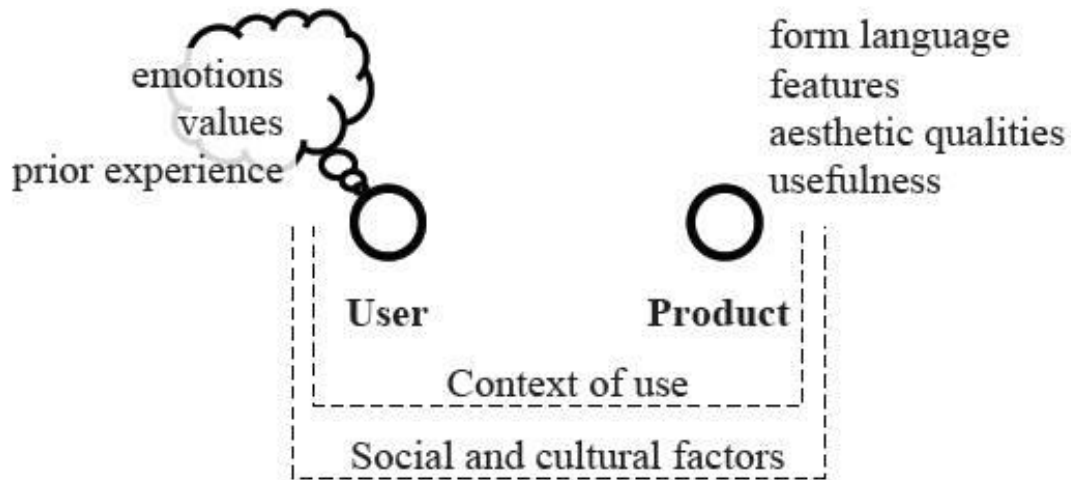
Figure 3.5: Elements of experience (Forlizzi and Ford, 2000).

The view of Forlizzi and Ford (2000) is outlined in Figure 3.5. This view highlights that the elements of user experience extend beyond the user (emotions, prior experiences and expectations) and the product (its look and feel). It rather encapsulates other variables outside the actual interaction between the product and user. Such elements influence the user experience. The external use scenario is defined as the context of use. The context of use consists of the social and cultural factors. Hence, design for user experience requires a consideration of these elements.

Figure 3.6 shows the architecture of a great customer experience, as suggested by Hess (2009).
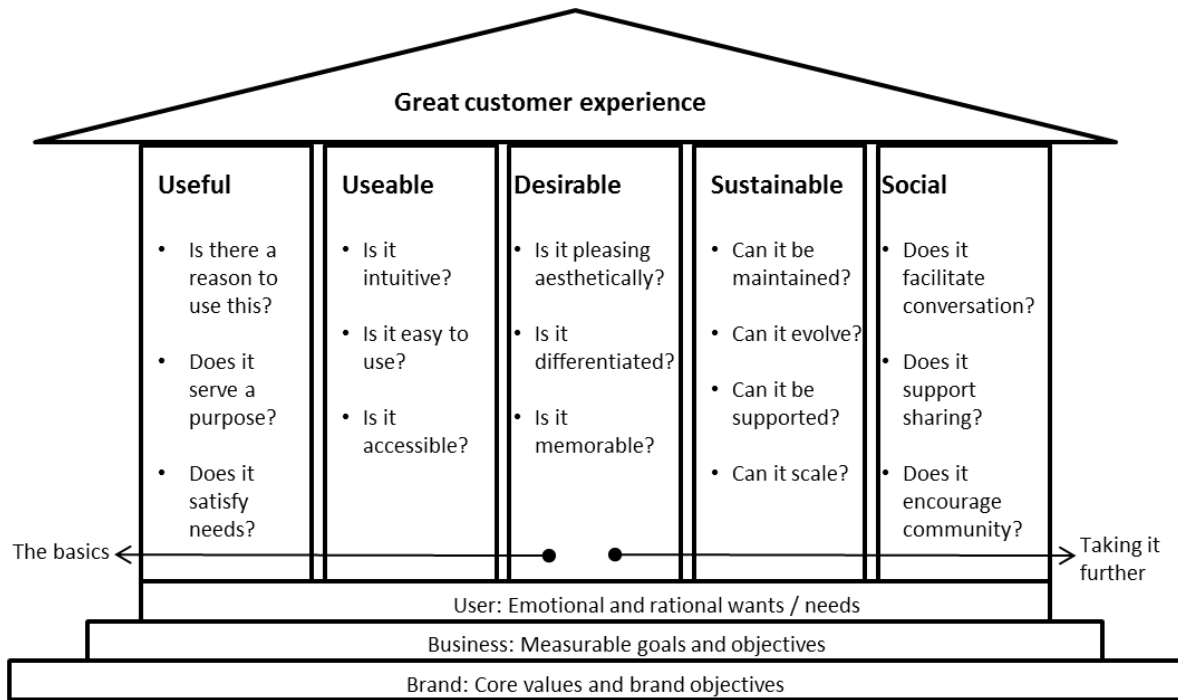
Figure 3.6: Customer experience building blocks (Hess, 2009)

As shown in Figure 3.6, Hess (2009) suggests that a great customer experience has its foundation in the values of the brand, the business objectives and the user's emotions and requirements. Aligning this with the definition of user experience, great user experience is established by anchoring it to the product's purpose of use, the context of use and the expectations and requirements of the users.

Arhippainen (2009) explores the user, product and context in the Usability and User Experience Framework (U^{2}E-Frame) depicted in Figure 3.7.
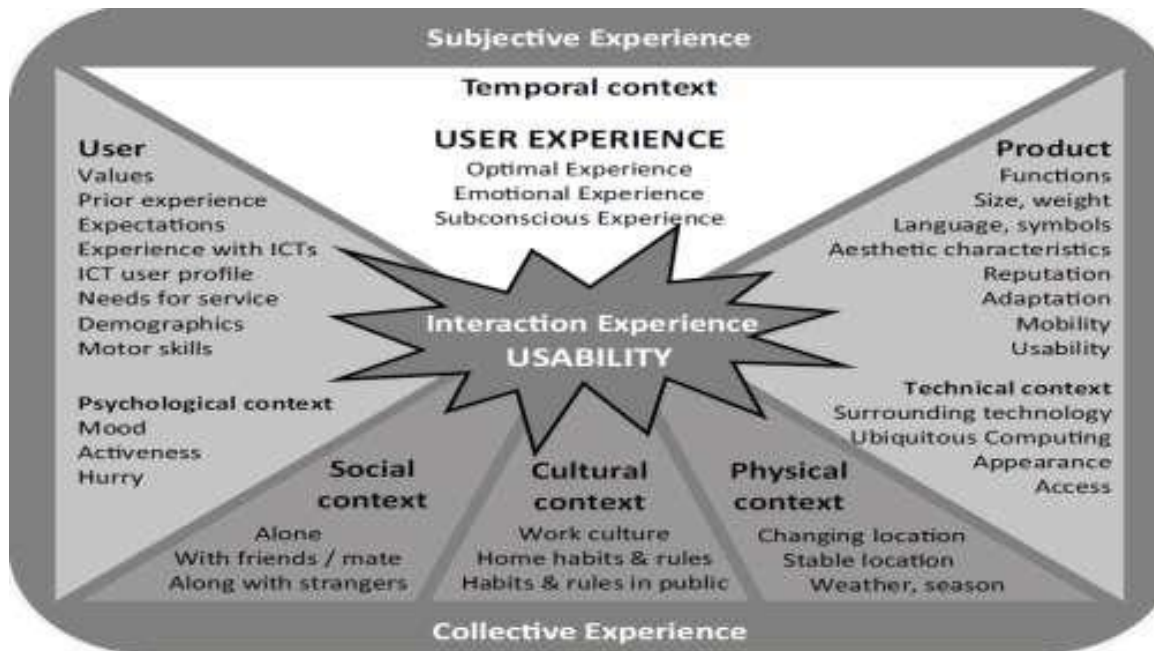
Figure 3.7: Usability and User Experience Framework (U2E-Frame) (Arhippainen, 2009)

The U^{2}E-Frame puts forward that interaction experience and usability are influenced by the elements of the user, product and context. The attributes of each of the elements are shown in Figure 3.7.

In Figure 3.8, Roto (2006) postulates that the elements of user experience consist of the context, the system and the characteristics of the user.
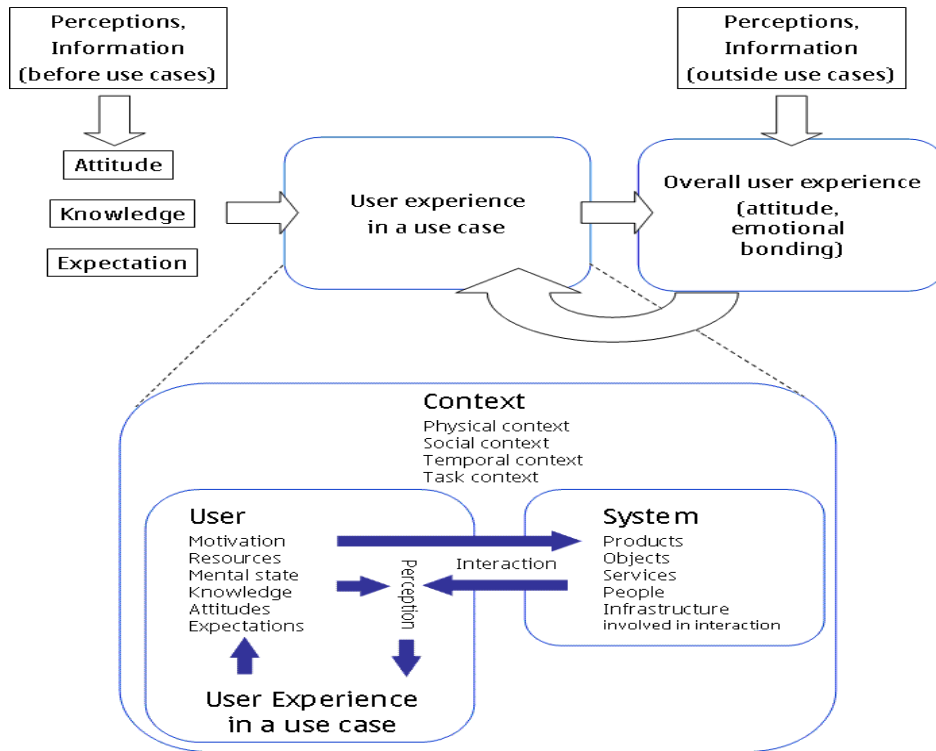
Figure 3.8: User experience building blocks (Roto, 2007)

Roto (2007) explored the internal state of the user before, during and after interaction with the system as compound elements of the overall user experience. The perceptions that a user will have before interacting with the product, the emotions of the user as well as the context in which the product is used, all influence the user experience.

An understanding of the elements of user experience helps to establish how to manage user experience. An exploration of the characteristics of each of the identified elements of user experience follows next.

3.4.1. User

Users are the central point of user experience. Without the user, there will not be anything to write or say about user experience. User experience is a result of the subjective intrinsic feelings of the user as stated in the definition. Thus, the overall user experience is a summative reflection of the user's anticipatory, momentary, episodic and long-term user experiences (Hassenzahl & Tractinsky, 2006).

Users have emotional and rational needs. It is important that such needs and wants of the users should be addressed when designing for user experience (Hess, 2009). The values, prior experience, demographics, skills in using the product, goals and psychological state of the user all influence the user experience. It is therefore vital to pay attention to the profiles and characteristics of the users and potential users of the products in order to manage the user experience.

Hiltunen, Laukka and Luomala (2002) presented a user experience life cycle to illustrate how the expectations of the users form user experience. The life cycle is illustrated in Figure 3.9.
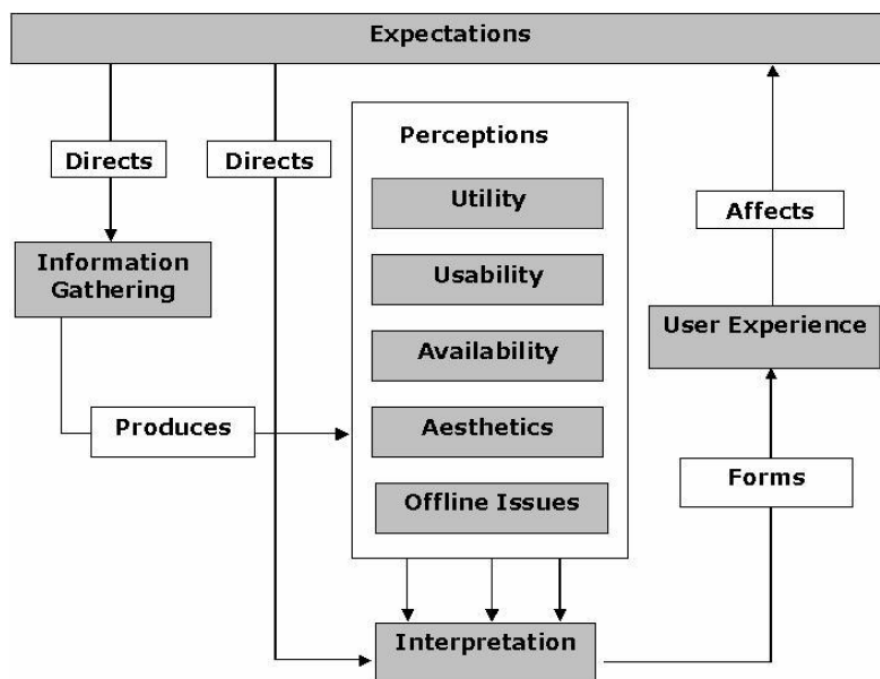
Figure 3.9: User experience life cycle (Hiltunen *et al*., 2002)

The proposed user experience life cycle depicts that the expectations of the users direct the perceptions, interpretation and interactions in information gathering. A user judges his or her interaction based on the emotional excitement and pleasure by means of which their expectations are satisfied. The subjective feelings of the user form the user experience. The resulting user experience forms the modified or new user experience, and this affects the user's anticipated user experience / expectations.

Thus, the user is a significant element of user experience. Humans are rational and reasonable beings who develop a variety of subjective emotions when exposed to different features of a

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product. Any aspect of the user interface that influences the expectations of the user, as well as the feelings of the user during and after interaction with the product, consequently determines the user experience. The purpose of this study is to develop a model that is aimed at delivering products that do not negatively impact on the expectations and interaction of the user. The model is therefore aimed at promoting a sustainable long-term positive user experience.

3.4.2. System / product

In differentiating user experience from experience, Roto (2006) mentions that user experience involves a user interacting with a system / artifact, while an experience does not require the interaction. Thus, user experience will not be complete without the product / system for the user to interact with. There are a variety of features of a product that influences the user experience. It is part of the goal of this study to identify the factors that influence the user experience.

Morville (2004) proposed a "user experience honeycomb" that identifies seven facets that a product must have in order to provide a positive user experience. The user experience honeycomb serves as design direction for developing usable products that appeal for positive user experience. The facets of user experience are shown in Figure 3.10.

Figure 3.10: The user experience honeycomb (Morville, 2004)

Morville (2004), in reference to web design, cites that a product should have the following characteristics in order to provide a positive user experience:

➢ The product must be useful in supporting user intentions;

➢ The system must be usable for a user to complete a specified task;

➢ The product must be valuable by providing intended benefits to the user;

➢ The system must provide easy access to find information (findable);

➢ The system must be aesthetically pleasing to interact with (desirable);

➢ The system must have accessibility options to accommodate users with disabilities; and

➢ The system must entrust confidence to the users (credible).

Hess (2009) suggests that designers who aim to develop their products for great user experience must make their products useful, usable, desirable, sustainable and able to facilitate social collaboration (c.f. Figure 3.6).

A positive customer experience builds on a product that satisfies the needs of the users, the context and the core values of the product (Hess, 2009). Hess' (2009) model goes beyond the aspects of physical design of the product and also ties it to human cognitive considerations.

Maassen (2008) highlights the attributes of a product that yields a positive user experience. The author cites several elements that have to be integrated in the design process for a positive user experience. Figure 3.11 illustrates the elements.
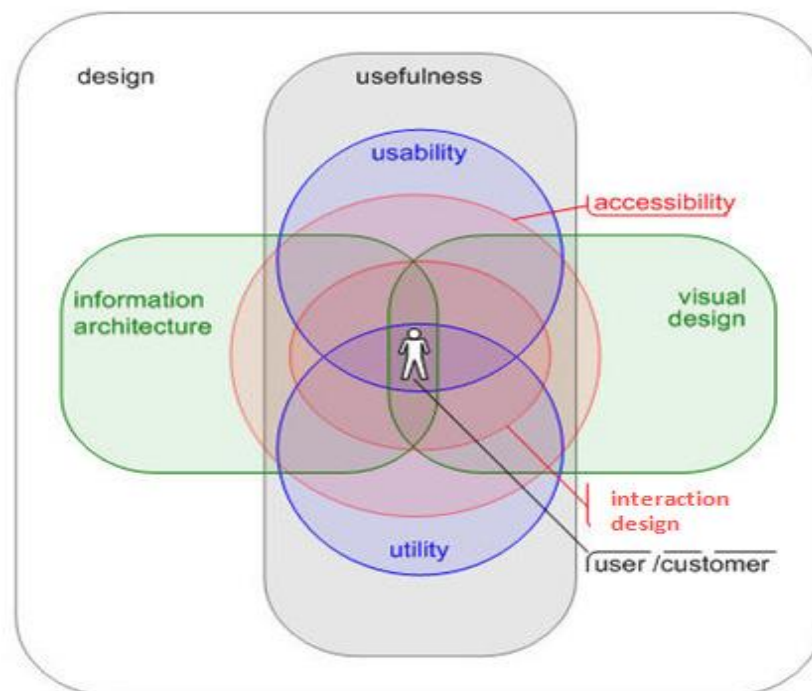
Figure 3.11 Elements of user experience design (Maassen, 2008)

A good product is one that is designed by placing the user requirements and cognitive attributes of the users at the core of the design process. Designing a product with attributes such as useful, understandable, usable and visual aesthetics are important in order to influence the achievement of a positive user experience.

This argument on product / system as an element of user experience helps to identify what to design and how to design products that meet the needs and emotional expectations of the user. The model for managing user experience to be proposed in this study considers the elements that are required for designing products for positive user experience. The requirements serve as the components of the model for managing user experience.

3.4.3. Context

The third element of user experience is the *context* of product use. The context refers to time, location and user disposition (Sward & Macarthur, 2007). According to Hess (2009), the context is not restricted to the physical and technological aspects; it also includes the values and culture of an individual or organization. Arhippainen's U^{2}E-Frame (2009) cites the context of use to be defined by the following aspects:

- ➢ The user's psychological state:
- ➢ Social environment of product use;
- ➢ Cultural context;
- ➢ Physical context; and
- ➢ Technical context of the product.

Although the user interacts with the product and not the context, the context of use is an important factor that influences the user experience. The psychological state of the user (mood, predispositions) determines the anticipated user experience as well as the user experience during interaction with a product. Cultural aspects such as organizational setup and personal habits also impact on the user experience. The social computing environment affects the user experience and the way in which people interact with a given system (Heim, 2007). Some situations require privacy, which implies that the users will not be comfortable in a public context. With the inception of social networking sites, the use of certain products gives discomfort to the users as a result of fear from invasion by strangers, thus resulting in a negative user experience.

The physical context (location, weather, etc.) has an impact on the momentary user experience. The technical context of the product (its appearance, scalability with other applications and platform of operation) contributes significantly to the user experience. A product that fits in with the context to which users are accustomed, promotes a good user experience.

The definition of user experience that has been proposed in this study indicates that user experience consists of the subjective feelings of a user, a product, a specific context and a specific task. The user, product and context are the most common elements of user experience

among various authors, as discussed. This study proposes a fourth element of user experience, namely the "task".

3.4.4. Task

It has been stated in defining user experience that it is formed from the subjective feeling of a user as a result of interaction with a product in order to accomplish a specific task in a specific context. Thus, whenever users interact with a product, there is a specific objective that they intend to accomplish. The intentions of a user may range from completing a specific task to gaining some level of satisfaction from interacting with the product (for example, in playing computer games). The intention of the user forms the basis of expectation for their interaction with the system. It is essential to take into account the specifics of the intentions of the users in order to design for positive user experience. If the tasks of the user are misunderstood or considered out of context, the designed system may end up being inefficient, inappropriate and failing to provide a positive user experience.

An analysis of the tasks of a user when interacting with a product can best be understood using the Execution / Evaluation Action Cycle (EEAC) Framework (Norman , 1990). Figure 3.12 depicts the EEAC Framework.
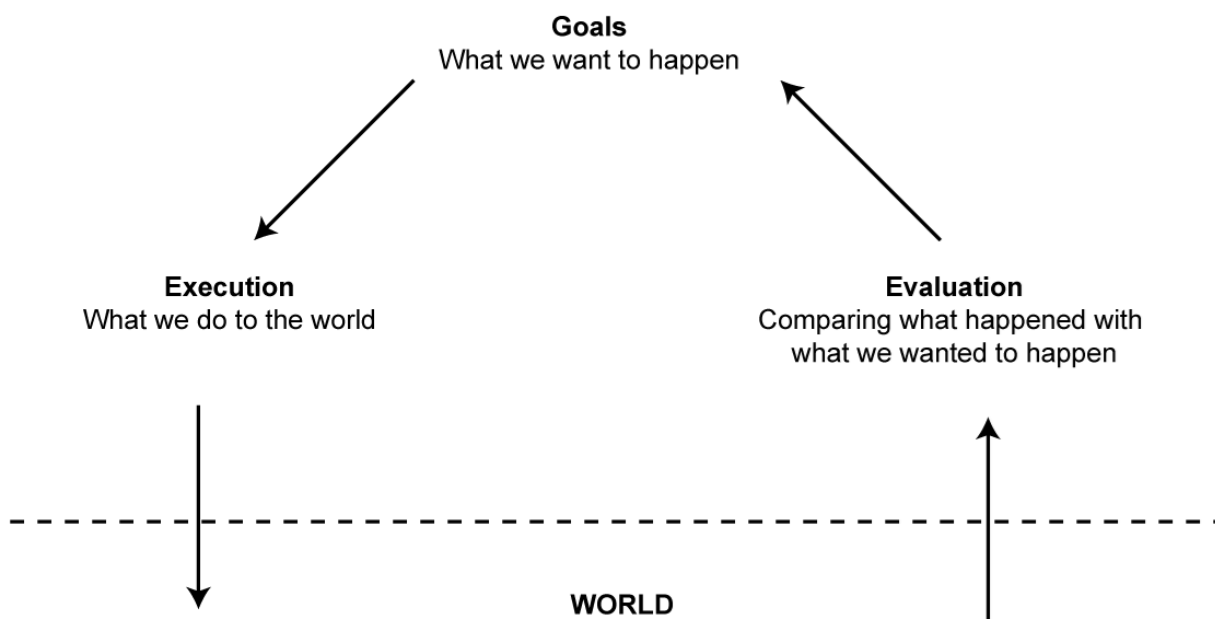
Figure 3.12: Execution Evaluation Action Cycle (Norman, 1990)

The EEAC framework describes how users interact with computers. Understanding the goals of the users helps designers to structure the design process and to identify potential problem areas in the design of products (Heim, 2007). The EEAC framework describes user interaction to consist of user *goal* articulation, *execution* and *evaluation* of the observations against the intended goal. When users interact with a product, they have a goal of what they expect to accomplish. The expectation may be to complete a task, to be efficient in completing a task or to derive some level of satisfaction from the interaction. Although the user has not interacted with the product at this point, they have some expected / anticipated user experience. During the execution, the user interacts with the product. Thus, execution is related to the actual usage of the product. The overall user experience is summed when the user evaluates the anticipated user experience against the user experience during product usage.

It is important to understand the goals and tasks of the user when managing user experience. Users often have habitual tasks when they use a product, whereas other tasks are occasional (Siegel, Sorin, Thompson, & Dray, 2013). An example of a habitual task is when a user always plays a game on their mobile phone, while an occasional task may be to use the calendar. The habitual tasks should be maintained and improved in a manner that does not disturb the users and their prior mental model, and occasional tasks should not be hidden from the users when they need them. The tasks of the users can also be mandatory or optional, as well as institutional or personal (Zhang, Chen, & Zou, 2006). In all cases, the product should be designed in a way that persuades the users to use the product. The product should be appealing to trust, and should be arousing positive emotions for the user when performing their tasks (WanNooraishyaWan & NazlenaMohamad, 2013).

The task that the user needs to accomplish is an important element of user experience that always has to be considered when investigating the factors that influence user experience. This helps to formulate a proper strategy for managing user experience.

Figure 3.13 represents the elements of user experience that have been proposed in this study.
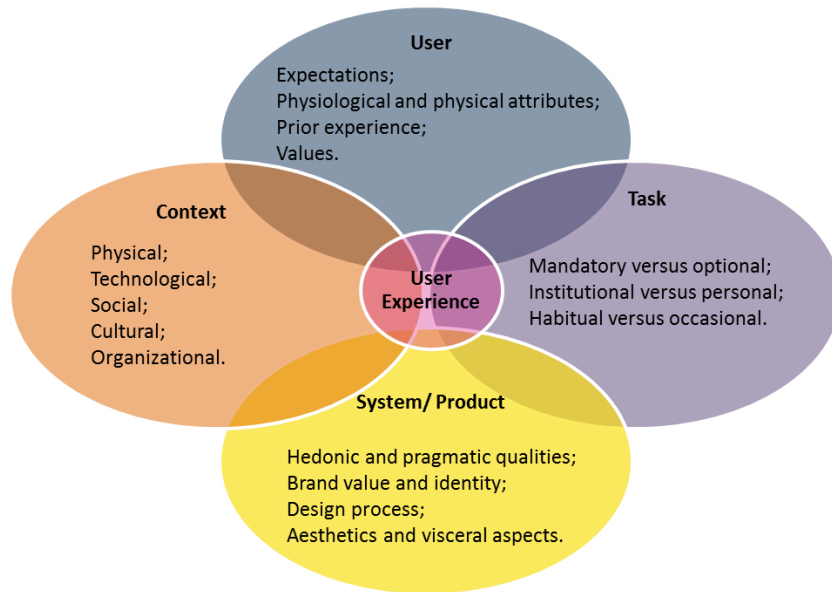
The elements of user experience proposed in this study are the users, product, context and tasks. There is a need to understand these elements, as they form the foundations of the factors that influence user experience. When users interact with a product, they always have a specific objective that they need to accomplish. The objective is attained by completing some task(s) while interacting with the product. This interaction happens in a specific context. Therefore, it is important that a product is developed to support accomplishment of the tasks of the user. The features of the product should suit its context of use, as well as the functional and psychosomatic requirement of the users. The design aspects of the product should match the expectations of the users in order to promote a sustainable long-term positive user experience.

These elements influence user experience at various phases in the user experience development process. The phases of user experience are discussed in section 3.5.

3.5. PHASES OF USER EXPERIENCE

Figure 3.14 provides a diagrammatic illustration that depicts the phases of user experience in line with the definition of user experience adopted in this study.
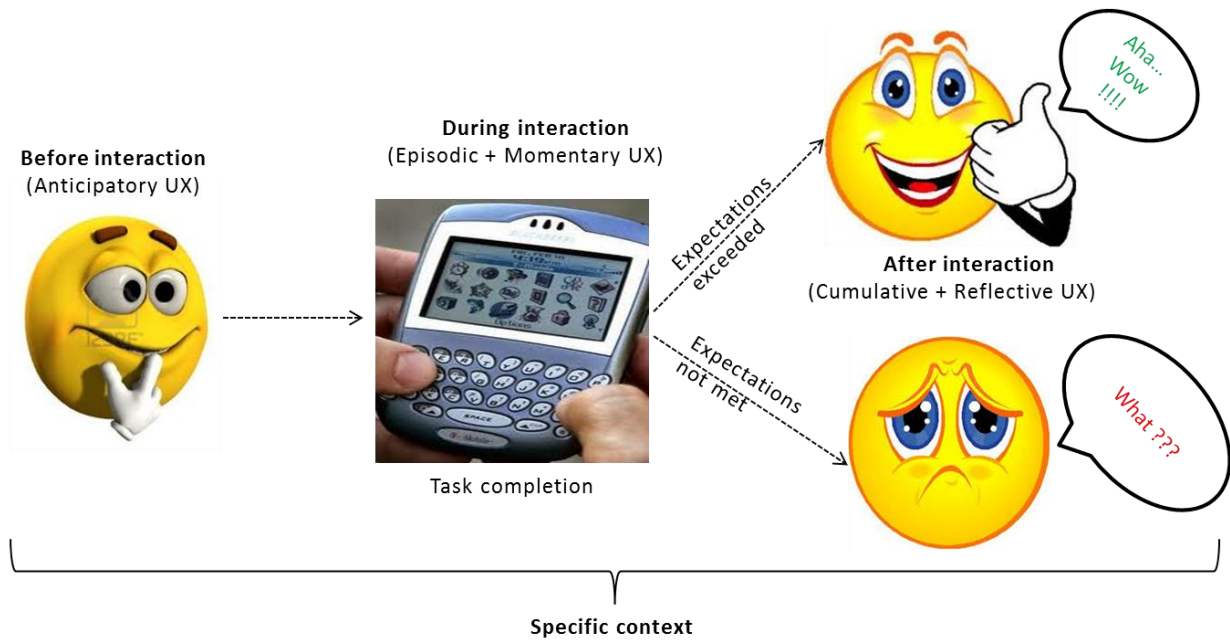
Figure 3.14: Phases of user experience

Figure 3.14 aims to guide toward defining the phases that people undergo in developing user experience. The development involves the phase when the user has not interacted with the product, through to during and after interaction with the product. In support of this, Roto, Law, Vermeeren and Hoonhout (2011) posit that user experience goes beyond the experience of the user during interaction with the product. User experience rather stretches and evolves over time spans as illustrated in Figure 3.15.
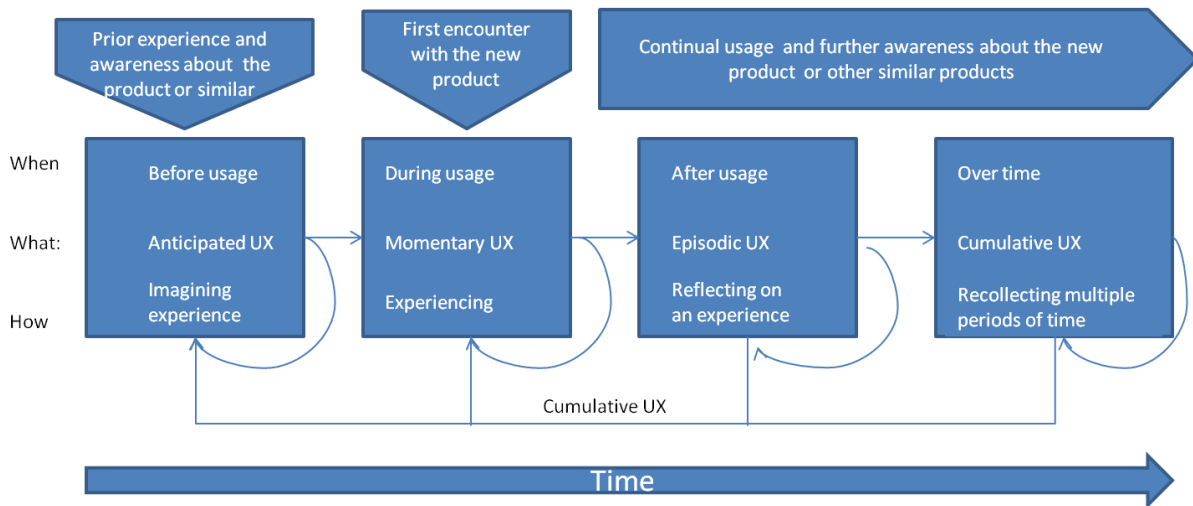
Figure 3.15: Spans of user experience over time (Adapted from Roto *et al.*, 2011)

3.5.1. Anticipatory user experience

As shown in the Figures 3.14 and 3.15, user experience may not be regarded as being restricted to the user's feelings during interaction with the product. Whether it is the first or repeated interaction with a product, a user always starts with some expectation of their interaction with the product (*anticipated user experience*). The expectations may have been influenced by the visceral and aesthetic appearance of the product, its brand image or the associated publicity. Other contributing factors to the expectations may come from the user's previous experience with similar products, and reviews from friends who may have used the same product. The anticipated opinions of the user before they interact with a product are defined as the expected / *anticipated user experience* (Roto, 2007; Obrist, Meschtscherjakov, & Tscheligi, 2010). The anticipated user experience invites a user to interact with a product, where after the user is motivated to use the product. Elements such as the context also contribute to the formation of expectations. For example, certain products have some values attached that are associated with a certain level of affluence in a society. Hence, when a user sees the product, they set a level of experience that they would expect from interaction with the product.

3.5.2. Momentary user experience

When the user gets to interact with the product in actual usage, they experience the reality of its behaviour. User experience during actual interaction and product use is directed by the expectations of the user before interaction (Hiltunen *et al*. 2002). At this point, the feelings of the user may change at specific instances of action, as the user interacts with the product based on their expectations. This experience that results from the instantaneous feelings of the user is called *momentary user experience*.

3.5.3. Episodic user experience

Another phase of experience during interaction is *episodic user experience*. The episodic user experience is when the user reflects on their overall feeling after completing a specific task or interaction (Roto *et al*., 2011). Most authors have defined the user experience during product use to be the actual user experience (Hassenzahl & Tractinsky, 2006; Hassenzahl*,* 2007; Desmet and Hekkert, 2007). Aspects like the psychological emotions of the user, the level of complexity of a

task and the social and technological environment influence the user experience during the momentary and episodic phases of user experience.

3.5.4. Cumulative and Reflective user experience

After having used the product for a long time, the user consolidates the overall experiences into long-term *cumulative user experience* and *reflective user experience*. Cumulative user experience is a summation of the feelings of the user before, during and after the user interacted with the product. Reflective user experience is a long-term user experience that involves users comparing their experience with other similar products. As users continuously interact with the product, they discover new features that contribute to their experience with the product. If the product provides an interaction that comprehends the expectation and mental model of the user, the result is a positive user experience. A negative user experience results when the expectations of the user are not met. A product that provides a positive user experience inclines the user to build a stronger loyalty towards the product (Kiewe, 2006). The long-term cumulative user experience contributes to product brand loyalty and self-identity for the user that possesses or uses a specific product (Escalas & Bettman, 2003).

Designing a product that fits the experience and expectations of the users promotes product acceptance. A product that fails to meet user expectations causes "product rage" (Kiewe 2006). Product rage refers to the situation where the users become physically violent or verbally abusive of a product because of their frustration with the product. Most of the user frustrations result from poor user interface design (Kiewe 2006). Designing a product that offers a positive user experience to its users requires that the various phases of user experience be considered.

The phases of user experience identified above provide guidance on areas of prioritization during the process of designing for user experience.

An understanding of the elements of user experience, together with the phases of user experience, is important in determining the factors that influence the experience of the users. The user, tasks, product and context of product use have been identified as the prevalent elements of user experience. Determining the phases of user experience of the target users is important in managing user experience and structuring the process of designing for user experience.

3.6. DESIGNING PRODUCTS FOR USER EXPERIENCE

There exist different ideologies on whether or not user experience can be designed. Some authors posit that user experience can be designed (Ballard, 2007; Anderson, McRee, Wilson, and The Effective UI Team, 2010; Hess, 2009) On the contrary, another school of thought argues that user experience may not be designed. They advocate that the designers have to design *for* user experience (Rogers *et al*., 2011; Fredheim, 2011). The difference between designing the user experience and designing *for* user experience is difficult to separate but important to comprehend (Fredheim 2011).

Considering the characteristics of user experience defined earlier, and the elements of user experience discussed in section 3.3, this study takes the stance that user experience cannot be designed. Instead, designers can only design products *for* user experience. User experience is described by subjective terms such as enjoyable, entertaining, provocative, fun, boring and annoying (Harrison 2008; Rogers *et al*., 2011). It is vital to note that one cannot directly design such inherent subjective user emotions, but can only design the product to have the features that can evoke such emotions with the user (Rogers *et al*., 2011). Hence, it follows that user experience cannot be designed, because user experience is not only about the product but also the user and the context of product use. This is because it is practically impossible to design either the user or the context in which a product can be used (Fredheim, 2011). Thus, product designers can only design a product to fit the users and the context. Only then will a product appeal to a positive user experience.

Designing for user experience goes beyond satisfying the functionality and ease of use of a product. The process of designing for user experience transcends to the aesthetic and hedonic qualities of the product, as such evoking and stimulating positive emotions of the user that interacts with the product. Therefore, designing for user experience means the designer has to create a physiological and psychological fit between the user interacting with the product and the context within which the product is used.

Designing the user experience becomes unrealistic, because no designer can design the user or the context of product use (Fredheim, 2011). Users are diverse with varying prior experiences, goals and expectations from the product; hence no one size fit all user experiences. The

subjective and evolving nature of user experience makes it hardly achievable to design the user experience, but rather asks for the design of products with enchanting features that enhance a positive user experience.

An understanding that products can be designed to provide a user experience, and that this is contrary to the notion of designing the user experience, is important in this study. This understanding helps in setting the scope of the proposed model for managing user experience. The model serves to guide how to manage the user experience by promoting a sustainable long-term positive user experience, and not by designing the user experience. Designing for user experience and hence, managing the user experience requires one to know the factors that influence user experience.

The purpose of this chapter is to identify the factors that influence user experience.

3.7.   FACTORS THAT INFLUENCE USER EXPERIENCE

A definition of user experience has been established (c.f. section 3.2), followed by a discussion on the importance of user experience in section 3.3. The elements of user experience have been identified (c.f. section 3.4) and the phases of user experience were discussed in section 3. The purpose of this section is to consolidate the components of user experience (that were identified from the definition of user experience) together with the phases and elements of user experience, into factors that influence user experience. Once these factors have been identified, it will be possible to work towards a criterion for managing user experience in order to achieve a sustainable positive long-term user experience.

At the time of writing this study there is no evidence of the existence of holistic domain independent criteria for determining the factors that influence user experience. Most of the studies on the factors that influence user experience are domain specific, for example business process management tools (Van Greunen *et al*., 2010), accounting tools (Mashapa & Van Greunen, 2010) and computer games (Bernhaupt, 2011). This study proposes a holistic approach to the factors that influence user experience. The wholeness of this approach is that it provides a generic way of determining the user experience, which is not dependent on the domain. This is achieved by investigating the factors that influence user experience based on the elements of user experience, phases of user experience and the period of interaction.

User experience has been defined to consist of a series of phases over time spans, which are anticipatory, momentary, episodic and cumulative (c.f. section 3.5). Each of the phases has specific factors that influence the user experience. Therefore, it is important to identify the factors that influence user experience with respect to the phases of user experience (Roto *et al.* 2011). A variety of factors may influence a person's user experience with a product. These factors can be determined based on the elements of user experience and the process of designing for user experience. Determining the factors that impact on user experience is essential to establish the cause of a resultant user experience, and to determine why a user would have a particular user experience (Roto, 2011). An understanding of the situation in which a person felt a particular user experience and the cause of such user experience is important in managing and improving user experience. The factors that influence user experience are presented in the form of a User Experience Factor Diagram (UXFD), to be discussed next.

3.7.1. User Experience Factor Diagram (UXFD)

Figure 3.16 illustrates a consolidation of factors that influence the user experience. These factors were identified from a synthesis of the definition of user experience, as well as the elements and phases of user experience.

Phase of UX	Period of interaction	Factor impacting on UX

Anticipatory UX — UX before usage

User : Level of user awareness about the product, prior experience, user's perceptions, attitude, knowledge about the product, user needs.

Product: Brand, publicity, visceral features.

Context: Social, physical and technological settings.

Momentary UX / **Episodic UX** — UX during usage (Modifies / Directs / Influences / Affects)

Product: Hedonic and pragmatic qualities (usefulness, usability).

User: Psychological and physiological state.

Context: Social, physical and technological settings.

Tasks: Habitual, occasional, mandatory, optional, personal, institutional.

Cumulative UX / **Reflective UX** — Long term UX

Product: Design process, brand image, help and support, feature iterations .

User: Self fulfilment, social and cultural values.

Context: Physical environment.

Tasks: Habitual, occasional, mandatory, optional, personal, institutional.

Figure 3.16: User Experience Factor Diagram (UXFD).

The UXFD relates the phases of user experience to the respective periods of interaction and the factors that influence user experience at that particular phase of user experience. The dotted lines show the relationships among the periods of interaction and how they influence each other.

Anticipatory user experience is influenced by the factors that relate to user experience before the user interacts with the product. Such factors include the visceral aspects of the product. The outward appearance of a product raises or lowers the expectations of the user. The user's prior knowledge and level of awareness about the product, perceptions of the user and present attitude form the expectations of the user. In certain contexts the physical, social and technological settings create impressions that influence the expectations of the users before they interact with the product. Such expectations direct the user experience during usage and ultimately affect the long-term user experience.

The momentary and episodic user experience arises as a result of the feelings of the user during use of or interaction with the product. The hedonic and pragmatic qualities of the product directly influence the feelings of the user at this stage. Users are pleased with a product that is effective, efficient, safe and usable. While a product may have all the required characteristics, aspects of the user's physiological and psychological state also have an impact on the user experience. Furthermore the social, physical and technological environment may cause users to enjoy their interaction with a product at one setting while they may have a negative user experience when the context varies. The nature of the task that the user is performing also influences the momentary user experience. If a task is complex and requires a large cognitive load, it is likely to result in a negative user experience. A task that is easy for the users to perform, results in a positive user experience. User experience during usage becomes a user's prior experience on their next interaction with the product, thus modifying the anticipatory user experience. User experience during usage affects the long-term user experience. Users will form loyalty with a product that gives them a satisfactory user experience, while one that is frustrating to the users is likely to suffer low acceptance and low usage or would out-rightly be rejected.

Long-term user experience consists of cumulative user experience and reflective user experience. The factors that influence long-term user experience include the design process of the product. A product that is designed with a focus on the needs, expectations and requirements of the users promotes a bond of user loyalty to the product. Involvement of the users at every stage of product development and implementation instills a sense of belonging to the product, thereby improving the user experience. The need for user self-fulfillment and sense of communicating self-status and image by possession or use of the product is another factor that influences the long-term user experience. Habitual user tasks that are pleasant to perform also contribute to a positive long-term user experience. The latter affects the user experience before and during user interaction with the product.

The UXFD served the purpose of outlining the factors that influence user experience. Such factors are determined by the phase of user experience, the period of interaction and the attributes of the elements of user experience namely the user, context, product and nature of the task. It is important to understand the factors that influence user experience in order to be able to manage user experience. The proposed UXFD can work as a template that guides the

identification of the factors that influence user experience. Managing the factors that influence user experience is important in improving the user experience of the product.

3.8. SUMMARY

This chapter introduced the concepts of user experience. A definition of user experience was given together with the elements of user experience. A discussion on the phases of user experience was presented.

It has been identified in this chapter that limited knowledge exists on the generic factors that influence user experience. Most of the work has been to identify the factors that influence user experience in a specific domain. The inadequacy of knowledge regarding the generic factors that influence user experience makes it difficult to manage user experience. The User Experience Factor Diagram has been proposed as a domain-independent generic template that can be used to determine the factors that influence user experience. The UXFD consolidates the factors that influence user experience at specific phases of experience and periods of interaction.

Aspects of the user's physiological and psychological state, product design, process, nature of tasks and context in which the product is used have been identified as the factors that impact on user experience. Such factors have to be considered when managing user experience. This chapter highlighted that it is important to manage user experience in order to improve the overall user experience of interactive products. Currently, there is no available method for managing user experience.

It has been established in this chapter that a hype exists with respect to design of products with the intention of improving the user experience. There exist many methods for evaluating the user experience. Furthermore, there are several guidelines and principles aimed at guiding the design of products for positive user experience (Mendel, 2013; Anitha & Prabhu, 2012). It has also been discussed that a change in the user interface of an existing product or the introduction of a new product influences the user experience. However, there lacks criteria for managing this change in user experience.

This chapter therefore contributed a theoretical holistic foundation for managing user experience by identifying the factors that influence user experience. In addition to the UXFD, the user task has been added as a fourth element of user experience. It has been established in this chapter that management of user experience has to focus on the elements of user experience as well as on the phases thereof. The contribution described in this chapter is the User Experience Factor Diagram (UXFD). The UXFD serves as a template to be used by user experience practitioners in order to research and discover the factors that influence user experience.

This chapter therefore concludes that identification of the factors that influence user experience is the first step towards managing and ultimately improving user experience. User experience evolves over time; it is therefore important to manage the change in the user experience. The application of change management techniques to manage user experience is discussed in Chapter 4.

CHAPTER 4: MANAGING USER EXPERIENCE

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4.10. SUMMARY

4.0.   INTRODUCTION

It has been established in Chapter 3 that user experience varies with respect to time span, i.e. before interaction, during interaction and over a long period of user interaction with a product. The elements of user experience at each of the time spans of user experience were identified (c.f. Chapter 3, section 3.4). The same Chapter 3 (c.f. section 3.5) outlined the phases of user experience over time as people continue to use a product. Failure to manage the change in user experience has been mentioned as one of the factors that contribute to failure to design products for positive user experience (Sharp *et al*., 2007). The purpose of this chapter is therefore to propose requirements for managing user experience by referring to change management practices, but also to establish a theoretical basis that guides the answering of the secondary research question which state:

> *What are the requirements for managing user experience?*

The requirements for managing user experience are obtained from a synthesis of literature on managing organizational change and psychological change. In order to answer the stated question, the concept of technology as experience (McCarthy & Wright, 2007) is looked at, followed by a discussion of the evolutionary nature of user experience. The evolutionary nature of user experience raises the need to adopt change management techniques in order to manage the change in user experience. Thereafter, the importance of managing user experience is discussed. In order to determine the requirements for managing user experience, one has to start by defining change management. A definition of change management is followed by a discussion of existing models that are aimed at managing change. Thereafter, the identified change management models are analyzed. Finally, the requirements for managing and improving on user experience are proposed and presented in the form of a framework, the User Experience Management Requirements (UXMR) Framework.

4.1.   TECHNOLOGY AS EXPERIENCE

The concept of technology as experience brings about the psychological side of people as they interact with technologies. McCarthy and Wright (2007) posit that people do not just use technology, but that technology has become engraved in the daily lives of people. Technology must therefore not only satisfy the functional and usability qualities such being effective,

efficient and easy to learn, but importantly it must also be useful in the lives of the people using it. The process of people interacting with technology consists of intrinsic emotional, cognitive and sensual attributes that define how people feel about their interaction with technological artifacts. Such attributes influence the decision of people to both adopt and use the technology, or to abandon it.

There is a general trend of phases that people go through in the acceptance and adoption of technology. Individuals differ mainly in the amount of time that they spend on each phase and in terms of the amount of overlap that there is between the phases (Bridges-to-technology, 2006). The amount of effort and time needed for the individuals to adopt the products solely depends on the position of the person relative to the technology adoption model (Rogers, 1995; Moore, 1999). The technology adoption model describes people as being either innovators, early adopters, early majority, late majority or laggards. The user experiences of these people need to be monitored and managed accordingly so that no one is left out.

A discussion on the phases that people go through in adopting products follows (Bridges-to-technology, 2006).

4.1.1. Awareness

This initial phase is when the technology / product is being introduced to the people. The people need to be made aware of the technology. Awareness is twofold: people may be totally unaware of the existence of the product, or they may know that the product exists but may not be aware of the benefits of using such a product. Thus, awareness refers to the experience when people gain their first knowledge and possibly their first contact with the technology, or when the people get to know of the features, functionality and benefits of using the product.

Strategic marketing and campaign activities aimed at making the people aware of the product are important, as this phase is designed to influence people to develop a desire to learn more about the product. This involves that the marketing strategy needs to focus on creating awareness of the technology and generating enough interest for people to investigate further. The techniques for awareness creation also need to communicate the benefits of using the product.

In most cases, awareness is enough for innovators to make their decision to adopt. Early adopters and visionaries are able to quickly assess the benefits of the technology and decide whether they will benefit from it, in other words whether to accept it or not. However, most people take a slower route to adopt because they need to be sure that they will be able to learn to use the technology or capture its benefits. They are more cautious of any changes, or of the introduction of new technological products, and are skeptical and at times resistant to any changes.

For the early and late majorities, the goal of the awareness campaigns is to get their agreement to assess the possibility of using the technology. The goal of awareness for the people who are not quick to adopt the product is to do away with any possible pockets of resistance and to get them to defer their decision to reject the product until after they have assessed the product.

4.1.2. Assessment

As presented in Chapter 3, various factors influence user experience and contribute to the users' decision either to accept the product or not to use it. Thus, users always make an assessment based on the advantage for them of using the product. Hence, during the assessment phase users always seek to know "what's in it" for them to use the product. The factors determining this decision include the availability of the product, its accessibility, its cost, safety, perceived usefulness and usability. A product that satisfies these expectations of the users provides a positive user experience and is likely to be accepted.

Theories and models on technology acceptance help to determine the factors that users consider when choosing a product. The popular models are the Technology Acceptance Model (TAM) (Davis, 1989) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis , 2003). The Technology Acceptance Model suggests that when users are presented with a new technology, their attitude toward using it is based on how useful and easy to use they perceive the technology to be (Davis, 1989). The UTAUT puts forward performance expectancy, effort expectancy, social influence and facilitating conditions as the determinants for technology acceptance and usage. Performance expectancy and perceived usefulness harmoniously concur that users will most likely accept and use a product that they believe to be useful in accomplishing their tasks. Effort expectancy is similar to perceived ease of use. When users find a product to be easy to interact with, they are more inclined to use that product quite

often. If the users find from their assessment that they will benefit from using the product, and it is accessible to them, they move on to accept the product.

The focus at this stage is to communicate the message of the benefits of using the technology and incentivizing the people to use the technology. At this point it is important to adopt techniques that are aimed at convincing the potential users that the technology is not only right for them but also accessible to them. Users want to know what is in it for them, when they accept the technology. They need the confidence that they can learn the technology and use it successfully. There is a need to build a strong user support structure in order to be able to boost the trust and confidence of the users. A desire to accept the technology is instilled into the users.

4.1.3. Acceptance

The acceptance phase is the period after the users have made up their mind to try and use the technology. The users have gone through the process of weighing all the evidence that they have on the technology, and they have decided to accept it.

The focus at this point is to sustain the decision made by the users so that it sticks and that they will not return to rejecting the technology. It is important to congratulate the users that that they have made the right choice by accepting the technology. The benefits of adopting the product have to be recapped, so the decision made by the users becomes engraved.

4.1.4. Learning

After accepting the technology, people need the knowledge on how to use it. Innovators and early adopters are often highly motivated to explore the features of the product and learn how to use the product by themselves. However, there is a need to provide training for other users to be able to use the product. People need to acquire or develop the skills and knowledge that is necessary to use the technology.

A product that is intuitive, usable and providing a positive user experience makes it easy for the users to learn how to use it. It is important to keep reinforcing the benefits that come with adopting the technology, so that the users remain keen to use it.

4.1.5. Usage

At this stage people are actively using the technology to achieve their goals. The developers of the product should keep researching and improving on the features of the product to keep abreast of the needs of the users. User needs should drive the innovation.

The same requirements in terms of communication with the user must be met. These include reinforcing the benefits, highlighting the fact that people have made the right choice in adopting the new technology, and emphasizing that the support that people need is available.

It is important that any change in features of the product or the introduction of a new product should recognize the phases that individuals go through in accepting and adopting new technologies. It is also important to acknowledge that the user experience of the people changes with the introduction of a new product or with changes to the features of an existing one. A positive user experience is paramount for the acceptance, adoption and usage of a new product. Thus, the purpose of this study is to provide a model aimed at promoting a sustainable long-term positive user experience.

Managing user experience requires an understanding of the user experience development process. The process of how user experience develops and changes over time, as well as change in the features of the product, is discussed next.

4.2. EVOLUTIONARY NATURE OF USER EXPERIENCE

The experience resulting from a user's interaction with a product is not static, but is composed of emotions that are subject to change over time and with the context of product use (Roto *et al*., 2011; Kujala *et al*., 2011; Abbasi *et al*., 2012). Mahlke and Thuring (2007) mention that the perceived pragmatic and hedonic qualities of a product, and the reactions of the user resulting from their interaction with a product, change over time. Furthermore, the perceptions and user emotions influence change in user experience and overall decision of the user about a product. The visceral aspects of a product dominate in its appeal to the anticipatory user experience and act as a key contributing factor to a positive decision for the purchase of a product. These visceral aspects last for a period of about a month after purchase of the product. Thereafter the user experience is influenced by the touch and audition features of the product (Fenko,

Schifferstein, & Hekkert, 2009; Sonderegger, Zbinden, Uebelbacher & Sauer, 2012). In addition to this, Mendoza and Novick (2005) found that the types of errors, error rates and the resultant user frustrations change drastically over time as the users continue to use the product. Thus, as time progress and users continue to use a product, certain aspects stimulating their user experience fade away while other product attributes become prominent determinants of user experience (Karapanos, Zimmerman, Forlizzi, & Martens, 2009; Fenko *et al*., 2009; von Wilamowitz-Moellendorff, Hassenzahl, & Platz, 2006).

Abbasi *et al*., (2012) developed a framework that illustrates the evolution of user experience, called the User Experience Evolution Life-cycle (UXEL). Their framework is aimed at guiding requirements engineering for user experience and evaluating user experience at each of the evolution stages. Figure 4.1 shows the abstract UXEL by presenting the actors and phases of user experience evolution.
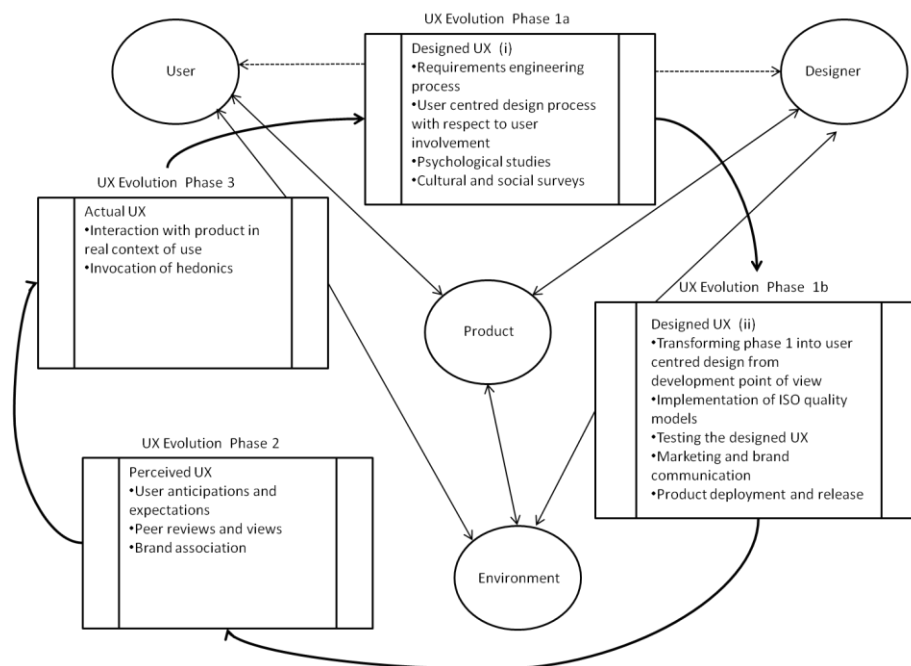
Figure 4.1: User Experience Evolution Lifecycle (Abbasi *et al*., 2012)

The authors suggest that, at the initial stage Phase 1a: *Designed UX (i)*, user experience evolution results from the relationship between the user, the product and the designer. This phase advocates that user involvement in the design process of the product improves user experience. During this stage, the user requirements, their mental models and their socio-cultural information are the important determinants of user experience that have to be determined.

Phase 1a: *designed UX (i)* stage is followed by Phase 1b: *Designed UX (ii). Designed UX (ii)* involves balancing aspects of the designer, product and environment to suit the user requirements and expectations. Hence, the development of user experience is affected by aspects of the design process, as well as the by product features and the context within which the product is used. Following phase (1b) is Phase 2: *Perceived UX.* Phase 2 presents the expectations of the users based on their level of awareness of the product. The final stage of the framework is Phase 3: *Actual UX.* At this stage the user gets to interact with the product in its context of use. The invocation of emotions and user experience goes beyond the instrumental qualities of the product, to also include hedonic attributes such as identification, satisfaction and attractiveness.

The UXEL contributed to the identification of actors involved in the user experience evolution life cycle. It also helped in identifying the attributes of the actors at each phase of user experience. However, the UXEL framework is inadequate in that it does not show any aspects of change in user experience over time. The time span of user experience has been noted to be an important dimension in the development of user experience (Roto *et al*., 2011; Karapanos *et al*., 2009; Fenko *et al*., 2009; von Wilamowitz-Moellendorff *et al*., 2006). Furthermore, the UXEL framework only focuses on momentary and episodic user experience during the user's interaction with the product in the specified context of use, as well as on the invocation of the hedonic stimulations (Mäkelä & Fulton, 2001). The framework does not recognize the evolution of long-term user experience. Long-term user experience has been noted to be the determining factor for product loyalty (Kujala *et al*. 2011; Garrett, 2003). This study therefore proposes a User Experience Lifecycle Chart (UXLC) to illustrate how user experience evolves over time.

4.2.1.   User Experience Lifecycle Chart (UXLC)

The UXLC is based on the phases of user experience over the time spans presented in Chapter 3, and on the UXEL. The components of the UXLC are presented in Figure 4.2.
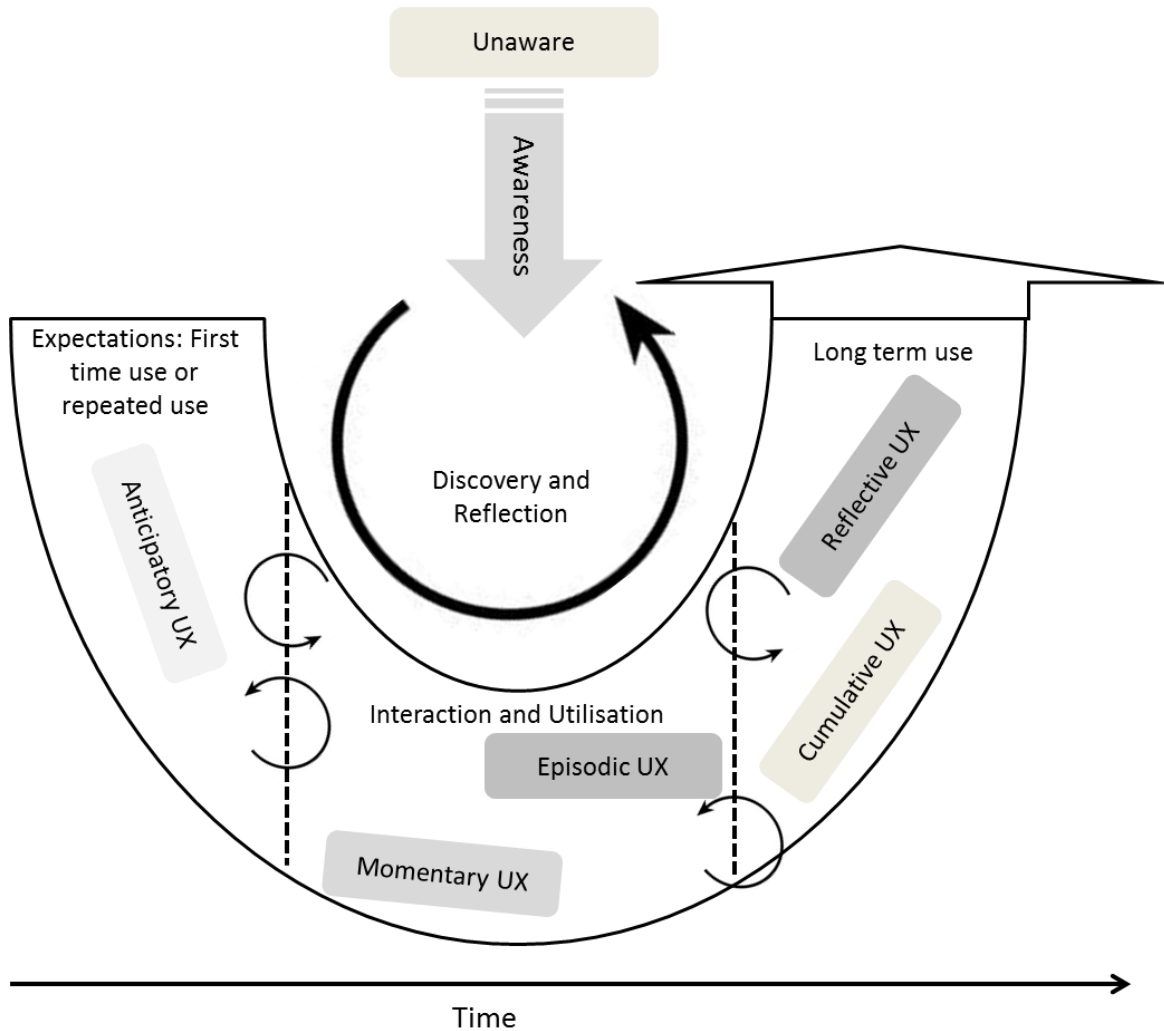
Figure 4.2: User Experience Lifecycle Chart.

The UXLC begins with an unaware user. Unawareness refers to the user's lack of knowledge about the existence of a product, its instrumental qualities or its hedonic attributes. The user is made aware of the product and its features. The UXLC shows that awareness happens through the phases of the user experience development life cycle. Awareness is brought by product reviews, publicity about the product and also by discovery of product features as users interact with it. As users continue to interact with the product, they discover new features and reflect on them based on prior experience and comparison with similar products. A positive reflection on the product promotes a lasting user – product relationship.

Awareness creates anticipatory user experience. Users that interact with the product for the first time develop an anticipatory user experience based on the mental models that are created from the reviews and publicity that they receive about the product, as well as from the visceral aspects

of the product. Henceforth the anticipatory experience of users that have had prior interaction with the product is modified as they utilize the product.

Anticipatory user experience directs the expectations of the user as they interact and utilize the product. As the product is used, users discover product qualities and reflect on them in momentary and episodic user experience. Momentary user experience refers to instantaneous feelings of the user at a particular moment as they interact with the product. Accumulation of momentary user experience during a task session forms episodic user experience. Momentary and episodic user experience is fluid and subject to change, based on the context of use as well as on the psychological and physiological aspects of the user at a particular moment (c.f. Chapter 3, section 3.5). Users sum their episodic user experience into cumulative user experience, and as they continue to interact with the product they discover product features that result in the development of reflective user experience.

With continued usage and technological advances users discover more about the product, and their needs grow and change over time. The need to grow and adapt the product to meet these needs arise, hence the experience loops back to anticipatory user experience.

User experience therefore evolves from an unaware user to anticipatory user experience. Anticipatory user experience is modified into momentary and episodic user experience as the users interact with and utilize a product. Continual use of a product results in long-term user experience (cumulative and reflective user experience).

Product designers who wish to have loyal users of their product should aim to develop products that are appealing in terms of long-term user experience. An effective long-term user experience is achieved by managing anticipatory, momentary and episodic user experience. It is therefore important to manage the change in user experience as it evolves.

The importance of managing user experience is discussed next.

4.3.   WHY MANAGE USER EXPERIENCE

The design of interactive products in a dynamic environment, which is characterized by ever-changing technologies and user expectations, requires an agile approach to the management of the evolving user expectations as well as the user experience. It has been mentioned that new

products are being designed and existing ones are being improved through the development of new functionalities, interaction and navigation styles as well as new user interface components. Most users are conservative when it comes to new products or to a change in the user interface of a familiar product (Constantine, 2004). Designers and developers need to keep in mind that anything genuinely "new and improved" entails risk and invariably provokes resistance (Vahs *et al*., 2010). As such, improving the user interfaces or introducing a new product may result in a change in the user experience of the users that are interacting with the product. Such a change in user experience has to be managed for the product to be accepted and utilized.

Managing user experience aims to promote and cultivate a sustainable long-term positive user experience. When user experience is managed properly, the users are not caught by surprise when the new features of the product are introduced. The users are always kept aware of the product, its functionalities and the benefits of using such a product. Furthermore, the users will not be left lagging when a new product with different user interface elements, and different interaction and navigation styles, are introduced. User awareness enhances user readiness and promotes a desire for users to accept and continuously use the product with satisfaction. When users get to use a product continuously, their competence improves and they will subsequently form a loyal kinship with the product. Product loyalty brings self-fulfilment to the users and communicates some status about the user using or possessing the product. Hence, managing user experience development is important because it promotes awareness of the product among users, increases user readiness to accept the product, improves the usage of the product and promotes self-fulfilment of the users that are interacting or possessing the product.

Despite these merits of managing the change in user experience, there currently lacks guidance on how to manage the user experience of the people. As such, many products fail to meet their expected user acceptance, adoption and usage. The products fail to satisfy the expectations of the users, and fall short on usability and the overall user experience. Therefore, this chapter serves to establish the requirements for a model aimed at managing and improving the user experience of people using interactive products.

It has been highlighted that user experience changes over time. The development in user experience involves a transition from the current state of user experience through transitional phases to another level of user experience. Such a change needs to be managed. This study

applies principles from change management to manage the process of user experience development.

4.4.   DEFINING CHANGE MANAGEMENT

Change is a complex process, often involving a revolution and transformation of the old and customary ways of doing things and replacing them with an unfamiliar style (Higgs & Rowland, 2011). Hence, change is often characterized by uncertainty, fear and risk to the lifestyles of the people (Vahs *et al*., 2010). Whenever change is introduced to people, whether in an organization or society, it will ultimately impact on the lifestyle of the people, the organizational structure, tasks, job roles, processes and other related variables (Creasey, 2007). Literature posits a 70% failure rate of projects that bring about change (Higgs & Rowland, 2000; Hammer & Champy, 2003). Poor management of the change process has been attributed as the root cause of failure in change projects (Bordia, Restubog, Jimmieson, & Irmer, 2011). It therefore follows that management of transitions during change initiatives is of paramount importance and fundamental to the success of any change project. A definition of change management follows next.

Despite the abundance of literature with advice on guiding and implementing change management for practitioners and academics, there is a lack of an agreed definition of change management. Change management is closely related to project management. However, Creasey (2007) differentiates change management from project management. He defines project management as methods, tools, skills and techniques that are employed in response to change in project activities, in order to meet project requirements. Contrary to this, Creasey (2007) defines change management as:

> "*The process, tools and techniques to manage the people-side of change to achieve the required business outcome*".

Change management is therefore aimed at managing the turmoil in the feelings, experiences and expectations of the people that are impacted by the anticipated change. The purpose of this study is to develop a model that can be used to manage the change in user experience, resulting from the introduction of new products or improvement in the user interface of the products with which people interact.

Managing change in user experience is an integral process aimed at cultivating a user audience that is ready for change, and developing products that are fit for use, usable and offering pleasure to the users. The process involves identifying and managing the factors that influence user experience. Furthermore, it requires planning of the methods and techniques required for design and introduction of the products in a user-centred manner to make the users prone to accepting the introduced product. Following this, a sustainable long-term positive user experience is reinforced by creating a lasting bond between the user and the product.

The next section presents a discussion on selected change management models. An analysis of the existing change management models serves as the fundamental basis for identifying the components and requirements for managing user experience.

4.5.   CHANGE MANAGEMENT MODELS

Various models aimed at managing change and guiding implementation of change are available in literature (Kotter & Cohen, 2002; Jick, 1993; Garvin, 2000; Mento *et al*., 2002; Price & Chahal, 2006; Hiatt, 2006). Most of these models focus on managing change in organizations. It has been mentioned that the user experience evolves (c.f. section 4.2). User experience is subjective and individualistic, as stated in the definition of user experience. Hence, managing change in user experience requires approaches that focus on persuading individuals to willingly accept the introduced changes. The purpose of this section is to identify change management models from which inferences for a proposed model for managing user experience can be drawn. The proposed model for managing user experience differs from those in existence, in that it is oriented towards managing the feelings and experiences of the people as it relates to the use of interactive products in a user-centred manner. Another unique aspect of the model is that it is to be applied in a community environment that is not bound by organizational regulations that compel people to change. Rather, it positively promotes a user's willingness to change.

The following models have been chosen, from a range of possible models, for conceptual reference in this study:

  ➢ Three-Stage Change Model (Lewin, 1951);
  ➢ Eight-Step Change Management Model (Kotter & Cohen, 2002);
  ➢ ADKAR model (Hiatt, 2006); and

➢ Twelve-Step Change Model (Mento *et al.*, 2002).

The models by Lewin (1951) and Kotter and Cohen (2002) have been selected because they are most widely referenced by many authors of change management. Furthermore, the Twelve-Step Change Model (Mento *et al*. 2002) has been chosen because it addresses change implementation from a broader perspective, and has been applied in various domains. The ADKAR model (Hiatt, 2006) guides the implementation of change in organizations and individuals, and is therefore applicable to the management of change in user experience of people in a community setup. A discussion of each of the models is presented in the next sections.

4.5.1. Three-Stage Model of Managing Change (Lewin, 1945)

Lewin's model is one of the most popular and widely used change management models. His model is most applicable for managing planned change rather than for managing a reactive response to unplanned change (Pryor, Taneja, Humphreys, Anderson, & Singleton, 2008). The model is entrenched in systems theory, which views behaviour as composed of a dynamic equilibrium of antagonistic push and pull forces in a system (Graetz, Rimmer, Lawrence, & Smith, 2002). According to Lewin (1945), these forces can be managed by means of a three-stage process of unfreezing, changing and refreezing. In its current state, the system will be in equilibrium. The current state is the "*as is*" situation of business processes, behaviour of the people, organizational culture or any variables that need to be changed. The three steps of Lewin's model are presented in Figure 4.3.
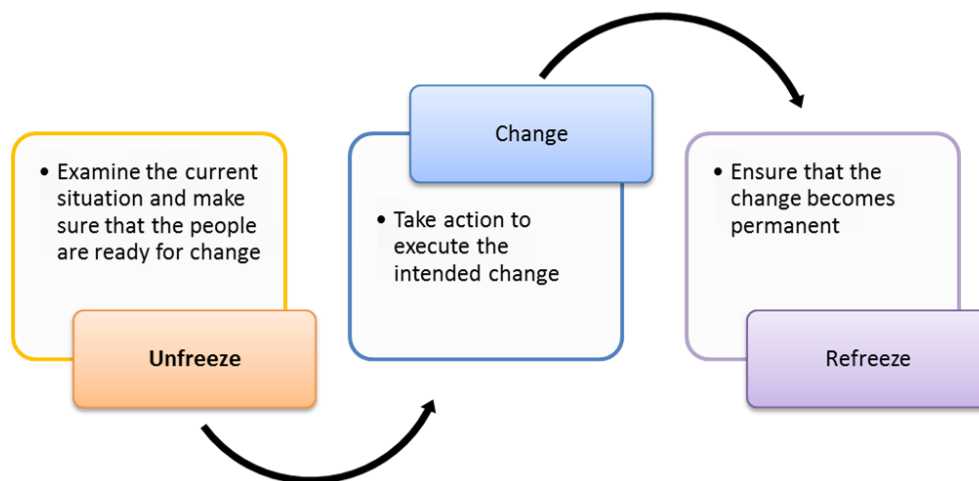
Figure 4.3: Three-Stage Model of Managing Change (Lewin, 1945)

Stage 1: Unfreezing

The first step in introducing change will be to unfreeze the status quo. Unfreezing can be achieved by motivating people to let go of their traditional way of doing things and helping them to recognize the need for change and the urgency to embrace change (Kristonis, 2005). Unfreezing involves creation of a favourable environment for people to change by exposing the problems with the current system and communicating the benefits of change.

Stage 3: Moving / changing

The second step in institutionalizing change involves *moving / changing* from the current state through transitional stages towards the desired goal. At this stage, all pockets of resistance are identified and eliminated by convincing people that the traditional way of doing things is not the best, and by highlighting what aspects of change is to their advantage (Lewin 1945).

Stage 3: Refreezing

Once the people have embraced change, the next step is *refreezing*. Refreezing reinforces change to make it stick, and to be permanently sustainable (Kristonis 2005). The new state becomes the system equilibrium, and refreezing therefore stabilizes the new state to remain as the desired state (Lewin 1945).

4.5.2.   Eight-Step Change Management Model (Kotter & Cohen 2002)

Kotter and Cohen's model is designed to guide the strategic management of an organization on how to transform the organization's practices and change its long-term vision through a series of interrelated steps, as shown in Figure 4.4.
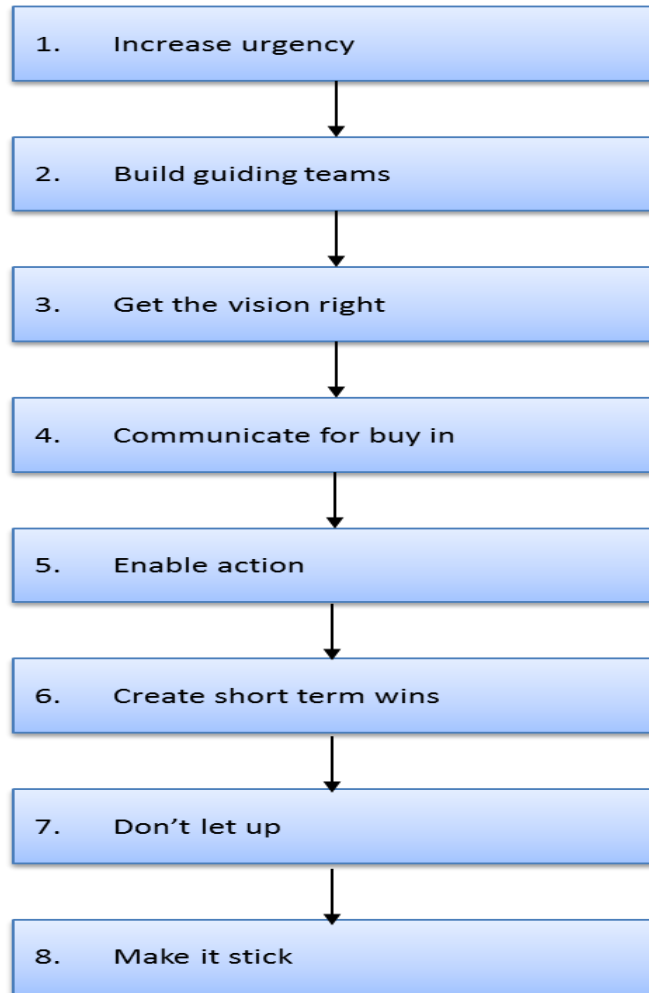
Figure 4.4: Eight-step change management model (Kotter and Cohen, 2002)

Step1: Increase urgency

According to Kotter and Cohen (2002), implementation of change has to begin with creating a sense of urgency for the people to realize that the change is needed. A sense of urgency is established by making people aware of the change initiative as well as the benefits of change, and by doing away with the uncertainties and misconceptions that people may be having about the change (Pryor *et al*. 2008).

Step 2: Build guiding teams

Once a sense of urgency has been established, management has to form a coalition team to intervene and fight against any pockets of resistance, and to encourage people to be prone to accept the change.

Step 3: Getting the vision right

Step 3 involves creating a vision and strategies that guide the transitions towards attaining the desired state.

Step 4: Communicate for buy-in
The vision is formally and strategically communicated to the people, and the people are empowered to act on the vision.

Step 5: Enable action

Human empowerment can be through training, imparting of new skills for doing things and encouraging people to be innovative and to contribute new ideas that are aimed at achieving the vision.

Step 6: Create short-term wins

The sixth step involves motivating commitment to the change initiative by celebrating short-term wins. Short-term wins make people recognize that the change is realistic and can be achieved. Celebrating short-term wins keeps the people focused and devoted to reach the set vision.

Step 7: Don't let up

In step 7 the change is monitored and adjustments are made if necessary to improve on the change.

Step 8: Make it stick

Finally, the change is reinforced in order to make it stick. Making the change stick is important to sustain the change so that people do not revert to their old habits, in which case the whole process will become futile.

4.5.3.   ADKAR Model (Hiatt 2006)

The Awareness, Desire, Knowledge, Ability and Reinforcement (ADKAR) model is aimed at guiding and implementing organizational and personal change. The ADKAR model presents techniques for enhancing awareness, creating a desire to change, imparting knowledge,

demonstrating ability and reinforcing the change. Components of the ADKAR model are summarized in Figure 4.5

Figure 4.5: ADKAR Model (Hiatt 2006)

Awareness

The model emphasizes that, for change to take place, the people must be aware of the nature of change and the need to change. An understanding of the nature of change makes people aware of the change. The nature of change is expressed with respect to: what has to change, why the change has to take place and what the risks are of not changing, as well as what the benefits of change are. Hiatt (2006) posits the following as techniques for making people aware of the change initiative: effective communication, establishing the priority for change, highlighting the importance of change and the associated risks of not changing and (in the organizational context) bringing transparent access to information about the organization. Awareness on its own does not bring change. It therefore follows that a desire to change must be encouraged.

Desire

The people must have a desire, both to change and to participate in the change project. A desire to adopt change is encouraged by making the benefits of change known to people, having a strong sponsorship coalition and by having people actively participates in the change program (Hiatt, 2006). People are motivated to have a desire to support and participate in change by making change suit the personal situations and context of individuals. Having a desire to change without the knowledge of how to change is not enough to convert to change.

Knowledge

Knowledge has to be imparted to the people. Techniques such as job aides, training workshops, one-on-one coaching and work support groups help to share knowledge. Following impartment of knowledge, the people must demonstrate that they have the ability to make the change real.

Ability

Ability can be demonstrated and improved through interaction with experts, performance monitoring and practical (Hiatt 2006). Human beings have the propensity of reverting to old practices. Change must therefore be reinforced to make it institutionalized.

Reinforcement

Lasting change is enforced by constantly gathering feedback from the recipients of change, rewarding and celebrating successful change, setting performance measures and implementing accountability mechanisms (Hiatt 2006).

4.5.4. Twelve-Step Change Model (Mento *et al.,* 2002)

Mento, Jones and Dirmdofer (2002) developed a twelve-step framework to guide leaders of change to implement change in an organization. The model represents a refinement of the models by Kotter and Cohen (2002), Jick (1991) and Garvin (2000). The twelve steps of the model can be classified under three distinct themes, namely *planning change, implementing change* and *managing change* (Shum, Bove, & Auh, 2008). Figure 4.6 outlines the twelve steps of the model.
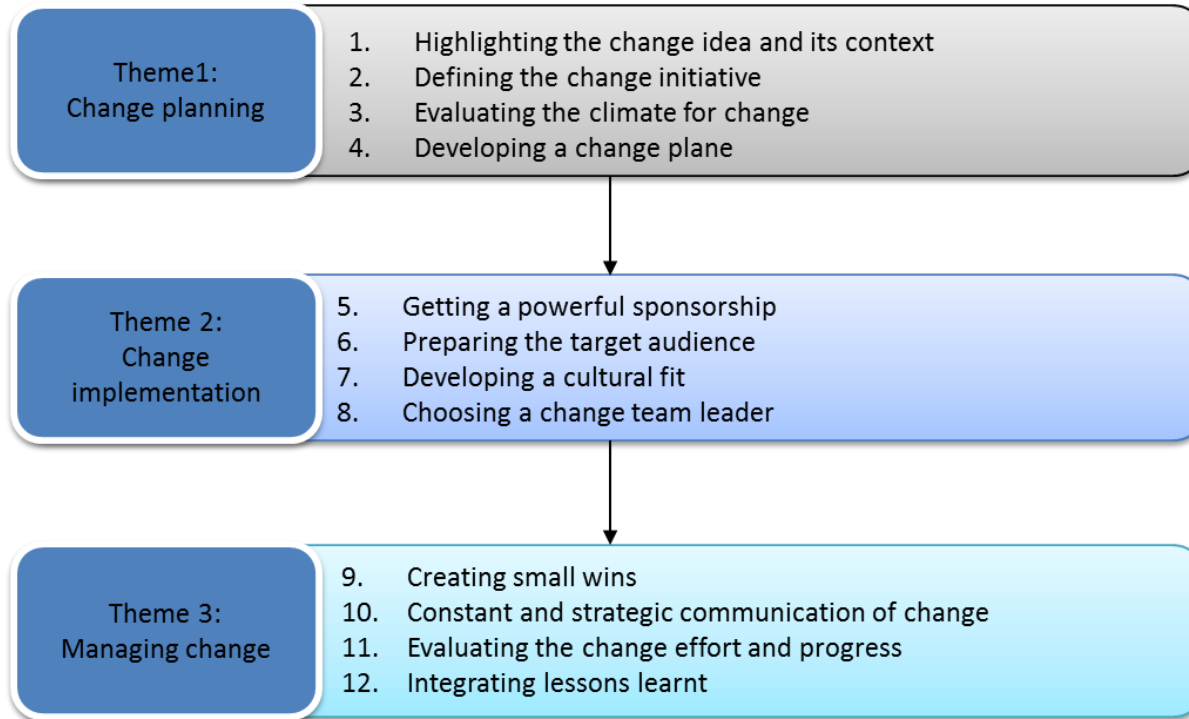
Figure 4.6: Twelve-Step Change Management Model (Mento *et al*., 2002)

Theme 1: Planning for change

Planning change involves the preparatory steps that a change leader has to follow to assess the change environment. During assessment of the change environment, the change leader has to formulate the change idea and its context by highlighting what needs to change and what needs to remain unaltered. This is followed by a definition of the change initiative in terms of an analysis of the costs and benefits of change to the organization. It is identified who has the power, who has the required information, who are the losers and who are the beneficiaries as a result of the change. A cross-sectional representation of all the change stakeholders is recruited as key role players. Key roles are defined by identifying change strategists, implementers and recipients in the change initiative (Mento *et al*., 2002). The third step in planning is concerned with an evaluation of the climate for change. The organization is scanned in terms of how it functions, its strengths and weaknesses and the previous history of the organization with respect to similar change initiatives. Previous history about change initiatives has an impact on the attitudes of the people towards the acceptance of change (Bordia *et al*., 2011). The final step of

planning change is to develop a change plan. At this stage, the leader has to set a specific vision for the change initiative and craft an implementation strategy that suits the frame of reference of the change audience (Mento *et al.*, 2002). A well-planned change program nurtures the success of change implementation.

Theme2: Implementing change

Implementing change involves getting support from executive managers and influential leaders, preparing the target audience, creating a cultural fit and choosing a change leader team as cited by Mento *et al.* (2002). The role of executive managers and influential leaders is to decide whom to commit to change and to set a monitoring tool to assess the progress of the change process. The change recipients are cultivated to accept change by eliminating any possible pockets of resistance and by getting continuous feedback from the target audience (Mento *et al.*, 2002). People always want things to change, but they do not want to be changed or have the change affect them. Thus, for change to last it must fit the expectations and context of the people. A change initiative that is aligned to the expectations of the people has a high probability of being successful. Mento *et al.* (2002) mention that an inspirational leadership team that is committed, competent and sharing the same purpose is important in implementing change. The credibility of the leader that is disseminating the change message influences the success of change (Hiatt 2006). Implementing change requires a powerful sponsorship, a ready audience and an inspirational leading team.

Theme 3: Managing change

The final steps of the model deal with managing the change. It involves motivating the people by celebrating short-term wins, constant and strategic communication of change, evaluation of progress of the change effort and integration of lessons leant during the change process (Mento *et al.*, 2002).

4.6. ANALYSIS OF CHANGE MANAGEMENT MODELS

The discussed models have some resemblance with respect to their suggested process and activities of managing change. Jick (1993) suggests that the process of managing change can be

categorized into three parts, namely *preparing for change*, *implementing change* and *sustaining change*.

4.6.1.   The three part change process

The components of the discussed change management models will therefore be categorized based on the three parts. The categorization helps to analyze the overlap and relatedness of the models. The similarities are presented in Figure 4.7.
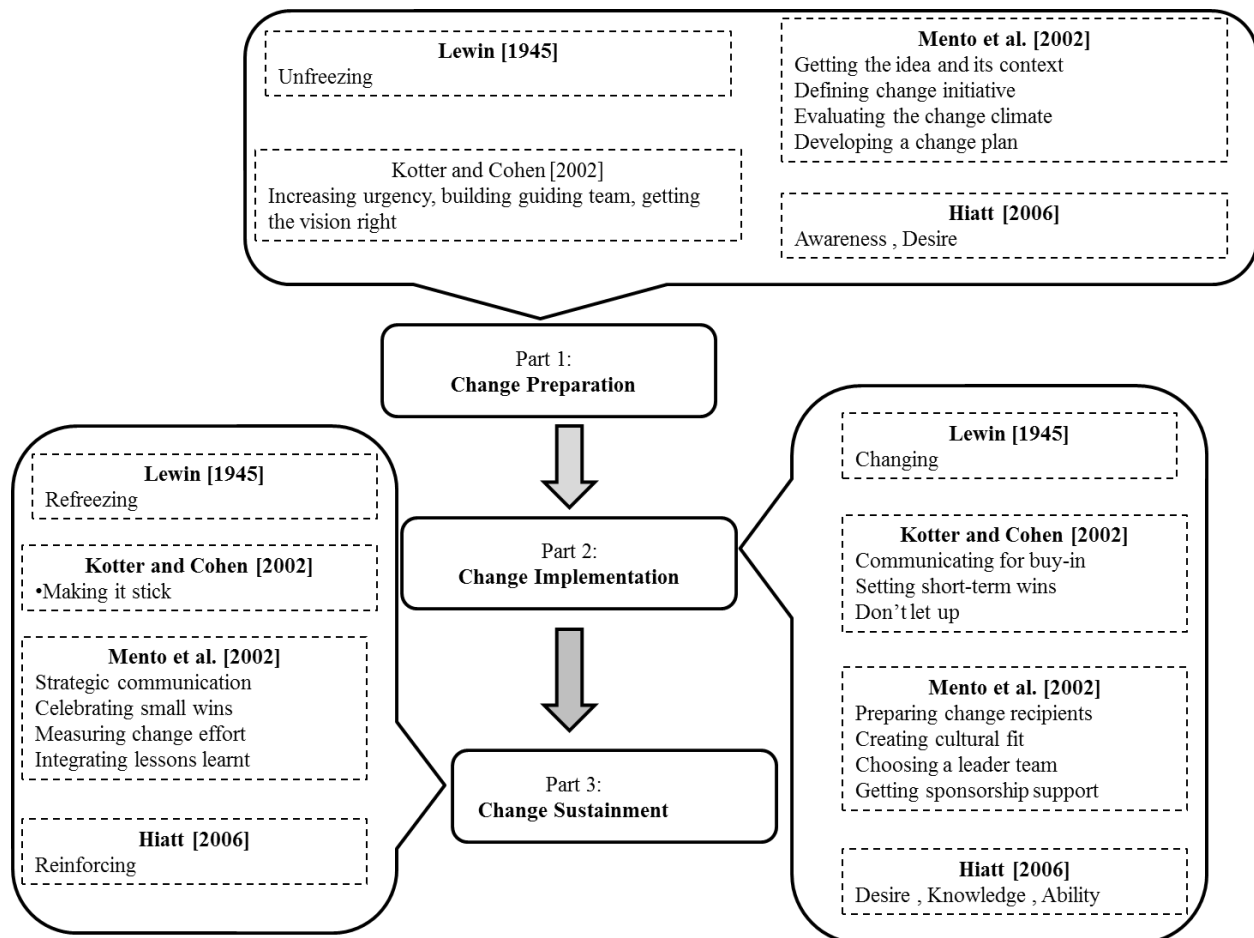
Figure 4.7: The three phases of managing the process of change (Researcher's interpretation of literature)

Part 1: Change preparation

Change preparation cultivates people to be ready for change. It involves formulating the vision and strategy for implementing change (Lewin, 1945; Kotter & Cohen, 2002; Mento *et al*., 2002). Preparing people for change helps them to recognize the importance of change and the benefits

of letting go of the old way of doing things. This aids them to become receptive to innovative ways and to develop a desire to change (Hiatt 2006; Kotter & Cohen 2002 Mento *et al*., 2002). Hence, preparing for change involves choosing the team that will guide the change as well as doing a scan of the change context (Kotter, 2002, Mento *et al.*, 2002).

Part 2: Change implementation

When the people have appreciated the need to change and are ready for change, the next step in the process is to implement the change. Lewin (1945) refers to this step as *changing*. Change implementation involves doing away with any potential pockets of resistance, communication, training and empowerment and gaining executive support for the change (Hiatt, 2006). The people are given the platform to demonstrate their ability to perform activities in the changing environment (Hiatt, 2006). Short-term wins are set as motivators for the people not to let go of the change (Kotter & Cohen, 2002). This keeps people moving along and not giving up on the change.

Part 3: Change sustainment

Once the new approach has been grasped, it is important that change is reinforced so that people do not revert to the old habits. Kotter and Cohen (2002) calls this stage "*making it stick"*, while Hiatt (2006) refers to it as reinforcement. Lewin (1945) uses the concept of refreezing while Mento *et al*. (2002) refer to measuring the change effort and consolidation of lessons learnt.

While these models have proven to be helpful in managing change in other disciplines, they have some shortfalls when it comes to their applicability to manage change in user experience. This inadequacy has motivated the development of a model that suits change management with respect to user experience.

4.6.2. Critiquing existing change management models

A critical analysis of the existing models reflects the following aspects that make them not appropriate to managing change in user experience. The ADKAR model (Hiatt 2006) concentrates on change implementation while lacking an assessment of the environment for change and an evaluation of the outcome and impact of change. It has been established earlier in

Chapter 3 that the context influences the user experience of the people. In his model, Lewin theorizes change and makes unrealistic assumptions that change occurs in a stable state. He neglects power struggles in an organization, and the feelings of recipients of change (Burnes, 2004). Thus, the model does not adequately relate to managing change in an agile environment where the requirements of the people are fluid and ever-changing. Kotter and Cohen's (2002) eight-step change management model is aimed at strategic level activities that transform an organization. Mento *et al.* (2002) focus on the role of strong leadership in implementing change in an organization. Lewin (1945), Kotter and Cohen (2002) and Mento *et al.* (2002) focus on implementing and managing change from the organization's point of view and neglect the needs, requirements and user experience of the people who are recipients of the change. These models therefore address the implementation of change within organizations, where people's behaviour are defined by the organizational operating policies, authorities, reporting protocols, hierarchies and binding organizational objectives.

User experience is subjective and not stipulated by organizational mandates. Therefore, it requires employment of persuasive means to guide changes in user experience by the individual's willingness to change. Another shortfall of the identified models is that they are generic regardless of the size of project, nature of industry and the overall environment. The models put more emphasis on the role of managers in managing change, while ignoring the involvement of the change recipients at early stages of the project and their experiences that result from the transition.

The desired model for managing user experience has a number of characteristics, which make it unique and different from the existing ones. The model is to be applicable in a society where there are no organizational policies, watchdogs or authorities to *force* change. Thus, change in user experience is based on the individual's willingness to change. The model aims to involve a cross-sectional representation of all the project stakeholders (sponsors, strategists, implementers, change leaders, recipients) by making them *see and feel the need for change* for them to take action for change, contrary to the "*think, analyze and change*" approach (Kotter & Cohen, 2002). This approach creates a compelling urgency with respect to the need for change and emotionally engages individuals in lasting actions and behaviours. A participatory user-centred approach will be adopted to manage the change in user experience of the people. In managing the user

experience, it is acknowledged that people adapt to new ways of doing things at different paces and that they have different levels of skill with respect to the use of the products (Rogers, 1995). Hence, individuals react differently to changes when a new product is introduced, and consequently have different user experiences. Such differences need to be considered and managed when designing for positive user experience. For any product to be accepted with positive user experience, the product should be designed and implemented in a manner that comprehends the user's skills, their expectations, environment and the tasks that they need to accomplish when using the product.

An analysis of change management models provides the basis for determining the requirements for managing user experience.

4.7.   DETERMINING REQUIREMENTS FOR MANAGING USER EXPERIENCE

The purpose of this chapter is to determine the requirements for managing user experience. As noted earlier, the introduction of a new product or a change to the features of an existing product brings change with respect to the user experience of the people that interact with the product.

Change is a process; hence the people interacting with a product with new features undergo a series of transitional phases in user experience development. This evolutionary nature of user experience has already been discussed and presented in the UXLC (c.f. Figure 4.2). As such, the changes in user experience have to be managed when a product is introduced or enhanced, for the users to be able to use it with pleasure. Failing to manage user experience will result therein that the whole effort of improving the product would be futile, as the users may not accept or use the new or changed product. Therefore, managing user experience aims to persuade users to have positive experiences throughout their interaction with the product. Furthermore, managing user experience promotes acceptance, adoption and use of the product. The change in user experience becomes a positive journey when the people know the benefits of the introduced changes, when they are prepared for what is coming and when they feel involved in the change process.

This study applies the three-phase process postulated by Van Greunen, Yeratziotis, & Pottas, (2011), together with aspects of design science, to gather the requirements for managing user experience. Figure 4.8 illustrates the process that was followed to determine the requirements for managing user experience.
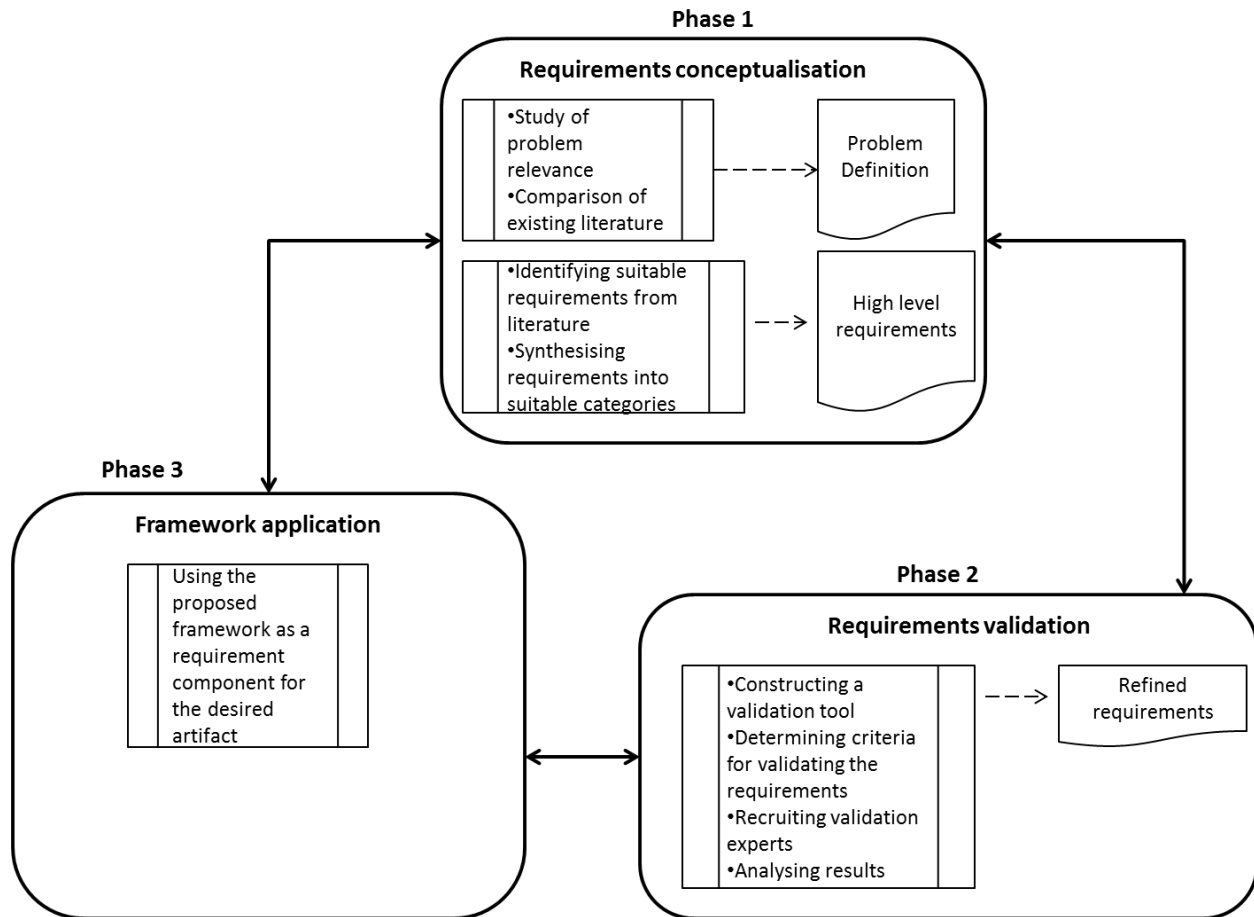
Figure 4.8: Three phase process (Adapted from Van Greunen *et al*., 2011)

Phase 1 of the model is aimed at conceptualizing the requirements by studying the relevance of the problem. This is achieved by analyzing and comparing literature from related subject domains. The literature is synthesized to identify the suitable categories of requirements. The outputs of the requirements conceptualization phase are a problem definition and high-level requirements.

Phase 2 aims to validate the requirements. A strategy for evaluating the validity of the model is formulated. This involves the development of the validation tool and selection of the techniques for validating the requirements. The participants for validating the model are recruited, and finally the results are analyzed and the refined requirements are presented.

Phase 3 involves application of the requirements in order to demonstrate their usefulness and applicability.

A discussion on application of the three-phase process to determine the requirements for the management of user experience follows next.

This chapter identifies the requirements for managing and improving the user experience by inferring factors that influence user experience, the evolutionary nature of user experience and the application of change management techniques in order to manage the user experience.

The factors that influence user experience have been presented (c.f. Chapter 3). It has been established earlier in the same chapter that user experience may not be designed, because no designer has the ability to design a user's internal emotions. Hence, change management has been introduced to curb the complexity of understanding the subjective nature of the users and to provide persuasive guidance towards attainment of a positive user experience. It is therefore important to have clearly defined requirements that guide the management of user experience.

The requirements for managing user experience are determined following application of the three-phase process (Van Greunen *et al*., 2011).

4.7.1. Phase 1: Requirements conceptualization

The requirements for managing user experience have been synthesized from a study of literature pertaining to the subject domains of interest, namely user experience and change management. The problem relevance was determined by identifying a gap in existing theories and practice on change management and user experience, and by observing practical phenomena in the field of user experience. The problem that was identified is that no set of requirements currently exists for the management of user experience.

The definition of the problem and its relevance lead to the identification of the domain components of the requirements. Thus, the requirements have been identified from literature related to factors that influence user experience, the evolutionary nature of user experience and change management. The theoretical requirements were identified and classified into suitable categories. The identified theoretical categories of requirements were then synthesized into high-level requirements that underwent validation.

4.7.2. Phase 2: Requirements validation

The high-level requirements were evaluated for their validity by means of conference publications at international conferences specializing in HCI. The publications underwent a double-blind peer review process with subject domain experts. The experts provided feedback on the relevance, applicability and novelty of the proposed requirements. The process of evaluation by means of subject domain experts at HCI conferences was chosen over other means because of the scarcity of experts in the fields of user experience and change management. Furthermore, other means of validating the actual application became infeasible because it required a longitudinal study, which could not be done within the allocated academic period. The output product of validation of the requirements is the User Experience Management Requirements (UXMR) Framework to be used in Phase 3.

4.7.3. Phase 3: Requirements application

The UXMR framework is used as requirement component for the User Experience Management Model (UXM^2) to be developed in Chapter 5. The process loops back to requirements conceptualization in order to make it suitable for the identification of similar requirements in a different domain.

4.8. USER EXPERIENCE MANAGEMENT REQUIREMENTS (UXMR) FRAMEWORK

The proposed UXMR Framework is inferred from change management models and from factors that influence user experience, as identified earlier. The UXMR Framework outlines the requirements for managing and improving the user experience of people using interactive products. Figure 4.9 presents the User Experience Management Requirements (UXMR) Framework.
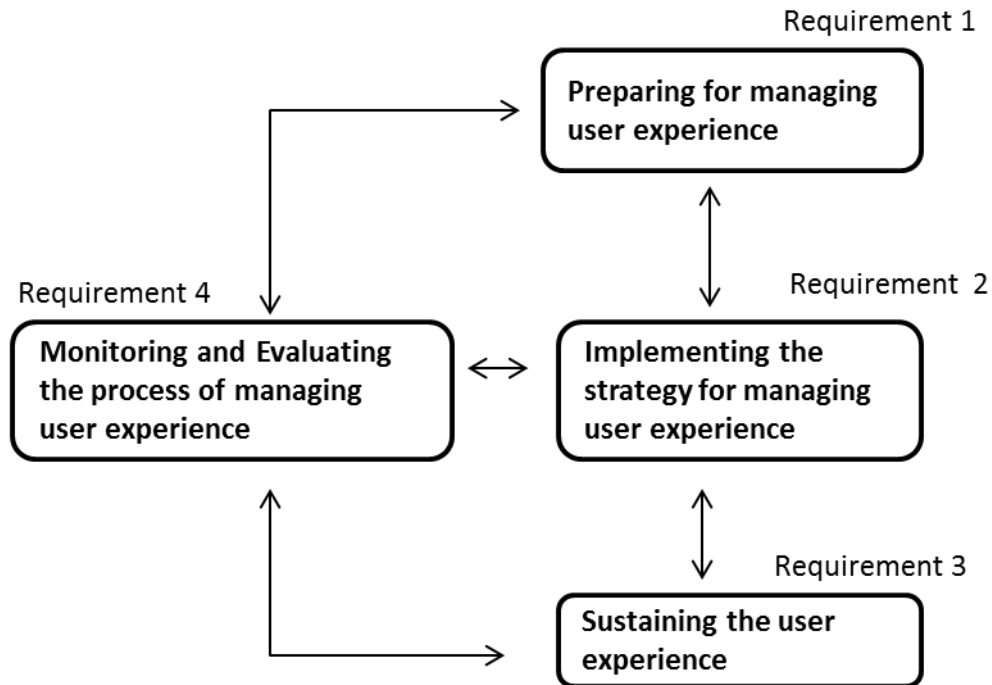
Figure 4.9: User Experience Management Requirements (UXMR) Framework

The UXMR Framework is based on the three phases of managing the process of change (c.f. Figure 4.7) with an additional component of *monitoring and evaluation* included. The first requirement relates to the process of preparing for managing user experience. The second requirement deals with implementing a strategy for managing user experience. Requirement number 3 entails sustaining the user experience, and the fourth requirement aims to monitor and evaluate the process of managing user experience. It is important to note that the management of user experience is an iterative process. There is constant revision of each activity with the intention of perfecting the subsequent phases. The components and related activities of the requirements framework are discussed next.

4.8.1. Requirement 1: Preparation

Preparation involves cultivating a favourable change environment, creating a change-ready audience and formulating the vision and strategy for change. The aim of preparing for managing user experience is to discover the factors that influence the user experience of people, crafting a change implementation plan, defining a means of sustaining user experience and setting the

evaluation criteria. Table 4.1 presents the user experience management preparation requirement components and the related tasks and activities.

Table 4.1: User experience management preparation requirements

Preparation: UXMR – I	
UXMR - 1.1: Scanning the environment	
a). Discovery of users and their tasks .	User profiling, task determination and analysis, assessing the level of user experience of the users.
b). Assessing previous change history .	Determining the resultant user experience with respect to any previously introduced product. Analysing the factors impacting on user experience.
c). Analysis of the context of product use .	Examining the physical , social, technological and cultural environment in which the product is used.
d). Testing the wetness of the waters - Getting the preconceived user experience.	Facilitating an informal awareness vibe about the new product initiative, stirring up change urgency by making the users see and feel the need to change.
e). Identify the current product challenges.	Determining what features of the product have to change , the new features to add based on the arising needs of the users.
UXMR – 1.2: Formulating the vision and strategy	
a). Gathering a guiding team.	Selection and defining roles for sponsors, change activists, user experience strategists, designers and user representatives to spearhead managing user experience.
b). Setting measurable user experience objectives .	Stating the hedonic and pragmatic attributes of the system and metrics defining effectiveness, efficiency, satisfaction and enjoyable interaction
c). Defining the purpose and vision.	Stating clearly what the user experience should be
d). Identifying and recruiting stakeholders .	Selection of cross -sectional representatives of primary users, secondary users and tertiary users of the product . It is important to maintain a balance between the user experience needs of the users and the values and mission of the organisation.
e). Crafting the change strategy and timeline .	Defining the means of implementing change that suite the users and environment to create a cultural fit promoting positive user experience .
f). Brand strategy .	Developing the brand and how the changes will potentially affect the brand perception .

Scanning the environment

The preparation phase requires scanning and examination of the users and the context in which the product is used, as well as formulation of the strategy and vision for managing user experience. During the environment scan, the user experience-related aspects of the user, product and the context of product use are investigated. Examination of the users involves determining their priorities that will lead to a favourable user experience, their user profiles and their socio-cultural background. The level of user experience of the people must be assessed prior to implementation of any changes that impact on user experience. Assessing the level of user experience facilitates the design of the product with comprehension of the expectations of the people.

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Techniques such as contextual inquiry (Beyer & Holtzblatt , 1999) and user observation (Oates, 2008) are used to determine who the users are, and what their tasks and preferences are. It is important to assess the users' previous change history, as this will influence the present user experience. An assessment of change history is done through assessment of the attributes of users by means of surveys (Olivier, 2006; Creswell, 2009) and content analysis (Neuendorf, 2002; Hsieh & Shannon, 2005).

Preparing for user experience management requires determining the features of the product that do not work well for the users. This is done through user experience and usability evaluation methods such as expert reviews, user testing and user inquiry [allaboutux[2]]. Furthermore, a successful user experience management exercise requires a "*test of the wetness of the waters*". This involves facilitating an informal awareness about the new product initiative, and stirring up change urgency by making the users see and feel the need to change. The informal awareness serves to create an urgency of change with the people (Kotter & Cohen 2002). The informal awareness is created through informal means of communication such as the grapevine (Tamer & Suhaila, 2012).

Formulating vision and strategy

In addition to the above, preparation for the management of user experience requires formulation of the implementation strategy and defining the vision. Also, the strategy for managing user experience needs to be aligned with the requirements of the users so as to create a cultural fit that promotes product acceptance. The user experience implementation strategy and vision has to be supported by an agile change champion guiding team and a cross-sectional representation of stakeholders. The guiding team is required to set the timeline and implementation plan for managing user experience. The guiding team is also responsible for defining the brand strategy, measurable usability and defining user experience metrics for effectiveness, efficiency and enjoyability. Formulation of the vision and strategy needs brainstorming and dynamic interactions that stimulate innovative creativity and that can be achieved by means of focus groups (Olivier, 2006). Measurable usability and user experience metrics for effectiveness, efficiency and enjoyment should be defined beforehand to ensure that the user and business

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[2] www.allaboutux.org

requirements are met. Clearly stipulated change management preparation requirements set the pace for change implementation.

Thus, the output of the Preparation phase is a list of factors that may affect the user experience as well as a strategy on how to implement successful user experiences. The User Experience Factor Diagram (UXFD) presented in Figure 3.16 serves as a template to guide the determination of factors that influence user experience.

4.8.2. Requirement 2: Implementation

The second set of requirements for managing user experience involves putting the strategy for managing user experience into practice. The components and activities of the requirements for implementing the process of managing user experience are presented in Table 4.2.

Table 4.2: User experience management implementation requirements

Implementation : UXMR – II	
UXMR - 2.1: Awareness	
a). Formal communication of the change initiative .	Formal communication on what aspects of the products are to be introduced or improved, how that is going to affect the user experience, what aspects of the product will remain unchanged. Making the users awareness of the potential benefits resulting from product redesign or new product.
UXMR – 2.2: Desire	
a). Create an affinity for people to embrace change with positive user experience .	Employing persuasive techniques on the product such that users see and feel the need to change and embrace the product. Eliminate pockets of resistance hindering people from accepting the product .
UXMR – 2.3: Knowledge	
a). Passing on knowledge on how to use the product and the benefits of adopting the product.	Training the users such that they will be able to use discover the product features by themselves and be able to reflect on its benefits .
UXMR – 2.4: Ability	
a). Give the users the platform to demonstrate that they have the ability to transform knowledge into action .	Promoting continual and persuasive use of the product by observing the users as they interact with the product with intention of improving the user experience.

The requirements for implementing the process of managing user experience are adopted from the ADKAR model (Hiatt, 2006). Managing user experience implementation requires making the user *aware* of the product, creating a *desire* for the users to accept and use the product, imparting *knowledge* on how to use the product and providing the users with a platform to demonstrate that they have the *ability* to use the product.

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Awareness

The user's lack of awareness about a product and / or its functionalities has been identified as a factor hindering a positive user experience (Von Saucken, Michailidou, & Lindemann, 2013; Al-Ghaith, Sanzogni & Sandhu, 2010). Therefore, managing user experience requires making users *aware* of the product. Users judge a product based on their level of awareness about the product as well as their expectations (von Saucken *et al*., 2013). A product that has features that reflect a comprehension of the expectations of the users promotes a positive user experience (Roto, 2007). Hence, in order to achieve a positive user experience, the users should be made aware of the product being developed and its functionalities, as well as of new features being introduced for existing products. The users should be made aware of why the changes are being implemented, the risks of not changing and the benefits of embracing change (Hiatt, 2006) .

A user-centred design (UCD) approach has been the most popularized design philosophy aimed at keeping users aware of products (Abras, Maloney-Krichmar & Preece, 2004; Steen, 2012). UCD aims to make users aware of the product by involving users in the development of the product from the onset of product development throughout the product life cycle. Awareness is brought through advertisements, prior experience with similar products, reference from peers using the product, newsletters and posters (Obrist *et al*., 2010). Techniques such as training workshops, group meetings and one-on-one communication are used to bring awareness to the users (Hiatt, 2006).

Making users the central focus of the design process and making them aware of the product is pivotal in implementing and managing user experience for designs that are intended to be accepted and enjoyed by the users. Without awareness, many users would prefer a bad but familiar design to a better but unfamiliar one. This is a sign of resistance to change. Therefore, users need to be aware of what is changing, and of the potential benefits resulting from revamping the product or from the newly introduced product. When the users are aware of the product, its functionality and benefits of using it, they develop a sense of belonging to the product, thereby improving the user experience (Sharp *et al*., 2007). However, awareness on its own does not result in product acceptance. There is need to create a desire for the users to use the product.

Desire

User awareness does not result in the development of a need to use the applications. There is a need to create a sense of urgency and desire for the users to accept and adopt the product (Kotter & Cohen, 2002; Hiatt, 2006). A product is accepted when the desire to use it exceeds the fears and resistance, hence a need to eliminate any existing pockets of resistance that inhibit the adoption and usage of the product.

A desire to accept and use a product is promoted by means of design techniques that focus on persuasion, emotions and trust, and that are aimed at creating an affinity for the users to embrace the changes with a positive user experience (Schaffer, 2008). Designing for persuasion involves influencing users to change their behaviour and attitudes to overly accept a product without coercive powers (Schaffer, 2008; Fogg, 2009). Persuasion is achieved by arousing the physiological, social and behavioural aspects of the user (emotions) with the intention of building confidence (trust) in the product (Schaffer, 2008).

Kotter and Schlesinger (2008) proposed approaches to increase a desire for people to change and to deal with resistance. The techniques used to deal with resistance to change include informing and educating the people about the change, making the people actively participate in the change effort, negotiations aimed at striking an agreement, managerial support and co-opting. These techniques are in harmony with Hiatt's (2006) means of creating a desire for people to change. Hiatt (2006) proposes that the change must be effectively sponsored, together with coaching of the people about the change. Offering training and making people active participants in the change initiative makes them more susceptible to accepting the change. Change sponsorship is effective when an individual who has influence over other people is seen as being committed to the change. Thus, managing user experience in a community-based context requires identification of the people who are respected in the community and convincing them to buy into the change initiative (Kotter & Cohen, 2002). Such influential people become the change champions to spearhead a desire to accept, adopt and use the introduced product. Another technique for promoting a desire to change is to bring other users to share the benefits and pleasure of interacting with the product. Sharing of success stories promotes a desire for the user to accept using the product in order for them to enjoy the testified benefits (Fawcett, Magnan, & McCarter, 2008)

Conversely, the users may be aware of the changes and have a desire to embrace the new initiatives. However, if they do not have knowledge about how to use the product, then the whole change initiative is susceptible to the tyranny of legacy systems failing to provide a favourable user experience (Hiatt, 2006).

Knowledge

Managing user experience requires that users be provided with knowledge on the product and on how to change in order to use the product (Hiatt, 2006). Users need to know the benefits associated with the use of the products and how to use the technology. The techniques for imparting knowledge include training and education, peer coaching and forming user support groups. Users are educated about the changing features of the product through prototypes that demonstrate how the product works. When the users have the knowledge about the product, they will be able to discover the product features by themselves and will begin to reflect on their user experience. The more knowledgeable the users become about the product, the more they are inclined to use it productively and become loyal to it. Knowledge has to be transformed into practice by providing users with the platform to demonstrate that they are able to use the product.

Ability

Knowledge of how to use a product effectively is necessary but not sufficient to yield a positive user experience; the ability to use the product effectively, satisfactorily and with pleasure should also have been demonstrated. Ability is fostered by continuous practice, progression of time, the pragmatic and hedonic characteristics of the product as well as by the physiological and psychological attributes of the user. Hence, users should be given a platform to demonstrate their ability to use the product. It is through continual usage of the product that the proficiency of use may be evaluated. Continual usage promotes long-term user experience. A product must therefore have captivating features that promote its usage and adoption by the users. Managing user experience requires that users be given a platform to transform their knowledge into practice.

Techniques such as hands-on exercise during training and coaching help to promote ability. Ability and confidence can be improved by making users become ambassadors that share the benefits and pleasant interactions of the product with others. Once the users have demonstrated

their ability to use the product with positive user experience, there is a need that the user experience should be sustained and be made to stick (Kotter & Cohen, 2002).

4.8.3. Requirement 3: Sustaining user experience

Change preparation and implementation aims to manage the behaviours and subjective emotions that result in the experience of the users interacting with the product. Managing user experience may be planned well, and may go according to plan on implementation, but may still fail to yield lasting results due to lack of sustainability. An effective approach to managing user experience during change preparation and implementation will result in a positive user experience. It has been discussed earlier that the development of user experience is not a one-step event, but an evolutionary process (c.f. section 4.2). Humans are creatures of habit and users are consequently subjected to revert to their traditional ways of doing, thus letting go of the aimed user experience (Skinner, 2005). Therefore, the newly cultivated must be enshrined to make it last by reinforcing and continuously improving it. A need therefore exists to make the new user experience last and to sustain it to prevent users from reverting to their prior practices. It follows that the change in user experience must be sustained. Table 4.3 presents the components of requirements for sustaining user experience.

Table 4.3: User experience sustainment requirements

User Experience Sustainment : UXMR – III	
UXMR – 3: Ensuring a lasting positive user experience	
a). Celebrating short term achievements.	Recognising successful positive anticipatory, momentary and episodic user experience goals
b). Reinforcing.	Promoting and ensuring an addictive point-of-no return positive user experience. User experience can be reinforced by employing techniques of persuasion, emotion and trust in the design and development of products.
c). Persuading for continuous user experience improvement.	Continuous user research aimed to understand and address any emerging needs of the users . The new requirements and needs of the uses can be implemented using agile and iterative techniques.

In change management, the change is made to stick by celebrating short-term wins (Mento *et al*., 2002), by refreezing (Lewin 1945) and by reinforcing (Hiatt 2006). Hence, managing user experience requires that user experience must be sustained to make it a last in the long run.

Recognizing short-term user experience

User experience development consists of anticipatory user experience, momentary user experience, episodic user experience and long-term user experience (c.f. section 4.2). Sustaining a lasting long-term user experience is achieved by recognizing and rewarding anticipatory user experience, momentary user experience, episodic user experience and long-term user experience. Users get to benefit from the rewards of positive user experience when their interaction with a product becomes pleasing, effective, efficient, fun and overly satisfactory. Such attributes of positive user experience lead to the development of a positive user-product relationship and ultimately to brand loyalty. Long-term user experience is a result of the accumulation of the overall user experience over time. The long-term user experience results in a user-to-product relationship and product loyalty. It is important to sustain long-term user experience so that the users become product addicts and do not revert to their old habits.

Reinforcing

Once the users have demonstrated loyalty to the product, it follows that the user experience has to be reinforced to make it stick. Reinforcement is done by implementing agile product development processes which are aimed at continuously improving the user experience. This is achieved by designing for persuasion, emotion and trust. Designing products for persuasion, emotion and trust keeps the users captivated in their interaction with the product. Such techniques aim at nurturing a free-will change in behaviour by appealing to the social influence factors of the people (Fogg, 2009; Schaffer, 2008). Thus, the lasting user experience is promoted by a product development process that is in line with the social and cognitive expectations of the users.

Continuous user experience improvement

Similar to total quality management and continuous process improvement, the quality of user experience has to be improved continuously. Sustaining user experience requires continuous improvement thereof. Therefore, there is need for ongoing research to constantly determine emerging user needs and business requirements. User experience is sustained by a continuous scan of the environment, and by investigation of emerging user needs and business requirements.

Arising user needs and business requirements are then incorporated, so as to improve on the features of the product and thereby improve on the user experience.

4.8.4. Requirement 4: Monitoring and evaluation

The process of monitoring and evaluation is central to managing user experience and has to be done during every stage. Monitoring and evaluating user experience requires strategic communication, measuring user experience and consolidating lessons learnt (Hiatt, 2006; Mento *et al*., 2002; Kotter & Cohen, 2002). Table 4.4 presents the requirements of user experience monitoring and evaluation.

Table 4.4: User experience management monitoring and evaluation requirements

Monitoring and Evaluation : UXMR – IV	
a). Strategic communication .	Sending the right messages to the correct people in the right context and at the right time.
b). Measuring user experience.	Mapping transitional state to desired outcome and evaluating the level of the user experience of the people at each phase of the management of user experience.
c). Consolidation of lesson learnt.	Tracking any lesson learnt at each phase of managing user experience. The objective is to improve on the process of managing user experience in subsequent projects. Any variances to the defined strategy and expected outcome are determined and rectified.

Strategic communication

Monitoring and evaluating a change in user experience requires that one should strategically communicate the right message to the correct people and at the right time and within context at every stage of managing user experience. Sending wrong messages to wrong people in a wrong context is a recipe for creating resistance and overall failure to manage user experience (Hiatt, 2006)]. Specific users have to be provided with contextually relevant information; only then will they positively accept and enjoy their interaction with the product that is being developed or introduced.

Measuring user experience

The process of managing the evolution of user experience is a journey characterized by a variety of hurdles. Evaluating and measuring user experience is crucial to identify both the hedonic and pragmatic user experience factors that may arise during product usage. Measuring user

experience is important in order to map the transitional state of the experience of users and to the set the objectives for managing user experience. During evaluation of the user experience, the level of user experience of the people is assessed at different stages of its management. A variety of user experience evaluation techniques can be used to determine the hedonic and pragmatic attributes of the product that hinder positive user experience. These include user observations, contextual inquiry, user testing and expert reviews (allaboutux.org). Measuring user experience is accompanied by an iterative implementation of recommendations that are aimed at improving user experience.

Consolidation of lessons learnt

Moreover, it is important to track and consolidate lessons learnt in order to improve on the process of managing user experience (Mento *et al*., 2002). Consolidating the lessons learnt helps to identify any variances and discrepancies as to why things did not go according to plan, and to formulate contingencies for what has to be done next time in order to rectify the observed discrepancies. This further helps to identify any feedback loops that were missed and new requirements that emerged from the users. The aim is to unveil contingences for what has to be done for positive user experience to be achieved. Like any change management project, managing user experience requires an assessment of the process impact and outcome. The outcome is determined by comparing the business and user goals as well as the metrics of user experience against the achieved user experience at a particular stage in the management of user experience. Impact assessment thus entails evaluating the level of experience of the product users at each stage of the management thereof.

Managing user experience requires preparation, implementation of the set plan, sustaining the user experience and monitoring and evaluation of the user experience. These requirements have been presented in the UXMR Framework (c.f. Figure 4.9). The framework processes are iterative and loops continuously. Any arising needs observed during monitoring and evaluation has to be implemented appropriately and in such a way that all requirements are satisfied. Identification of the requirements for the management of user experience lays the foundations toward the development of a model for managing user experience. The related activities and methodological approach to the management of user experience is discussed in Chapter 5.

4.9. APPLICATION OF USER EXPERIENCE MANAGEMENT REQUIREMENTS (UXMR) FRAMEWORK

Various guidelines and approaches aimed at designing for positive user experience and managing change have been analyzed. It has been established that the existing approaches for managing user experience are inadequate, considering the diversity of factors that influence user experience. The purpose of this study is to develop a model for managing user experience. The UXMR Framework serves as the basis for identifying the components of such a model. The framework proposes the requirements, tasks, related activities and techniques for managing user experience. The purpose of the framework is to guide the assessment of the level of user experience of the target users, determine the factors that impact on user experience and provide interventions for improving user experience. The findings are then used to develop a strategy for managing user experience. Practitioners will have to employ techniques for creating awareness and desire, for imparting knowledge and ability and for sustaining the user experience. The requirements, tasks, activities and techniques serve as the foundational components of the model for managing user experience.

These requirements were evaluated with respect to their applicability and relevance through review of academic publications in international conferences focusing on HCI. The review was performed by subject domain experts, and feedback was provided during conference presentations. The results of the feedback from the subject domain experts are presented in Chapter 6.

4.10. SUMMARY

This chapter introduced the concepts associated with the evolutionary nature of user experience by presenting the User Experience Lifecycle Chart (UXLC). The evolutionary nature of user experience drives the need to manage change in user experience. A working definition of change management, together with the analysis of existing change management models, was given. The importance of managing user experience was discussed. This led to the identification of the requirements for managing user experience. An understanding of the requirements for managing change is crucial for the development of a model for managing user experience.

User experience practitioners and academics emphasize that a user experience evolves, and that a positive user experience is important for the acceptance of any product. The emphasis is on providing the means and techniques aimed at designing products that are appealing for positive user experience, and on how to evaluate the user experience. However, they are lacking in the provision of solutions on how to manage the change in user experience that is brought about by the implementation of such products.

Change management principles are considered to have the potential to enhance positive user experience. However, from the change management perspective, various authors have developed models aimed at managing the transition and guiding the implementation of change. The focus of these models is to guide implementation and manage change at corporate level. These authors appreciate that people are affected by change in user interfaces and that the change has to be managed. Legris and Collerette (2006) cited people as the major obstacles in successful project implementation and management. Managing the "*people side*" of change is a core aspect of change management (Creasey, 2007). This involves making sure that the expectations and experiences of the people are satisfied. Failure to reach such expectations results in the project being rejected. Existing change management models place significant focus on change awareness, communication and reinforcement. They neglect the means of managing change in the behaviour of the people and their user experience. This chapter therefore concludes that there is a great need to manage user experience.

In conclusion, the chapter highlighted the fact that a gap exists in the body of knowledge regarding the management of user experience. Hence, the requirements for managing user experience have been suggested. The proposed requirements are preparation, implementation, sustaining user experience and monitoring and evaluating the process of managing user experience. These requirements are important components for the development of a model for managing user experience, which is presented in Chapter 5.

CHAPTER 5: USER EXPERIENCE MANAGEMENT MODEL

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INTRODUCTION

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Introduction

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5.7. SUMMARY

5.0.   INTRODUCTION

The previous chapters introduced the research that outlined the objectives of, and rationale for, the study. A review and analysis of related literature was done in order to provide the background that substantiates the existence of the problem as well as the inadequacy of existing knowledge to solve the identified problem. The study now moves on to propose a solution by developing a model as an artifact that is aimed at managing user experience. The purpose of this chapter is to answer the main research question that states:

> *What are the components of a model for managing user experience?*

A conceptual background pertaining to the required components for the model has been identified during the literature review phase of the research. The proposed User Experience Management Model (UXM^2) infers its components from user experience and change management literature. Inferring model components from these two distinct disciplines brings novelty to the UXM^2. The proposed UXM^2 is of both descriptive and prescriptive nature in that it describes the core components that are required to manage user experience, and gives guidance on how to design products for attainment of a sustainable long-term positive user experience. This chapter commences by outlining the methodological approach used to develop the model, followed by the definition of a model and its components. A detailed design process of the conceptual UXM^2 follows, stating an overview of the primary constructs and relationships of the model components. Thereafter the model is presented, with evaluation following in Chapter 6.

5.1.   MODELS

The primary objective of this study is to develop a model for managing user experience. The concept of user experience involves a broad range of aspects. User experience is influenced by various factors. This nature of user experience requires a flexible approach that can be adjusted and applied to the different contexts that influence user experience and the related facets thereof. This need for a flexible approach justifies the selection of a model as the viable artifact to address the problem. A model has the characteristics of being abstract, conceptual, and technology-independent (Tomhave, 2005). As such, models can be applied to other related use cases with little or no modification (Lethbridge & Laganiere, 2005)

A definition of a model, typical components of a model and the types of models are discussed next.

5.1.1. Definition of a model

The abstract nature of models makes it difficult to have a unified definition of a model. In its broadest sense, a model can be considered as a construct that represents something else by illustrating the relationships of variable quantities and logical aspects of the real artifact.

This study adopts the following definition of a model, as put forward by Tomhave (2004):

> "*A model* is *an abstract, conceptual construct that represents processes, variables and relationships without providing specific guidance on, or practices for, implementation*".

The stated definitions of a model reflect that a model can be conceptual (in mind), or it can be a tangible artifact that mimics the use case of the real artifact. An understanding of the components of a model helps to comprehend the definition of a model.

5.1.2. Components of a model

Models represent the operations and mechanism of the real artifact in order to solve a phenomenon under investigation. A model identifies and explains the relationship between the different logical components and quantitative elements by means of a set of variables.

The typical components of a model are as follows (Tomhave, 2005; Lethbridge & Laganiere, 2005):

- ➢ Elements of the participating variable;
- ➢ Their relationships;
- ➢ Processes;
- ➢ Specific guidance for using and implementing the model.

5.1.3. Types and purposes of models

De Bruin, Freeze, Kaulkarni, and Roseman (2005) categorized models into three types based on their scope and purpose. The three types are descriptive, prescriptive and comparative, as presented in Table 5.1.

Table 5.1: Types of models

Type of model	Description
Descriptive	Descriptive models are used to describe some relationship between elements of the subjects under investigation. This type of model is used to evaluate the "as-is" status of the capabilities of an entity based on its "here and now" characteristics (Röglinger, Pöppelbuß and Becker, 2012; De Bruin *et al., 2005*). …. Descriptive models can be used in the management of user experience to assess the factors that influence user experience and the level of user experience of the people using a product, as well as to determine the impact of the process of managing user experience.
Prescriptive	Prescriptive models provide guidelines and roadmaps for suggesting improvement and solutions to the identified problem (Becker *et al.,* 2009*;* De Bruin *et al.,* 2005). Prescriptive models have the potential to be used to provide interventions on how to achieve a sustainable long-term positive user experience during the process of managing user experience.
Comparative	The purpose of comparative maturity models is to assess the capability of an entity compared to the best standards and performance of other similar entities or processes (De Bruin *et al.,* 2005)

The purpose of this study is to develop a model that aims to promote a sustainable long-term positive user experience. The proposed model will therefore have descriptive as well as prescriptive attributes.

5.2. MODEL DEVELOPMENT: METHODOLOGICAL APPROACH

The purpose of this section is to explore the approach used to develop the UXM^2 based on the given definition of a model, its characteristics and the guidelines of design science as motivated in Chapter 2. The nature and characteristics of the artifact being designed influence the choice of design methodology (Kothari, 2008).

Firstly, existing literature describing the process of developing models is looked at and analyzed. This is followed by a consolidation of the identified processes in order to propose a generic process for developing a model. The generic process is then applied to develop the UXM^2.

The existing processes for developing models are discussed next.

5.2.1. Procedure model for developing models

Becker, Knackstedt, Lis and Stein (2010), in conjunction with Hevner *et al.* (2004), suggested a procedure for developing a model as applied to the design of maturity models. The procedure outlines the following phases as illustrated in Figure 5.1.
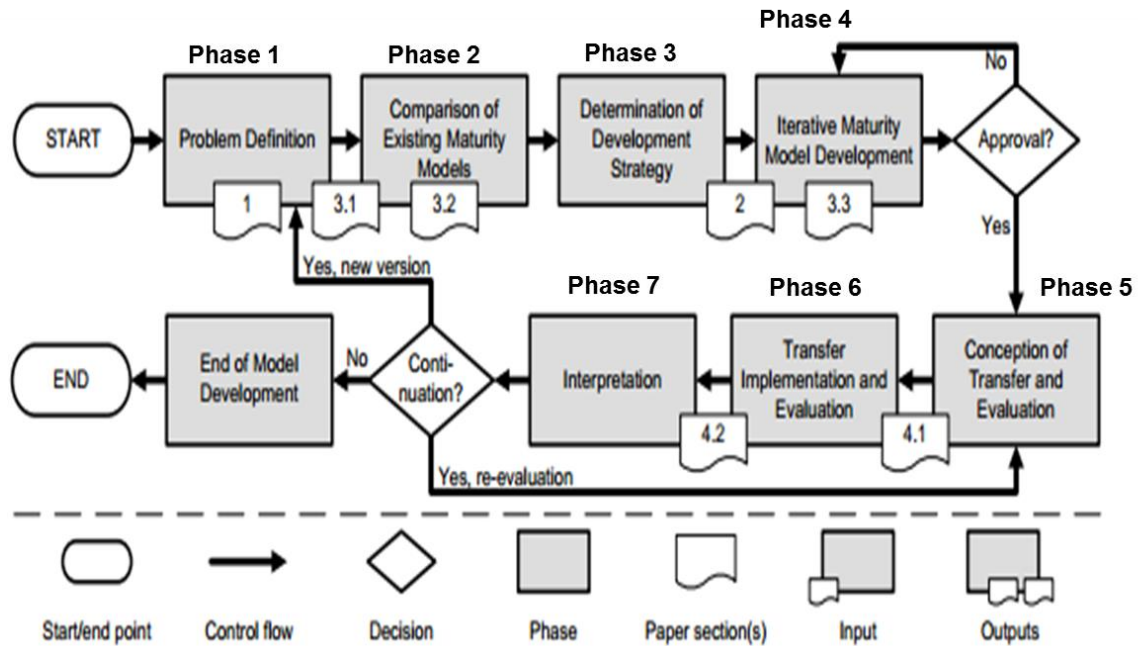
Figure 5.1: Steps for developing a model (Becker, Knackstedt, Lis, and Stein, 2010)

Phase 1 Problem definition

The first phase in the procedure for development of a model is the identification and definition of the problem. The problem is defined with respect to the context within which the model will be used. The related components of the domain within the context are defined. This is done in order to identify any discrepancies in the existing system that needs to be resolved. Thus, problem definition involves establishing the problem relevance, as would be the case in design science. The problem can be identified by means of a gap analysis in order to define the missing links in the areas of interest that need to be solved.

Phase 2: Comparison of existing models

Existing models are analyzed and the problem that has been defined is compared with the existing models. The comparison helps to determine the strategy that can be followed for the design of a similar model that is aimed at solving the identified problem.

Phase 3: Determination of the development strategy

A comprehensive comparison of existing models is requisite for guiding the determination of a well-reasoned strategy that has to be followed during the model development. The following strategies can be followed:

- ➢ Innovative development of a new model from scratch;
- ➢ Enhancing an existing model to suit the desired application context;
- ➢ Combining aspects from several models in to one; or
- ➢ Transferring structures and contents from existing models to a new application domain.

The next phase is to develop the model based on the selected strategy.

Phase 4: Iterative model development

The iterative development of the model includes iteration of the processes of selecting the design level, selecting the model development approach / strategy, designing the model and testing of the results. The iterative process of developing maturity models is in harmony with the build-and-evaluate cycle of design science.

Phase 5: Conception of transfer and evaluation

Phase 5 goes along with the guideline of research as communication of design science. This phase aims to determine the different forms of communicating results of the evaluation for the academic and user communities. A reasoned selection of the different forms that the targeted communication of the model can take is prescribed. If the evaluation includes the differentiation between groups, communication of the results should provide criteria for targeting the results at the different user groups.

Phase 6: Transfer implementation and evaluation.

The purpose of phase 6 is to make the model and its supporting tool available to the audience in a manner as specified during the *conception of transfer and evaluation* phase. The model goes through an evaluation process. The evaluation phase is similar to the design evaluation guideline of design science. Evaluation involves rigorous demonstration of the utility, quality and efficacy of the model using well-executed evaluation methods. The model should be evaluated to assess whether it satisfies the desired goals in real-life use.

Phase 7: Interpretation

Findings obtained during the evaluation are analyzed and interpreted to determine if the model meets the desired goal. If the model has to be used continually, it is either revised into a new version or goes back for re-evaluation, else it will be rejected.

5.2.2. Main phases of developing a model (De Bruin *et al*., 2005)

De Bruin *et al*. (2005) proposed an iterative sequential methodology outlining the generic phases to be followed when developing a model. Figure 5.2 shows the proposed phases for developing a model.
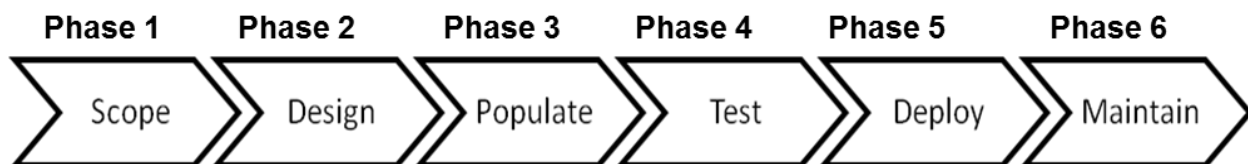
Figure 5.2: Main phases of developing a model (De Bruin *et al*., 2005)

Phase 1: Scoping

The first phase in the development of a model is to define its scope as a purposeful and innovative artifact. Scoping involves focusing the model by explicitly stating its domain of use and its purpose. The problem that is intended to be solved by the model has to be identified during scoping. Setting the scope of the model requires carrying out an extensive review of literature in order to identify related work and existing domain issues. Potential model stakeholders are also derived from studying the past and contemporary domain issues. This is in

line with guidelines number 1 and number 2 of design science. Guideline number 1 emphasizes that design science is applicable to the design of an artifact that is unique and suitable for a specific purpose. Guideline number 2 states that the artifact must yield a solution to the specified problem.

Phase 2: Designing

Designing involves establishing the target stakeholder audience of the models and gathering requirements for the target users. In establishing the model stakeholders, it is important to identify the various users, determine their rationale for using the model, establishing how they may use the model and what they will achieve from using the model. Gathering such information aids in populating the architectural requirements of the model that are of relevance when solving the problem. In that way, the artifact becomes effective and efficient in solving the problem. The artifact must therefore be relevant to solving the problems of the target users. The relevance of an artifact is a desired characteristic of design science products.

Phase 3: Populating

Once the scope and design of the model has been clarified, the next step is to populate the model constructs. Populating involves creating concept diagrams that outline the domain components and requirements needed for the model to satisfy the needs of the stakeholders and to solve the identified problem. The components must be representative of all possible domain elements; in this way the artifact attains rigor.

Phase 4: Testing

Testing is aimed at validating the relevance and rigor of the model and its components in order to assess its internal and external validity. Design science research emphasizes the building and evaluation of the artifact. The model must conform to the foundational theoretical requirements (internal validity); it must also be acceptable to the intended users with respect to its components (requirements, activities, techniques, outputs, etc.), thus demonstrating external validity. Testing involves evaluating how well the model satisfies the basic requirements of typical model characteristics and addressing the needs of the target audience in solving the identified problem.

The model should undergo a series of *develop* and *evaluate* iterations until the stated objectives are met, after which the model may be deployed for use.

Phase 5: Deploying

After satisfying the validity and reliability testing, the model is put into use to verify its applicability and generalizability. It is important to ensure that the model is strategically made available to the right audience, in the right manner and within the correct domain of model use. Strategic deployment of the model makes it useful and relevant for the context of use. Deploying is associated with communication in design science research.

Phase 6: Maintaining

Extensibility and flexibility are key characteristics for the model to be successful. The needs of the people change over time. Furthermore, the contextual domain issues are dynamic. The model therefore needs to be maintained and be kept agile in order to accommodate the changing environment.

The discussion on the methods of developing a model that was presented earlier, sets the basis for proposing a generic process for developing a model. The methods discussed in sections 5.2.1 and 5.2.2 have been selected because they are in harmony with the guidelines of design science. Design science has been motivated as the appropriate research paradigm to be adopted for the development of the UXM^2.

Section 5.3 presents a generic process for developing models, based on the methods that have been discussed in sections 5.2.1 and 5.2.2.

5.3. A GENERIC PROCESS FOR DEVELOPING MODELS

A generic procedure for developing a model is proposed, based on the work of De Bruin *et al*. (2005) and Becker *et al*. (2010). Their methods and processes for developing models are analyzed and combined to present a hybrid procedure that will be adopted to design the UXM^2. A choice of components for the proposed generic procedure is made so as to satisfy the guidelines of design science (Hevner *et al*., 2004).

An analysis of the method postulated by De Bruin *et al*. (2005) revealed the following inadequacies in the process:

➢ There is no problem definition and specification of problem relevance;

➢ It does not address the need for communicating the model; and

➢ It does not consider the need to develop a strategy for developing the model.

The following shortfalls were identified from the process suggested by Becker *et al*. (2005):

➢ The focus area and development stakeholders are not specified. The problem relevance may not be justified without specifying the intended domain for using the model;

➢ The process is silent on the need to specify the target users of the model, how they will use the model and what they will achieve from using the model; and

➢ There is no mention of implementation and maintenance of the model.

A generic procedure for developing a model is presented. It was developed by combining phases from Becker *et al*. (2010) and De Bruin *et al*. (2005). It also follows the guidelines of design science. The shortfalls identified for each of the models have been incorporated in the proposed procedure. The phases of the model are iterative, as depicted by the dotted arrows.

The proposed procedure is presented in Figure 5.3.
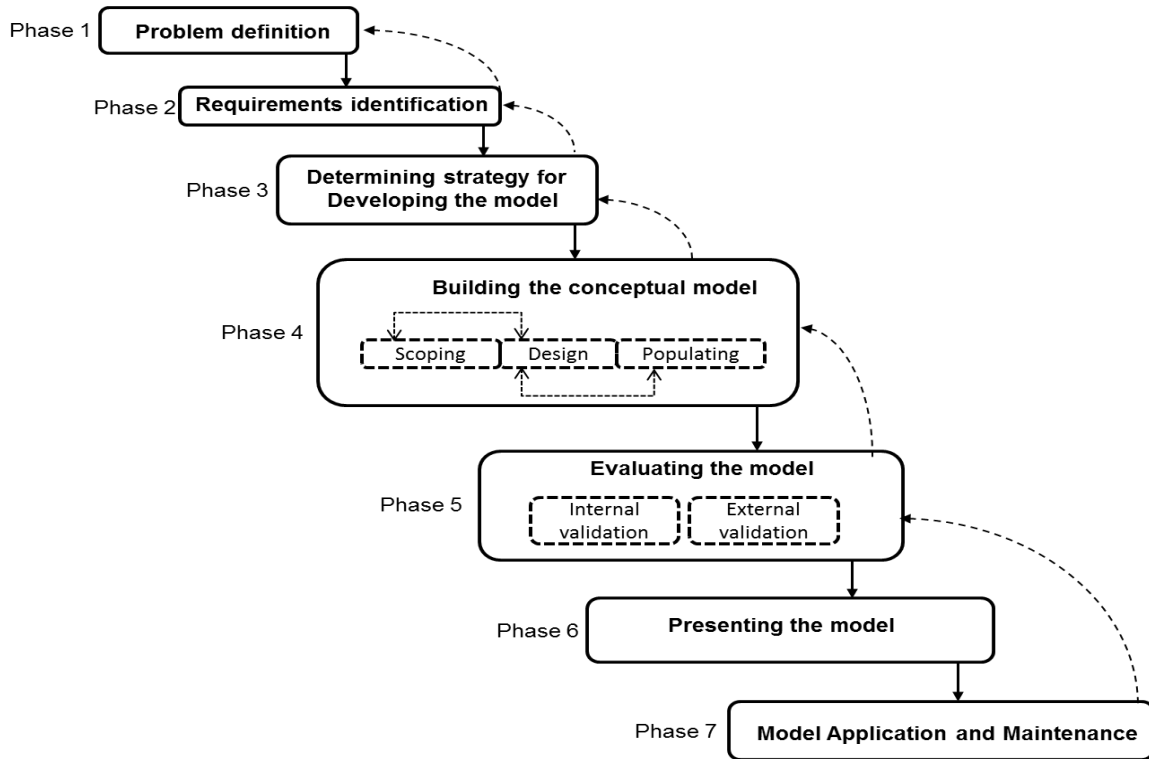
Figure 5.3: Generic procedure for developing a model

5.3.1. Phase 1: Problem definition

The first phase in developing a model requires that the problem to be solved by the model should be defined. An investigation into the problem can be done by means of a study of literature within the context of the domains that are addressed by the model. Existence of a problem can also be identified through observing the practical issues in the domains of interest. The identified problem(s) is then contextualized so that it becomes defined and relevant. Gap analysis techniques may be used to define the problem.

The requirements for developing the model can be identified based on the problem definition.

5.3.2. Phase 2: Requirements identification

The requirements for defining the model can be obtained through a review of other models and by observing contemporary real-life objects for which the model is developed. Requirements elicitation aims to determine the components, activities and techniques that are desired for the

model. Methods of gathering requirements such as literature review, observations and subject domain expert inquiry can be used to elicit the requirements.

5.3.3. Phase 3: Determining the strategy for developing the model

It is always important to formulate the plan of execution with respect to model. A strategy for developing the model outlines how the requirements will be addressed in order to solve the defined problem. Becker *et al*. (2010) suggested the following strategies for developing a model:

- ➢ Innovative development of a new model from scratch;
- ➢ Enhancing an existing model to suit the desired application context;
- ➢ Combining aspects from several models into one; or
- ➢ Transferring structures and contents from existing models to a new application domain.

Hence, an optimal strategy for developing the model should be chosen. The choice of the appropriate strategy depends on whether similar models exist, the availability of information on the subject domain as well as the domain within which the model has to be applied.

5.3.4. Phase 4: Building the model

This phase is an adaptation of the method suggested by De Bruin *et al*. (2005) (c.f. section 5.2.2). The identified requirements have to be put together and the relationships between the components will be defined. The following have to be done when building the model:

Scoping: This involves defining the focus areas of the model within the domain of interest. A team of stakeholders has to be selected. The stakeholders help by specifying their needs with respect to what they want to achieve by using the model, and how they will use the model. The stakeholders will also help (during the evaluation phase) to determine if the model has addressed their needs.

It is advised that a cross-sectional representation of the target users of the model should be selected as stakeholders. This ensures that the needs and interests of all the target users of the model will be satisfied.

Designing: The following specification aspects of the model are addressed during design:

➤ Who will be using the model;

➤ How the model can be used and how it can be applied in other focus areas within its domain of use;

➤ Why the model has to be used; and

➤ What the users of the model can achieve by using the model?

Populating: The various components, activities and techniques that have been identified in phase 2 are then brought together by specifying the relationships that exist between the components and the sequence of activities within the model. The output that results from the populating phase is the domain component diagram. This diagram shows the disciplines that contribute to the components of the model.

5.3.5. Phase 5: Evaluating the model

Both Becker *et al*. (2010) and De Bruin *et al*. (2005) mentioned the need for evaluating the model. This phase goes along with evaluation in the guidelines of design science. The process of evaluating the model aims to assess the relevance and rigor of the selected model constructs as well as the contents of the model. Testing involves an evaluation of how well the model satisfies the basic requirements of typical model characteristics (internal validity) and addressing the needs of the target audience (external validity) in solving the identified problem.

5.3.6. Phase 6: Presenting the model

The model should be communicated to the target users in forms that users can understand. It is important to ensure that the model is strategically made available to the rightful audience, in the right manner and within the correct domain of model use. The model should be accompanied by an explanation of the terms used in the model as well as the guidelines for using the model. Presentation of the model goes with the deploying phase (De Bruin *et al*. 2005), and the guideline of communicating the artifact to both techno-centric and management audiences.

5.3.7. Phase 7: Application and maintenance

The final phase involves the practical application of the model in order to solve the problem that was defined. The generalizability of the model can be obtained by using the model in different

domains. During the practical use of the model, any shortcoming will be noted and the model will be modified. Thus, a proposed generic procedure for developing a model acknowledges the importance of making the model flexible and extensible in order to make it adjustable and adaptive to the agile environment.

The next section illustrates how the proposed procedure for developing a model has been used to design the UXM^2.

5.4.   DESIGNING THE USER EXPERIENCE MANAGEMENT MODEL (UXM^2)

User experience consists of attributes from various disciplines. It is subjective and the expectations and feelings of the users rapidly change with the rapid developments in interactive products. Such complexity makes it difficult to develop products that satisfy and captivate the users for a sustainable positive user experience. The purpose of this study is to propose a model aimed at managing user experience and promoting a sustainable positive user experience of the people using interactive products.

5.4.1. Phase 1: Problem definition

The first phase in developing the UXM^2 was to analyze existing literature within the domain of user experience and change management. A description of the problem was presented in Chapter 1. The following problem was identified:

There lacks a criterion for managing user experience in order to promote a sustainable long-term positive user experience

The proposed model, UXM^2, serves to address the stated problem by providing guidance on how to manage the user experience and how to make the user experience sustainable, despite the changes in the user interfaces.

5.4.2. Phase 2: Requirements identification

Chapters 3 and 4 served to identify the required components for a model that is aimed at managing user experience. The requirements identification process was done by analyzing literature in the domain of user experience and change management. It has been determined that

the management of user experience requires an understanding of the factors that influence user experience, as well as determination of the components required for managing user experience. The factors that influence user experience were presented in the UXFD (c.f. Figure 3.16) and the requirements for managing user experience were presented in the UXMR Framework (c.f. Figure 4.9).

5.4.3. Phase 3: Determination of the strategy to develop the model

The UXM^2 is inferred from concepts of user experience and change management. Hence, the strategy employed is to combine aspects from existing models in change management and user experience. Components of models from change management are transferred and used in user experience.

5.4.4. Phase 4: Building the model

The UXM^2 was constructed following the main phases of developing a model proposed by de Bruin *et al.* (2005). The application of these phases is discussed next.

Scoping

The focus of the model is to solve problems that pertain to issues in the Human-Computer Interaction domain. It is inferred from the disciplines of user experience and change management. The stakeholders who participated in the development of the UXM^2 are practitioners in user experience and change management, and academic professionals in the domain of HCI.

Change management approaches and user experience principles are inadequate in terms of providing a solution for managing user experience. Therefore, the purpose of the UXM^2 is to provide criteria for managing and improving on the user experience of the people using the products.

Designing

Designing aims to define the target audience of the model and their needs. An analysis of the target users and their motivation for using the UXM^2 is presented in Table 5.2.

Table 5.2: Target audience of UXM^2

	Target users of UXM^2	
	User experience practitioners	Product designers
Why use UXM^2	To manage and promote the development of a sustainable long-term positive user experience.	To provide user-centred change management based design direction for designing products for positive user experience.
How they use UXM^2	As a tool to assess the level of user experience of the target users, factors impacting on user experience and suggesting interventions for improving the user experience.	By integrating the model in the product development lifecycle.
What to achieve using UXM^2	A user ready audience with a sustainable long-term positive user experience.	Designing products that comprehend the expectations and skills of the target users.

The target users of the proposed UXM^2 are user experience practitioners and product designers. A variety of guidelines and principles exist to guide the design of products for user experience. However, the guidelines do not cater for the change in user experience, different levels of user experience and the diverse factors that influence the user experience of people. Thus the UXM^2 is aimed at guiding user experience practitioners to manage user experience by directing the design of products for positive user experience. This is done by assessing the level of user experience of the target users, determining the factors that influence user experience and providing interventions for improving the user experience. For product designers, the UXM^2 serves to provide user-centred design directions for designing products for positive user experience.

Populating

As discussed earlier, the model infers its components from the disciplines of user experience and change management. The proposed model consists of factors impacting user experience, requirements for managing the identified factors and techniques for implementing the requirements to manage the factors. The conceptual model components are presented in Figure 5.4.
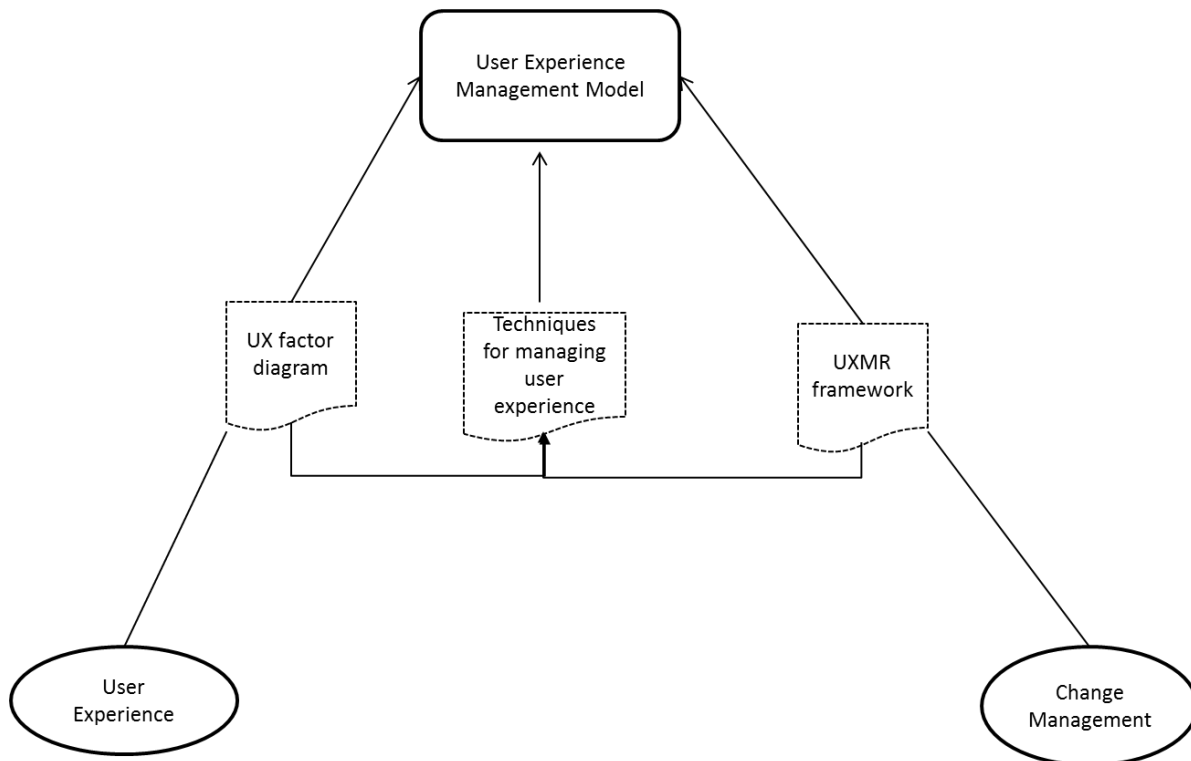
Figure 5.4: UXM² conceptual model component diagram

The component diagram illustrates the domain concepts and how they contribute to the UXM². The constructs of the model are from the following areas: the user experience domain, from which the factors that impact on user experience were identified and presented in the UXFD (c.f. Figure 3.16); from change management, from which requirements for managing user experience were incorporated into the UXMR Framework (c.f. Figure 4.9) and from the interventions techniques for managing user experience that were discussed along with the UXMR Framework.

5.4.5. Phase 5: Model evaluation

The process of evaluating the model aims to assess the relevance and rigor of the selected model constructs and the contents of the model. Evaluation of the model does not involve assessing the effectiveness of the process of managing user experience. The UXM² went through stringent validation to ensure that it is useful to the practitioners, and to ensure that the model makes a valuable contribution to the knowledge base. The internal validity of the model was evaluated using argumentation of literature, as well as by expert review through interviews with subject domain experts and feedback in the form of comments from double-blind peer review of the publications submitted to international conferences in HCI. The model was tested for external

validity by demonstrating its applicability using scenarios that simulate the real use cases of the model. Subject domain experts were given the scenarios and they were asked to apply the model as they would use it in real use cases. The experts where then asked to evaluate the applicability and relevance of the model, based on the scenarios. A justification for the use of these approaches to evaluate the model was presented in Chapter 2.

5.4.6. Phase 6: Presenting the model

Guideline number 7 of design science states that the output of design science research must be communicated and presented effectively to both technology-oriented and management-oriented audiences. This has been achieved by presenting the UXM^2 to academic audiences at an internationally recognized conference in HCI (INTERACT '13). Presenting the model to the academic audience contributed to the knowledge base. The model was also presented to subject domain experts, consisting of academic professionals in the field of HCI and user experience practitioners, for evaluation of its relevance and applicability.

5.4.7. Step 7: Model application and maintenance

The application of the model has been demonstrated through the use of scenarios. The scenarios were modeled to mimic the use cases of the model. Subject domain experts had to use the model to determine its applicability. The feedback that was obtained from experts was used to refine the model, thus maintaining the model.

Practical application of the model required the study to be conducted over a longitudinal time horizon. Time has been a constraining factor, and this research has been delineated not to cover the application and maintenance in actual use. For future work, the model may be used in a longitudinal case study where the model can be practically applied to manage user experience. In this way, the model may be generalized in terms of its applicability and flexibility for maintenance.

The UXM^2 consists of phases outlining requirements, activities and tools aimed at addressing the factors that influence user experience. The proposed model for managing user experience is discussed next.

5.5.   THE USER EXPERIENCE MANAGEMENT MODEL (UXM^2)

The previous sections outlined the procedure that was used to design the UXM^2 and the components of the UXM^2. The purpose of this section is to present the model with the identified components amalgamated. The components of UXM^2 have been introduced in detail in section 5.3 by outlining their description together with the associated requirements, activities, techniques and the expected outcome. The UXM^2 consists of phases, requirements, activities and techniques that are required to manage user experience. Also, the model suggests the expected outcome at each phase of managing user experience. The presentation of the components of the model is illustrated in Figure 5.5.
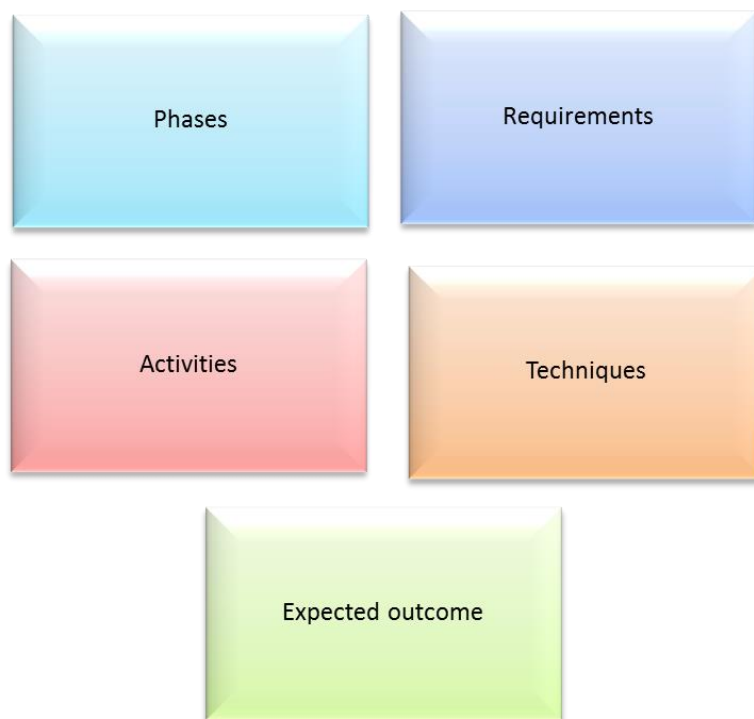
Figure 5.5: Color coding presentation of UXM^2 components

Different color codes have been used to present the phases, requirements, activities, techniques and expected outcomes of the model in order to increase the visibility of the model components. Figure 5.5 depicts the color-coding, showing how the components are presented in the model.

The UXM^2 is presented in Figure 5.6.
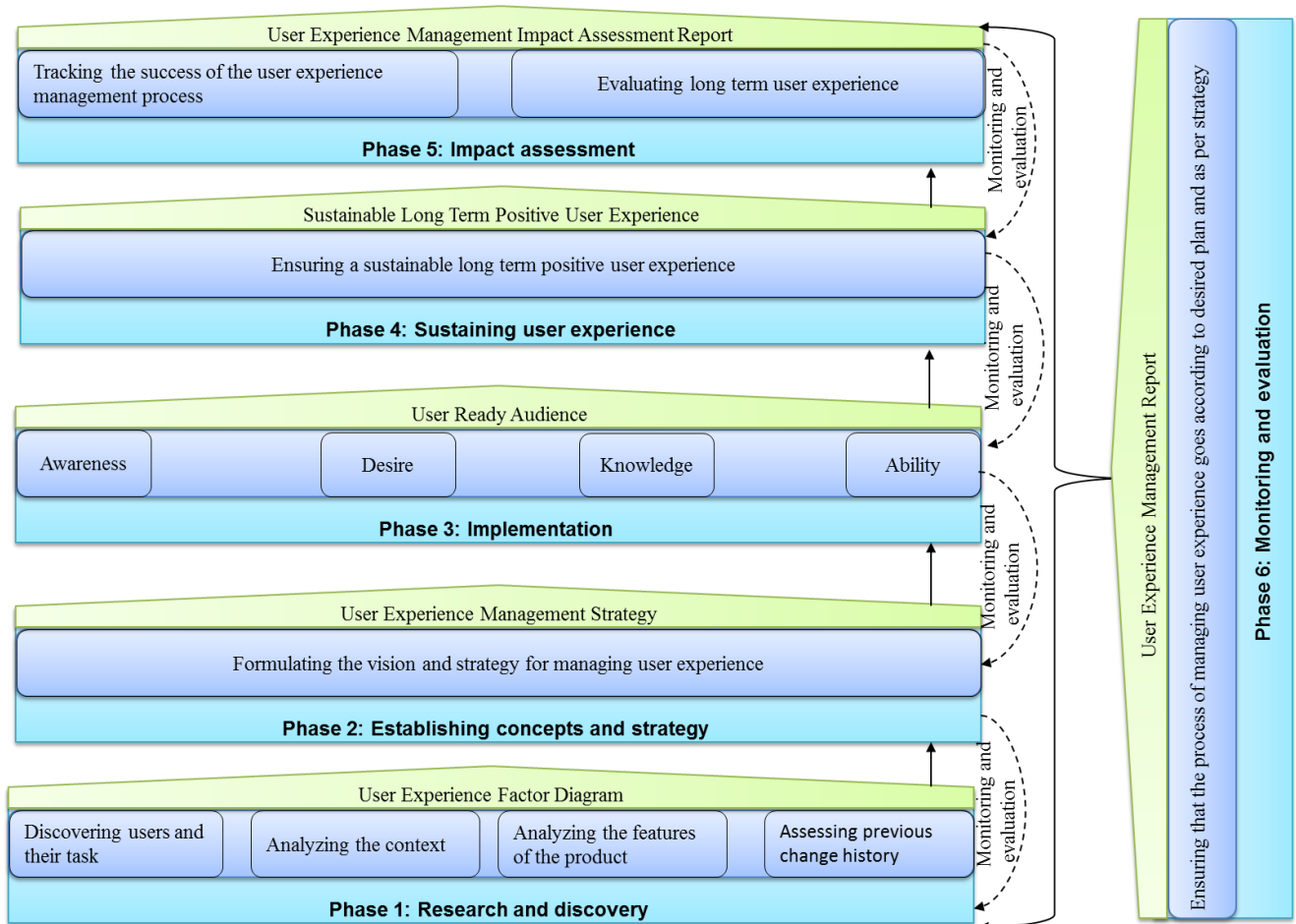
Figure 5.6: User Experience Management Model (UXM²)

The purpose of the proposed model is to manage the user experience of people using ICT products and to promote a sustainable long-term positive user experience. It has been established that a change in the user interface of a product or the introduction of a new product subsequently influences the user experience of the people. Furthermore, it has been discussed that the development of user experience is not a once-off thing, but a process that involves transitions. Hence, the UXM² aims to guide user experience practitioners and product designers or developers on how to introduce changes to the products in a way that does not hinder the user experience. The model therefore seeks to cultivate the development of a sustainable long-term positive user experience.

The UXM^2 consists of six phases. The phases are iterative and there is a process of monitoring and evaluation at each phase. Figure 5.6 shows the phases of the model, the requirements for managing user experience and the expected outcome of each phase.

A high-level presentation of the phases involved in managing user experience is shown in Figure 5.7.
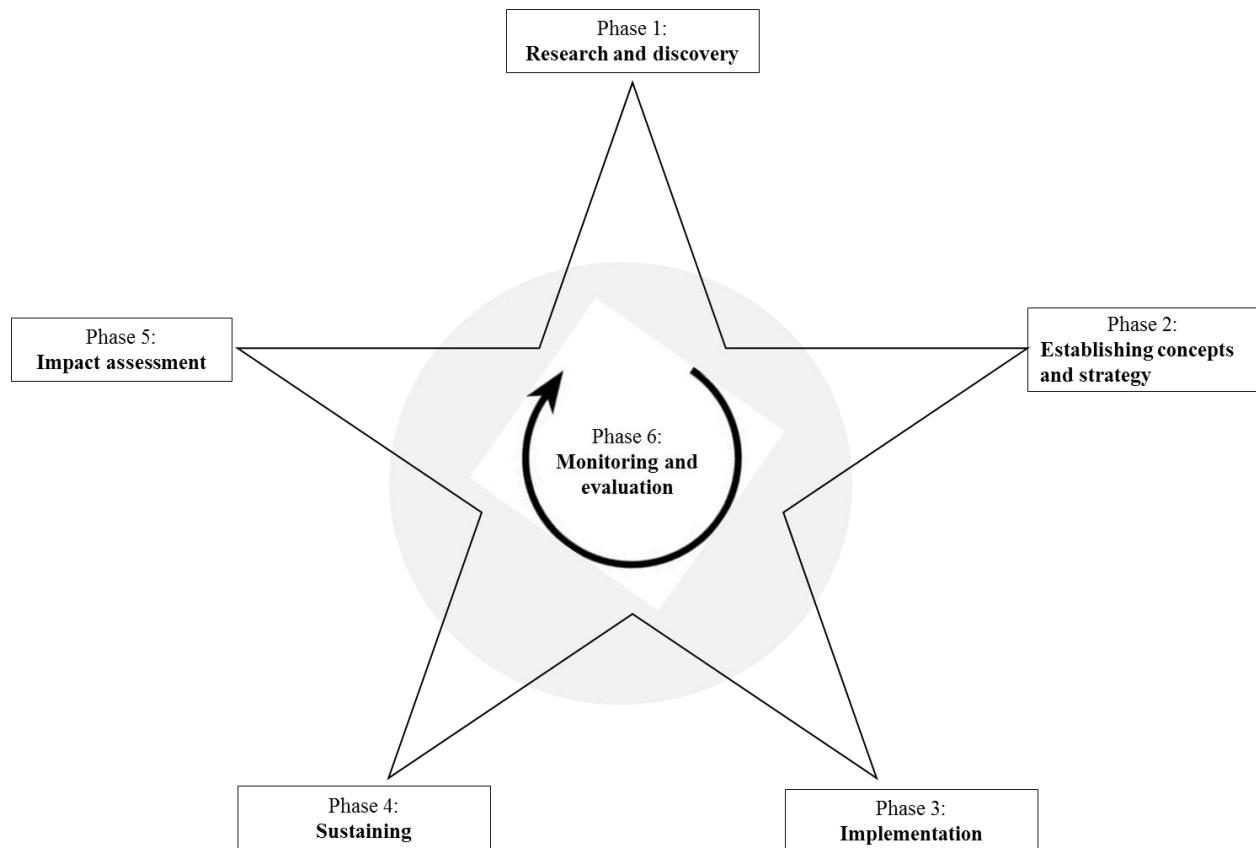
Figure 5.7: Phases for managing user experience

A discussion of each of the phases for managing user experience is presented next.

5.5.1. Phase 1: Research and discovery

One cannot manage that which one does not know; hence managing user experience requires researching and discovering the factors that influence user experience. This involves investigating the characteristics of the users, the features of the product and the context in which the product is used. The output of researching and discovering is a list of factors that influence

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user experience, to be presented in a blueprint template based on the User Experience Factor Diagram presented in Chapter 3.

Figure 5.8 shows the respective requirements, activities and techniques for discovering the factors that influence user experience.

Research and discovery				
Requirements	Discovering users and their task	Analyzing the context	Analyzing the features of the product	Assessing previous change history
Activities	Determining the characteristics and profiles of the users and the nature of their tasks.	Investigating the social, physical, and technological environment in which the product is used.	Determining the features of the product that work well for the users and those that they find difficult to interact with.	Determining how the users reacted to previous changes to product features or introduction of new product.
Techniques	Context inquiry, interviews, surveys, questionnaires, user observations.	Context inquiry, user observation, field studies.	User testing, expert reviews, user observations, context inquiry.	Document analysis, user inquiry (interviews and questionnaires).
Expected outcome	User Experience Factor Diagram			

Figure 5.8: User experience management research and discovery

It is important when managing user experience to do thorough research and to discover the factors that influence user experience. Researching the factors that influence user experience requires a discovery of the users, their tasks, the context in which the product is used, analysis of the product and researching how the users could have reacted previously to the introduction of a new product or any changes in the product, and how such reactions to change influenced the user experience of the people. The process of researching the factors that influence user experience may be guided by adopting the 5W+H heuristic framework (Heim, 2007). The 5 W+H heuristic framework helps to identify who the users are, what tasks they perform, and when and where they interact with the product. It also leads to identifying why and how the users would want to use the product.

Techniques like contextual inquiry, interviewing the users, survey, expert inspection methods, user observations, user testing and document analysis are used during research and discovery.

The techniques help to investigate the users, their tasks, features of the product and also the context in which the product is used.

The expected output of user experience research and discovery is a list of factors that influence user experience. A working template for presenting the UXFD has been presented in Chapter 3 (c.f. Figure 3.16). The UXFD outlines the factors that influence user experience. An understanding of the factors that influence user experience brings an effective formulation of a strategy for managing user experience.

5.5.2. Phase 2: Establishing the concepts and strategy

The second component of managing user experience involves establishing the concepts and formulating the strategy for managing user experience. Strategy formulation and establishment of concepts set the foundation and a way that has to be followed for the successful management of user experience. The strategy for managing user experience is formulated based on the factors that were identified to influence user experience, derived from the research and discovery phase. Thus, after determining the factors that influence user experience, it follows that there is a need for formulating a plan on how to address the factors identified so as to achieve a good user experience. A strategy for managing user experience entails recruiting sponsors to spearhead a positive user experience, selecting user experience champions to support product acceptance, formulating the vision of the product, setting specific user experience goals and defining the budget.

Figure 5.9 shows the respective requirements, activities and tools for establishing the concepts and strategy for managing user experience.

Establishing the concepts and strategy				
Requirements	Formulating the vision and strategy for managing user experience			
Activities	Gathering a guiding team.	Identifying and recruiting stakeholders.	Defining the brand strategy, purpose and vision of the product.	Setting user experience metrics and goals.	Crafting user experience implementation plan and defining the timeline.
Techniques	Key role mapping.	Focus groups, steering committee.	Focus groups, brain storming.	Focus groups, brain storming.	Focus groups, brain storming.
Expected outcome	User Experience Management Strategy			

Figure 5.9: Establishing concepts and strategy

A well-formulated strategy yields successful results. The same applies to managing user experience; one needs to formulate a strategy and vision of what has to be achieved through managing user experience. The first step in formulating a user experience management strategy is gathering a guiding team as identified in change management (Kotter & Cohen, 2002; Mento *et al*., 2002). Gathering a guiding team refers to choosing a leadership team that sponsors and supports the project for user experience management. This leadership team should consist of people who are trusted, respected and are leaders in a community; thus, people who have referent power to influence others. Having the support of such influential people ensures positive user experience and acceptance of the product. The techniques for gathering a guiding team include key role mapping. Key role mapping involves identifying role players with respect to the level of power and influence that they have with respect to other individuals in the community.

Once the guiding team has been established, the next task is to identify stakeholders to participate and get involved in the project. The selected stakeholders should be a cross-sectional representation of the community. Stakeholders should include a sample of potential or current users of the product, representatives of developers, user experience experts and product owners. The users are important to provide user requirements, while product owners make sure that the product satisfies the business requirements. Developers are there to see to it that meeting the specified requirements is feasible with the available technologies, thus specifying the technical requirements. The role of the user experience expert is to be the mediating party among the rest

of the stakeholders and to ensure that all parties are happy with the product. The mediation process includes requirements specification, user experience evaluation and managing the change in user experience.

The guiding team, together with stakeholders, then defines the brand strategy, purpose and vision of the product. This relates to the prime functionality and theme that the product has to portray. For example, a sport site may have the functionality of providing sports news while conveying the themes of being entertaining and humorous or reflecting some social community aspects.

After defining the requirements, purpose and vision of the product, it follows that the guiding team, together with stakeholders, have to formulate the strategy for managing user experience. Implementation strategy entails planning as to what has to be done and at what stage, defining the responsibilities of the team members as well as the expected timeline for each activity. Such activities include defining how much time should be spent during preparation and what has to be focused on. The techniques to be used for implementing the strategy for managing user experience are selected and defined during establishment of concepts and strategy.

The goals of user experience management and the metrics for assessing the desired user experience objectives have to be defined during planning. The implementation plan also specifies the criteria for assessing the impact of the process of managing user experience.

The expected output of establishing concepts and strategy is a User Experience Management Strategy. The strategy is formulated through key role mapping to identify the guiding team and stakeholders. These will develop the plan for executing user experience management activities through meetings, focus group discussions and brainstorming sessions to come up with the most applicable plan for managing user experience in the given context.

5.5.3. Phase 3: Implementation

Implementation involves the translation of the chosen strategy to manage user experience so as to achieve a positive long-term user experience. The chosen requirements, activities and techniques for managing user experience should be amalgamated and utilized to follow a defined strategy for successful user experience management. Figure 5.10 illustrates the requirements,

activities, techniques and outcome of the implementation of the user experience management plan.

Implementation				
Requirements	Awareness	Desire	Knowledge	Ability
Activities	Making users aware of the existence of the product, its features and the advantages of using it. Informing users about the features of the product which are changing and of the benefits of the changes made.	Creating an affinity for the users to accept the product with a positive user experience.	Imparting the know-how of using the product and the knowledge of the benefits accompanied with use of the product.	Providing a platform for the users to demonstrate that they have the ability to transform knowledge into action and interact with the product with positive user experience.
Techniques	Advertising, product promotions, newsletters, workshops, campaigns, group meetings, individual meetings	Educating, champions sponsorship, participatory and user-centered design, designing for persuasion, emotion and trust	Training, user support, peer coaching	Training and coaching, hand-on practice, user testing, continuous interaction with the product
Expected outcome	User-ready audience			

Figure 5.10: User experience management implementation

During the implementation phase the users have to be made aware of the product, its features and the benefits of using the product. If the product is already existent, it is important to make the users aware of any changes introduced as well as of the benefits of the changes. The techniques for bringing awareness include advertising, promotions, workshops and meetings. After the users are aware of the product, it is important to cultivate a desire for them to adopt and use the product. People may be aware of the product but may lack the willingness to accept and use it. Thus, there is a need to promote a desire to use the product. User education, use of change champions, participatory design and designing for persuasion, emotion and trust helps to cultivate a desire for users to have an affinity to embrace the product with positive user experience. A desire to interact with the product does not convert to product adoption and usage. Users need to have the knowledge to use product. They need training, support and coaching so that they become conversant with the product and its features. Thereafter, it is important that the users demonstrate that they are able to translate their knowledge into action while interacting

with the product. Ability is demonstrated through continuous hands-on usage of the product and users may be assessed for their effectiveness and efficiency through user testing.

The expected outcome of a successfully implementing the strategy for managing user experience is a user-ready audience. User readiness refers to positive receptiveness of the product by the users. When the users are aware of the product, have the desire and knowledge to interact with it and are effective and efficient when using it, they become susceptible to a positive user experience. Once a positive user experience is attained, the next step is to continuously sustain it.

5.5.4. Phase 4: User experience sustainment

Human beings are creatures of habit who often revert to their old ways of doing things, despite experiencing the benefits of new practices. Thus, after cultivating a user-ready audience with a positive user experience, it is vital that the user experience be sustained and continuously improved upon. Failure to sustain the implemented user experience will result in the whole process of managing user experience to be futile. The requirements, activities, techniques and outcome for sustaining user experience are presented in Figure 5.11.
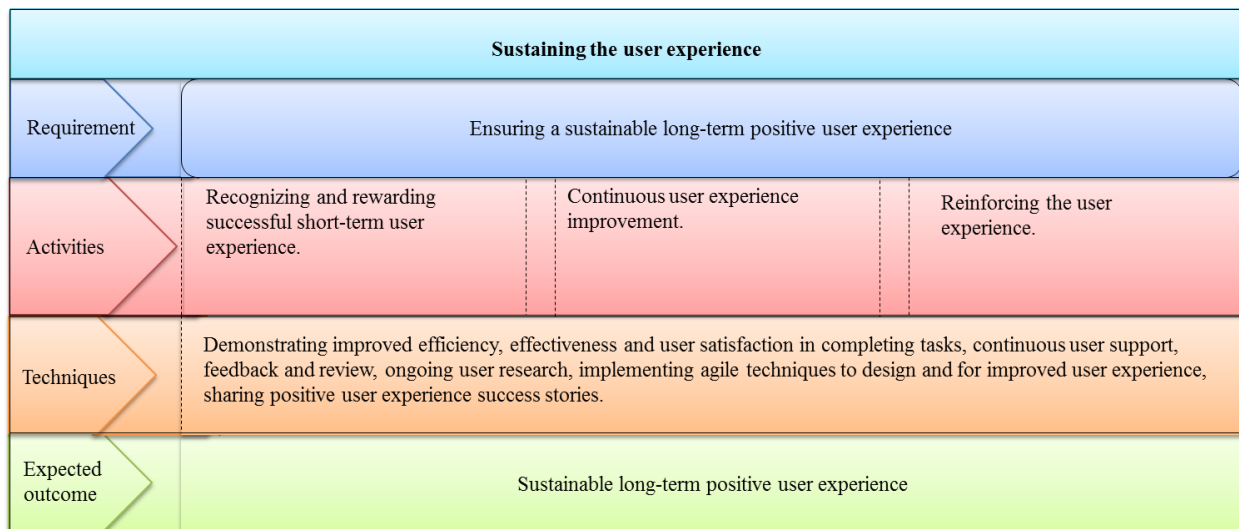
Figure 5.11: User experience sustainment

Once the users have shown an affinity to accept the product and demonstrated some positive user experience, the positive user experience has to be reinforced to make it stick. User experience development consists of anticipatory user experience, momentary user experience, episodic user experience and long-term user experience. Long-term user experience is a result of the

accumulation of the overall user experience over time. The long-term user experience has to be sustained in order to achieve total product acceptance, usage and product loyalty. Sustaining a lasting long-term user experience requires the celebration of short-term user experience achievements, making the user experience stick and allowing continuous improvement of the user experience. It is therefore important to sustain long-term user experience. In the process of sustaining user experience, successful positive anticipatory, momentary and episodic user experience have to be recognized and rewarded. Also, the activities of sustaining user experience involve continuous research and improvement of user experience. The techniques for making user experience stick include persuasive, emotional and trust research, and agile design processes for user experience. It also includes sharing success stories on how the product proved to be efficient, effective and satisfactory. Such techniques aim to keep the users captivated through the product with which they interact, and to nurture permanent free-will behavioural changes by appealing to the social influence factors of the people.

The first through to the fourth component outlined the process of managing user experience. The fifth component of the model, *Impact Assessment,* aims to evaluate how the intervention (process of managing user experience) affects the desired outcome (long-term positive user experience).

5.5.5. Phase 5: Impact assessment

The process of managing user experience is an intervention that aims to cultivate a positive long-term user experience for the people using interactive products. The requirements, activities and techniques for assessing the impact of managing user experience are presented in Figure 5.12.
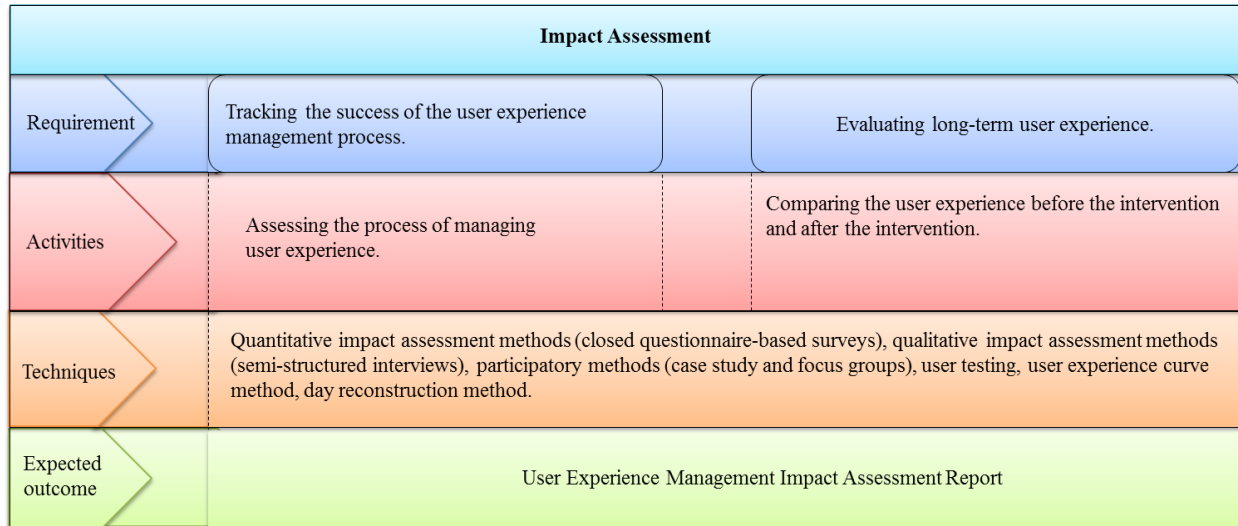
Figure 5.12: User experience management impact assessment

Figure 5.12 depicts that impact assessment seeks to measure the effectiveness of the user experience management process, as well as to evaluate how the people responded to the intervention by measuring the effective long-term user experience. In this regard, the purpose of impact assessment is to determine more broadly whether the process of managing user experience had yielded the desired effects on individuals, and whether those observed effects are attributable to the intervention. The process of managing user experience is evaluated to determine any deviations from the stipulated strategy. The desired outcome (that is long-term user experience) is evaluated based on the baseline that was established before the intervention as well as after the intervention. Impact assessment further determines whether or not the noted improvement in user experience is as a result of the user experience management. Counter-factual scenarios of a control group and a treatment group have to be set to determine if the observed improvement in user experience has resulted from the intervention or not. The treatment group is the selected sample to be subjected to undergo the user experience management process. Qualitative, qualitative and participatory impact assessment methods, together with long-term user experience management methods, have to be used as techniques to assess the impact of the process of managing user experience.

5.5.6. Phase 6: Monitoring and evaluation

It is important to note that a monitoring and evaluation component follows each stage in the process of managing user experience. Figure 5.13 presents the activities of monitoring and evaluation during the user experience management process.

Monitoring and evaluation			
Requirement	Ensuring that the process of managing user experience goes according to desired plan and as per strategy		
Activities	Evaluating the factors that have been identified to influence user experience	Evaluating the effectiveness of the process of implementing the strategy for managing user experience	Consolidation of lessons learnt through the whole process of managing user experience
Techniques	User testing, user observations, user inquiry methods, comparing the current "as-is" state against the desired "to be" state		
	User Experience Management Progress Report		

Figure 5.13: User experience management monitoring and evaluation

During monitoring and evaluation, user experience is measured and any deviations from the planned strategy are noted. This provides feedback on how to improve the process of managing user experience in the subsequent steps as well as during other projects. Just like any project, managing user experience requires monitoring of the progress of the process and activities, so that the desired objectives are accomplished. After each phase of the model, there is a monitoring and evaluation activity to ensure that the process of managing user experience is done properly. Corrective measures are taken based on what may have gone wrong, and lessons are consolidated on how to improve the process in similar user experience management processes.

This phase involves an evaluation of the whole process of managing user experience at each phase in order to ensure that it is executed according to plan. This entails determining whether the factors that influence user experience are fully explored, ensuring that the strategy for managing user experience is adhered to and making sure that the user experience is sufficiently sustained.

5.6.   HOW TO USE THE UXM^2

As mentioned earlier, the target users of the UXM2 are user experience practitioners and product designers (c.f. Table 5.2). For user experience practitioners, the model serves the purpose of assessing the level of user experience for a particular product, determining the factors that influence the user experience and providing interventions on how to improve the user experience. In this way the development of user experience can be measured over time. The UXM^2 also serves as an assessment tool for evaluating the effectiveness of the process for managing user experience and provides focus areas for improving the process of managing user experience through the consolidation of lessons learnt. For product designers, the purpose of the UXM^2 is to provide directions on how to design products for a positive user experience. The usage of the UXM^2 follows the phases of the model as well as the process of designing for positive user experience. The steps for using the UXM^2 are presented in Figure 5.14. Detail of the requirements, activities, techniques and expected outcome of each of the steps has been discussed in section 4.3.
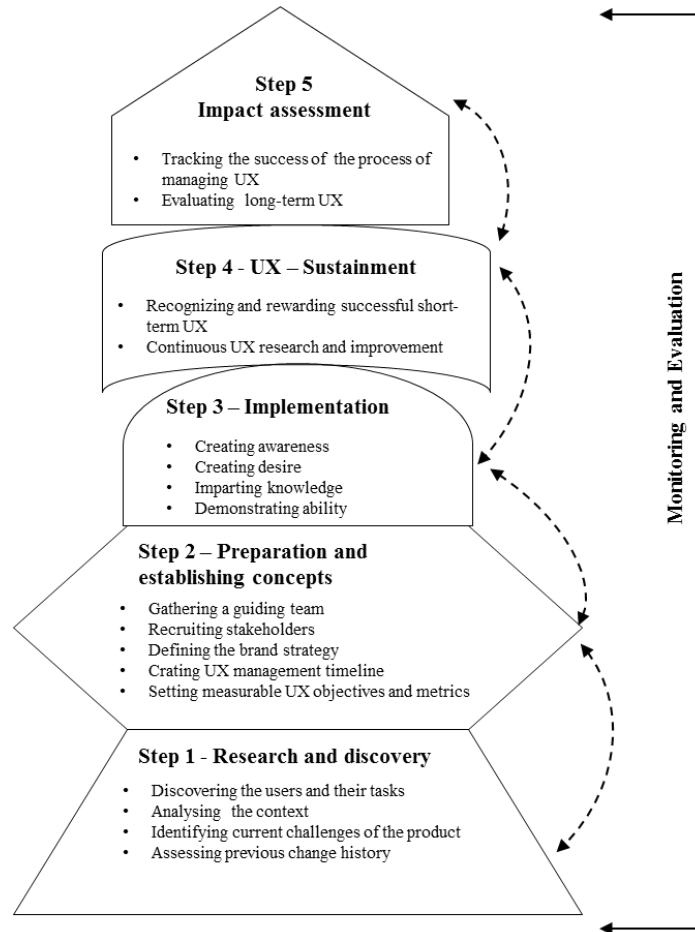
Figure 5.14: Steps for using UXM[2]

5.6.1. Step 1: Research and discovery

The user experience practitioners will do research on the factors that influence user experience. The factors are important in establishing the plan for managing user experience.

5.6.2. Step 2: Preparing and establishing concepts

Based on the factors identified, the user experience practitioners develop a strategy for managing user experience. The strategy aims to guide developers on how to address the factors that influence user experience, in order to develop a product that appeals for positive user experience.

Step 1 and Step 2 of the model are used in harmony with the research phase of the user-centred design process.

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5.6.3. Step 3: Implementation / Managing user experience

The strategy is implemented in order to make the product accessible, usable, findable, valuable, safe, desirable, credible and overly useful. User experience practitioners also follow implementation techniques to create awareness, and desire as well as to impart knowledge and ability for the users to interact with the product with positive user experience.

The implementation of the strategy is used in harmony with conceptual and physical design activities of user-centred design.

5.6.4. Step 4: Sustaining user experience

The desired user experience is sustained through continuous user research and by recognizing the achievement of short-term user experience goals. It is the role of user experience practitioners to continuously research how to improve user experience and to formulate a suitable strategy for addressing any factor that influences user experience.

Sustaining user experience is an added component to the traditional user experience design process.

5.6.5. Step 5: Impact assessment

The UXM^2 provides the additional component of assessing the impact of the user experience management process to the process of designing products for user experience. Thus, after undergoing the whole process of managing user experience, the model suggests retrospective techniques for assessing the effectiveness of the process of managing user experience. User experience practitioners, together with other stakeholders, will have to assess the impact of the user experience management process on the users.

Assessing the impact of the process of managing user experience is an added feature to the user-centred design process.

5.6.6. Step 6: Monitoring and evaluation

It has been emphasized earlier that the process of managing user experience is not strictly linear and sequential. Rather, it is an iterative process in which the activities can be applied based on identified need. Step 6, monitoring and evaluation, occurs in-between each of the phases of the model.

This monitoring and evaluation step is similar to the evaluation phase during user-centred design. User experience practitioners have to measure the levels of user experience as the process of managing user experience progresses. The anticipated outcome at each stage is compared with the one that was realised, and iterations are made if any divergence is noted.

5.7. SUMMARY

This chapter proposed the User Experience Management Model (UXM^2), and also outlined the process that was followed to identify the components of the proposed model. The chapter discussed in detail the various components of the model and how they have been derived from the related disciplines, namely user experience and change management. The components were identified through an intensive literature study, which was described in Chapters 3 and 4. The components consist of the requirements, activities and techniques required to manage user experience, based on findings from the literature study on user experience and change management.

The UXM^2 places emphasis on the following aspects:

> ➤ Understanding of the factors that influence user experience by researching the users, the product and the context;
> ➤ Formulating a strategy for managing user experience. The strategy has to be user-centred and must have a cross-sectional representation of the current users of the products as well as of its potential users; and
> ➤ Focusing on creating a user-ready audience by making the users aware of the product, creating a desire for them to use the product and imparting knowledge and ability for them to interact with the product with positive user experience.

➢ Sustaining the user experience so that users do not revert to their old practices, thus instigating a behavioural change;

➢ Measuring the effectiveness of the process of managing user experience; and

➢ Monitoring and evaluating the process of managing user experience with the intention of improving it for similar projects.

This chapter provides user experience practitioners and product developers with steps and procedures for managing user experience in order to achieve a positive user experience.

The process and results of the validation of the conceptual model are described in Chapter 6. The model is refined and finally updated based on the results of the validation.

CHAPTER 6: MODEL EVALUATION, RESULTS AND ANALYSIS

INTRODUCTION

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Introduction

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Research Design
and Methodology

PART B: REQUIREMENTS IDENTIFICATION

Chapter 3

User Experience

Chapter 4
Managing User
Experience

PART C: THE CONCEPTUAL MODEL

Chapter 5
User Experience
Management Model

PART D: EVALUATION

Chapter 6
Model Evaluation,
Results and Analysis

Chapter 7
Applicability of the User
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PART E: THE EPILOGUE

Chapter 8
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6.0.   **INTRODUCTION**

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6.6.   **SUMMARY**

6.0.   INTRODUCTION

This chapter describes the process followed to evaluate the usefulness and applicability of the proposed UXM^2. The purpose for the evaluating is mentioned first, explaining the aspects that the evaluation exercise seeks to uncover. After-which the techniques for evaluating the model are discussed. The findings from the evaluation are then presented. Constraints to the evaluation process are also mentioned; thereafter a summary of the chapter is presented.

6.1.   PURPOSE OF EVALUATION

In order to ensure that the proposed artifact, the User Experience Management Model (UXM^2), is useful to practitioners (relevant) and that it also contributes to the body of knowledge (rigorous), it must undergo stringent evaluation and justification. The model evaluation process aims to validate the relevance and rigor of the identified model constructs and content in order to assess how well they satisfy the needs of the target audience and solve the identified problem.

The model must satisfy two goals: internal as well as external validity, as discussed in Chapter 2 (c.f. section 2.5) and Chapter 5 (c.f. section 5.4.5). The methods used to evaluate the model are discussed next.

6.2.   METHODS FOR EVALUATING THE MODEL

The design of the conceptual UXM^2 followed principles of design science as described in Chapter 5. The choice of the method that is applicable to evaluate the UXM^2 is made, based on the description of characteristics of the methods used to evaluate design science artifacts prescribed by Hevner *et al*. (2004) (c.f. Table 2.5).

Descriptive methods have been chosen to be suitable for evaluation of the proposed model. The following descriptive methods were used to evaluate the model:

- ➢ Argumentation using existing literature; and
- ➢ Expert reviews, by means of the following:
    - • Interviewing subject domain experts;
    - • Completion of a model validation tool by subject domain experts; and

- Feedback in the form of comments from double-blind peer reviewed international conference papers.

Figure 6.1 illustrates how the methods of evaluation inform each other.
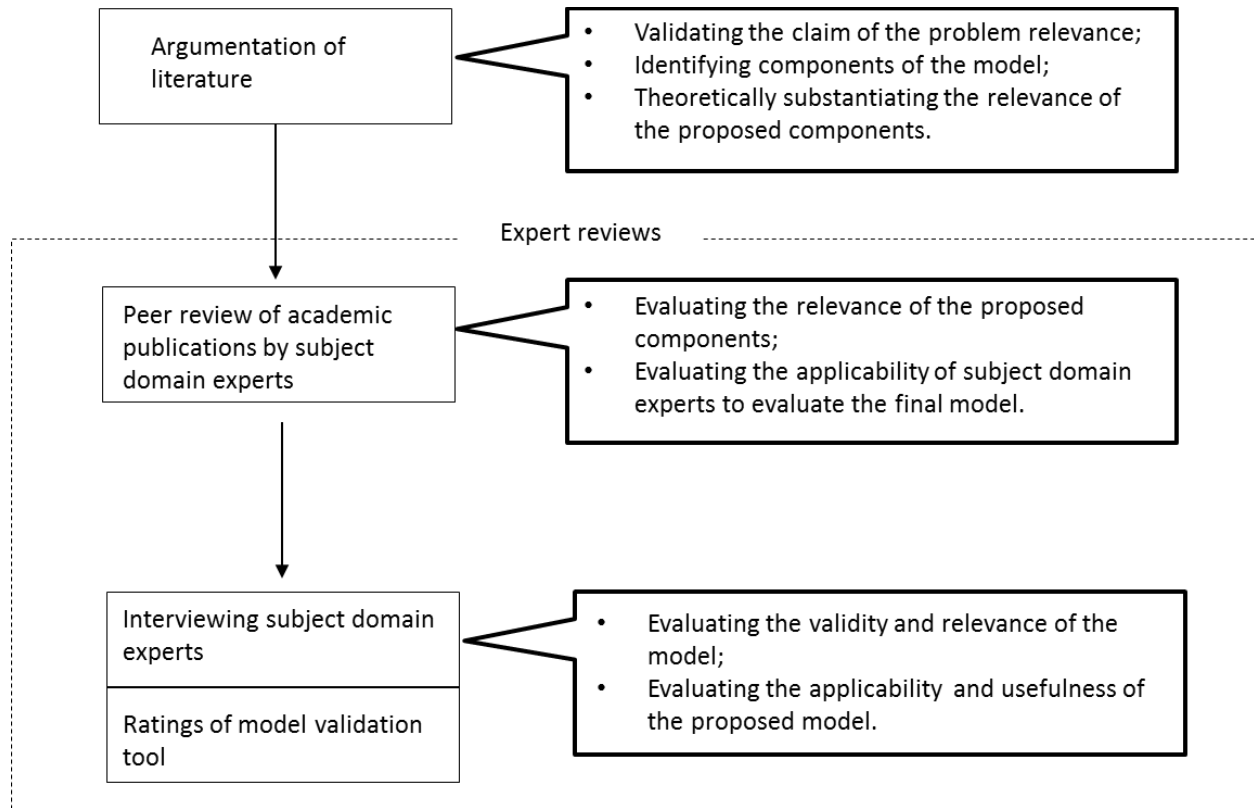
Figure 6.1: Methods used to evaluate the UXM²

A discussion of the evaluation methods follows next:

6.2.1. Argumentation using existing literature

The purpose of using argumentation is to reach a mutually accepted conclusion on the importance, relevance and usefulness of the proposed UXM². A thorough study of literature on user experience and change management helped to build a convincing problem definition and an argument that there is a need for managing user experience. The review of literature helped to identify the existence of a gap in the two domains of user experience and change management, hence a need for a model for managing user experience.

Figure 6.2 illustrates the missing link that builds a case towards an argument for the need and usefulness of the UXM^2.
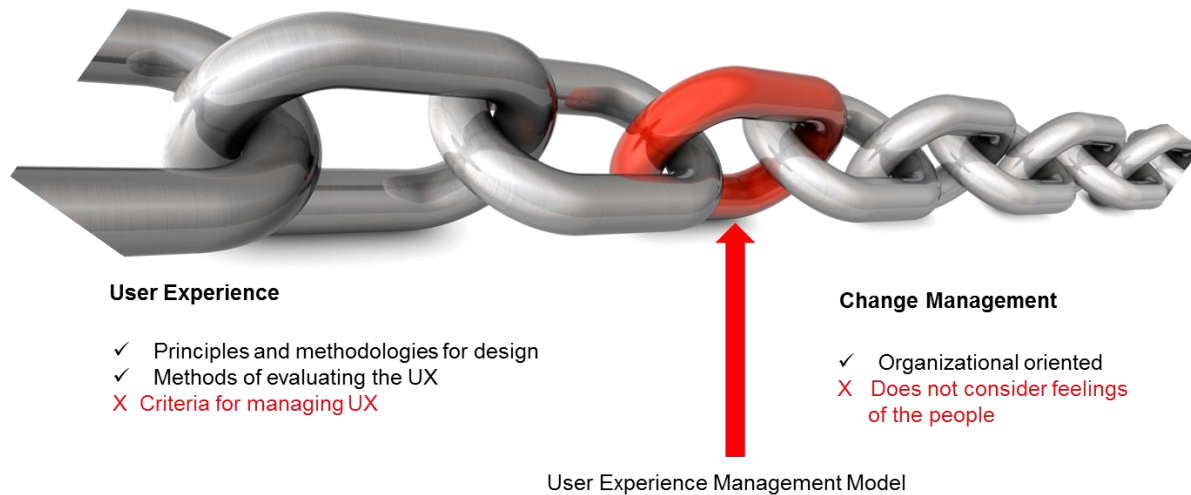
Figure 6.2 User experience - change management missing link

Figure 6.1 depicts how the proposed UXM^2 bridges the gap between the disciplines of user experience and change management. The user experience domain lacks criteria for managing the change that people undergo in the development of user experience, while change management approaches are inadequate to address the feelings of the people resulting from change. As such, the UXM^2 has been proposed to guide how to introduce new products or improve the user interface or features of existing products in a manner that promotes a sustainable positive user experience. A full description of the problem description has been provided in Chapter 1.

Argumentation of literature served the purpose of determining the internal validity of the proposed model through an assessment of the appropriateness of the proposed components of the UXM^2.

6.2.2. Expert reviews

Expert reviews using subject domain experts were conducted to validate the model. The purpose of expert review was to evaluate the relevance of the proposed components of the model. It also served the purpose of evaluating how the potential users of the model found the proposed model to be useful and applicable to managing user experience. The expert reviews were done by

interviewing subject domain experts, completion of the model validation tool and feedback in the form of comments from a double-blind peer review of academic publications. The panel of experts who were interviewed and who completed the validation tool consisted of academics in the field of HCI as well as user experience practitioners. The academic publications were submitted and presented at international conferences on HCI. The review publications from such a conference with reviewers who are experts in the field of HCI yielded valuable results with respect to the validation of the model.

Peer review of academic publications

Two publications were made at international conferences on HCI, namely INTERACT (Interact '13) and International Conference on Computing and ICT Research (ICCIR '10) (c.f. Appendix B). The paper submitted to INTERACT'13 proposed requirements for managing user experience, while the paper submitted to ICCIR'10 proposed a model for managing ICT user experience in rural contexts. The academic papers formed part of the components of the model and contributed to the development of the UXM^2.

An argumentation and synthesis of literature laid the foundation from which the conceptual components and requirements of the UXM^2 were identified in the publications. These requirements were modeled into artifacts, the User Experience Management Requirements (UXMR) Framework and User Experience Factor Diagram (UXFD), also presented in Chapters 2 and 3 respectively.

The identified factors that influence user experience, as well as the components and requirements for managing user experience, were evaluated using expert review by means of feedback from comments by the reviewers of the publication. Both papers were presented at international conferences where they underwent a double-blind peer review process by subject domain experts. The peer review process assured credible feedback towards refining the proposed requirements and components of the model. The papers were evaluated in terms of the relevance, originality and appropriateness of the suggested components. Feedback in the form of comments from the reviewers was obtained and used to refine the proposed artifacts. The feedback from the review of academic publications formed the foundations of evidence to support the declared

claim and to build convincing arguments for the usefulness and relevance of the model. The results of the peer review of the conference papers are presented in section 6.4.

Interviewing subject domain experts

The components and requirements that were validated through argumentation of literature and feedback from the double-blind peer review of academic publications were used to develop the UXM^2. Expert reviews in the form of interviews with subject domain experts were conducted to evaluate the usefulness and applicability of the proposed UXM^2. The interviews were guided by detailed scenarios, with characteristics that suit the use cases of the model. Scenarios were constructed to mimic the context in which the model will be used. The scenario described a case in which the model will be used, and the interview participants were asked to discuss the usefulness and applicability of the model based on the scenario.

The details of the interviews with the experts are discussed next.

Selection of experts: Interview participants were selected from subject domain experts who represented a cross-sectional balance on the areas of interest in the study, namely user experience and change management. Six participants were selected to evaluate the proposed model through interviews. All the participants had more than five years of experience in their domain. The participants consisted of three academics also involved in HCI research and three non-academic user experience practitioners. The participants evaluated the proposed components of the model and provided feedback on how they perceived the model to be useful and applicable to solve the defined problem.

Figure 6.3 represents the distribution of expertise of the selected participants.
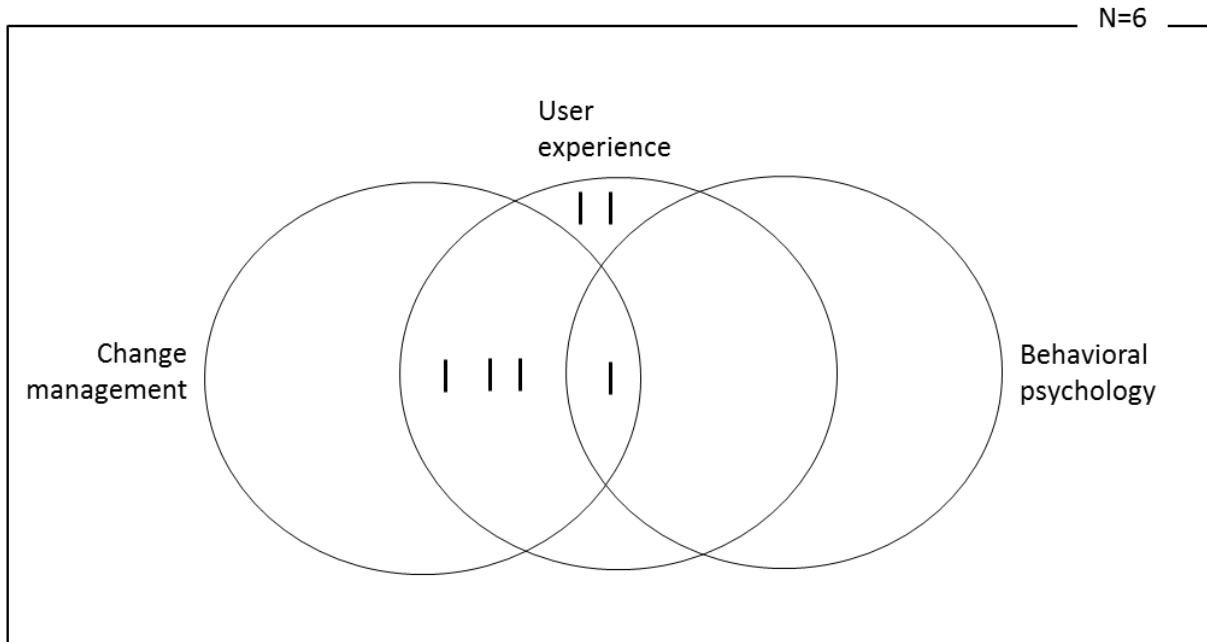
Figure 6.3: Distribution of skills of expert participants

The Venn diagram in Figure 6.3 depicts the intersections of the skills of the participants. All six selected participants had experience in the domain of user experience. Four of the participants practised in both user experience and change management. One of these also had extensive knowledge of behavioural psychology. The other two participants practised in the field of user experience only. The biographical information of the participants is presented in the results section (c.f. section 6.4.1).

Such a sample of participants helped to evaluate the model in order to provide credible results, as the experts examined the components of the model and its usefulness from the perspective of how it will be applicable in their domain.

Scenarios: Two scenarios were modeled to represent how the model will be used in practice. The purpose of using scenarios was to mimic the use of the model as it will apply in practical use, and to have the participants comment on how they perceive the model to be useful and applicable in given situations.

The scenarios were based on the following cases:

➢ **Scenario 1 - Development of a new product:** The participants were asked to comment on how they will apply the model to cultivate a sustainable positive long-term user experience and user readiness when a new product is being introduced to the market.

➢ **Scenario 2 - Improvement of a product's user interface and functionality:** This scenario involves promoting a positive long-term user experience and the receptiveness of people to the introduction of an enhanced version of an existing product. The new product may have new functionalities and / or an improved user interface. In this case, the model is validated in terms of its applicability to deal away with any user resistance to the improved version of the product.

A first draft of the scenarios was developed and used for a pilot study with two experts to validate the applicability of the scenarios. The draft was then refined to a version that was used during interviews with the experts.

The final scenarios are presented below:

Scenario 1

Tafadzwa is 52 years old and works as a nurse at Franks Private Hospital in Sandton. She has a soft spot for the patients and she ends up being friends with them. Tafadzwa has been working as a nurse for the past 30 years and knows her job well. Many of the young nurses ask her advice when they need help, and she likes sharing her knowledge with them. She uses her old Nokia 3310 phone and she is comfortable with it. Her son bought her the latest Nokia Lumina, as she is so loyal to the Nokia brand and would not want to try other phone types, but she rarely uses the new phone. Her grandchildren always show her the "cool" features and functionality of the new phone. When she gets time, she tries to use the new phone only at home. She does not feel comfortable using it where there are many people, because she does not want to appear to be not knowledgeable and not versed with technology.

At work the hospital's patient record system is changing from the manual card system, and they are introducing an Electronic Medical Record (EMR) system. The EMR system will help her to capture the following;

• Patients details and contact information, including next of kin details;

- Vital signs, e.g. height, weight, blood pressure, temperature and an automatically calculated body mass index;
- Access to past medical record of the patients;
- Patients' billing information;
- Patients' treatment plans; and
- Discharge summaries.

Tafadzwa is very skeptical about the introduction of the proposed system. She is comfortable with the manual way of capturing patients' records and she wonders if she will be able to use the system without interrupting her traditional way of work.

As a user experience practitioner, how would you use the UXM^2 to introduce the EMR and to cultivate a long-term positive user experience and to make the user experience stick for Tafadzwa to use the EMR efficiently, effectively and with satisfaction?

What suggestions can you propose to make the UXM^2 valuable, useful and applicable in order to promote a sustainable positive long-term user experience in the given scenario?

Scenario 2

Ngoni is a 23-year old university student studying Information Technology. She enjoys playing computer games and programming. She often gets frustrated and has a high level of computer rage when the computer system or application does not meet her expectations. She is a fervent and heavy user of social networking sites. She uses the social network sites to keep in touch with her friends around the globe as she has recently moved overseas for her studies. Ngoni enjoys reading and commenting on posts from her friends and viewing their photos. She regularly updates her status, posts her photos and shares whatever she finds interesting, or the pain points that she may have encountered with technology.

One day she woke up at midnight and logged on to her favourite social networking site. To her surprise, the site did not look as she was used to and she almost closed it. The user interface of the social networking site had changed. It took her days of struggling to find specific messages in her inbox, the chat system had changed and she could hardly locate her posts or the profiles for her friends. Out of frustration Ngoni and a lot of other users of the social networking site began

to rant about the changes. Suddenly there was drop in traffic to the site as many users boycotted its use. The site's feedback forum got filled with complaints from, and whining of, the users. Their emphasis was "If it is not broke, then don't fix it".

The concerns and complaints of the users have come to your attention as the user experience consultant for the social networking site. Your aim is to keep the users happy and to improve and sustain a long-lasting positive user experience.

How would you use the UXM^2 to plan for the next version of the site that involves a change in user interface and an addition of features to the site?

What suggestions can you propose to make the UXM^2 valuable, useful and applicable in order to promote a sustainable long-term positive user experience in the given scenario?

Interview procedure: Out of the six participants, only five were interviewed face to face. The remaining one could not be interviewed because she is based overseas. A detailed paper outlining the proposed model was sent to the overseas-based participant for review (c.f. Appendix C). The participant was asked to rate the appropriateness of the proposed components of the model, based on structured interview questions in the form of the validation tool that was sent together with the detailed paper (c.f. Appendix D.1).

For locally based participants, an email requesting participation in the interview was sent to the targeted participants (c.f. Appendix A.2). Appointments were set to interview the participants upon acceptance of their agreement to participate in the interviews. The proposed UXM^2, together with a brief description of its components, were sent to the participants a week before the confirmed date of the interview (c.f. Appendix A.3).

On the day of the interview, the participants were asked to complete a consent form before the interview commenced (c.f. Appendix A.1). The interview started with a briefing of the proposed model, explaining its components and how it is envisioned to work. The participants were allowed to interject and comment on how they perceived the components of the model to be appropriate as the interview progressed. Thereafter the participants were presented with the scenarios, and they were asked to comment on the applicability of the model, based on the scenarios presented to them. During the interview, the participants were asked to make

comments on the script when they wanted to comment on components of the model. In addition, the researcher was taking written notes as the interview progressed. The comments made during interviews are provided in Appendix A.4.

Lastly, each of the participants was asked to rate the relevance of the proposed components of the model based on the validation tool (c.f. Appendix D.2).

Model validation tool

The validation tool was designed in Microsoft Excel, and it consisted of three work sheets. The first work sheet provided instructions on how to use the evaluation tool. The second worksheet was used to capture the biographical information of the participants, while the third worksheet contained the components, requirements and activities of the model to be evaluated (c.f. Appendix D.1).

Figure 6.4 shows the structure of the questionnaire

May you please rate the extent to which you believe the proposed components categories are relevant to managing user experience.									
Model Component						Relevance	Overall Rating	Comment	
Research and discovery									
Preparation and establishing concepts									
User experience management implementation									
User experience sustainment									
Impact assessment									
Monitoring and evaluation									

Figure 6.4: Snippet of the validation tool

The participants were asked to rate the components, activities and requirements of the model on a five-point Likert scale with the following ratings:

Not relevant: I strongly disagree that the proposed component is useful and applicable to managing user experience;

Neutral: I neither agree nor disagree that the proposed component is useful and applicable to managing user experience;

Somewhat relevant: I agree that the proposed component is of little usefulness and applicability to managing user experience;

Relevant: I agree that the proposed component is useful and applicable to managing user experience; and

Very relevant: I strongly agree that the proposed component is useful and applicable to managing user experience.

Another column for verdict on the proposed component was provided, where the participant could select if the component should be retained, removed or if the participant is undecided.

The final column was for the participants to provide any comments that they may have on the proposed component.

The results from the validation tool are presented in section 6.3.

6.3.   MODEL EVALUATION RESULTS PRESENTATION AND ANALYSIS

Sections 6.1 and 6.2 outlined the purpose, process and methods for evaluating the UXM^2. The purpose of this section is to present as well as analyze the findings of the model evaluation process. Qualitative and quantitative data describing the usefulness and applicability of the conceptual model was gathered. Descriptive data was also obtained from academic publications and interviews with experts. Quantitative data in form of frequent count of the Likert scale ratings was gathered. The results of the evaluation of the conceptual model provide valuable feedback for refining the UXM^2.

The following results are presented:

 ➤ Validation tool results consisting of biographical data of the experts and the frequent count of the ratings on the relevance of the model using the validation tool;
 ➤ Interview comments on the usefulness and applicability of the model; and
 ➤ Feedback from the review of academic conference publications.

6.3.1. Validation tool results

Experts' biographical data

A total of six experts were interviewed. The biographical information of the experts is presented in Table 6.1.

	P1	P2	P3	P4	P5	P6
Gender	Female	Male	Female	Female	Male	Male
Home Language	German	English	English	English	English	English
Country	German	South Africa	South Africa	United States of America	South Africa	South Africa
Occupation	Researcher / Lecturer	UX Designer	Researcher / Lecturer	UX Practitioner	Researcher / Lecturer	Director / Co-founder – UX Consultant
Years of experience	5	8	18	20	17	18
Industry	Academic / Computer Science	Banking	Academic	Research and Consultancy	Academic	UX Consultant
Experience: UX	Intermediate	Expert	Experts	Expert	Expert	Expert
Experience: Change Management	Beginner	Beginner	Intermediate	Expert	Expert	Expert
Experience: Managing User Experience	Beginner	Beginner	Beginner	Expert	Expert	Expert

A total of three female and three male experts participated in the interviews. One out of the six experts was from Germany and she used German as her first language, while the rest used English. Four of the experts were from South Africa while one was from the United States of America. Such a diversity in the distribution of the experts helped to evaluate how the model will be of value to the different contexts.

Three of the experts are academic lecturers doing research in the HCI domain, while the other three are user experience practitioners. The academic experts evaluated the model mainly on the thoroughness of the components from a scholarly point of view, while the user experience practitioners evaluated the model based on how they see it applicable and useful in their day-to-day practice.

The years of experience of the experts in their respective industry of service were 5 years (one participant), 8 years (one participant), 17 years (one participant), 18 years (two participants) and 20 years (one participant). Five of the participants ranked themselves to be experts in the domain of user experience and the other one ranked as intermediate. Three participants ranked themselves to be experts in change management, one stated to be at intermediate level and the other two ranked themselves to be beginners in change management. The distribution of

experience in managing user experience was equally distributed, with three participants ranking that they are beginners while the other three considered themselves to be experts.

A frequency count on the number of participants who rated the proposed components of the model is presented next.

Ratings of the relevance of the proposed components

The participants were asked to rate how they found the proposed components to be relevant, and whether the components should be retained or not. They were also asked to provide any additional comment on the components. The results from the ratings of the participants are presented as a count of the frequencies of how that particular component was rated on the Likert scale.

The results are presented in Table 6.2.

Table 6.2: Participants' rating of the components of UXM[2]

Component	Rating of relevance					Verdict			Comments
	Not relevant	Neutral	Somewhat relevant	Relevant	Very relevant	Retain	Undecided	Remove	
Research and discovery					6	6			
Preparation and establishing concepts				1	5	6			
User experience management implementation			1		5	5	1		One particpant thinks this is related to marketing
User experience sustainment			1		5	6			
Impact assessment				1	5	6			
Monitoring and evaluation				1	5	6			

All six participants rated that the research and discovery component is very relevant to managing user experience and that the component must be retained. Five participants rated preparation and establishing concepts to be very relevant while one rated that the component is relevant. All the participants gave the verdict that the component should be retained. One participant commented that she thinks the implementation phase is more like marketing, and she rated the component as somewhat relevant (of little importance to managing user experience). The participant indicated that she was undecided on whether to retain the component or not. The other five participants indicated that they strongly believe that implementation of user experience is of essential importance to managing user experience and should be retained.

Based on the ratings from the participants, it can be concluded that the proposed components are useful and applicable to managing user experience.

Following the ratings of the components of the model, the participants were asked to rate the requirements together with the related activities. The following feedback was obtained:

Phase 1: Research discovery requirements and activities

The ratings on how the participants found the proposed requirements and activities for the research and discovery phase are presented in Table 6.3.

Table 6.3: Rating on research and discovery requirements

Phase 1 : Research and discovery		Rating of relevance					Verdict			Comments
		NR	N	SR	Rel	VR	Ret	U	Rem	
Discovering the users and their tasks	Investigating the user profiles, determination and analysis of their tasks and assessing the level of user experience of the users					6	6			User tasks and user needs should be separated and investigated differently.
Analyzing the context of product use	Investigating the social, physical and technological environment in which the product is used					6	6			
Assessing the previous change history	Determining how the users reacted to previous changes to the user interface of the product or introduction of new product					6	6			
Identifying the current product challenges	Determining the features of the product that work well for the users and those that they find difficult to interact with				1	5	6			

NR = Not Relevant; N = Neutral; SR = Somewhat Relevant; Rel = Relevant, VR = Very Relevant; Ret = Retain; U = Undecided; Rem = Remove

The following requirements and their respective activities were rated to be very relevant and of essential importance to the management of user experience:

➢ Discovering users and their tasks;
➢ Analyzing the context of product use; and
➢ Analyzing the previous change history.

One participant rated the requirement of identifying the current product challenges to be relevant and important to managing user experience, while the other five believed the requirement is very relevant; thus of essential importance to managing user experience.

All the participants believed that the requirements should be retained. One participant suggested that there is a need to determine the needs of the users and their tasks separately.

The requirements and activities for research and discovery were on the whole found to be useful and applicable to managing user experience.

Phase 2: Preparation and establishing concepts

The responses of the participants on how they perceive the usefulness and applicability of defining a vision and strategy for managing user experience is provided in Table 6.4.

Table 6.4: Ratings on preparation and establishment of concepts

Phase 2: Preparation and establishing concepts		Rating of relevance					Verdict			Comments
		NR	N	SR	Rel	VR	Ret	U	Rem	
Formulating the vision and strategy for managing user experience	Gathering a guiding team			1		5	5	1		Not sure of "guiding team"
	Identifying and recruiting stakeholders			1		5	5	1		
	Defining brand strategy, purpose and vision of the product			1		5	5	1		
	Crafting user experience implementation planning and defining the timeline				1	5	6			
	Setting measurable user experience metrics and goals				1	5	6			"Maybe this should be part of evaluation"

NR = Not Relevant; N = Neutral; SR = Somewhat Relevant; Rel = Relevant, VR = Very Relevant; Ret = Retain; U = Undecided; Rem = Remove

One participant indicated that she was not sure of what the concept of a *guiding team* means, and suggested that the setting of user experience goals and objectives be part of evaluation. This feedback may be attributed to the fact that the participant had no experience in the change management domain. As such, the participant rated the following activities to be of little importance to managing user experience:

➢ Gathering a guiding team;
➢ Identifying and recruiting stakeholders; and

> Defining brand strategy, purpose and vision of the product.

The participant was undecided on whether to retain or remove the proposed activities.

The same participant also rated the setting of measurable user experience goals and metrics to be relevant, thus believing it is important to managing user experience.

The other five participants strongly believed that the activities proposed for formulating the vision and strategy for managing user experience are of essential importance, and they gave the verdict that these activities should be retained in the model.

It can therefore be concluded that the requirements and activities for preparing and establishing concepts are both useful and applicable to managing user experience.

Phase 3: Implementation

The results of how the users perceive the requirements and activities for the implementation phase are presented in Table 6.5.

Table 6.5: Ratings on user experience management implementation

Phase 3 : Implementation		Rating of relevance					Verdict			Comments
		NR	N	SR	Rel	VR	Ret	U	Rem	
Awareness	Making the users aware of the existence of the product and its functionalities.				1	5	5	1		
	Communicating any changes to product's features and making the users aware of the benefits of such changes.				1	5	6			
Desire	Creating an affinity for people to embrace the product with positive user experience.				1	5	6			Easy in theory than it is to put this in practice
Knowledge	Imparting the know-how of using the product, its features and accompanied benefits of using the product.					6	6			
Ability	Giving the users a platform to demonstrate that they are practising the new skills and interaction behaviour positively.				2	4	6			Not easy to implement when users are dispersed

NR = Not Relevant; N = Neutral; SR = Somewhat Relevant; Rel = Relevant, VR = Very Relevant; Ret = Retain; U = Undecided; Rem = Remove

The activities of the implementation phase received mixed responses. For awareness, the five participants rated that making the users aware of the product and its functionalities is a very relevant requirement for managing user experience, while one was neutral. Five participants believed that the requirements must be retained while one participant was undecided on whether to retain the requirement or to remove it. Activity 2 of the awareness requirement proposed that any changes to the user interface of the product must be communicated. The benefits of the changes must also be mentioned to the users. Five participants believed that this is very relevant while one user rated it to be relevant. All the participants agreed that the activity must be retained in the model.

On creating a desire, five participants rated the activity to be very relevant while one participant rated it to be relevant. All the participants indicated that the requirement should be retained. However, three users emphasized that the process of creating a desire is not an easy thing and that it requires a considerable amount of effort as users are always resistant to change.

Imparting knowledge to the users was rated to be a very relevant activity that should be retained. Giving users the ability to demonstrate that they can implement new skills was mentioned to be very relevant by four participants, while the other two rated it to be relevant. The two participants highlighted the difficulty of this requirement when considering a product that has to be used by many users. For example, it will be difficult to track the progress of the ability of users if the product is used globally.

Based on the feedback, it can be concluded that the requirements and activities of implementation are useful and applicable to managing user experience. However, there is a need to recognize the challenges of implementing this in practice.

Phase 4: Sustaining user experience

The participants' feedback on how they perceive the activities of sustaining user experience is presented in Table 6.6.

Table 6.6: Ratings on sustaining user experience

Phase 4: Sustaining the user experience		Rating of relevance					Verdict			Comments
		NR	N	SR	Rel	VR	Ret	U	Rem	
Reinforcing user experience to make it stick	Recognizing and rewarding successful short-term user experience goals					6	6			Not sure how this can be achieved
	Continuous user experience research and improvement					6	6			Need to ensure that habitual user tasks are maintained

NR = Not Relevant; N = Neutral; SR = Somewhat Relevant; Rel = Relevant, VR = Very Relevant; Ret = Retain; U = Undecided; Rem = Remove

All the participants rated the activities of sustaining user experience to be very relevant. A suggestion was made that it is important that habitual user tasks should be maintained in order to sustain the user experience. As such, sustaining user experience is both useful and applicable to managing user experience.

Phase 5: Impact assessment

The following feedback was obtained from the participants' evaluation ratings on the requirements and activities of impact assessment.

Table 6.7: Ratings on impact assessment

Phase 5 : Impact assessment		Rating of relevance					Verdict			Comments
		NR	N	SR	Rel	VR	Ret	U	Rem	
Tracking the success of user experience management process.	Assessing the process of sustaining user experience.					6	6			
Evaluating long term user experience	Comparing user experience before the intervention versus after the intervention.					6	6			Another valid dimension is to evaluate the manifestations of positive user experience.

NR = Not Relevant; N = Neutral; SR = Somewhat Relevant; Rel = Relevant, VR = Very Relevant; Ret = Retain; U = Undecided; Rem = Remove

All the participants indicated that the proposed requirements and activities for impact assessment are useful and applicable to managing user experience. A comment was made to add another activity of evaluating the manifestations of positive user experience over time. The requirements have been rated to be of essential importance to managing user experience.

Phase 6: Monitoring and evaluation

Table 6.8 shows the ratings of the participants on the requirements and activities of monitoring and evaluation.

Table 6.8: Ratings on monitoring and evaluation

Phase 6: Monitoring and evaluation		Rating of relevance					Verdict			Comments
		NR	N	SR	Rel	VR	Ret	U	Rem	
Making sure that the process of managing user experience goes according to plan.	Evaluating factors identified to influence user experience.					6	6			
	Evaluating the strategy for managing user experience.					6	6			
	Evaluating the effectiveness of the process of implementing user experience management.			1		5	6			
	Consolidation of lessons learnt through the whole process of managing user experience.					6	6			

NR = Not Relevant; N = Neutral; SR = Somewhat Relevant; Rel = Relevant, VR = Very Relevant; Ret = Retain; U = Undecided; Rem = Remove

All the participants rated the following activities as very relevant to monitoring and evaluating the process of managing user experience:

➢ Evaluating the factors identified to influence user experience;
➢ Evaluating the strategy for managing user experience; and
➢ Consolidation of lessons learnt throughout the process of managing user experience.

The participants indicated that the proposed activities and requirements for managing user experience are very relevant and that they should be retained.

One out of the six participants indicated that evaluating the process of implementing user experience is of little importance while the rest rated that it is very relevant. All the participants agreed that the item should be retained for consideration in the user experience management model.

It can be said that monitoring and evaluation is useful and applicable to managing user experience.

In conclusion, considering the frequency count of the participants rating with respect to the proposed components, requirements and activities for managing user experience, it is confirmed that the UXM^2 is both useful and applicable towards managing and promoting a sustainable long-term positive user experience. The strong point of the model is that its usefulness and applicability was acknowledged by all the experts, despite their contexts with respect to the countries they come from, their industry of service and the level of expertise in their disciplines of interest.

6.3.2. Overall comments on proposed model and its components

The comments on the model and its components were obtained through feedback from reviewers of the academic publications that were submitted to conferences, and through interviews with the experts. Two international conference publications were submitted. Each of the papers contributed to the identification of the components of the model. This section provides a summary of the reviewers' comments. The full comments are presented in an appendix (c.f. Appendix: B.2).

Results from interviews with experts

A total of six interviews were conducted. The details of the interviews and its procedures are discussed in section 6.2. The purpose of the interviews was to evaluate the conceptual UXM^2 and to be able to answer the secondary research question, which states;

What are the benefits of such a model for managing user experience?

During the interviews, the experts who happen to be potential users of the UXM^2, were asked to evaluate the model with respect to its usefulness for and applicability to managing user experience. A summary of the interview results is presented in Table 6.9. The full responses obtained from the interview discussions are presented in an appendix (c.f. Appendix: C.1).

Table 6.9: Summary of responses from interviews with experts

Participant	Overall Comments
P1	The proposed model is easy to read and describes an interesting topic. It is mainly appropriate and useful to designers and developers of products. The descriptions on the components of the model and how they differ from existing ones are rather short. There is a need to include a few justifications that should help to explain why the specific models were adopted or referred to derive the current model and how they intrinsically relates to user experience management. Its is of no doubt from the presentation of the model that following the proposed model in implementing the design of new products has the potential of minimizing the cognitive load of the users and hence a positive user experience.
P2	Based on practical experience in UX the model is very original and brings a solution to a real problem. The components of the model are well articulated and easy to understand. The scenarios provided to show how the model can be used makes the model real, useful and applicable for use in order to bring changes to the user interface in a manner that facilitates attainment of a positive user experience.
P3	Impressive and innovative model that presents and relates cross discipline research. The diagrams are well presented and easy to follow making the whole model visible, easy to understand and theoretically sound. It is a useful piece of work that can be applied to managing user experience. The model is complete, comprehensive and the components are well defined and consistent within their boundaries. The models gives all the required details, however, "diagrams never crash" hence there is a great need to implement the model in practice and practically test it in the real context of use. Another strong dimension to strengthen the credibility of the model is to relate it to other similar domain for example marketing, psychology, cultural aspects as some of the components of the model relates well with other domains. It is important to define the context in which the model will be used for example mandatory use of products versus optional use and institutional use versus personal use. Such a distinction helps in accessing the overall applicability of the model. The participants recommends capturing the manifestations of user experience together with what the users say they feel about the product.
P4	The model easily relates to a lot of work involved in user experience research and consultants. The suggested components of the model are clearly defined, with the activities well documented and practical. The model goes on to give justifiable appropriate techniques on how to manage the change in user experience. Thus the model and its components are convincing that it is useful and can be applied to manage user experience in any context. The participant suggested an additional technique to of the use of super users to train and demonstrate to other users so that they will be able to use the product with a positive user experience.
P5	The participant introduced the psychological aspects that need to be brought in the model. The model does not explicitly state the need to maintain habitual features of the products. It is the maintenance and retention of these habitual features that make the user experience sustained. Also the participant suggested that user needs and tasks need to be examined separately during the research and discovery phase. The model does not address the complexity in software products that are designed to be used by multinational users to illustrate how participatory design will work to satisfy the mental models of the users who are in different contexts. The participants mentions that overlay the model is useful and applicable as it stands theoretically and recommends testing the model in real context of use. This has the potential of unearthing possible defects of the model.
P6	The model is correct, well presented, very useful and applicable to promote a positive user experience. However, it does not acknowledge how hard some of the steps can be. Saying that a step needs to be done is only a little bit useful. Understanding how to make it happen is more useful for people working in industry. This may require documentation on what to do when: - Users have received bad updates in the past and are actively resisting upgrades - Users are not interested in reading release notes describing an upgrade - Users can not learn how to exploit the new features because they have a conservative attitude, low skills or because the features are hidden or difficult to learn

During the interview, all the participants were asked to comment on how they find the conceptual model and its components to be useful and applicable to managing user experience.

All of the participants agreed that the proposed model and its components are both useful and applicable to managing user experience. They mentioned that the components of the model are well defined, unified and relevant to promoting a positive user experience based on the applicability of the components to the given scenarios.

When the participants applied the model to the given scenarios, they pointed out that it is always important to start by doing research and discover the attributes of the users, the product and the context of use in order to be able to manage user experience. It was interesting that the participants mentioned that the aim of the research and discovery phase is to identify the factors that influence user experience. As such, the participants stated that the research and discovery phase is a crucial phase in managing user experience, since one needs to understand the factors that influence user experience in order to be able to design for user experience and promote a positive user for the people using the products.

All of the participants also commented that an understanding of the factors that influence user experience forms the foundation for establishment of the strategic base for the management of user experience. The concept of defining a user experience management timeline, setting measurable user experience goals and forming a guiding team to lead the process of managing user experience was well received by the participants. They revealed that, in practice, user experience goals are rarely stated, that there is no specific time plan for user experience set in projects and that there is a lack of people who are equipped to spearhead user experience activities in most product development projects. Hence, the model addressed and introduced important facets in the process of designing products for user experience and managing user experience.

All the participants could easily relate to each of the proposed activities of creating awareness and desire, and imparting knowledge and ability during the implementation phase of managing user experience. The participants used practical examples on how they currently perform the activities for implementing user experience. They emphasized that it is important to include such examples in the explanation of the model in order to increase the visibility of the usefulness and applicability of the model.

Participant 5 mentioned that it is important to address sustaining user experience from a behavioural psychology point of view. The participant suggested that, when new products are introduced or the user interface of a product is changed, it is important to maintain habitual user tasks. Habitual tasks are the features that are available on a product that the users end up performing almost unconsciously. An example of a habitual task may be a game that the user always plays on a mobile phone. A version update of the mobile phone that removes the game

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or makes the mobile phone incompatible with the game will result in the users being disgruntled. A product that maintains the habitual tasks of the user retains existing users and has the potential of attracting more users, as the users often tell each other of such tasks. Participant 5 also mentioned that there is a need to differentiate user needs from tasks during the research and discovery phase, as the differentiation is important in sustaining user experience.

The phases *Impact assessment* and *Monitoring and evaluation* were considered to be presented soundly in the model. The proposed requirements, activities and techniques for monitoring and evaluation were found to be well explained and straight-forward to understand. These phases were therefore also found to be useful and relevant to the process of managing user experience.

The participants emphasised the need to empirically test the model on an ongoing project in order to demonstrate how the model would be useful in real context. This recommendation was respected and acknowledged in the study, and it has been stated in the scope of the study that the application and maintenance phase of the model is beyond scope due to time constraints (c.f. section 2.3.1 and sections 5.3.5).

Participant 3 suggested the inclusion of concepts from fields such as marketing and psychology, as well as cultural aspects, in the discourse of the study. This suggestion was found to be very valuable, considering that of user experience is related to a variety of other fields. This suggestion emphasised the need to highlight in the delineation of the study that, while the multifaceted nature of user experience is acknowledged, the process of managing user experience is restricted to the aspects of user experience and change management for the purposes of this study.

Participant 4 and Participant 5 raised concerns pertaining to the name of the model "User Experience Management Model". Their major concern was that the name is often used when referring to the coordination of user experience teams. It has been noticed that they had such concerns because they had not read the entire thesis, but only the section of the model that they were evaluating. An explanation of the proposed UXM^2 that outlines its uniqueness will be provided in Chapter 7, so as to differentiate the UXM^2 from managing user experience teams.

Participant 5 mentioned that the model is inadequate in addressing the design of products that are intended for use in different global contexts. In order to address this aspect, the components

of customization, personalization and designing adaptive user interfaces was added to the system. This has the potential of sustaining user experience.

Participant 6 mentioned that the proposed model does not clearly explain how to treat situations in the following scenarios, when:

- *Users have received bad updates in the past and are actively resisting upgrades:*

This scenario is addressed in the research and discovery phase. One of the requirements for research and discovery is that there is a need to assess the previous change history and how the people reacted to the change. An additional technique to deal with the pockets of resistance resulting from previous change history will be added to the model, in order to bring more clarity with respect to the situation mentioned. In order to deal with such pockets of resistance, product designers must introduce the new upgrade with a note apologizing to the users for the defects in the previous upgrade. Such an approach helps the users to gain trust in the new upgrade.

- *Users are not interested in reading release notes describing an update:*

There is a need to incorporate persuasive techniques in addition to the traditional release notes. The persuasive techniques are aimed at creating a desire for the users to find out more about the upgrade and the benefits of accepting the upgrade. Examples of persuasive techniques include the use of video tutorials instead of extensive text, and the use of context-based help in pictorial format to describe the update.

- *Users cannot learn how to exploit the new features because they have a conservative attitude and / or low skills, or because the features are hidden or difficult to learn:*

This challenge is addressed at the outset by doing research on the users, and discovering their attributes as well as their attitude toward the product. Involving the users in the design process of the product and designing the product for trust has the potential of converting conservative users to be willing to use the product. Participatory design increases the confidence of users and their will to use the product. The challenge of having features of the product that are hidden from the users is addressed by doing usability evaluation of the product and designing the product to make it intuitive, familiar to the user and meeting the expectations of the users.

Despite that fact that the participants were only provided with a snippet of the thesis when explaining the model, it was interesting to note that they managed to understand the problem that the model intends to solve as well as the intended functionality of the model without reading the whole thesis. It can be concluded from the feedback from the interviews and review of the academic publications that were submitted at conferences, that the identified components of the model and the conceptual model are useful and applicable to the management of user experience. The recommendations and suggestions for improvement have been noted and will be included in order to refine the conceptual model, for presentation in the final version of the UXM^2.

6.3.3. Results from review of peer reviewed academic publications

Peer review results of first conference paper

The first paper is entitled A Model for Managing Information and Communication Technology User Experience in Rural Context (c.f. Appendix B2). This paper was submitted and presented at the International Conference on Computing and ICT Research (ICCIR) in 2012. The reviewers reflected on the following shortcomings of the paper:

➢ The process of how the model was derived from requirements was not clear;
➢ Details on the choice and motivation of the methodology used to develop the model was inadequate; and
➢ The proposed model lacked validation.

The comments from the reviewer of the paper provided feedback that guided the improvement of the UXM^2. This review highlighted the need to include the views of the potential users of the model on how they find it to be applicable and useful, so as to illustrate the practicality of the model. The process of how the model was derived from the requirements and how the requirements were identified was addressed and incorporated in the thesis (c.f. Chapter 4). Chapter 5 of the thesis dealt with the issue of inadequacy of details about the choice of methodology that was used to develop the model by outlining the choice of research strategy, methodology and data collection techniques. An exercise to evaluate the internal and external validity of the model was conducted. In addition, the scope of evaluating the model was stated. A group of potential expert users of the model participated in the evaluation of the model in

order to review how they foresee the model to be useful and applicable to manage user experience.

Peer review results of second conference paper

The second paper presented the requirements of a model for managing user experience. The title of the paper is Managing User Experience, Managing Change (c.f. Appendix B2). The paper was aimed at identifying the requirements for managing user experience. The output of the paper was the User Experience Management Requirements (UXMR) Framework. The UXMR Framework served to identify the required components of the UXM^2. This paper was presented at INTERACT 2013 conference and published as a section in the book entitled Human-Computer Interaction–INTERACT 2013. A total of three reviewers provided feedback on the proposed framework. All of the reviewers agreed to have confidence in the usefulness of the proposed requirements for managing user experience. However, they highlighted the following as aspects that have to be addressed in order to improve on the proposed framework.

- ➢ The proposed framework is theoretical;
- ➢ The framework lacks incorporation of the aspect of technology as experience, which is an important factor influencing user experience; and
- ➢ The proposed framework has not been validated.

The UXMR Framework presented in Chapter 4 helped with the identification of the necessary requirements for managing user experience. The *theory of technology as experience* was incorporated to illustrate how the use of technological products has become widespread in the life of users. The model was validated for its usefulness and applicability using expert review interviews with expected users of the model. A set of scenarios that was mimicking the real usage of the system was modeled and used in order to make the UXM^2 as live as possible, thus dealing with the need to make it practical and not merely theoretical.

The data that was collected from reviews of the papers that were submitted to the conferences served as useful formative evaluation in developing the conceptual UXM^2. The feedback highlighted the need to clearly define how the requirements of the model were derived, and to outline the process that was followed to develop the model. The need to validate the proposed artifacts came as major feedback from the reviewers. Hence, a need was identified to have a

strategy to evaluate the validity of the proposed UXM^2. It has also been noted that it is highly important to bring to understanding how the model would be applied in a real-life situation. Interviews were conducted with experts in the field of user experience, who are the potential users of the proposed UXM^2. The experts were asked to comment on how they find the model to be useful and applicable to managing user experience. The experts evaluated the conceptual UXM^2 based on the given scenarios. The scenarios were developed to simulate the real problems that the model seeks to address. The results from the evaluation of the model by the experts are presented next.

6.4.   TRIANGULATION

The type of triangulation adopted in this research is data triangulation. Data are triangulated from argumentation of literature, review of academic publications and interviews with experts.

Figure 6.5 illustrates the data collection methods that were used to form the triangulation approach.
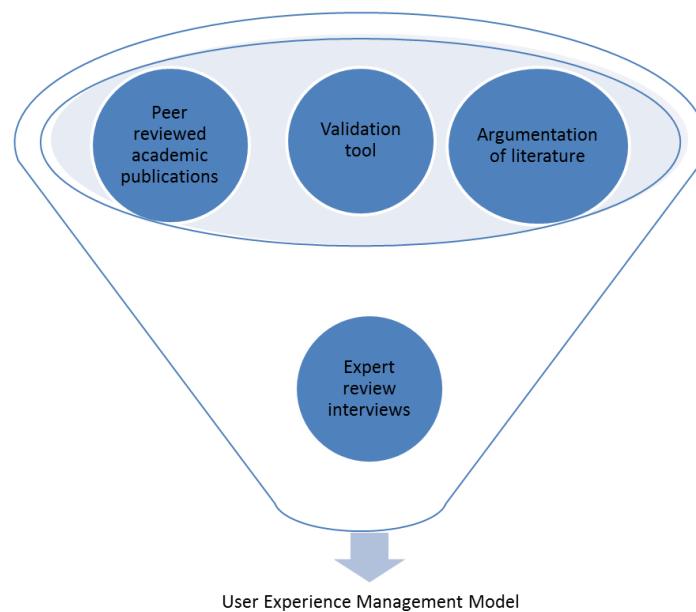

Figure 6.5: The data collection methods used to form data triangulation

A review and analysis of literature on user experience and change management provided secondary data supporting an argument for the need of the UXM^2. Primary data motivating the usefulness of the proposed model was obtained from expert review by means of interviewing

subject domain experts, completion of the validation tool and comments from review of the academic publications. The data collected was inductively and logically analyzed in order to interpret and structure the meanings that can be derived from it. This inductive approach aims to reveal the pertinent realities with respect to subjective perceptions on the usefulness and applicability of the UXM^2. The aim of triangulating data from the various sources is to obtain different but complementary data on the usefulness of the proposed model.

Hence argumentation of literature, review of academic publications, validation tool ratings and expert interviews were used as data sources in order to refute or support the usefulness and potential applicability of the proposed UXM^2.

6.5.   CONSTRAINTS

Due diligence was considered in validating the proposed model, so as to attain the desired level of credibility as far possible. However, a few challenges were encountered which hindered full satisfaction in validation of the model. The constraints included the following:

- ➢ The literature was inadequate;
- ➢ The model was not practically used in the actual situation;
- ➢ The study was conducted over a cross-sectional timeline horizon, whereas a longitudinal approach would have been ideal for using the model in practise; and
- ➢ Few experts are available that have dual expertise in the fields of user experience and change management.

The initial problem was a lack of literature that integrates user experience and change management. The two disciplines exist as separate entities. As such, the literature from the different disciplines was analytically and argumentatively interpolated to substantiate the observed practical problem of users getting frustrated and taking longer to get used to the changes and the introduction of new user interfaces. Hence, the observed practical problem motivated the relevance and potential usefulness of the UXM^2 to manage user experience so that the change in user interfaces or introduction of new products produces minimal interruptions in user experience. The validation process suffered due to the time limitation that precluded practical implementation of the model in a real context of use. Practical implementation of the model would require that a project be executed from the elicitation of requirements through to

the post-implementation phase and the evaluation of long-term user experience. Such a process would require a longitudinal study that would exceed the time period allocated for academic purposes. The time constraint was circumvented by developing scenarios by means of which to simulate the practical use of the model. It was difficult to locate the desired number of dual experts in both user experience and change management to evaluate the proposed model. This challenge was alleviated by selecting experts with sufficient experience (five years or more) in the field of user experience, to participate in the evaluation of the model. The expert participants were from varying backgrounds that included academia, user experience practice, change management and psychology (c.f. section 6.2.3). The profiles and diverse experience of the selected experts valuably contributed to the credibility of the process of validating the UXM[2].

6.6. SUMMARY

This chapter provided details on the purpose and process followed in validating the proposed model. Each of the methods that were used during model validation was explained. Furthermore, the results of the evaluation exercise were presented and analyzed. The constraints that were faced during the validation process were noted, and the means used to circumvent such challenges were mentioned. It can be concluded that the findings from the evaluation revealed that the model is considered to be useful and applicable to the management of user experience. The findings obtained during the evaluation of the model were used as feedback to refine the model, as explained in Chapter 7.

CHAPTER 7: APPLICABILITY OF THE USER EXPERIENCE MANAGEMENT MODEL

INTRODUCTION

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Introduction

PART A :RESEARCH DESIGN

Chapter 2
Research Design
and Methodology

PART B: REQUIREMENTS IDENTIFICATION

Chapter 3
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Managing User
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PART C: THE CONCEPTUAL MODEL

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Chapter 6
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7.0.   INTRODUCTION

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7.2.   REFINEMENTS TO THE UXM2
7.2.1. User Experience Management Models versus Managing user experience teams
7.2.2. Examples illustrating the components of the model

7.3.   SUMMARY

7.0.   INTRODUCTION

The purpose of this chapter is to verify that the proposed model has the potential of being used in practice. The verification serves to provide the evidence of the feasibility of the UXM^2 by reporting on the usefulness and applicability of the model. The main techniques that were used to evaluate the usefulness and applicability of the model were interviewing subject domain experts and completion of the validation tool by the subject domain experts. A discussion on the applicability of the UXM^2 will demonstrate how the subject domain experts used the model to address the scenarios. Details of the scenarios were discussed in Chapter 6 (c.f. section 6.2.2).

The process that was followed to evaluate the model is discussed in section 6.2 and presented diagrammatically in Figure 6.1.

7.1.   APPLICABILITY REPORT OF THE UXM^2

In order to determine the usefulness and applicability of the model, the steps on how to use the model were followed. These steps are illustrated in Figure 7.1.

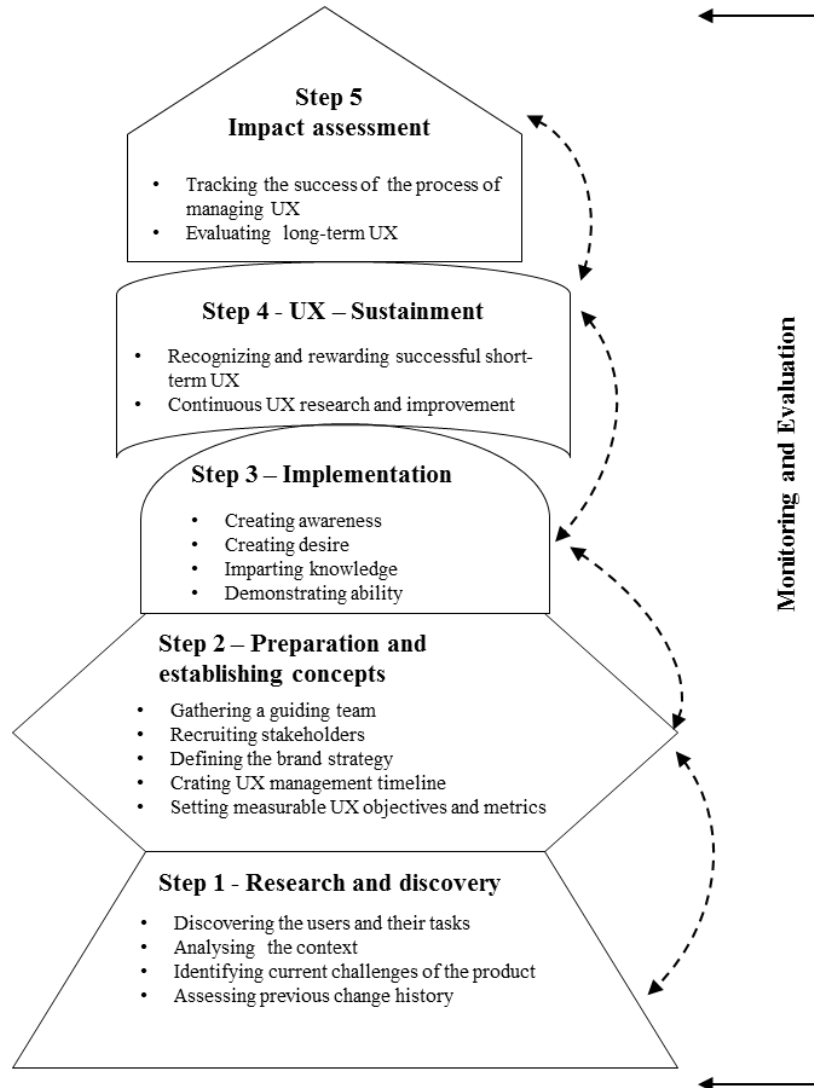**Figure 7.1: Steps for using the UXM[2] (c.f. Figure 5.14)**

This chapter reports on the results of each of the steps of managing user experience (c.f. section 5.6).

7.1.1. Step 1: Research and discovery

The first step, *research and discovery*, is aimed at determining the factors that influence user experience.

The factors that were identified to influence user experience are presented in Table 7.1.

Table 7.1: Factors influencing user experience from scenarios

Scenario 1	Scenario 2
• Level of the user's literacy; • • Prior experience with technology; • The age of the user; • The need to appear knowledgeable; • Fear that the new system may disturb her routine and closeness to patients;	• The user's prior knowledge of the product; • Age of the user; • Disturbances in the user's habitual tasks; • Discoverability of the features of the products; • Introduction of change without being informed; • Familiarity with the features and user interface of the current product.

The factors that were identified to influence the user experience varied between the scenario of developing a new product and the one for improving the user interface of existing products. This validated the generalizability of the UXFD (c.f. Figure 3.16).

7.1.2. Step 2: Preparation and establishing strategy

The requirement for gathering a guiding team was identified to be similar in both scenarios. The recruitment of stakeholders, defining brand strategy, crafting the UX timeline and setting user experience metrics were identified to be different for the different scenarios because of the following:

- The product in scenario 1 is meant for institutional use, while the one in scenario 2 is intended for personal use;
- The product in scenario 1 will be mandatory to use while the one in scenario 2 is optional to use.

The participants highlighted the fact that the model set the basis, and that it can be generalized and is required to prepare the process of managing user experience in different projects.

7.1.3. Step 3: Implementation

It has been noted that, in scenario 1, the user is not yet aware of the product, while in scenario 2 the user is aware of the product, she has the desire and knowledge to use the product and she is able to use the product. Thus, the first step in implementing the user experience management for scenario 1 will be to use the techniques for making the users aware of the product, its features

and the benefits of adopting the new system over the old way of doing things. A desire must be created for the user to develop an affinity to accept the product with positive user experience. The user must also go through training in order to impart knowledge on how to use the product. Finally, she must be given the opportunity of practical use so that she demonstrates the ability to use the product. In scenario 2, it is required that the user should be made aware of the features that are changing and the reason for the change. Also, it has been highlighted that users do not just want to be informed of the change but that they want to be involved and give feedback on what must change. The communication of change must be accompanied by persuasive techniques to entice the user to develop a desire to use the new features.

The participants reflected that the proposed model requirements are useful and applicable in the given scenarios.

7.1.4. Step 4: User experience sustainment

The purpose of the sustainment phase is to make the user experience stick and last. The participants highlighted that researching and improving the user experience is a valid activity, since users quickly get bored and they do not like legacy systems. However, the participants pointed out that the improvements in user experience should be well coordinated and should follow on step 1 in order to discover what the users want to be changed, and on step 3 so as to implement the improvements in a manner that does not disgruntle the users.

Another dimension added to sustaining the user experience is that the improvements to the user interface or the introduction of a new product should always support the habitual tasks of the users and should not interrupt the flow of the tasks. For example, in scenario 1 the introduction of the new product must not detach the user from her passion of being close to the patients. Hence, the new system must still collaborate with the user so that she keeps her tight relationships with the patients. In scenario 2 the tasks of reading comments, commenting on the posts of friends and viewing pictures must be maintained. Keeping the habitual tasks of the users maintains a seamless and sustainable positive user experience.

7.1.5. Step 5: Impact assessments

All the participants reckoned that doing an impact assessment is important so as to reflect on the effectiveness of the process of managing user experience. Another requirement that was proposed as a means of assessing the effectiveness of the process of managing user experience is to consider evaluating the manifestations of user experience. For example, in scenario 2 the long-term manifestations of positive user experience may be an increase in the number of people creating profiles, an increase in the duration of visits and return- as well as unique visits to the site.

7.1.6. Step 6: Monitoring and evaluation

All the participants indicated that the proposed requirement of monitoring and evaluation is applicable and important to the management of user experience. It is also useful as it helps in the improvement of the process of managing user experience for similar scenarios in real use.

Shortfalls of the model were noted during the evaluation process, and this feedback validated the usefulness of the proposed phase of monitoring and evaluation. The refinements to improve the model, based on the evaluation, are presented next.

7.2. REFINEMENTS TO THE UXM²

The UXM² was mostly well received by the subject domain experts, who followed the steps of using it to while applying it to the given scenarios. The subject domain experts represent the potential users of the UXM². The experts rated the model to be useful and applicable to managing user experience, with some minor recommendations that are discussed next.

The following suggestions were made to improve on the model:

➤ Clearly differentiate how the UXM² differs from managing user experience teams;
➤ Use examples in explaining the components of the model in order to increase the visibility of the usefulness and applicability of the model;
➤ Maintain habitual tasks as a means of sustaining the user experience;
➤ Include measuring the manifestations of positive user experience as a means to assess the impact of the process of managing user experience; and

> ➤ Differentiate the user needs and tasks during the research and discovery phase of the model.

The next sections outline how the suggested recommendations were addressed.

7.2.1. User Experience Management Models versus Managing user experience teams

The UXM^2 aims to promote a positive user experience when a new product is introduced, or when the user interface of an existing product is changed. The model acknowledges that the user interfaces of products change and that new products are being introduced in the market. The changes in user interfaces and the introduction of new products subsequently result in changes in the user experience of the people that use the product. This change in user experience evolves over time. The change in the user experience can be either negative or positive, depending on how the users feel that the changes made to the product affect their expectations and tasks. A growth in positive user experience results in acceptance and adoption of the product, while a negative user experience brings disgruntlement of the users, leading to the product being rejected and not utilized.

The purpose of the UXM^2 is to prescribe techniques for maintaining a positive user experience of the people when the user interface of a product is changed or when a new product is introduced. Thus, the model aims to provide guidance on how to introduce changes to the user interface of a product without hampering the user experience of the people. In this regard, the uniqueness of the UXM^2 lies in its user-centred dimension, which is compared to and contrasted with the theory of managing the user experience team as postulated by Lund (2011). Lund's concept of managing user experience focuses on the recruitment of an effective user experience team and evangelising user experience within the organisation. It does not address the dimension of how to promote a positive user experience by dealing with the real users of the products. The target audience of the two approaches differ in the sense that Lund's work is targeted to be used by user experience managers in an organisation. In contrast, the target users of the UXM^2 are user experience practioners and product developers who aim to produce products that provide a captivating user experience with minimal user frustration.

7.2.2. Additional components of the UXM^2

Figure 7.2 illustrates the UXM^2 that incorporates the recommendations obtained during the evaluation of the conceptual model.
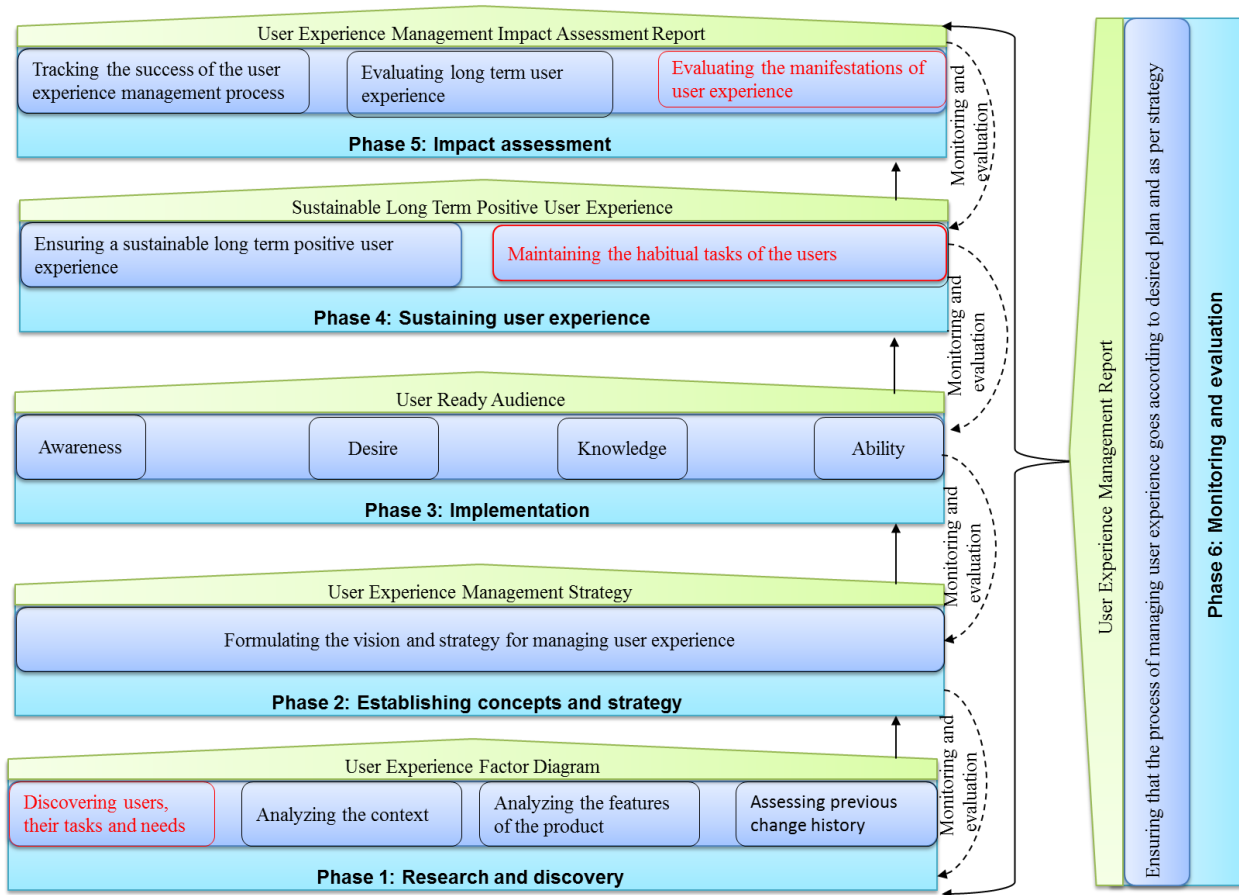
Figure 7.2: User Experience Management Model

The components in red are the ones that have been added to address the suggested recommendations. The added components are: discovering user, their needs and their tasks; maintaining habitual tasks of the users and evaluating user experience manifestations. Arrows have been added between the phases to show that there is some iteration between them.

7.2.3. Examples illustrating the components of the model

It has been recommended that the visibility of the usefulness and applicability of the model can be improved by using examples to explain usage scenarios of the model. The following are scenarios setting examples to illustrate the use cases of the proposed components of the model.

Example 1: Research and discovery

It has been mentioned earlier in Chapter 5 that research and discovery involves investigating aspects of the user, the product and the context of use of the product. An example of research and discovery will be to explore if a product will have to be used in a specific context, or used globally by a number of different users. The design process of an accounting system that is developed in-house to be used by a one organization will have to be different from the design process of an accounting system that has to be used in multiple organizations that have a global population of users. In this regard, it is important to research the targeted users of the product, so as to make sure that it satisfies the intended use by determining and addressing the factors that influence the user experience of the people who are meant to use the product. Another example of the applicability of research and discovery is to determine the reason why the users will use the product. It is important to differentiate between products that are mandatory to be used and those that are optional. A further differentiation that needs to be made is between institutional use and personal use. Such an investigation is helpful in determining the needs that the user must accomplish with the product, and the tasks that the user has to do in order to have their needs satisfied.

Example 2: Establishing concepts and strategy

The process of establishing concepts and strategy for managing user experience is closely related to the idea of managing user experience teams, as put forward by Lund (2011). For example, when planning to re-design the user interface of a public social network site or application, there is a need to strategize about who will be responsible for the collection of data, and a need for defining the measurable user experience goals and specifying the expected measures of the manifestations of a positive user experience. Examples of concepts that describe the goals of user experience would be to make the social network attractive, pleasing and captivating, and many similar concepts that describe positive emotions (Rogers *et al.*, 2011). Examples of the manifestations of a positive user experience would be an increase in conversions by X%, an increase in site revisits of Y% and an increase in new users of Z%. This would help to determine whether or not the desired level of user experience has been attained.

Example 3: Implementation

The design of products for positive user experience requires that the user interface informs the users of what will be changing, the benefits of change and what the user needs to do in order to be competent and keep abreast of the introduced changes. Quite often users get messages that inform them that a new update or upgrade is available. The message only serves to inform the users of the availability of the update, and such messages are inadequate in creating a desire for the users to be able know the benefits of installing the updates. Some users become actively resistant to install the upgrades / updates, perhaps because they had a bad experience with the previous update. A solution to this situation has been provided in section 6.4.2 during the analysis of results of the evaluation of the model. A message informing the users of the availability of the update or the upgraded version of the products should go beyond the informative part to create a desire for the users to accept the proposed upgrade, and to provide them with the knowledge of how to install and use the new version.

Example 4: Sustaining user experience

An example of sustaining the user experience will be to maintain availability and compatibility of the habitual tasks that the users perform, with the improvement in user interface or the introduction of new features of the product. Aspects and examples of habitual user tasks have been discussed in section 6.4.2. Another means of sustaining the user experience will be by conducting continuous user research. For example, developers of a sport website should continuously do research on the needs of the users and the devices that they are using. In the current era, most users are using mobile devices. It therefore becomes important for the developers to develop mobile versions of the website and applications that should run on the devices that the users are currently using. Such innovation does not require the user to switch from their current routine in order to access the content of the sport website. The content will be rendered on the devices that the user is using at the time. This approach has the potential of retaining existing users and inviting more users to use the product.

Example 5: Impact assessment

Monitoring and evaluation serves to evaluate the effectiveness of the intervention of managing user experience. For example, if a public social network site is embarking on a project of changing their user interface, they can choose a control group to whom they will introduce the intervention of managing user experience using the UXM^2. The level of user experience of the control group is measured, and the control group users get to participate in the design of the new user interface. They are made aware of the features of the product with respect to what will change and what will remain unchanged. Also, the benefits of the changes are communicated to them in order to create a desire for them to accept the change. The users are trained and the long-term user experience and the manifestations of user experience are considered. The user experience, as well as the manifestations of user experience of the users who did not go through the intervention process, is evaluated. The findings of the two groups are then compared in order to assess the effectiveness of the UXM^2 towards promoting and managing a positive user experience.

Example 6: Monitoring and evaluation

Monitoring and evaluation involves keeping track of all the activities during the process of managing user experience. For example, monitoring and evaluation serves to check if all the factors that influence user experience have been explored, whether the strategy for managing user experience has all the components and whether or not it addresses the factors that have been identified to influence user experience. The extent and effectiveness of the techniques aimed at bringing awareness, creating a desire and imparting knowledge and ability to the users are evaluated during the monitoring and evaluation phase. There is a need for strategic communication that sends the right message to the right people at the right time. For example, if an organization would want to change one of the business information system applications, the use of grapevine communication may be useful in order to get the informal reaction of the users with respect to the planned change before the project is commissioned. Such informal reaction is useful in equipping the process of managing user experience, as the fears of the users will be known beforehand. When the project has been officially started, it is important to send credible information to the users in order to make them fully aware of the benefits of the planned change in the information system application. The strategic information of how the project will have to proceed should only be communicated to the responsible stakeholders and not to everyone in the

organization. The level of user experience of the people will be measured at each phase as a means of monitoring and evaluation. The findings from monitoring and evaluation help to further refine the process of managing user experience.

It is hoped that the brief examples and explanations describing the use cases of the model will help to make the UXM^2 more understandable.

The steps of using the UXM^2 remain unchanged, as presented in section 5.6.

7.3.   SUMMARY

This chapter presented the UXM^2. The presentation of the model was based on the refinement of the conceptual UXM^2 that was presented in Chapter 5. Additional components namely discovering the needs of the users and their tasks, measuring manifestations of user experience and maintaining habitual user tasks have been included in the model. In order to improve on the understandability of the model, examples outlining the use cases of the components of the model have been included to aid the description of how the model can be applied in real-life contexts.

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8.0.   INTRODUCTION

The purpose of this study was to develop a model for managing user experience. The model aims to promote a positive user experience for the people, despite changes in the user interfaces of the products or the introduction of new products. The study defined the problem that people often have a bad user experience as a result of changes to the user interface of a product, or the introduction of a new product. The study outlined design science as the research paradigm adopted in this research, and highlighted the philosophy and methodological approach that was followed in developing and evaluating a model for managing user experience. It also presents the UXM^2 (Chapters 2 to 7).

Section 8.1 presents a summary of the research by revisiting the research questions and objectives and mapping them to the data collection methods, together with a summary of the mode of inquiry that was used to address the respective research questions. The second part of section 8.1 mentions the components that were developed, which contributed to the development of the UXM^2. These components are then joined as summative elements contributing to the desired model, the UXM^2.

The significance and contributions of the proposed model are discussed in section 8.2 by showing how the proposed model bridges the gap that was identified during the gap analysis phase in Chapter 1. The limitations of the study are discussed in section 8.4. The study culminates with an outline of possible future research and final conclusions, presented in section 8.5.

8.1.   SUMMARY OF RESEARCH

This section presents a summary of the research based on the mapping of the research questions to the research objectives, as well as a summary of the respective techniques that were used to answer the research question.

8.1.1.   Research questions revisited

The research questions, their corresponding research objectives and how they were addressed in the study is discussed next.

Sub- research question 1

What are the factors that influence user experience?

The corresponding research objective is stated as follows:

Sub-research objective 1

To identify the factors that influence user experience.

This research question was addressed in Chapter 3 through argumentation of literature. In broader terms, elements of the user, the features of the product and the context in which the product is used were identified to be the main factors that influence the user experience. A discussion describing these factors in depth is presented in Chapter 3. An investigation of the factors that influence user experience lead to the development of the User Experience Factor Diagram (UXFD), which was presented in Chapter 3 (c.f. Figure 3.16). The components of the UXFD were evaluated through an academic conference paper that was peer reviewed. The UXFD serves as a template to guide the factors that influence user experience during the research and discovery phase of the UXM^2. The use and contribution of the UXFD will be discussed in section 8.2.

Sub- research question 2

What are the requirements for managing user experience?

The corresponding research objective is stated as follows:

Sub-research objective 2

To determine the requirements for managing user experience.

The sub-research question was answered in Chapter 4 through argumentation of literature. The requirements for managing user experience were obtained from the main domains of focus in the research, namely change management and user experience. It was established in the study that the management of user experience requires preparation for managing user experience, implementation of the user experience management strategy, sustaining the user experience and

monitoring and evaluating the process of managing user experience. A further explanation on each of the requirements is covered in Chapter 4 (c.f. section 4.8). A User Experience Management Requirements (UXMR) Framework was developed to illustrate the requirements for managing user experience. The UXMR Framework was evaluated through an academic conference publication review process. The framework is a contributing component of the UXM^2. The significance and contribution of the UXMR Framework will be discussed in section 8.2.

Sub-research question 3

What are the benefits of this model for managing user experience?

The corresponding research objective is stated as follows:

Sub-research objective 3

To establish the significance and contributions of the user experience management model.

This research question will be answered and discussed in section 8.2. The mode of inquiry used to determine the benefits of the UXM^2 include a triangulation of: argumentation of literature, analysis of the review feedback by academic publications and results of the evaluation of the model with the experts. The triangulation results will be presented to show how the model contributed to the academic scientific body of knowledge, the practical contribution for the practitioners and how the design process of the model can be followed for the design of other models - thus, the methodological contribution.

Primary research question

What are the components of a model for managing user experience?

The corresponding primary objective states:

Primary research objective

To develop a model for managing user experience.

The purpose of this study was to develop a model that is used to manage user experience. It has been revealed that there is currently no model that exists to solve the problem of managing the

change in user experience that result from changing the user interface of a product or the introduction of a new product.

The problem under investigation involves the complexity of the evolutionary nature of user experience. Since user experience evolves over time (c.f. section 4.2), there is a need to manage the change in user experience. The nature of the problem of managing user experience requires a multidisciplinary approach. As such, the disciplines of user experience and change management have been motivated as the potential candidates for solving the identified problem. A study and argumentation of literature on user experience and change management was conducted in order to determine the required components of a model for managing user experience (Chapters 3 and 4). This lead to the development of the conceptual UXM^2 presented in Chapter 5. The conceptual UXM^2 was evaluated for its internal and external validity using argumentation of literature, feedback from review by academic publications and expert review interviews (Chapter 6). The findings were triangulated and used to refine the conceptual UXM^2 into the desired artifact, the User Experience Management Model (UXM^2).

The significance and contribution of this research is discussed next.

8.2. SIGNIFICANCE AND CONTRIBUTION OF RESEARCH

All products provide some experience to its users. (Van Tyne, 2009). Some products provide a negative user experience while others provide a positive user experience. A product that fails to satisfy the user experience expectations of the people suffers from being rejected by the users, whereas a product that provides a positive user experience is accepted and used with delight by the users (Van Greunen *et al*., 2010). It is therefore important that the designers of products should consider designing for positive user experience. The development of user experience is not a once-off thing but evolves over time. A positive user experience is cultivated by managing the change in user experience that is effected as new products are introduced or the user interfaces of existing products are changed.

8.2.1. The User Experience Management Model

This section of the study discusses the contribution of this reseach project toward the management of user experience so as to ensure a positive user experience. The main contribution

of the reseach is an artefact for managing the user experience, namely the User Experience Management Model (UXM^2). The UXM^2 is presented in Figure 7.2.
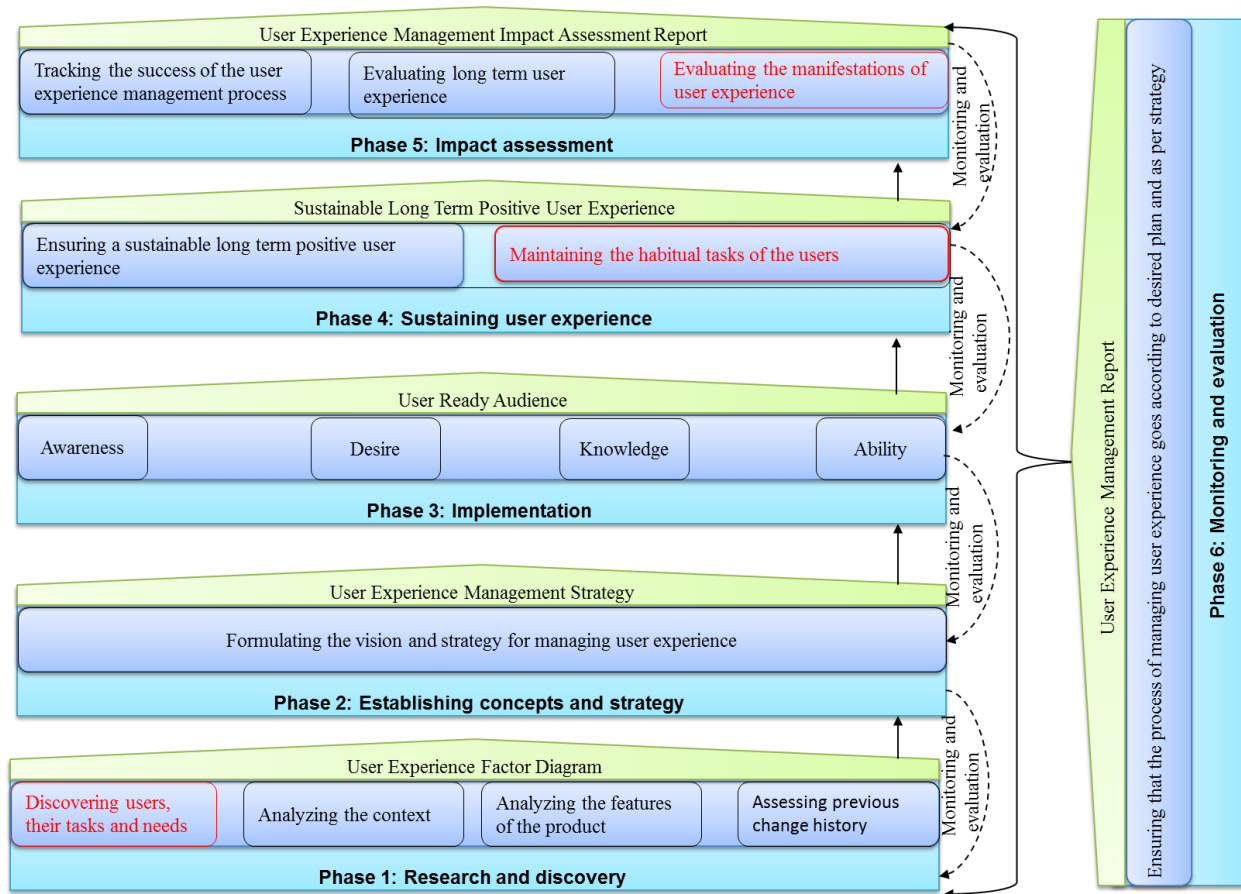

Figure 8.1: User Experience Management Model (c.f. Figure 7.2)

The UXM^2 provides both desriptive and prescriptive measures for managing user experience. The UXM^2 desribes the process of managing user experience by stating the requirements, activities and techniques for managing user experience. Not only does the UXM^2 describe the components of managing user experience, it also prescribes what has to be done in order to cultivate a positive user experience. The prescriptive contribution of the model is offered by providing steps that guide the target users of the model on how to use the model.

The UXM^2 is of benefit to user experience practitioners in that it helps them to manage and improve the user experience of the people by providing guidance on how to change the user interface of products without upsetting the users. The user experience practitioners who participated in the expert evaluation of the model indicated that they will benefit from the model by being able to use it to assess the user experience of the people and to determine the factors

that influence user experience. They also mentioned that the model suggests useful interventions for improving the user experience. The other contribution of the model is that it provides directions to product designers on how to design the product for positive user experience. The UXM^2 contributes significantly to the creation of a user audinence that will be ready to accept the changes to the user interface of products and the introduction of new products. This will hopefully promote product acceptance, adoption and usage.

In addition to the main contribution of the UXM^2, other contributions that resulted from this reseach are discussed below.

8.2.2. User Experience Factor Diagram (UXFD)

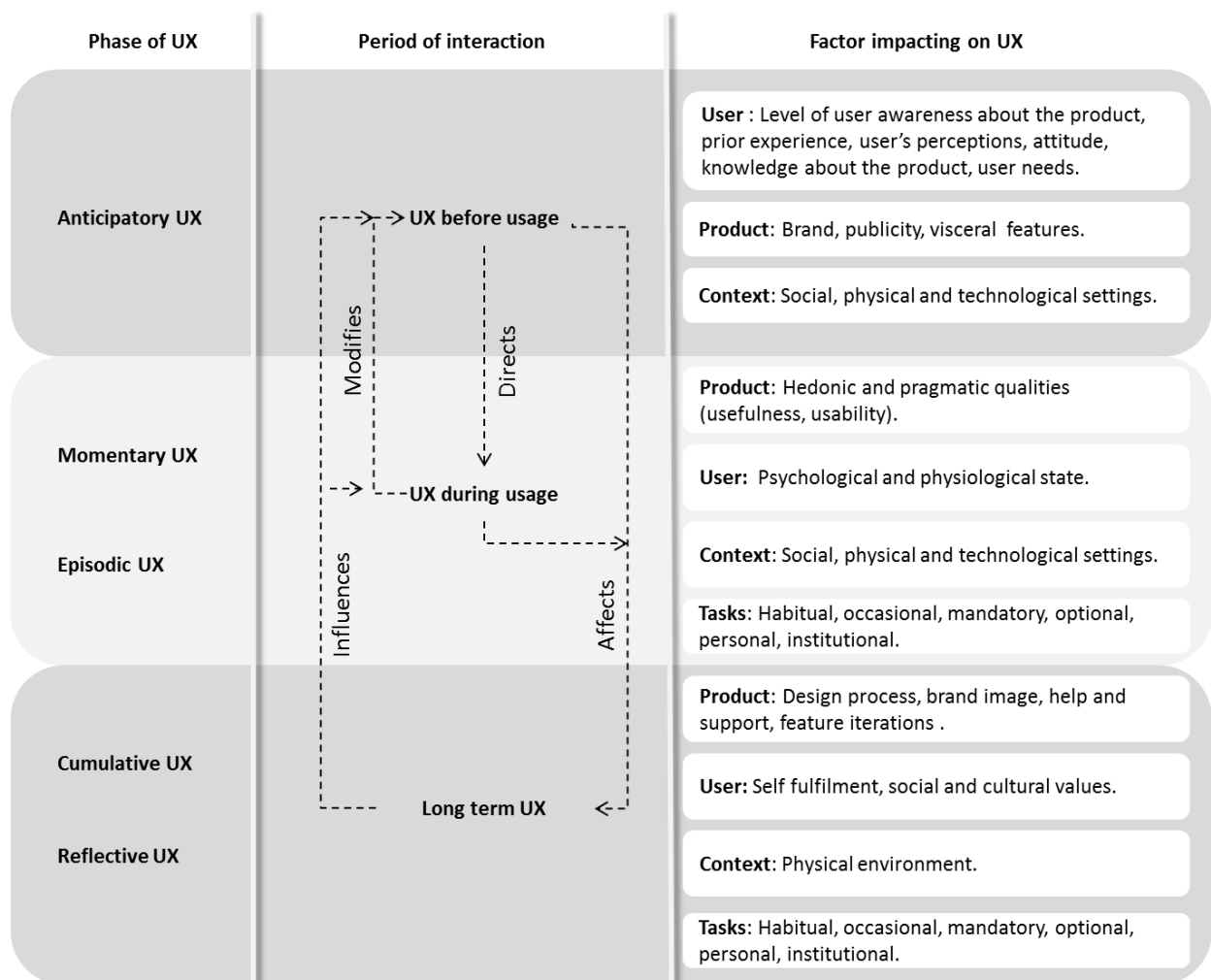The UXFD was presented in Chapter 3 (c.f. Figure 3.16).

Figure 8.2: User Experience Factor Diagram (c.f. Figure 3.16)

The UXFD outlines the factors that influence user experience. A number of authors have identified the factors that influence user experience. Most of the factors are identified based on a specific application or domain (Van Greunen *et al*., 2010; Saariluoma, Jokinen, Kuuva & Leikas, 2013; Law, Roto, Vermeeren & Kort, 2009; Hassenzahl & Tractinsky, 2006; Roto *et al*., 2011). The UXFD provides a holistic approach to discovering the factors that influence user experience. The wholeness of the UXFD lies in the fact that it ties the elements of user experience and the phases of user experience to the attributes of the elements that influence user experience. The benefit of the UXFD is its flexibility, as it can be generalized and used to examine the factors that influence the user experience of any product. The proposed UXFD serves as a blueprint template that can be used by user experience practitioners to research the factors that influence user experience. Thus the UXFD is an important tool that can be used during the research and discovery phase of the UXM[2].

8.2.3. User Experience Management Requirements (UXMR) Framework

The purpose of Chapter 4 of this research was to determine the requirements for managing user experience. The requirements were determined and developed into the User Experience Management Requirement (UXMR) Framework (c.f. Figure 4.9).
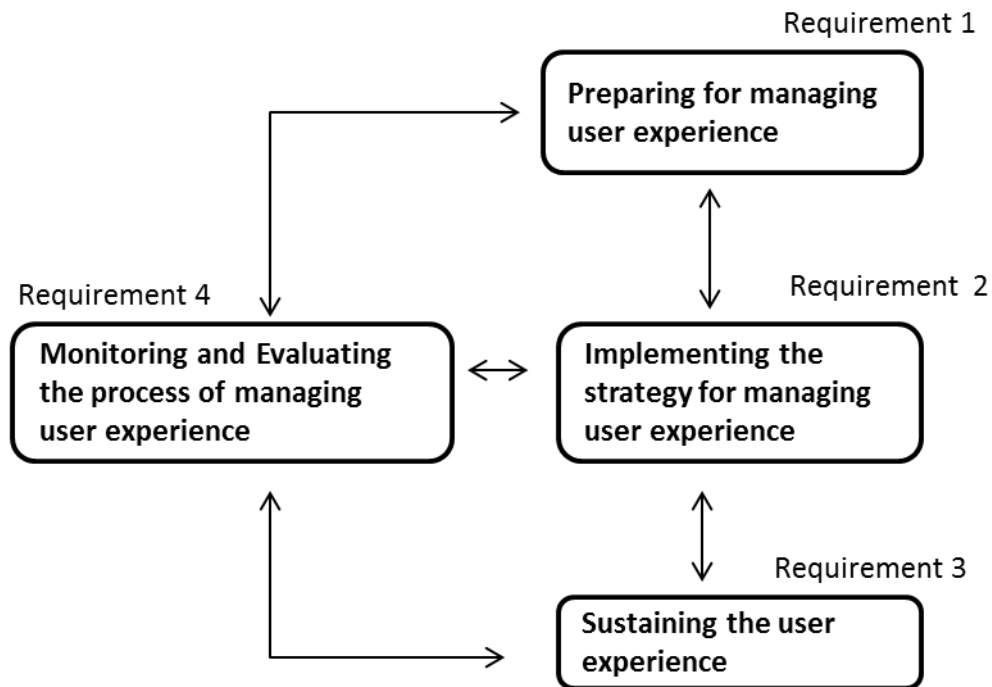

Figure 8.3: User Experience Management Requirements Framework (c.f. Figure 4.9)

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The UXMR Framework consists of four phases namely preparation, implementation, sustaining user experience and monitoring and evaluation. Each of the phases has its requirements as well as the activities and techniques that are necessary to manage user experience. The UXMR Framework is closely related to the UXFD. The findings from the research and discovery phase are used to formulate the strategy for managing user experience. The strategy is then implemented in order to promote a positive user experience. The UXMR Framework sustains the newly cultivated user experience. Another requirement for managing user experience is monitoring and evaluation. This is a requirement that must be ongoing through all the phases of managing user experience.

The UXMR brings the following contributions:

> It provides criteria for researching the factors that influence user experience;
> It provides the structural content of what has to be included in a strategy for managing user experience;
> It provides means and techniques for sustaining the user experience in order to make it last;
> The requirements for implementing user experience management guide the user experience practitioners on how to cultivate a user-ready audience for a positive user experience; and
> The framework suggests useful ways of how to improve on the process of managing user experience by monitoring and evaluating the process.

The UXMR Framework became a key component of the UXM[2].

8.2.4. User Experience Lifecycle Chart

The User Experience Lifecycle Chart (UXLC) (c.f. Figure 4.2) is a novel output of this research that uniquely describes the process of how user experience develops over time.
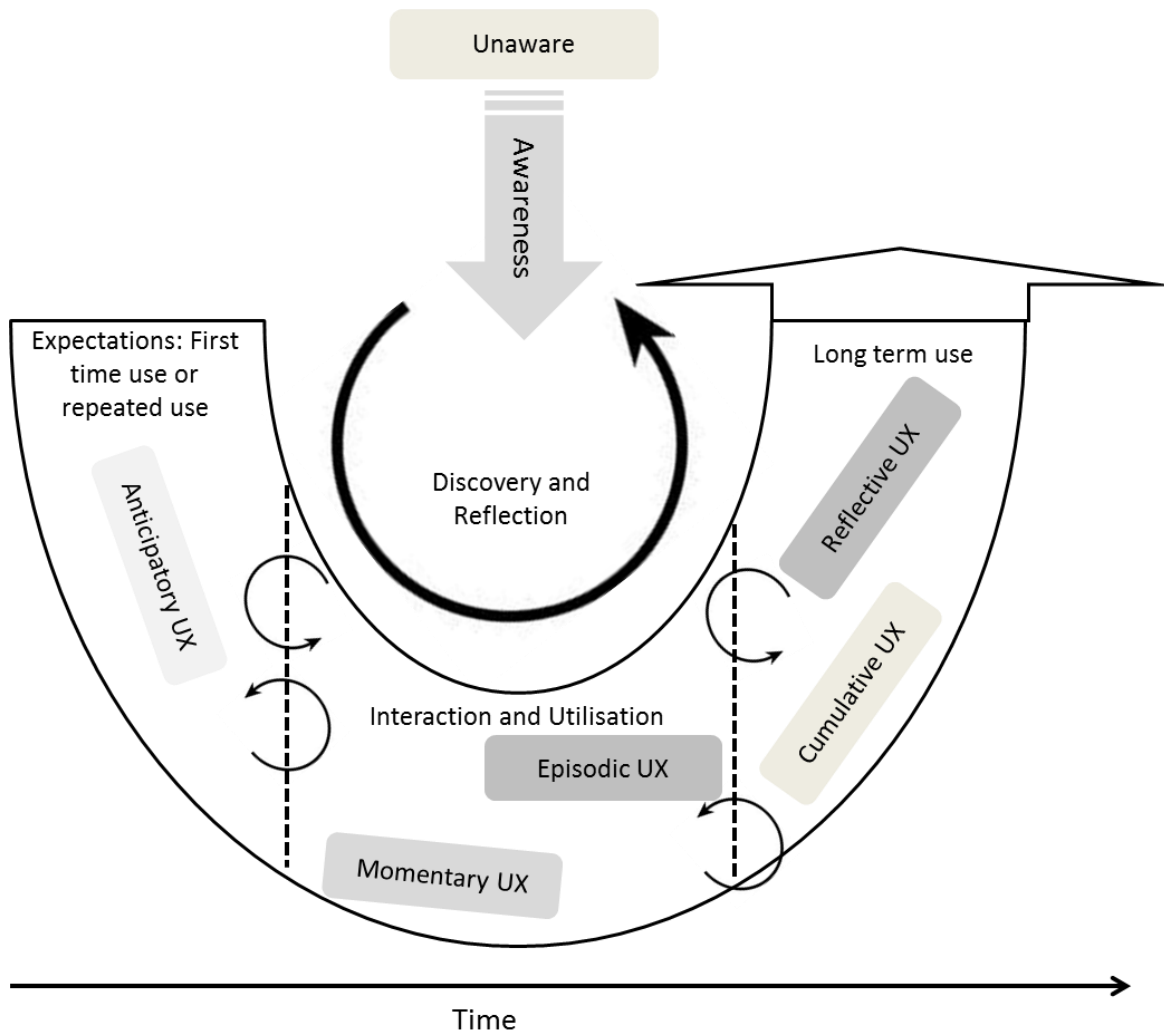
Figure 8.4: User Experience Lifecycle Chart (c.f. Figure 4.2)

The UXLC outlines the process of how user experience changes as users continue to reflect on and discover the features of the product. The UXLC describes how the users develop habitual tasks when using the product, and how they change their priorities with respect to the features of the product as they progress along the continuum of using the product. It goes on to illustrate how the phases of user experience overlap and how they influence each other. An understanding of the user experience life cycle has the following benefits:

➢ It helps to guide the process of gathering user experience requirements by considering the times span and the phases of user experience; and

➢ It gives a clear relation of the factors that influence user experience with respect to the time span and phase of user experience.

These benefits subsequently contribute to the formulation of strategy for managing user experience, considering the factors that influence user experience during some specific time span and phase of user experience.

8.2.5. A tool for evaluating the relevance of the components of a model

A tool that was based on a Likert scale was developed for the purpose of evaluating the internal validity of the model and its components. A copy of an extract of the validation tool is presented.

May you please rate the extent to which you believe the proposed components categories are relevant to managing user experience.									
Model Component						Relevance	Overall Rating	Comment	
Research and discovery									
Preparation and establishing concepts									
User experience management implementation									
User experience sustainment									
Impact assessment									
Monitoring and evaluation									

Figure 8.5: Snippet of tool for validating the model (c.f. Figure 6.4)

The tool was designed for use during the expert review of the conceptual UXM^2. The tool yielded the required results, and four out of the six experts commented that the tool was both easy to use and useful for the purpose of validating the relevance of the model. It is therefore believed the tool can be adopted and be useful for application in similar exercises of validating the relevance of theoretical artifacts. The full version of the validation tool is presented in Appendix D.

8.2.6. A generic procedure for developing a model

A generic procedure outlining the process of developing a model was proposed in section 5.3. This procedure developed from a synthesis and analysis of existing models. A copy of the diagram is shown below.
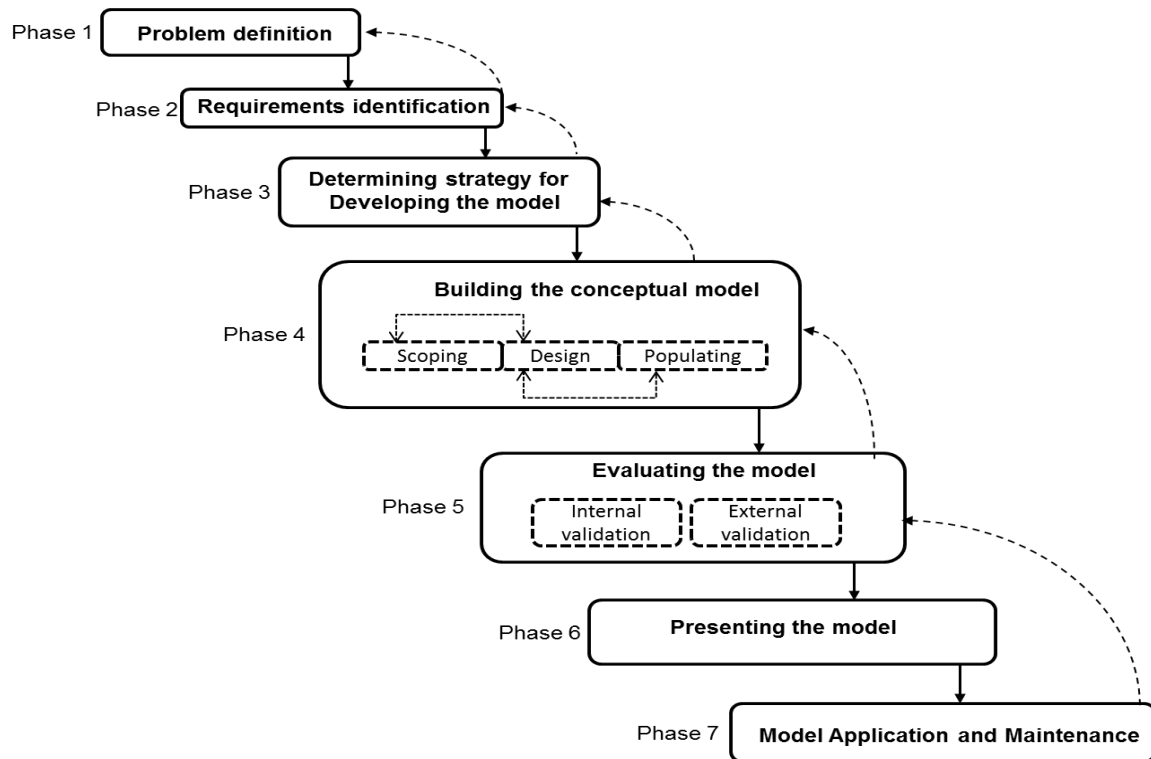
Figure 8.6: Generic procedure for developing a model (c.f. Figure 5.3)

Two methods describing the main phases of developing maturity models were analyzed in order to identify their inadequacies. The shortfalls in the processes were identified and consolidated for improvement and incorporation in the generic procedure for developing models (c.f. Figure 5.3). The applicability of the proposed procedure was demonstrated through the development of the UXM[2].

It is expected that the proposed generic procedure provides a holistic approach that can be generalized for the development of any model across all domains.

8.3.   REFLECTION

The reflections on the study are provided from three perspectives, namely: scientific, methodological and substantive.

8.3.1. Scientific reflection

The problems that relate to the failure of most ICT products to be accepted, adopted and utilized by the intended users was introduced and discussed in this study. The fact the user interfaces of

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existing products are changing and that new products are being introduced in order to improve the user experience also contributes to the low uptake and acceptance of the products. Often times the users are left struggling with the introduction of new user interfaces and new products. The changes in the user interfaces of the products influence the user experience of the people interacting with the product. It has been discussed in Chapter 4 that the development of user experience goes through transitional phases over time and with continued use of the product.

It has been established that there is no criterion for managing the change in user experience. The inadequacy of existing change management approaches for the management of user experience has been discussed in Chapter 4. User experience practitioners and product designers require a means of managing the user experience and promoting a sustainable long-term positive user experience. An artifact aimed at managing the user experience, the UXM^2, was proposed. This artifact is aimed at solving the technological problem of the low uptake of ICT product, hence satisfying one of the guideline requirements of design science. A generic process for the design of models was also proposed in the study, thus adding a contribution to the scientific domain of knowledge.

The UXM^2 provides a solution to the identified problem by assisting the user experience practitioner, as well as product developers or designers, with the process and practice that is aimed at changing user interfaces and introducing new products in a manner that promotes a sustainable long-term positive user experience.

8.3.2. Methodological reflection

This study involved a trans-disciplinary approach of bringing together the disciplines of user experience and change management. This involved inference of aspects from the fields of sociology, ergonomics, HCI, psychology, information systems and computer science. The various disciplines employ different research approaches ranging from being wholly qualitative to totally quantitative. An intermediate approach accommodating both the qualitative and quantitative approaches was adopted. The inclusion of such an approach helps to strike a balance between a social science perspective and that of pure science. The social scientist may find the methodology used in this study to be inadequate with respect to data collection and practical use of the model, and may find that the data analysis employed is not comprehensive enough. The

pure scientists may argue that the methodology lacks in statistical presentation and empirical / experimental aspects. However, the rationale behind following the research process that has been employed has been motivated in the study. Various approaches were analyzed and the approach that best satisfied the objective of the study was chosen.

Reflecting on the methodology, the limitations encountered during the study are discussed in section 8.4

8.3.3. Substantive reflection

The scope associated with the combination of the two fields of change management and user experience was very wide. User experience on its own is a multidisciplinary field comprising of aspects ranging from anthropology, human factors, sociology, psychology and engineering to computer science and many others. On the other hand, change management involves behavioural change dimensions and organizational change. Most research studies involve only one discipline, whereas two diverse domains were considered in this study. These perspectives of the multidimensional nature of both areas of interest in the study broaden the research. The process of scoping it in terms of what to include and delineate was not a simple task.

However, the complexity of the wide scope of the subject domains made it possible to capture more factors and their interactions, which makes the contribution unique. ICT products are ever-changing, the characteristics and needs of the users are invariably not constant and the context of use of the products is also forever changing.

Such dynamics with respect to the factors that influence user experience highlights a need to consider conducting a longitudinal study in order to explore other components that are required to manage and promote a sustainable long-term positive user experience. However, the proposed model can be considered to be flexible enough to cater for the changes, and the UXM^2 remains a valid contribution.

8.4. LIMITATIONS

The research was conducted in a manner that was aimed at obtaining the best possible credible results. However, the following limitations were encountered:

➤ Inadequacy of literature;

➤ Inability to empirically validate the model through actual usage;

➤ Conducting the study over a cross-sectional timeline horizon, whereas a longitudinal approach would have been ideal for implementing the model in real use; and

➤ A scarcity of experts with dual expertise in the fields of user experience and change management.

A detailed discussion on how these limitations were addressed has been presented in Chapter 6 (c.f. section 6.5).

8.5.   POSSIBLE FUTURE RESEARCH

The following aspects build avenues for further researching the aspect of user experience management:

➤ Application of the UXM^2 in order to manage user experience in a real-life context. This involves following the steps of using the UXM^2 in order to apply the model throughout the development of a new product or when changing its user interface;

➤ A study on the techniques for measuring the sustainment of user experience;

➤ Conducting multiple case studies in different contexts, using different products and users so as to evaluate the extent to which the model can be generalized;

➤ A study on the contents of a strategy for managing user experience;

➤ Combining a report on the process of managing user experience;

➤ A study on the user readiness resulting from the process of managing user experience;

➤ Conducting the process of managing user experience in cycles within a longitudinal research project, so as to evaluate how the process of managing user experience can be improved based upon the consolidation of lessons gathered during the monitoring and evaluation phase;

➤ Incorporating the aspects of how the UXM^2 will be beneficial to user-centered service and system design;

➤ Increasing the number of participants to review the usefulness and applicability of the model;

➤ Introducing aspects from fields that are related to user experience for example marketing, psychology and anthropology, as additional components of the UXM^2;

> Conducting the process of managing user experience in cycles within a longitudinal research project, so as to evaluate the impact of continuously managing user experience; and

> Assessing the maturity of user experience that result from continuously managing user experience.

8.6.   LESSONS LEARNT

A lot of insights into the world of user experience and change management, as well as research experience, were gained during the period of this research project. These insights are important, because they provide the basis for supporting the value of this study and highlighting the large amount of work that was devoted to this research.

The initial scope of the research was to develop a model for assessing the maturity of user experience. This concept seemed to be very interesting, as the idea was to attempt to establish some levels of maturity of user experience. However, this approach did not seem viable, mainly because of the difficulty to have a unified established index base for different levels of user experience. Also, assessing the maturity of user experience was challenging because of the subjective and individualistic nature of user experience. This challenge opened up the avenue of establishing some criteria for managing user experience and cultivating a positive user experience for the people using the products. The ability to manage user experience therefore becomes a step toward establishing the basis for assessing the maturity of user experience as it is being managed. Thus, assessing the maturity of user experience has been mentioned as an area of potential future research.

The relationship between change management and user experience was not readily acknowledged by most people. The two disciplines seemed to be entities in domains that are far apart from each other and which cannot be unified within one study. Most people thought of change management from the organizational change perspective, while others viewed user experience from the dimensions of evaluating user experience and establishing guidelines aimed at designing products for user experience. None of the people that were interacted with during the study realized the evolutionary nature of user experience, and hence the need to manage the change in user experience by using change management approaches. However, after explaining

the potential of combining user experience and change management in order to manage the change in user experience, the concept sparked great interest with people.

The problem of people developing a negative reaction when the user interface of a product is changed has been discovered during this study to be a common occurrence. It has also been established that people generally go through a similar type of reaction when the user interface of a product is changed. Most of the time there is a drop in the user experience of the people as a result of change in user experience. Thereafter people get used to the user interface of the product and tend to forgive any of the faults in the new user interface as they continue to interact with the product. The difference that exists is the amount of time taken by individuals to forgive the aspects that they find to be faulty and to get used to the new user interface. The other difference is the level to which the user experience of individuals drops. Thus, the UXM^2 aims to minimise the drop in user experience and the amount of time that the users take in order to get used to the new user interface.

It has been learnt during the study that most users have habitual frameworks of work that they perform using specific products. A change in the user interface or the introduction of a new product should not disturb the habitual work frameworks of the users. Any product that disturbs these habitual work frameworks or that fail to provide the desired habitual work frameworks result in user resentment and subsequently in a negative user experience. The UXM^2 suggests maintaining the habitual work frameworks of the users as a means of sustaining user experience.

The study brought the insight that there is a difference in the factors that lead to product adoption and usage between products that are meant for institutional use versus those that are meant for personal use, as well as products that are meant for mandatory use versus those that are meant for optional use. Hence, the aspects of institutional use versus personal use, as well as mandatory use versus optional use, must be considered when managing user experience.

The lack of empirical testing in real usage scenarios, in order to validate model applicability, is the one aspect of the model that was criticized by most of the experts who reviewed it. Such comments brought the lesson that the components of the model may be empirically applied as single entities, as they are identified to validate their applicability in real usage scenarios. In this way all the components of the model may be validated, thereby circumventing the constraint of

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time, as it would demand more time to test the model as it would have been the case when the components of the model are tested as single entities.

8.7.   SUMMARY

The purpose of this study was to develop a model for managing user experience. The research has been motivated by the identification of a lack of criteria for managing user experience, both in literature and practice. This lead to the development of the User Experience Management Model (UXM^2) as a solution to the identified gap. An investigation into the existence of the problem, formulation of research questions and research objectives was carried out in Chapter 1.

The research followed a design science research paradigm while observing an interpretivistic philosophical stance. A qualitative approach, employing an inductive mode of reason, was used in the study. The research strategy that was used in the study was argumentation, because this strategy is aimed at developing new theories by applying reasoning on the existing theories in order to accept or refute and improve the existing theories. This strategy was considered to be applicable, based on an analysis of theories form user experience and change management. This lead to the development of a new artifact, the UXM^2. The data collection techniques in the research included a literature study, expert reviews consisting of academic review of publications submitted to international conferences, as well as interviews with experts. The research methodology and design section of the study was presented in Chapter 2.

Chapters 3 and 4 served to identify the components of the UXM^2. Five phases of managing user experienced were identified as the components of a model for managing user experience. The five components are preparation, implementation, sustaining user experience, impact assessment and monitoring and evaluation. These components were used to develop the conceptual UXM^2 presented in Chapter 5.

The proposed conceptual UXM^2 was then evaluated for its validity through expert reviews. This was done in form of interviews with experts, as well as feedback from the review of academic publications that were submitted to international conferences. The results of the evaluation were used to refine the conceptual model to the User Experience Management Model (UXM^2) that was presented in Chapter 7.

It can be concluded that the purpose of the research was satisfied through identification of the components of a model for managing user experience, and through the development of the User Experience Management Model (UXM^2).

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