

Managing User Experience – Managing Change

Job Mashapa¹, Edna Chelule¹, Darelle Van Greunen¹; Alida Veldsman¹

¹Institute for ICT Advancement, School of ICT, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa

{Job.Mashapa, Edna.Chelule, Darelle.vanGreunen,
Alida.Veldsman}@nmmu.ac.za

Abstract. Interactive products with innovative user interfaces are being designed while the user interfaces of existing products are being improved. The changes in user interfaces are being prompted by the need to design products that are useful, usable and appealing for an enchanting user experience to the people using the products. It is harmoniously agreed within the user experience domain that a change in the user interface of a product consequently affects the user experience of the people who use the product. Furthermore, user experience practitioners and academics acknowledge that user experience evolves over time. Paradoxically, there is lack of strategies for managing user experience as it evolves, or when a new user interface is introduced. Change in user experience is a process that needs to be managed for a positive user experience to be attained. Literature is awash with models aimed at guiding and managing change implementation. On the contrary, most of the change management models are aimed at managing change in organizations while neglecting managing the user experience of the people to which change is introduced. At the time of writing this paper, no evidence was found of an existing model aimed at managing user experience, both in theory and practice. Following the aforementioned premise, the purpose of this paper is to propose theoretical requirements for managing user experience of the people using interactive products. The paper commences with a conceptual background synthesis of related domain components required for managing user experience. Thereafter, the requirements for managing user experience are determined. After-which the requirements are presented in a User Experience Management Requirements (UXMR) framework. The paper culminates with proposed future work.

Keywords: User Experience, Usability; User Centred Design, Change Management, Requirements

1 Introduction

Every product whether designed considering the requirements for user experience or not, stimulates some level of user experience to the users interacting with it [1]. Users create cognitive expectations on a product's ease of use, usefulness and level of satisfaction based on their first impression of it [2], [3]. When a product is designed to comprehend these expectations, users' mental models and capabilities, it pleases them

and arouses their senses positively [4]. A product that meets or exceeds the expectations of the user provides a positive user experience. On the contrary, a product that fails to satisfy the expectations of the users result in a negative user experience [5]. Despite the publicity of designing products for positive user experience most applications on the market fail because of poor user experience [6], [7], [8]. Users are often resistant to change in user interfaces, and would prefer a poor, but familiar, user interface to new and improved ones [9]. With such, any changes in the user interface of a product should be designed and implemented in a manner that complements the needs of the users, enhances acceptance of the product and encourages a positive user experience. The development of user experience is not a once off thing, but a process involving various transitional phases over time spans of product use [10], [11].

There exist many models to guide the product development lifecycle as compared and analysed by Davis et al. [12]. However, at the time of writing of this paper, stipulated requirements for managing the user experience and subsequently promoting the development of positive user experience of the people using the products were lacking. The aim of this paper is to answer the research question that states:

What are the requirements for managing and improving the user experience of people using interactive products?

The User Experience Management Requirements (UXMR) Framework was developed to answer the mentioned research question. The UXMR Framework serves as the basis for providing holistic requirements for managing user experience. The comprehensiveness of the Framework lies in its all-inclusiveness of planning for user experience improvement, managing user experience during implementation of product changes and providing guidance of how to sustain a positive user experience and making it last.

Section 2 presents the background to the paper. Literature of technology acceptance and usage are explored in section 2.1 and the concept of user experience is introduced in section 2.2. Managing change requires an understanding of the change management processes as introduced in section 2.3. The paper proposes how change management techniques may be implemented as a component of the requirements for managing user experience. Section 3 presents the requirements for managing user experience through the User Management Experience Requirements Framework (UXMR). Section 4 provides some guidelines for the application of UXMR, whilst section 5 concludes with the significance of the UXMR Framework and future work to improve on the credibility and applicability of the Framework.

2 Background

2.1 Technology Acceptance and Usage

Although there are a number of benefits associated with the use of technology, the uptake of the services offered by the technologies is contingent upon the willingness of the people to accept and use the technologies [13]. It is important for product developers to gain an understanding of the factors that influence users to accept and use their products. The adoption of technology depends on a variety of factors in a given

environment. A number of researchers have explored and developed theories and models that aim at explaining user behaviour in relation to their acceptance of technology. Examples of such include the Technology Acceptance Model (TAM) [2], and the Unified Theory of Acceptance and Use of Technology (UTAUT) [14].

TAM postulates that attitude to use a product results when the users perceive the product to be useful and easy to use. The UTAUT puts forward performance expectancy, effort expectancy, social influence and facilitating conditions and 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.

While these models play a vital role in determining what factors influence acceptance and usage of technology, they are inadequate in addressing user experience issues as a key determinant towards product use. McCarthy and Wright [15] argue that people do not just use technology, but technology becomes imbedded in their lives. The authors highlighted the importance of considering the emotional, intellectual and sensual aspects of the users' interactions with technology. Thus, products that fit into the lives of people are pleasant to use and do not disrupt the activities of the users and provide a positive engagement between the users and the product. It is therefore important to be able to analyse, understand and manage the felt experiences of users as they interact with products. The following section investigates user experience and the nature thereof.

2.2 User Experience

In this section, the concept of user experience (UX) is explored. UX is defined, followed by a discussion of the factors that influences UX. The section concludes with a discussion on the evolutionary nature of user experience and an introduction to the User Experience Development Lifecycle Chart (UXDLC).

Defining user experience. The complexity and multifaceted nature of user experience makes it difficult to present a conventional definition of user experience as witnessed by the various user experience definitions [allaboutux.org¹]. The complexity in defining user experience indicates how difficult managing user experience can be. In this paper, user experience is defined as a subjective judgement and feeling of the quality of a user's interaction with a product, to complete a specific task in a specific context [16], [17]. The quality of a user's interaction with the product is judged based on the usefulness, usability and the level of satisfaction, whilst interacting with the product.

An analysis of literature on user experience identified that user experience is determined by the expectations of the users prior to interaction with the product. Furthermore, it results from long or short-term interaction with a product; and it is an

¹ www.allaboutux.org

evaluation of the user expectations against how they feel as a result of the interaction with the product [18], [19], [20]. Various authors have looked at user experience from different domains such as games [21] and mobile user experience in m-Learning [8]. Calvillo et al. [21] state that a positive user experience, when a user is playing a video game, is achieved when the user feels to be in control of the game. Ownership and enjoyment result from both the hedonic and pragmatic qualities of the video game device as well as the gaming application. In mobile interaction, a number of core elements exist that determine the level of user experience. These elements include the aesthetic and visceral aspects of the device and the applications on the device as well as the availability of external variables to offer services. An example of the external variable will be the network infrastructure [8].

User experience can be positive or negative, depending on how well a product satisfies the user's expectations [4], [5]. A negative user experience is when the user finds a product to be boring; difficult to interact with or does not fit the intended use. A positive user experience is developed when the user finds the product to be usable with pleasure and satisfaction [5]. While TAM and UTAUT lay fundamental components in understanding user behaviours towards technology acceptance and usage, the models left out important aspects of user experience as a core variable in product adoption. It is therefore vital to establish the factors that influence user experience. Understanding the factors that influence user experience, form the basis of determining requirements for managing user experience.

As depicted from the definition of user experience, it is not restricted to the period during product use but includes the expectations of the user before interacting with a product and the summation of quality of interaction over a long period of time. In addition, the definition of user experience reveals the elements of user experience. These elements are the hedonic and pragmatic qualities of a product, the psychological and physiological state of the user and the context in which the product is used [22], [23], [24], [25]. Understanding the time spans and elements of user experience is important in determining the factors that impact on user experience. One cannot manage what he / she does not know.

Factors influencing the user experience. A variety of factors may influence users' experience with a product. The factors can be determined based on the elements of user experience and the process of designing for user experience. Determining these factors is essential in order to establish a resultant user experience and why a user would have a particular user experience [18]. An understanding of the specific context in which a person has a particular user experience and the cause thereof is important in managing and improving user experience.

The user experience of a person depends on his or her previous experiences, motivation and the context of use. Future user experiences are influenced by the user's previous experiences and expectations of how things work. This corresponds with the user's mental model and is present even before the interaction starts. For instance when users are interacting with online mobile instant messaging applications, they expect to find where to type their message, an option for inserting emotions and the functionality for sending the message. If any of these functions are inaccessible, the

users' expectations will be shattered, resulting in a negative user experience. The whole interaction between the user and system happens in a dynamic context (social, situational, locational etc.) that influences and is influenced by what the user does and experiences. The natural personal view explains how user experience is shaped over time, highly subjective and connected to the context. A user's current experience is dependent on the internal state of mind of the user, at that very moment. A user can interact with a system/product in many different situations with different states of mind. This can be positive, while in a good frame of mind and negative in another [5].

The factors that affect user experience are presented in Fig 1. The User Experience Factor Diagram (UXFD) (cf. Fig 1) maps the factors influencing user experience to a respective period of product usage and time span/phase of user experience. The periods of product usage refers to the user experience before a user interacts with a product, during interaction and after a long period of repeated usage. The type of user experience namely anticipatory, momentary, episodic, cumulative or reflective determines the time span phases.

Anticipatory user experience results from the expectation of the user before interacting with the product. Momentary and episodic user experience relate to the feelings of the user during interaction with the product. Cumulative and reflective user experience arises as the user continues to interact with the product, thus discover and compare the product with their expectations or experience with similar products.

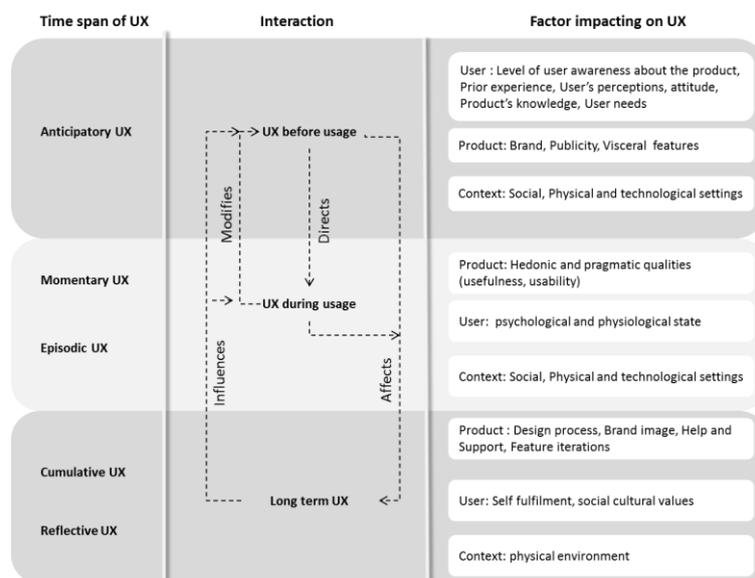


Fig. 1. User Experience Factor Diagram (Researcher's interpretation of literature)

Anticipatory user experience is directed by the factors that impact on user experience before the user interacts with the product. Such factors include the visceral aspects of the product.

Users are pleased with a product that is effective, efficient, safe and usable. If a user is using a video game and the system keeps freezing while the user is playing the game, then the user will experience a negative interaction with the product. User experience goes beyond the pragmatic and hedonic qualities of the product. It is also impacted by the physiological and psychological state of the user. Moreover, the social, physical and technological environment influences the users to enjoy their interaction with a product at one setting while they may have a negative user experience when the context varies.

Long-term user experience consists of cumulative user experiences and reflective user experiences. The factors affecting long-term user experience include the design process of the product. A product that is designed focusing on the needs, expectations and requirements of the users promote a bond of user loyalty to the product. Involving the users at every stage of product development and implementation creates a sense of belonging to the product thereby improving the user experience.

User experience, therefore, changes over time and is influenced by the internal state of mind of the user, the features of the product and the context in which the product is used. The development of user experience from anticipatory level to the reflective level is therefore a process. The next section describes evolutionary nature of user experience.

Evolutionary nature of user experience. The resultant relationship when a user interacts with a product is not static but composed of emotions subject to change over time as well as the context in which the product is used. Literature mentions the perceived pragmatic qualities of a product, user emotional reactions resulting from interacting with a product and perceived hedonic qualities of the product to influence the change in user experience and overall decision of the user about a product [10], [11], [26]. The visceral aspects of a product seem to have dominance in appealing to the sensory experience of the user only on purchasing a product. Such visceral aspects cease to be important to the user when the user interact with the product for a period of a month. Thereafter the touch and audition qualities of the product becomes a more important stimulus for the experiences. Fenko [27] and Mendoza [28] found out that the types of errors, error rate users make and the resultant user frustrations changes drastically over time. Thus, as users continue to use a product, certain aspects stimulating their user experience fade away and, as time progresses, other product attributes become more prominent determinants of user experience.

Abbasi et al. [11] developed a framework illustrating the evolution of user experience termed the User Experience Evolution Lifecycle (UXEL). The authors suggest that the user experience lifecycle consists of Phase1 – Designed UX, Phase 2- Perceived UX and Phase 3 – Actual UX. Their framework is aimed at guiding user experience requirements engineering and evaluating user experience at each of the evolutionary stages. The UXEL contributed to the identification of actors involved in the evolution of user experience. It also helped in identifying the attributes of the actors at

each phase of user experience development. However, the UXEL Framework is inadequate in that it does not show any aspects of change in user experience over time. Time span of user experience has been noted to be an important dimension in the development of user experience [18], [27], [29], [30]. The UXEL Framework only focuses on user experience during the user's interaction with the product in the specified context of use and invocation of the hedonic stimulations. This paper is unique in such a sense that, it proposes a User Experience Development Lifecycle Chart (UXDLC) to illustrate how user experience evolves over time. The UXDLC is based on the components of the User Experience Factor Diagram (cf. Fig 1). The UXDLC is presented in Fig 2.

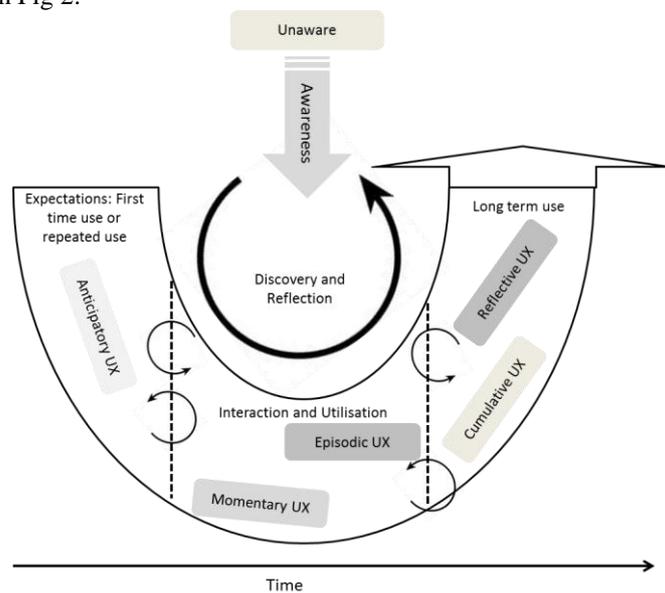


Fig. 2. User Experience Development Lifecycle Chart (Researcher's interpretation of literature)

User Experience Development Lifecycle Chart (UXDLC). The UXDLC begins with an unaware user. Unawareness refers to the user's lack of information either about the existence of a product, its instrumental qualities or hedonic attributes. The user is made aware of the product and its features. The UXDLC shows that awareness happens through the phases of the user experience development lifecycle. Awareness is created by product reviews, publicity about the product as well as the discovery of product features as users interact with it. As users continue to interact with the product, they discover new features and they reflect on them based on prior experience with similar products. A positive reflection is vital in building a lasting user – product relationship

Awareness creates anticipatory user experience. Users interacting with the product for the first time, develop anticipatory user experience based on the mental models created from the reviews and publicity they receive about the product and the visceral

aspects of the product. Whereas the anticipatory user experience of the users with prior interaction with the product is modified as they utilise the product.

Anticipatory user experience directs the expectations of the user as they interact and utilise the product. As the users use the product, they discover product qualities and reflect on them in momentary and episodic user experience. Accumulation of momentary user experience during a task session forms the episodic user experience. Momentary and episodic user experience is fluid and subject to change based on the context of use and the psychological and physiological aspects of the user at a particular moment. Episodic user experience accumulates into cumulative user experience as a user continues to interact with the product. As users continue to interact with the product, they discover product features resulting 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.

Thus, user experience 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 a product and utilise it. Continual use of a product results in long-term user experience (cumulative and reflective user experiences). New features and product enhancements, which the users may not be aware of creates anticipatory user experience.

Product designers and developers who wish to have loyal users should aim at developing products appealing to 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 development. The techniques for managing user experience are inferred from change management. Change management concepts are discussed next.

2.3 Change Management

Lately there has been a notable paradigm shift in the focus of product design, from designing for functionality and usability to designing for user experience. Designing for user experiences involves adding or/and improving product features, changing the visceral look and feel aspects of the product, its navigation and interaction styles and the overall user interface. The resultant of such is change in user experience of the people using the improved products. It was discussed that the development of user experience is a transitional process for the users, involving changes in the subjective and objective factors. Like any other process, the process of change in user experience needs to be managed for a positive user experience to be achieved. Thus this section begins by defining change management and then analysing existing models aimed at managing change. A synthesis of the change management models contributes towards the requirements for managing the user experience.

Defining change management. Change is a complex process and often involves a revolution and transformation of the old and customary ways of doing things, with unfamiliar styles characterised by uncertainty, fear and risk to the lifestyles of the people involved [31 - 32]. Whenever a change is introduced into an organisation or society, it will ultimately affect the lifestyle of the people, organisational structure, tasks, job roles, processes and other related variables [33]. Creasey [33] differentiates change management from project management. He defines project management as methods, tools, skills and techniques to respond to change in project activities in order to meet project requirements while he defines change management as “the process, tools and techniques to manage the people-side of change to achieve the required business outcome”. Thus, the processes, tools and techniques for managing the feelings of the people are examined through literature analysis.

Various models aimed at managing change and guiding implementation of change is available in literature [34 - 38]. Most of these models focus on managing change in organisations. This study aims at disseminating the requirements for managing change in user experience from the existing change management models. The uniqueness of requirements for managing user experience lies in the subjective nature of user experience and the need to adopt a user centred approach to managing change, contrary to the organisational oriented change management approaches.

Analysis of change management models. An analysis of the various change management models shows that managing change consists of phases namely planning change, implementing change and managing change [35 - 36]. Preparation for change involves cultivating a favourable environment for change while change implementation refers to the execution of change activities. On the other hand, managing change deals with controlling the change process in order for the change to go according to plan. Creating a change-ready environment includes an examination of the environment to be changed, formulating the change strategy and creating the urgency for change [34, 38]. Activities for implementing change, include choosing change champions, communicating the change, imparting knowledge and the ability for people to change and creating a cultural fit for the change to last [37 - 38]. Managing change deals with the integration of lessons learnt during the change by measuring the progress of the change effort and reinforcing the change [35, 37 - 38]. These phases will be applied to propose the requirements for managing user experience.

3 User Experience Management Requirements Framework

The proposed User Experience Management Requirements (UXMR) Framework infers from change management models and factors affecting user experience. The UXMR Framework outlines the requirements for managing and improving the user experience of people using interactive products in a user centred approach. The user centred design philosophy has been the popularized approach aimed at designing products for positive user experience. Fig 3 presents UXMR Framework for managing user experience.

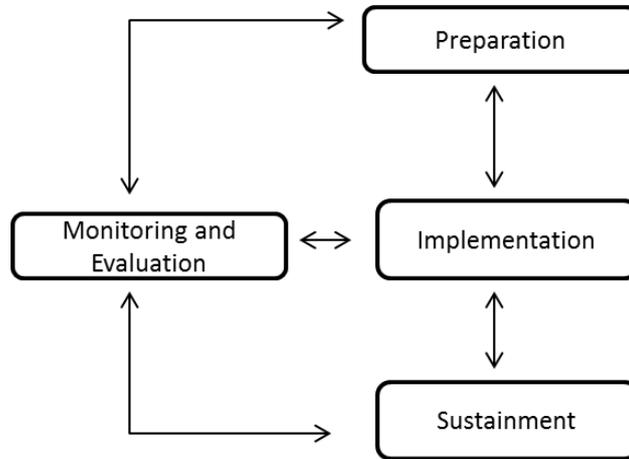


Fig. 3. User Experience Management Requirements Framework

The Framework is based on the three-phase change process and adopts a user-centred approach. The identified requirements are categorized into four categories namely: preparation (UXMR-I), implementation (UXMR-II), sustainment (UXMR-III), and monitoring and evaluation (UXMR-IV). It is important to note that the process of managing user experience is not as linear as presented in the diagram. Managing user experience is an iterative process. There is constant visiting and revisiting of each activity with the intention of perfecting the subsequent activities

3.1 Preparation: (UXMR - I)

Managing user experience requires preparing the people for the change, managing the change in user experience during implementation and sustaining the new user experience. Preparation involves cultivating a favourable change environment, creating a change-ready audience and formulating the vision and strategy for the change. Table 1 presents the UXMR - I components and the related activities.

The Preparation phase requires an examination of the users and the context in which the product is used as well as the formulation of the change strategy and vision. Examining the users, involves determining their priorities that will lead to a favourable user experience, their user profiles and socio cultural background. It is important to assess the users' previous change history, as this will influence the present user experience. A successful user experience management exercise requires a 'test of the wetness of the waters'. Testing the wetness of the waters involves facilitating an informal awareness vibe about the new product initiative, stirring up change urgency by making the users to see and feel the need to change.

Table 1. User experience management preparation requirements

UXMR – 1.1: Scanning the environment	
Task	Activities

Discovery of users and their tasks	User profiling, task analysis, assessing the level of user experience of the users
Assessing previous change history	Determining the resultant user experience of the users with respect to any previously introduced product. Analysing factors influencing user experience
Analysing the context of product use	Examining the physical, social, technological, social environment in which the product is used.
Testing the wetness of the waters	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
Identifying the challenges and feature requirements of the current product	Determining what features of the product have to change, what new features have to be added based on the arising needs of the users.

UXMR- 1.2: Formulating the vision for change

Task	Activities
Gathering a guiding team	Selection and defining roles for sponsors, change champions, user experience strategists, and user representatives to spearhead the process of managing user experience
Setting measurable user experience objectives	Stating the metrics for measuring the hedonic and pragmatic aspects of the product , defining effectiveness, satisfaction and efficiency
Defining the purpose and vision	Stating clearly what successful user experience should be
Identifying and recruiting stakeholders	Selection of cross sectional representatives of primary, secondary and tertiary users of the product so as to maintain a balance between user needs and the values and mission of the organisation
Crafting the change strategy and timeline	Defining the means of implementing change that suites the users and the environment to create a cultural fit promoting positive user experience
Brand strategy	Assessing and determining the brand and how the changes will potentially affect the brand perception

Further to scanning of the environment, user experience management preparation requires formulation of the implementation strategy and defining the vision. The user experience implementation strategy needs to align with the user and business requirements. This strategy needs to be supported by an agile change champions guiding team and cross-sectional representation of stakeholders. The guiding team is required to set the timeline and implementation plan for managing user experience. Measurable usability and user experience metrics for effectiveness, efficiency and enjoyment should be defined beforehand to ensure that the user and business requirements are met. Clearly stipulated change management preparation requirements set the pace for a successful user experience implementation.

Thus, the output of the Preparation phase is a list of factors that may affect the user experience and a strategy on how to implement successful user experiences. The User

Experience factor diagram presented in Figure 1 serves as a template guiding the preparation phase.

3.2 Implementation (UXRM – II)

The second set of requirements for managing the user experience involves managing the user experience during the implementation of the product changes. The components of requirements for managing the implementation of products for user experience are presented in Table 2.

Table 2. User experience management implementation requirements

UXMR – 2.1: Awareness	
Task	Activities
Formal communication of the change initiative	Formal communication on what aspects of the product are to be introduced or improved, how the change is going to affect the users, what aspects of the product will remain unchanged. Awareness of the potential benefits resulting from redesigning the product
UXMR – 2.2: Desire	
Task	Activities
Creating an affinity for people to embrace change with positive user experience	Employing persuasive techniques on the product so that the users will see and feel the need to change and embrace the new product with a positive user experience. Eliminating pockets of resistance hindering positive user experience and product acceptance
UXMR- 2.3: Knowledge	
Task	Activities
Passing on knowledge on how to use the product and the benefits of adopting the product	Training users that they will be able to discover the product features by themselves and be able to reflect on such
UXMR- 2.4: Ability	
Task	Activities
Giving the users a platform to demonstrate that they are able to transform knowledge into action	Promoting continuous and persuasive use of the product by observing the users as they interact with the product with the intention of improving their user experience

The requirements for managing user experience implementation are adopted from the ADKAR model [38]. Managing user experience requires making the user aware of the product, creating a desire for them to use the product, imparting knowledge on how to use the product and providing a platform for the users to demonstrate the ability to use the product.

Awareness. Managing user experience requires making people aware of the product by involving them from the onset of product development through the product lifecycle. A product with its features comprehending the expectations of the users, promotes a positive user experience. Putting users at the centre and making users aware of the changes are pivotal in a process of managing user experience for designs that are intended to be accepted and enjoyed. Without awareness, many users would rather prefer a bad, but familiar design to a better but unfamiliar one. Therefore, users need to be aware of what is changing, the potential benefits resulting from revamping the old product or introducing a new product. 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 making users develop a need to use the applications. There is a need to establish a sense of urgency and do away with pockets of resistance in using and re-using the product. There is a need to adopt emotional trust by persuasive design techniques to create an affinity for the users to embrace the changes with a positive user experience. Persuasive design aims at influencing change in the behaviour of the users. Conversely, the users may be aware of the changes and have a desire to embrace the new initiatives but 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.

Knowledge. Managing user experience requires imparting the users with knowledge on how to use the product. Users need to know the associated benefits of using the products hence creating an emotional need to use the product. It is only when the users have the knowledge about the product, which they will be able to discover the product features by themselves and 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 applied in practice by providing the users with the platform to demonstrate that they are able to use the product.

Ability. The users should be given a platform to demonstrate their ability to use the product. Ability is achieved through continual usage of the product. Continual usage promotes long-term user experience, thus a product must have captivating features that promote its usage and adoption by the users.

3.3 Sustainment: (UXMR – III)

Change preparation and implementation aims at managing the behaviours and subjective emotions, resulting in positive user experience of the users interacting with the product. An effective approach to managing user experience during change preparation and implementation will result in a positive user experience. However, 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. Therefore, the change in user experience must be sustained and improved upon. Table 3 presents the components of requirements for managing user experience sustainment.

Table 3. User experience management sustainment requirements

UXMR – 3.1: Ensuring a lasting positive user experience	
Task	Activities
Celebrating short terms achievements	Recognising successful positive anticipatory, momentary and episodic user experience goals
Reinforcements	Promoting and ensuring an addictive point of no return positive user experience Employing persuasive techniques aimed at designing products for persuasion, emotion and trust.
Continuous user experience improvement	Continuous research to understand and address any emerging requirements, use of agile technologies to iteratively implement new features so as to satisfy an enchanting long term user experience.

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. 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. It is therefore important to sustain long-term user experience. In the process of sustaining long-term user experience, successful anticipatory user experience, momentary user experience and episodic user experience goals have to be recognized and awarded. Once the users have shown to develop an affinity for the product, the positive user experience has to be reinforced to make it stick. Persuasive, emotional and trust research, and agile user experience design processes have to be implemented to keep the users captivated by the product they interact with. Such techniques aim at nurturing free will behavioral changes by appealing to the social influence factors of the people.

3.4 Monitoring and evaluation: (UXMR – IV)

The process of monitoring and evaluation is central during managing user experience and has to be done during every stage. Monitoring and evaluation requires strategic communication, consolidation of lesson learnt as well as impact and outcome assessment of the process of managing user experience. Table 4 presents the requirement components of monitoring and evaluating user experience management.

Communicating the right message to correct people at the right time and contexts at every stage of implementation is an important requirement of managing user experience. Sending the wrong messages to the wrong people in the wrong context is a recipe for creating resistance and overall failure of managing user experience. Specific users have to be provided with contextually relevant information, only then will they positively accept the product being developed or introduced. The evaluation and

measurement of the user experience is crucial to identify both hedonic and pragmatic user experience issues that may arise during product usage. Moreover, it is important to track lessons learnt in order to improve and manage user experience. This further helps to identify any loops missed and new requirements, which emerge from the users with an aim to unveil contingences of 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 impact and outcome process. The outcome is determined by comparing the business and user goals, metrics of user experience against the achieved user experience at a particular stage in managing user experience. Impact assessment thus entails evaluating the level of user experience of the product users at each stage of managing user experience.

The next section presents the users of the UXMR Framework and how the Framework works.

Table 4. User experience management : monitoring and evaluation requirements

UXMR – 2.1: Ensuring a lasting positive user experience	
Task	Activities
Strategic communication	Sending the right message to the correct audience at the rightful context and time
Measuring user experience	Mapping transitional state to the desired outcome and evaluating the user experience level of the people at various phases during managing user experience. Iterative testing and implementation of recommendations found at each stage of the evaluation.
Consolidation of lessons learnt	Tracking any lessons learnt at each stage with the objective of improving on the process of managing user experience on next projects. Comparing what on hand with the initial plan to determine any variance so as to formulate what has to be done next to rectify the discrepancies

4 Application of the UXMR Framework

There exists a variety of guidelines and principles guiding the designing of products for user experience. However, the guidelines do not cater for managing change in user experience and the diverse factors that influence the user experience of the people. The target users of the proposed UXMR Framework are user experience practitioners and product developers. The Framework is aimed at guiding user experience practitioners on how to manage user experience by directing the designing processes of products for positive user experience. This is achieved through assessing the level of user experience of the target users, determining the factors that impact on user experience and providing interventions for improving the user experience. User experience practitioners will make use of the user experience factor diagram (c.f. Figure 1) to assess the factors that impact on user experience. A variety of user experience evaluation techniques may be used to determine the factors that influence user experience [www.allaboutux.org]. The findings are then used to develop a strategy for managing

user experience. Practitioners will have to employ techniques for bringing awareness, creating desire, imparting knowledge and ability and sustaining the user experience. During the process of managing user experience, there is continuous monitoring and evaluation to ensure positive user experience. For product developers, the UXMR Framework serves to provide user centred design directions for designing products for positive user experience. The model integrates change management practices in the product development life cycle in order to design products that comprehend the expectations and skills of the target users.

5 Conclusion

This paper introduced user experience and the factors impacting on user experience by presenting the user experience factor diagram. The evolutionary nature of user experience was highlighted resulting in the development of the User Experience Development Lifecycle Chart (UXDLC). The evolutionary nature of user experience requires the need to manage change in user experience. Change management approaches were examined and inferences to such were made to determine the requirements for managing user experience. The User Experience Management Requirements (UXMR) Framework was developed based on the UX factor diagram and UXDLC. The target users of the proposed UXMR Framework are user experience practitioners and product owners, designers and an organisation's management as a whole. Using the UXMR Framework, user experience practitioners may influence the design of products for positive user experience. By assessing the factors that impact on user experience and providing interventions for improving the user experience, a positive user experience can be achieved. The requirements for managing user experience serve as design directions for user experience designers who wish to design their products for positive user experience.

The UXMR Framework was derived from a purely theoretical foundation. To improve on its applicability the Framework should be tested empirically. The plan is to validate the Framework through expert reviews. Experts from both the domains of change management and user experience will be involved to determine the appropriateness and relevance of the proposed construct requirements for managing user experience. The UXMR Framework will be also be applied in a case study in the design of a specific product to validate its usefulness and applicability based on the recommendations for improvement from the various experts.

References

1. Tyne, S.: Corporate User-Experience Maturity Model. Proceedings of the 1st International Conference on Human Centered Design. 635-639 (2009)
2. Davis, F.: Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. 13 (3), 319--340 MIS Quarterly (1989)
3. Zhang, P., Li, N.: The importance of affective quality. In Communications of the 48 (9), 105—108. ACM (2005)

4. Rogers, Y., Sharp, H., Preece, J.: *Interaction Design: Beyond Human-Computer Interaction*. New York: John Wiley & Sons (2011)
5. Roto, V.: *Web Browsing on Mobile Phones – Characteristics of User Experience*. Finland (2007)
6. Bian, P., Zhang, N.: Gestalt Psychology Theory Based Design of User's Experience on Online Trade Websites. In: Xie, A., Huang, H.: *Advances in Computer Science and Education* 327–332. Springer, Heidelberg (2012)
7. Liedtke, C., Welfens, M. J., Rohn, H., Nordmann, J.: LIVING LAB: user-driven innovation for sustainability. In *International Journal of Sustainability in Higher Education*, 106–118 (2012)
8. Botha, A., Herselman, M., van Greunen, D.: Mobile User Experience in Mlearning Environment. Proceedings of the 2010 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists Bela Bela, South Africa: 29–38. ACM (2010)
9. Constantine, L.: Beyond User-Centered Design and User Experience: Designing for User Performance. *Cutter IT Journal*, 2, 1–12 (2004)
10. Kujala, S., Roto, V., Vaananen-Vainio-Mattila, K., Karapanos, E., Sinnela, A.: UX Curve: A method for evaluating long-term user experience. *Interacting with Computer*, 25 (5), 1–11 (2011)
11. Abbasi, Q.M., Lew, P., Rafique, I., Li, Z.: User Experience Evolution Lifecycle Framework. In *International Journal of Social and Human Sciences*, 6, 39–44 (2012)
12. Davis, A. M., Bersoff, E. H., Comer, E. R.: A strategy for comparing alternative software development life cycle models. *Software Engineering*, 14 (10), 1453–1461 (1988)
13. Carter, L., Belanger, F.: Citizen Adoption of Electronic Government Initiatives. Proceedings of the 37th Hawaii International Conference on System Sciences (2004)
14. Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D.: "User Acceptance of Information Technology: Toward a Unified View," (27:3), 425–578. *MIS Quarterly* (2003)
15. McCarthy, J. Wright, J.: *Technology as Experience*. The Massachusetts Institute of Technology Press (2007).
16. Mashapa, J., van Greunen, D.: User Experience Evaluation Metrics for Usable Accounting Tools. Proceedings of the 2010 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists Bela Bela, South Africa: 170–181. ACM (2010)
17. Sutcliffe, A.: Designing for User Engagement: Aesthetic and Attractive User Interfaces. In Carroll, J.M., *Synthesis Lectures on Human-Centered Informatics*. 1–55. Morgan and Claypool Publishers. (2010)
18. Roto, V., Law, E., Vermeeren, A., Hoonhout, J.: User experience white paper: Bringing clarity to the concept of user experience. <http://www.allaboutux.org/files/UXWhitePaper.pdf> (2011)
19. Obrist, M., Meschtscherjakov, A., Tscheligi, M.: User Experience Evaluation in the Mobile Context. In: Marcus, A., Sala, R., Roibás, C.: *Mobile TV: Customizing Content and Experience* 195–204. Springer, London (2010)
20. Hiltunen, M., Laukka, M., Luomala, J.: *Mobile User Experience*. Finland, IT Press (2002)
21. Calvillo-Gómez, E. H., Cairns, P., Cox, A. L.: Assessing the Core Elements of the Gaming Experience. In R. Bernhaupt, (eds). *Evaluating User Experience in Games*. 47–71. Springer London, London (2010)
22. Forlizzi, J., Ford, S.: The Building Blocks of Experience: An Early Framework for Interaction Designers. Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques. 419–423. ACM, New York City (2000)

23. Arhippainen, L.: Studying user experience: issues and problems of mobile services case ADAMOS: User experience (im)possible to catch? Doctoral Dissertation University of Oulu, Finland. (2009)
24. Mäkelä, A., Fulton Suri, J.: Supporting Users' Creativity: Design to Induce Pleasurable Experiences. Proceedings of the International Conference on Affective Human Factors Design, 387-391. (2001)
25. Hess, W. 10 Most Common Misconceptions About User Experience Design. <http://mashable.com/2009/01/09/user-experience-design/> 16. (2009)
26. Mahlke, S., & Thüring, M. Studying Antecedents of Emotional Experiences in Interactive Contexts. CHI 2007 Proceedings, 915-918. (2007)
27. Fenko, A., Schifferstein, H., Hekkert, P.: Shifts in sensory dominance between various stages of user-product interactions. Applied Ergonomics, 40 (1), 34-40 (2010)
28. Mendoza, V., & Novick, D. Usability over time. Proceedings of SIGDOC, Coventry 151-158. (2005)
29. Karapanos, E., Zimmerman, J., Forlizzi, J., Martens, J.: Measuring the Dynamics of Remembered Experience over Time. Interacting with Computers, 22 (5), 328-335 (2010)
30. von Wilamowitz-Moellendorff, M., Hassenzahl M., Platz, A.: "Dynamics of user experience: How the perceived quality of mobile phones changes over time". In User Experience - Towards a unified view, Workshop at the 4th Nordic Conference on Human-Computer Interaction. (2006)
31. Vahs, D., Koch, V., Kielkopf, M.: Innovation Generating and Evaluation: The Impact of Change Management in Innovation and International Business Growth. Business Economics, 151-174 (2010)
32. Higgs, M. J., & Rowland, D.: All changes great and small: Exploring approaches to change and its leadership. Journal of Change Management, 5 (2), 121-151 (2005)
33. Creasey, T. Defining change management <http://www.change-management.com/prosci-defining-change-management.pdf> . Prosci. (2007)
34. Kotter, J., Cohen, D.: The heart of change: real-life stories of how people change their organizations. Boston, MA: Harvard Business School Press (2002)
35. Jick, T. Implementing Change. Note 9-191-114. Boston: Harvard Business School Press (1991)
36. Mento, A. J., Jones, R. J., Dirndorfer, W.: A change management process: Grounded in both theory and practice. Journal of Organizational Change Management, 3 (1), 45-59 (2002)
37. Price, A., Chahal, K.: A strategic framework for change management. Construction Management and Economics, 24 (3), 237-251 (2006)
38. Hiatt, J. ADKAR: a Model for Change in Business, Government and our Community. Loveland: Prosci Research (2006)