Design process excludes users: the co-creation activities between user and designer

Abstract

User needs are a fundamental element of design. If the design process does not properly reflect user needs, the design will be severely compromised. Therefore, it is worthwhile to investigate how the user is, and user needs are, understood in the design process. In this paper, three accepted linear process models for web site and interactive media design are reviewed in terms of the designer and user participation. The paper then proposes a user-evolving collaborative design process which is built on co-creation activities between designer and user. Co-creation activities across the entire design process structurally and ontologically reposition the users, and user needs, centrally, which allows the designers to holistically approach to the user needs through building a partnership with the users. Co-creation creates an equal evolving participatory process between user and designer towards sharing values and knowledge and creating new domains of collective creativity.

Keywords: co-creation; collaborative design; design process; participatory design; user-centred design

Introduction

The design industry and design education have introduced a number of concepts and methodologies in terms of good design such as user-friendly design (Human-computer interaction), user experience design (Garrett, 2003, Park, 2007), emotional design (Norman, 2005), interactive design process (Graham, 1999), user-centred design (Norman, 2005), participatory design (Cleveland, 2011; Kensing & Blomberg, 1998; Vink, Imada & Zink, 2008), collaborative co-design (Somerville & Nino, 2007), and user-sensitive inclusive design (Newell et al., 2011). These models share an emphasis on the importance of the end user in the design process.

Design is an activity that involves development and production. The sequential nature of the process has been described as a linear pattern (Sims-Knight, 2004) or a stepwise approach (Vink, Imada & Zink, 2008). In particular, the design process for web site and interactive media development and production is mostly a collaborative activity where various experts are participants (Park, 2007). Therefore, if the designer understands the design process only as a series of phases, it is likely to result in a sequence of activities. According to Vink et al.'s

(2008) large scale research (n=311) in Europe, for example, designers are mostly involved in the two phases, idea generation and prototyping where the designers play the largest roles with their creativity and design knowledge.

Good design can be characterised as an end product designed in a functionally sound and visually pleasing manner (Park, 2008b). To achieve an end product of this standard, it seems imperative for the designer to extend knowledge and skills towards better understanding of user needs before and while developing a product.   The approach views the design process as an accommodation to the user needs that focuses on quality improvements (Cárdenas-Claros & Gruba, 2010). However, design processes have not been examined as to whether or not the process structurally and ontologically supports users as well as designers in web site and interactive media design. So the question remains: *how can a designer realise user needs within the design process?* Arguably, a more fundamental question centres on*: how, if at all, do the design processes enable designers as well as users to be participants?*

The intention of this paper is to illustrate how design processes need to be understood in terms of the designer and user participation mainly within the context of web site and interactive media design. First, I reviewed the concept of user needs in terms of its conceptualisation in the design process. Second, I examined the three accepted design models and identified their inherent limitations in line with the designer participation and user needs. Third, I discussed the user evolvement in the process, which lays the foundations for creating a composite design process. The contention is that the design process allows the users to be virtually advocates for designers and the designers to build a partnership with the users. Finally, I proposed and discussed *the co-creation activities* between users and designer that structurally and ontologically positions both as equal participants in design processes.

User needs

Designers can look at user needs from various points of view, and understanding user needs is regarded as key to strategic thinking in user-centred design (Lai, Honda & Yang, 2010). Buchanan (2000) believes that designers should expand their insights of the user experience to social experience and behaviours, and explore how the user experiences the interactive environment. One of user-centred design's intrinsic characteristics is that it encourages designers to aim towards a user-friendly design in design development (Wakkary, 2003).

Based on reviews of the information systems literature in terms of participatory design, in addition, Kautz (2011) argued that the reasons for user participation in the design activities are improving the knowledge on the product, enabling people to develop realistic expectations, and increasing equal decision making.

However, what is meant by 'user-centred' or 'user participatory' is somewhat ambiguous to the extent that how it can be realised in a design process. Iivari and Iivari (2011) reviewed 327 papers between 1998 and 2007 identifying user-centredness and found that many of them refer to renowned authors such as Norman (emotional design) or ISO 13407 (Human centred design processes for interactive systems) rather than conceptualise user-centredness in their context. They also state that quite many of them use it as a contrast to designer and system. This may be because designers often construct an idea of the user based on limited introspectively available information and 'supplement this with strategic in-fills that give direction, coherence and apparent logic to the process' (Whitfield, 2007, p.10). In other words, designers subjectively develop the design by constructing a socially plausible account of the user based on their own social milieu (Whitfield, 2007). Then why do the designers behave like that?

The outcomes of the various design stages have a tendency to contribute towards the end product despite the fact that each stage is supposed to embed user needs (Wakkary, 2003). Therefore, it can be presumed that the design process, as a conceptualised framework(s), is selective of user needs from the beginning to the end based on the designer's perception and understanding of the users. This can generate the functional and cognitive gap between the actual user needs and the design process. Sandhu and Corbitt (2003) investigated end-user web-based electronic service adoption from the user control-centred perspective and revealed that users experience a considerable degree of constraint in managing tasks because of a gap between the user and the system. The gap comes from the difference between the task based in the system and the system scope that assists the user with the task (Sandhu & Corbitt, 2003). The end-user found the control factor was derived from within the system and not with end-users (Sandhu & Corbitt, 2003). In software development environments, Patten (2007) claimed that designers and developers build requirements by describing the functionality according to what users want, yet the end-users often respond that that is not quite right. Teo, Lim and Lai (1999) explained the issue with Internet users' motivation

categorised by intrinsic and extrinsic characteristics. '*Extrinsic motivation* is defined as the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself' (p.26). '*Intrinsic motivation* refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity per se' (p. 26). Users' intentions to use the Internet are mainly influenced by their perceptions of usefulness (extrinsic motivation) and enjoyment (intrinsic motivation) (Teo, Lim & Lai, 1999).

From a viewpoint of design process, users' dualistic features can be framed with *limitedness* and *unlimitedness* in terms of their perceptions and recognition of the end-product. Limitedness refers to what people are limited to in their sensing and mental abilities, while unlimitedness refers to their desire towards perfection and truth that is embedded in their conceptual thinking. These dualistic features provide the foundation for understanding user needs in a design process. At the same time, the dualistic features imply that a process cannot perfectly encompass user needs by conceptualising alone. Conceptualisation is expected to identify core needs and embody them into the end product, however, as discussed with Sandhu and Corbitt's (2003) study (the structural issue) and Teo, Lim and Lai's (1999) study (the user's dual motivations), paradoxically it gradually excludes actual needs.

Conceptualising user needs

In design processes, user needs can be traditionally identified through various design methods such as persona construction, surveys, interviews, observation, card sorting, group task analysis, focus groups, field studies, user feedback testing, bug lists, and expert consultation (Bredies, Chow & Joost, 2010; Kinzie, Cohn, Julian & Knaus, 2002; Lai, Honda & Yang, 2010). These methods commonly aim to define user needs in an accurate and scientific way. Collected data about target users can then be conceptualised in the development process in relation to design objectives. In other words, the conceptualisation of user needs is supposed to be accurately reflected in each stage of the design development process. The design process can be reconfigured with various outputs such as a site map, a content map, a navigational structure, interaction designs, and graphical user interface designs. In this way conceptualisation can refer to the interpretation, configuration, and transformation of user needs in accordance with requirements of each stage or component of the development

process. Conversely, each stage or component is a pre-conceptualised and pre-defined framework, therefore intrinsically restricts the dualistic features of user needs.

In a design process, conceptualisation has been used to define, frame, and formulate facts, problems, ideas or thoughts to create better understanding, solutions, and approaches (Chong, Chen & Leong, 2008; Lai, Honda & Yang, 2009). It is a type of intermediate frame that allows connection and integration of all aspects of design investigation for building a comprehensive organic synthesis through critical thinking and analysis. Conceptualisation is often used as a map of thinking processes, particularly for an empirical understanding in which a designer approaches a problem through visualisation, structuralisation, and contextualisation (Bilda & Gero, 2006; Chong, Chen & Leong, 2008). When conceptualisation is reified from cognitive schema to artefact, whether digitally produced or in some other form (i.e., in the form of a concept map), it has beneficial effects in a number of fields (Bruillard & Baron, 2000) – the same way a conceptual framework provides benefits to better understand a problem. Conversely, conceptualisation has an obvious limitation to the extent that it may overgeneralise user needs and thereby widen the distance between designer and user in a design process. Furthermore, various conceptual frameworks produced through a design development process often contradict each other due to different perspectives among the team members (Xun & Land, 2004).

Then how can designers overcome the limitations of conceptualisation process? It seems that participatory design, which pursues user empowerment in the process, would give a mechanical solution. Ertner, Kragelund and Malmborg (2010) reviewed 39 papers from the participatory design conference of 2008 and found that user empowerment is enunciated in five difference ways: 1) Specific user groups 2) Direct democracy 3) The users' position 4) Researchers' practice 5) Reflexive practice. However, the researchers argued that the five ways commonly reproduce *idealism* towards the concept of democratic participation, yet participation does not provided equal grounds and can reproduce pre-existing power relations. They further claimed that 'none of the papers however, challenge the core idea of empowering people within the frameworks of technology and design' (p. 194). It is therefore important to identify the gap between designers and users in terms of their ontology and the structural limitations for the user participation in the design processes.

User needs in the design processes

- Linear design process

In web site development and interactive media processes, the collected/provided data about the target users are usually analysed, manipulated, and conceptualised through each stage of the development process, for example information design, interaction design, and interface design (Garrett, 2000; Graham, 1999). To maintain movement towards the end product, the most widely used methods to evaluate end-production, often in the form of a prototype, are usability and accessibility tests (Petrie & Kheir, 2007). There are two testing stages needed in the development process to ensure the quality of end product: one is pre-testing, usually undertaken at the stage of user definition. The other is post-testing, which is sometimes called 'usability testing' or 'functionality testing' for a prototype or end product (Park, 2008a). Figure 1 below illustrates a generic design development process often used in design production. The expectation is that there will be a thorough process through each of the stages (Kamaruddi, Park & Nam, 2009).

<Insert Figure 1 here>

However, this type of process model does not include a practical design cycle at each stage of process, which would allow an iterative design cycle of: prototyping, evaluating and redesigning. This iterative design cycle is recognised as an important risk assessment methodology in software development (Ebenreuter, 2007; Kamaruddi, Park & Nam, 2009). The iterative design is also crucial in a participatory design process where 'feedback loops' should occur for adjusting (usually after prototyping) (Iivari & Iivari, 2011; Vink et al., 2008). More fundamentally, such linear design processes are thought to have an inherent problem – design requirements are unable to be completely identified at the beginning of the process (Wakkary, 2003).

- Iterative design process

Figure 2 below shows the iterative design cycle or iterative waterfall model that seems to overcome the problem of the linear process. The iterative waterfall model is a design process methodology that can be used for driving changes at each stage of a sequential design process where the process consists of design, prototype, and test. In this model, the design stage

generates ideas, analyses and creates solutions; the prototype stage envisages the design by creating an instantiation of it; the test stage evaluates the prototype (Usability.gov, 2005).

<Insert Figure 2 here>

The iterative waterfall model has been used in various design processes such as software development process (Preece, Rogers & Sharp, 2007), experience design process (Garrett, 2000), interactive design process (Graham, 1999), educational courseware design (Muda, & Mohamed, 2006). The benefits of an iterative design process are that it accommodates changing requirements; does not leave integration of the stage outcomes at the end of production; identifies risk in the early stages, and reduces errors and misunderstandings among team members (Wakkary, 2003). Wakkary (2003) also stated that the iterative process is a part of good design practice and can be characterised as the iteration of prototypes in contact with end users. However, it does not allow users to engage in the early stages of the process, and the real context is not tested until the end of the process. An iterative process has an intrinsic limitation in that the quality of output at each stage needs to be assured in order to move to the next stage (Wakkary, 2003). Although the iterative design aspires towards designer's engagement throughout the project (Ertner, Kragelund & Malmborg, 2010), the end user needs are often reduced to the lowest minimum in the process. Cárdenas-Claros and Gruba (2010) explained the reason that the designer's opinion is rooted in his or her experience and the other participants need to be trained for their specific roles and learn terminologies and mechanism of functionalities. The baseline of each stage, therefore, may need to be changed depending on specifications and requirements identified. Furthermore, a long term (> six months) project may be put in jeopardy if technology were to change unexpectedly. Importantly, when 'the client wants the developer to evolve specifications in a gradual manner, this model is not suitable' (Prasad, 2004, p. 35).

- Experience design process
Garrett's model for experience design (2003) (see Figure 3 below) presents a more comprehensive model of design process. Although initially created for web-based applications, the model provides scope for defining the elements of user experience in terms of user-centred design. Garrett's model was primarily designed for information- and application-oriented websites (Joshi & Medh, 2006). Garrett has cleverly split the web design

process between abstract-to-concrete process for software interface and conception-to-completion for hypertext system. Both processes are interrelated in the development process; the first stage begins with the definitions of user needs and site objectives, the second, third and fourth stages have functional specifications, interaction design, and interface design from the former process and content requirements, information architecture, and navigation design from the latter process. The information design on the next stage is shared by both processes. The final stage is a visual design which becomes an outcome of the both processes. Garrett's model is worthwhile to the extent that it conceptualises each stage of development process by defining relevant design components in relation to user experience and articulates outcomes of each component. Therefore, it can be understood as a more advanced model reflecting the intricacy and complexity of (web) design development process by characterising relevant components (Joshi & Medh, 2006).

<Insert Figure 3 here>

In nature, a design development is not a static linear process but a process by which various factors are interrelated and correlated (Sims-Knight, 2004; Wakkary, 2003). However, in models such as Garrett's where the design process is in a linear form, there is no room for the non-linear dynamics of collaborative decision-making typical of groups of people involved in the creative process. Like the waterfall model, the linear pattern restricts designers' active participation and user involvement by the sequential nature of what they represent as the design process.

Extending Simon's argument (1996), Bredies, Chow and Joost (2010) argued that design is about dealing with risk and uncertainty, so it is not possible to gain 'complete information about real situations' and the 'bounded rationality of design decisions' (p. 158). Sanoff (2006) discussed participatory design, which refers to user's participation in decision-making in the design process that is a highly decentralised collective form. Fundamentally, the linear model for design processes has limitations in its ability to allow designers to identify, understand and act upon user needs. In this way linear models can be characterised as creating a gap between designer and user.

Krippendorf's constructivist approach (1995) claimed that people perceive meaning, not forms and objects. A meaning that a designer conceptualises and visualises in the product does not have the same meaning users read (Bredies, Chow & Joost, 2010; Krippendorf, 1989). There is always an inferential or 'second-order understanding' in perceiving artefacts. Bredies, Chow and Joost (2010) argued that designers should employ this 'second-order understanding' and anticipate the meanings of artefacts from people's (end-users') perspective. It is obvious that designers should be able to critically and analytically think about users, but does this skill enable designers to represent the users? By considering the user involvement in the process, the designer's conceptualisation of the user presumes that the design process is *linear* regardless of whether it includes the iterative cycle or it pursues participatory design or experience design as seen above. As a result, the conceptualisation within a linear pattern actually excludes user participation in the process. Therefore, the priority should be to investigate whether or not the design process reflects the user's second-order understanding and how the designer can unintentionally and structurally exclude users from the process.

Limitations of the linear models

Limitations inherent in the linear design process model widen the gap between user needs and end product; they prevent designers from actively engaging in the development process. Whitfield (2007) suggested that the design process in this formation has achieved no more than a sequence of stages which results in 'an iterative noodle soup of interconnections and feedback loop of increasing complexity' (p. 3). As a result, designers are expected to create interface designs according to instructional design guidelines provided by the project manager or the conceptualised frameworks generated in the initial stages.

<Insert Figure 4 here>

In Figure 4 above, the dotted line box illustrates the middle stage of a linear design process where user needs (the dualistic features of limitedness and unlimitedness) are conceptualised (contracted). The presupposition of linear procedures is that user needs or the user's experience are located out of the design scope and process. The user needs are seen as transcendental or 'super-natural'. The iterative process may play a role in developing conceptualised user needs only, which creates further limitations. With the linear design

process, user participation or/and collaboration creates a bell curve effect because there is less feedback from the user in the early and late stages of the process, which gives the illusion of full conceptualisation of the user needs in the middle stage of the process. As the process moves closer to a prototype in the development, user needs become materialised.

Therefore, there are four limitations in the linear design process model. These are over-generalisation of the dualistic features of user needs, user needs located out of the design process, conceptualisation of user needs without developing collaboration and communication, and the illusion that user needs are fixed and unchanging. Thus, these inherent limitations of the linear procedure restrict designers' active participation in the entire development process. Moreover, it does not ensure quality end production because it isolates designers from the collaboration, communication, and creativity in the development process because designers' creativity cannot be effective or valid when it is out of touch with user needs. Creative outcomes, when generated away from user needs or generated simply from the designer's experience, can hardly be adequate to meet user requirements.

Composite process

- Users' evolving participation and the role of designer

In a design process, one concern is how to empower users and allow them to make their knowledge visible to designers (Sarkkinen, 2005). This corresponds to what participatory design pursues, which views design as a process of collaboration and values mutuality and reciprocity (Cárdenas-Claros & Gruba, 2010). However, it shares the same limitation of linear models to the extent that the participatory design ultimately aims to identify potential problems and issues, which is the sequential nature rather than pursues 'transformation of the dominant worldview' (Sanders & Stappers, 2008, p. 9). For Sarkkinen (2005) this concern implicates two practical questions: how to help designers treat users as (empowered) partners and, how to include users into the process. In other words, the designer and user participation are not different issues, but the two sides of the same coin. As identified by this paper, the linear process and its conceptualisation widen the gap between designers and user needs, intrinsically prevent designer's active participation, and limit room for user involvement. As web site development is mostly a collaborative work, the team members should share the same target outcomes throughout the process. User needs have to be anchored in the centre of

the process so that there is a reduction in the gap between designer and users, regardless of whether users physically participate in the process or not.

<Insert Figure 5 here>

The Figure 5 above illustrates where users can be positioned in the middle stage of the process. It shows that user needs can be gradually developed to reveal the dualistic features of limitedness and unlimitedness and as a result, the process becomes a 'composite'. A composite process refers to a user-evolving collaborative design process (figure 5) whose focus is on the progression of user participation, not the process. The figure 5 illustrates how users participate in the process, so it allows designers to make a connection with the users. At the beginning stage, users do not know their exact needs, nor do they until they use the end-product for a while; therefore, the composite process requires designers to continually research user experience before and after product development and during the development stage. In this sense, Cárdenas-Claros and Gruba's (2010) point is quite meaningful to the extent that the challenge for participatory design is to ensure that the participants' roles need to be adequately fulfilled through education, open communication and usages of artefacts. Interestingly, Sanoff (2006) defined designers' role in participatory design process by adopting the metaphors of citizenship and community that is to facilitate a sense of community which promotes participatory democracy and user empowerment. Further Sandoff did not omit to emphasise that all participants need to learn participatory skills for their collective decision-making in the process.

A composite process enables designers to accommodate changing design requirements and identify risk through a user-evolving collaborative process. It shares a fundamental concept with the responsive architecture which is a user-centred interaction methodology by taking benefits of 'the form of second-order cybernetics' such as flexibility, instant feedback and direct manipulation (Ebenreuter, 2007; Sterk, 2006). It enhances design thinking through interaction, conversation, learning and understanding by concerning with human qualities of communication, collaboration and knowledge creation (Ebenreuter, 2007). It has been formed by the change of architects' identify. For example, architects design dynamic user feedback systems that can be enhanced by users' flexible participation through electric devices (Sterk, 2006).   Newell et al. (2011) also supported this claim that information and communication

technologies have been shown to be successful both in requirements gathering and in raising professional designers' awareness of the challenges.

Theoretically, a user-evolving collaborative process allows designers to actively participate in the entire development process while at the same time gradually incorporate user involvement. In this way there is always a thread of connection between the designer's and the users' evolving participatory process. The latter attempts to actively involve the end users in the design process, while the former brings the dualistic features of the user needs to each stage. In this context, the participation of users and designers in the development process presupposes that both have equal status, and implies that the relationship between designer and user is no longer defined as the separation of subject and object (ideal), but both equally participate in the process in cognitive, perceptive and structural ways. This corresponds to the contextual understanding of participatory design process that requires all the participants to aim to build a sense of community and intimate social atmosphere through sharing feelings, values, needs, and knowledge (Cleveland, 2011; Nikolova-Houston, 2005). For a case, with applying interview and survey instruments (n=62) in architecture projects, Cleveland (2011) investigated the benefits of participatory design process and concluded that the participatory design process serves to create design that the community finds functional.

- The six dimensions of the user evolvement

The complexity of user collaboration in the process can now be described further. Table 1 below shows the various dimensions of user needs in a design process. It shows six dimensions at least that allows flexibility in, and manipulation of, the design process. This taxonomy of dimensions shows how the concept of user needs is evolving from user as passive participant to a complex dynamic of user identity, user profile, user needs, prior user experience, and end user profiles to post user experience. The six dimensions of the user indicate that user needs are not just a passive disconnection between development and user, but something that must be engaged before the end product. User needs are part of activity that is continuously evolving and materialising throughout the process. The user in such as process is made incarnate by and though the process. This is applicable to address the dualistic features of user needs and resolve the structural limitations of liner process through ontological development of users in the process.

The six dimensions of the user definition imply that the end product has been developed through the concept of co-creation between user and designer. Co-creation here refers to equal evolving participatory process   between user and designer towards sharing values and knowledge and needs and building of a sense of community. In this sense, co-creation is a monistic system. Co-creation approach aims to develop the ongoing, informing relationships with the participants (or stakeholders) that leads to early detection of the problems and opportunities in a dynamically changing information environment (Somerville & Nino, 2007). As show in Ertner, Kragelund and Malmborg's study (2010) above, the various ways for user empowerment in participatory design does not provided equal grounds and can reproduce pre-existing power relations. This is because the participatory design as a linear pattern aims to identify the user needs from a designer's perspective and/or within a sequentially structured approach – conceptualisation, so the users still remain 'guest participants' despite of their ideological goal.

The evolution in design research from a user-centred approach to co-creation is changing the roles of the designer and users and creating new domains of collective creativity (Sanders & Stappers, 2008). A user-centred approach regards 'user' as 'subject' whereas co-creation approach as 'partner' (or equal participant). In doing so, the designer is participating in the process by conceptualising and materialising the user needs, while the user can participate, virtually or physically, in the process by expressing and describing their needs and (probably conceptually) creating the end product. Therefore, the designer's role as a facilitator is to help the users materialise/reify the end product through the user-evolving collaborative design process, which consists of the outcomes from co-creation between the designer and the user. In this sense, co-creation practically means activities of collective creativity where the designer and user have just different roles.

The co-creation activities
Co-creation activities between designer and user generate two implications. The first implication is the generation of collaborative communication between designer and user. Co-creation by its very nature requires both groups to collaboratively communicate with each other throughout the entire process. As such, design can be seen as a form of conversation in

which design issues are negotiated between the designer and stakeholders, which facilitates the collective learning of required objectives through an iterative process of negotiation and mutual understanding (Ebenreuter, 2007). The second implication is the participatory conceptualisation process where the designer conceptualises the user needs with user participation (evolvement). Unlike a linear design process where conceptualisation of user needs occurs through generalisation, in a participatory conceptualisation process designers are prevented from generalisation because users are actively evolving participants in the conceptualisation processes.

In a collaborative communication process, co-creation activities allow the both designer and users to become evolving participants with their own unique roles. This process enhances effective communication and enables team members to accept each other and the user in terms of collegial interaction, collaboration and partnership. It also reduces the generalisation of conceptual outcomes in each stage of the process and requires a sharing of outcomes through the same communication channel. As a result, a gradual development of user needs and the evolvement of users are cognitively acceptable and structurally embedded into the process. In a participatory conceptualisation process, on the other hand, co-creation minimises possible mis-conceptions between user needs and the end product. Regular and open communication with users helps design team members create an affective connection with users, hence they are able to look at the process from the users' perspective through the lens of their own expertise.

<Insert Figure 6 here>

Figure 6 above represents how designers, users and other team members follow the same flow in design process. What is significant here is the positioning of the user evolvement in the middle of the process. Given the difficulty of graphically illustrating the dynamics of an iterative process model in two-dimensional form, the diagram shows that a designer and team members share the user evolvement in the development process. The user evolvement directly links to each stage as the third participants (or team member) in the process; the process becomes a style of activity, not a linear process.

The participants' ontology and the co-creation activities

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A co-creation model allows designers room to develop their own ontological thinking in respect to user participation. Users are invited into the process as advocates and partners to help designers effectively communicate with other team members rather than react to a firmly (pre)conceptualised process. Designers may fear losing of any (pre)conceptualised frameworks because they have been used for so long to define what a designer is and what he or she does. In reality, however, design plays a role in connecting designer and user via various design outcomes. Conceptualised outcomes formed in a linear design process are by-products and ontological representations that can be changed.

User needs in a linear design process are ontologically defined as what 'ought to be', while in a composite co-creation process, the user needs are defined as 'being'. In the linear process, user needs are treated and regarded as the truth, ideal, absolute and transcendent; something that needs to be defined through creative but scientific methods. In a composite co-creation process, users are evolving an end product as well as evolving in the production. Users are participating in the entire process by communicating and interacting with the designer and the design team (shown in Figure 6). In the co-creation, user needs come down to the development process by designers who (need to) know how to communicate with them. In other words, users are not one whose personality, but they should exist within a development process through communicating with designers and their evolvements become advocates for the designers.

Understanding user needs through methods of (pre)conceptualisation generate a question as to whether a conceptualised framework is effective or not in the reality of end-production. Conceptualisation itself predisposes that designers must follow and adopt set formations in any institutionalised design process. As conceptualisation as theory or method is regarded as an accepted discourse and one that is removed from the reality of end-production; therefore, designers should aim to seek solutions for the problems not based on idealised formations. The process of seeking solutions can institutionalise a way of thinking and creativity for designers and, as a result, designers cannot effectively communicate with users. Thus, a key concept in design should not be to understand / accept conceptualisation as a *doctrine*, but to communicate with users in terms of *activities*. Co-creation activities reflect the reality where

designers, having the role of facilitating, collaborate with users by using various methods and conceptualisation, which keeps enhancing openness and responsive of the process.

Conclusion

The linear design process model tends to perceive user needs as a firmly (pre)conceptualised one. Processes using such a model limit the dualistic features of user needs of limitedness and unlimitedness by setting the design process in a sequential pattern. In this paper, three linear process models were reviewed for their conceptualisation of designer and user participation. The review revealed that linear processes exclude users because of inherent limitations in the way they predispose conceptualisation of the user. As a result, the gap between designer and users is gradually widened as the design process progresses. Positioning user needs centrally, however, generates user-evolving collaborative activities and formations where the user and the designer become equally active participants, while at the same time offers the evolvement of user needs. Evolvement of user needs also offers opportunities for other team members to share the same image of target user, and encourages them to communicate with users. By their very nature and existence, the user-evolving collaborative design process generates and supports the concept of co-creation that is composed of collaborative communication process and participatory conceptualisation outcomes. Eventually, the both designers and users become advocates for each other and partners in a design process ontologically, structurally and practically.

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| Analysis | → | Design | → | Development | → | Implementation | → | Evaluation |

Figure 1: Generic educational courseware development process (Kamaruddi, Park, & Nam, 2009)

Analysis → Define goal and target user / Determine the medium delivery

The Iterative Process

Design → Flowchart and Storyboard / Determine look and feel / Potential Screen Design

The Iterative Process

Development → Prototype / Media creation / Alpha and beta testing

The Iterative Process

Implementation → Product use by users

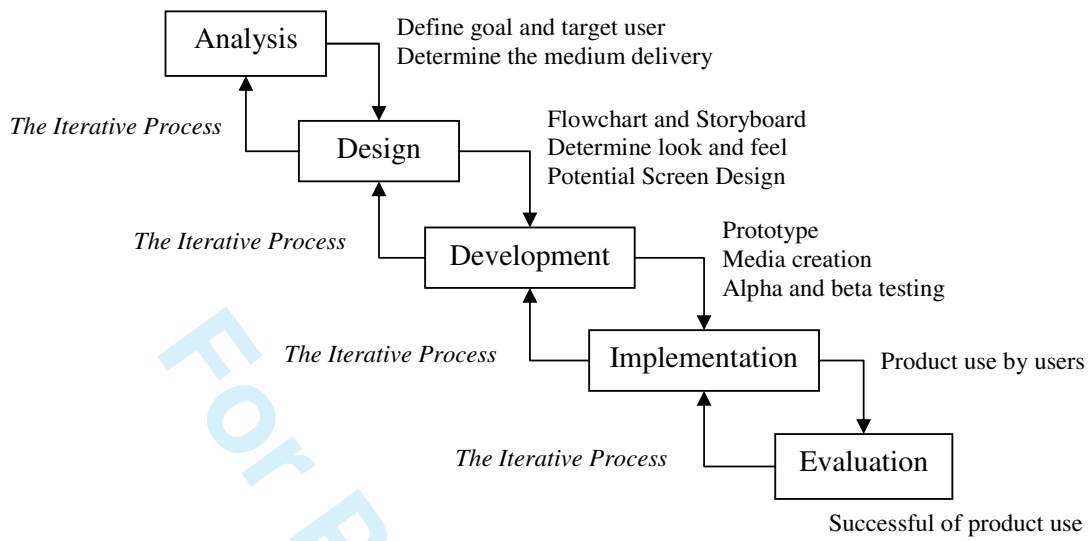*The Iterative Process*

Evaluation

Successful of product use

Figure 2: The iterative waterfall model (modified based on Preece, Rogers & Sharp, 2007; Royce, 1987; Sommerville, 2004)
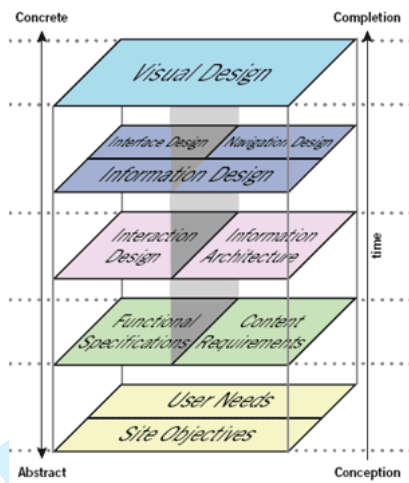
Figure 3: The model of user experience (Garrett, 2003)

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User needs

Analysis

Design process

Design

Development

Implementation

Evaluation

End product

Figure 4: Users needs within the linear design process

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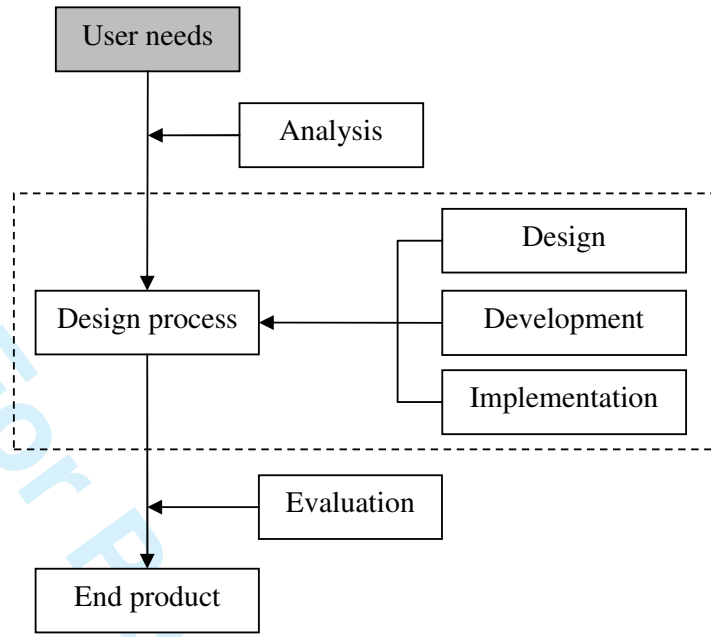41
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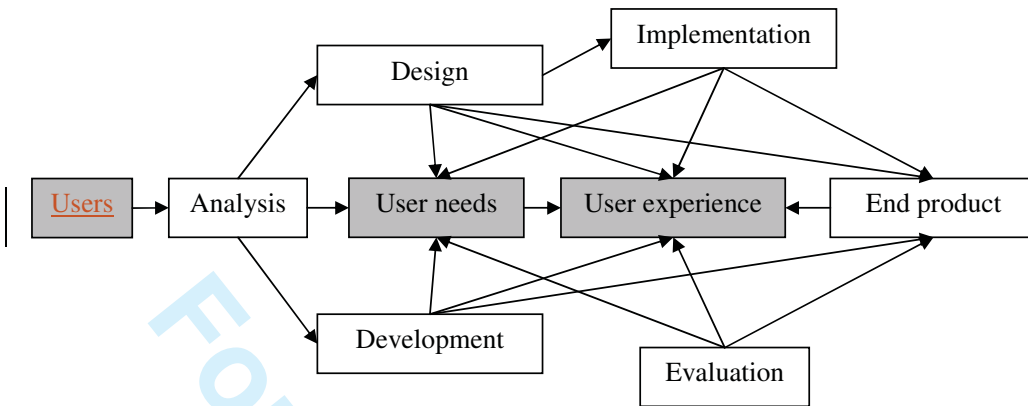

Figure 5: The user- centred evolving collaborative design process

Table 1 Six dimensions of the user definition in the design process

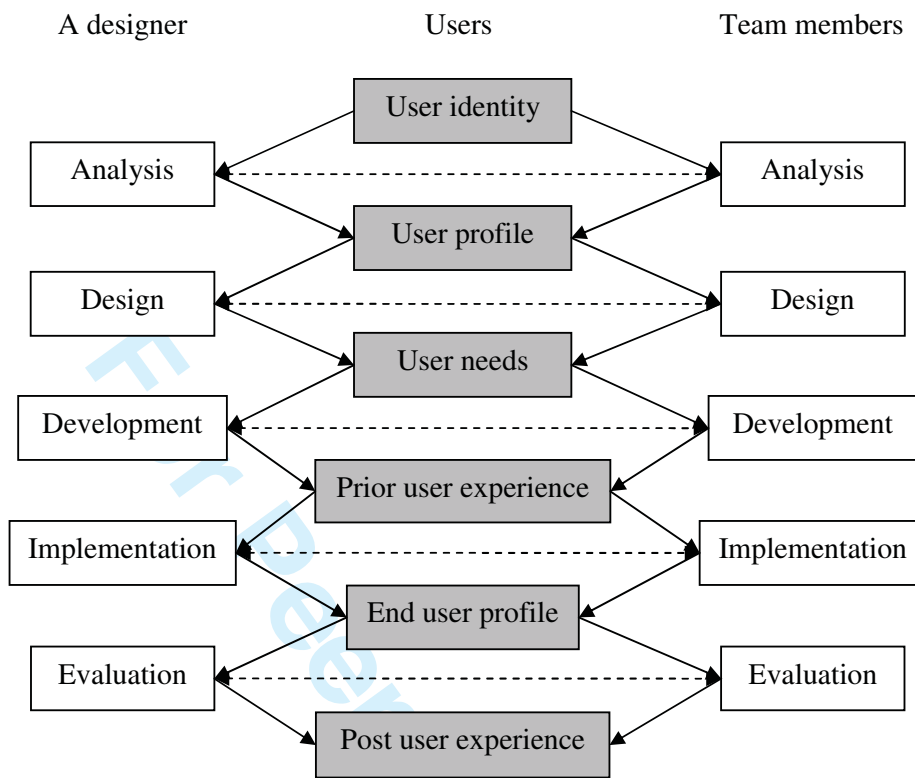| Dimensions	Descriptions
User identity	The user definition at the initial stage is ambiguous and vague unless the designer has recently done a similar project for a similar user group. The user identity dimension seeks various data to outline who will be the user group of the design project in line with conceiving what will be the form of the end product in terms of the project objectives and the client's requirements.
User profile	Based on the data collection and understanding of the project, the designer will create user profiles which illustrate the user identity in detail, including their generic demographics and expectations in relation to the product services and functions.
User needs	The specific user needs in this dimension enable the designer to conceptualize the user needs specified with various components such as visual, functional and communicational within the interface design.
Prior user experience	The user needs defined in the previous stage are still preliminary data because the user needs will be materialized and incarnated within the evolution of design product.
End user profile	With the completion of the prototype and post testing, the end user profile will also be completed. Thus the designer should be able to create a more specific user profile in relation to the product.
Post user experience	The user incarnation in the development process will not stop after completion of the product, but it will continuously evolve. This dimension allows the designers to consider the user experience and needs in a meaningful way, review the process of development as well as the incarnation process of user.

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A designer   Users   Team members

| User identity |

| Analysis | ← - - - - - - - - - - - - - - - - - → | Analysis |

| User profile |

| Design | ← - - - - - - - - - - - - - - - - - → | Design |

| User needs |

| Development | ← - - - - - - - - - - - - - - - - - → | Development |

| Prior user experience |

| Implementation | ← - - - - - - - - - - - - - - - - - → | Implementation |

| End user profile |

| Evaluation | ← - - - - - - - - - - - - - - - - - → | Evaluation |

| Post user experience |

Figure 6: The co-creation between user-designer participation process