Lean but not Mean UX: Towards a Spiral UX Design Model

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Abstract. A new user experience design model was proposed and evaluated through a case study of a new product development project within a multinational software organization. Strengths and weaknesses in existing and proposed user experience design models were discussed based on how the following three challenges to user experience design – co-evolution of design problem and solution, organizational silos, conceptual integrity in design – affected user experience design quality and productivity through their impact on nature of design tasks and the social context of design activities.

Keywords: User experience design · Design models

1 Introduction

Competition in software market is intense. The best organizations have realized that differentiation through the quality of user experience design is a key component to a product's success [9]. Meanwhile, rapid product release strategy demands even higher productivity from the product organization's user experience design process. How can a user experience design process sustainably create product with great user experience quality in an increasingly fast paced product development environment?

Design process models provide guidance on the order in which a design project carry out its major tasks. The waterfall design model [15] is one of the first widely adopted design models in user experience design. The waterfall model imposes disciplines on design activities by dividing design task into separate design stages with clear transition criteria in and out of each stage. In contrast to the waterfall model's stepwise progression view of design, the iterative design model [11] emphasizes on continuous improvement of design outcome through repeated design iterations. The lean user experience (UX) design model [7] further situates iterative design into a collaborative organizational process.

The need to simultaneously promote user experience design quality and productivity suggests structural changes to today's design process in organizations. A new design model should be in place to redefine the working consensus between designers and others involved in the design process. This article opens with current UX design models and the issues they address. Subsequent sections discuss the process steps involved in the proposed UX design model; illustrate the application of the new UX design model to software projects using one new concept product design in a multinational software organization as case study; summarize the primary advantages and implications

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involved in using the proposed UX design model and the primary challenges in using it at its current incomplete level of elaboration; and present resulting conclusions.

2 UX Design Models

The primary function of a UX design model is to bring order out of the natural chaos of developing new designs and to establish the transition criteria for progressing from one design stage to next. These include readjustment of design milestones to changing requirements, knowledge dissemination among design team members and assessment of design quality as entrance criteria for the next design stage. Thus, a UX design model addresses the following questions in user experience design:

- What shall design team do next to accommodate newly acquired information of user needs or business requirements?
- How to facilitate knowledge dissemination among interdisciplinary team members, and thus improve design process productivity?
- How shall design team ensure conceptual integrity of the design while promoting shared understanding in the team?

Ways to organize user experience design embody our fundamental views toward nature of design activities and the contexts of their happening. Following its legacy, the waterfall model is the first widely adopted user experience design model for enterprise products [4, 14]. Similar to the requirement–analysis–implementation stepwise procedure in information systems design, waterfall model imposes disciplines on user experience design activities by dividing design task into separate design stages with clear transition criteria in and out of each stage. The waterfall design model resembles Simon's rational problem-solving approach to design [18]. The problem of what to be designed is first rationally conceived and consolidated into requirement documentations such as user personas and usage scenarios, solutions to the problem definition are then explored in the design and prototyping stages.

However, a search problem requires a well-defined problem space whereas a design problem is often described as 'ill-structured' or even 'wicked' [6]. Furthermore, compared to fast-moving consumer products, enterprise products often have longer product design cycle, which means a longer 'requirement freeze' time from problem definition to final solution. For this reason, enterprise products are more prone to experience co-evolution characters of design [10] that design is an iterative interplay to "fix" a problem from the problem space and to "search" plausible solutions from the corresponding solution space.

Practitioners and researchers turned to iterative design method for a better design solution. In his reflection of product design for New Relic [8], Eton Lightstone highlighted the need to balance designer and engineer perspectives in the iterative design process – "A designer without an engineer is an art gallery, and an engineer without a designer is a parking lot." He also pointed out the importance of prototyping and evaluating design with real data. Arnowitz et al. [1] described their experience designing an enterprise expense reporting system. Their study identified internal politics as the most

challenging aspect of design process highlighting complex stakeholder needs in enterprise software design. The iterative design model emphasizes on continuous improvement of design outcome through repeated design iterations. This approach exemplifies Schön's phenomenological thinking of design as a reflective practice [17], where design excellence can only be achieved through repeated practices.

Despite their conceptual differences, views of Simon and Schön center on the dialectic relationships between problem and solution of a given design space. Since design activities increasingly happen in complex organizational environments, sociality of design exerts a stronger influence on the design process. Oehlberg et al. discussed the importance of shared understanding in human-centered design teams [12]. Their study reckons Orlikowski's classic investigation of organizational issue in groupware implementation: effective utilization of technology in organization depends on people's mental model about the technology and their work, and the structural properties of their organizations [13].

Lean UX seeks to improve design quality by looking inward into the internal working of design team. It promotes a collaborative design and user research approach to create shared understanding among design team members. Still, the lean UX model has various challenges. Shared understanding in user experience design demands consensus by many people, but consensus making stifles great design work in many ways. Collaborative problem solving in user interface design often turns out to become adding more and more features to the user interface. Because each team member has incentive to have own ideas adopted, consensus-making process inevitably creates a union of many wish lists that result in bloated requirements for a product. Even when requirements proliferation is missing, consensus mechanisms often force compromise in design by taking off its most innovative parts.

3 Spiral UX Design Model

The spiral UX design model is an adaptation of spiral software development model [2] to user experience design process. As shown in Fig. 1, the radial dimension of the spiral UX design model corresponds to the cumulative cost of the iteration step, or the fidelity of design. As prototypes in early iterations might be simple paper sketches, after the design has been evaluated and redesigned several times, prototypes of higher fidelity get produced to embody refined learning. The angular dimension represents the progress made in completing each iteration of design, in which each iteration involves the same sequence of steps.

3.1 A Typical Cycle of the Spiral UX Design Model

Starting from lower left quadrant of Fig. 1, each cycle of the spiral UX design model begins with refinement of user needs. This involves two distinctive phases: a divergent phase where insights of user needs are shared freely by every team member, followed by a convergent phase where diverse opinions are weighted and taken into design by the lead designer.

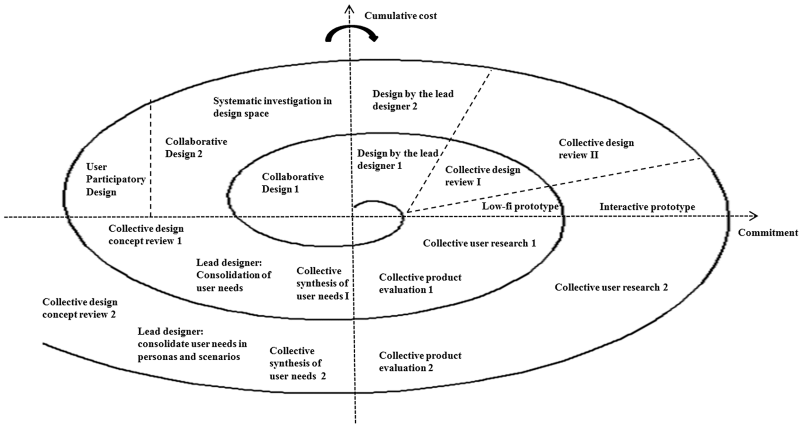

Fig. 1. The spiral UX design model

The next step is for the design team to review consolidated user needs. This may involve the lead designer sharing design rationales, results from competitive analysis, interpretation of user research findings and the team members sharing their critiques on the consolidated user needs. Frequently, this process will identify areas of uncertainty in personas and scenarios. If so, the lead designer should incorporate such critiques into the deliverable in the next step.

Once the user needs are consolidated and reviewed. The actual design should follow. Again, in the divergent phase of design, product team members brainstorm on alternative design solutions based on the shared understanding of requirements specified in personas and scenarios. Although we recognize the problem of co-evolution of problem-solution in user experience design, within each individual design cycle, it is still necessary to assume a relatively stable problem definition, such that systematic exploration of solution space becomes possible.

One important feature of the spiral UX design model is the collaborative open-ended brainstorming in design and interpretation of user needs. Open-ended brainstorming encourages sharing of diverse opinions, and affords debates about contradicting viewpoints. Conflict of opinions is the mechanism for facilitating knowledge acquisition in a productive design process. It is not a debilitating factor needing to be suppressed in the software design team. In user experience design, group brainstorming leads to the integration of the various knowledge domains owned by individual team members. This integration leads to shared understanding of the problem under consideration and potential solutions. A design team seldom starts with shared understanding of what to be designed. Instead, the shared understanding develops over time as team members learn from one another about the expected behavior of the design and the ways to produce such behavior.

The focus of design team should always be set on the final user appreciation of the product rather than on the acceptance of individual's idea into the product specification. The lead designer works in collaboration with other product team members. However,

at the same time, the lead designer enjoys autonomy in the work designing both overall conceptual framework as well as finer details of the product.

In the spiral UX design model, a design review and critique stage follows each design stage. The lead designer invites the entire product team to critique on the design concepts and other contract objects created. This step also plays a counterbalancing role to entrusting product design to a single lead designer, as even the most established designers may make mistakes.

4 Case Study: Using the Spiral UX Design Model

The various rounds and activities involved in the spiral UX design model are best understood through user of an example. This design model was used in the design and development of a mobile application project for professional athlete coaches by a large enterprise software organization. The following text summarizes the application of the spiral UX design model to the first two rounds. The major features of each round are also discussed.

4.1 Round 0: Feasibility Study

Feasibility study involved participatory design sessions with professional coaches as well as ethnographic field studies observing their work in multiple training sessions. The design problems were expressed at a very high level and in qualitative terms like "increase training data collection efficiency," "improve coach and athlete communication," etc.

Some of the alternatives considered, primarily those in the solution domain, could lead to development of mobile application toolkit, but the possible attractiveness of a number of alternatives in wearable devices, data management software running on desktop, web based applications for coaching activities management could have led to a conclusion not to embark on a mobile application development.

The primary design decisions involved considerations of felt pains in coaches' work, conformity to the product organization's existing product portfolio and product strategies, technical feasibility and resource constraints. The user research activities undertaken in Round 0 were primarily participatory design to solicit implicit user needs; surveys and stakeholder interviews of software developers, sales and marketing professionals; competitive analysis of current products in the market with similar target user group.

Product team conducted user research activities collaboratively with help from a user researcher. In the following brainstorming sessions, each team member shared his/her understanding of the meaning of data collected through user research activities. The team developed shared understanding that significant efficiency gains in coaches' daily work could be achieved at a reasonable cost by pursuing a mobile toolkit application initiative. However, some necessary parts in the candidate solution, such as analysis of time series data to infer athlete gestures, were found to be difficult to be fitted into standard development 2-week sprint. Separate research track was created in parallel with

development, design and user research. Thus, even at a very high level of generality of design objective, Round 0 was able to answer basic feasibility questions and also help to structure project progress roadmap.

4.2 Round 1: Concept Development

The design objectives and understanding of user needs evolved into more specificity in Round 1. Compared to Round 0, the current iteration had significantly greater investment from the product team; the product team collaboratively described more specific user personas and usage scenarios; concept prototypes were created by the lead designer in the convergent phase of design to convey team's shared understanding of what to be created; regular user evaluation was determined to happen in the second week of 2-week sprint.

The user interface design phase focused on systematic exploration of design space through rapid prototyping. The product team collaboratively proposed multiple design ideas based on shared understanding of user needs and project constraints. The lead designer then summarized such ideas into concrete low-fi prototypes and brought such prototypes to concept and design review sessions with product team.

4.3 Succeeding Rounds

It will be useful to illustrate some examples of how the spiral UX design model is used to handle situations arising in the subsequent design process, primarily, the interplay with software development.

Shared understanding among product team members means little design documentation is required as a part of official handoff procedure from design to development. In fact, the spiral UX design model requires no such official handoff between design and development teams. User experience designers are expected to have continuous involvement in development process. By working closely with developers during software development, designers have the opportunity to make timely responses to the numerous micro design decisions arising from the implementation of design, which are vital to the overall look and feel of the final product.

In a few occasions, development work outpaced design by implementing new features or making user interface design decisions that will influence the user experience of the product. Shared understanding among product team ensures there is no major deviation from the prescribed product user experience. However, it is important for the lead designer to guide the creation of the final product user experience, instead of letting the product grows organically in the design and development processes.

5 Discussion

The experimentation with spiral UX design model convinced us this design model has potential to be applied in other design situations. However, some difficulties must be addressed before it becomes a mature UX design model for enterprise products.

5.1 Design for Micro-interactions

Concept integrity – the consistency of a design's concept is a quality not only delights its users, but also yields ease of learning and ease of use in great design works. Many great designs with conceptual integrity are principally the work of one mind [3]. The solo designer usually produces work with this quality subconsciously by making each micro decision the same way each time he or she encounters it.

In user experience design, such micro decisions boils down to the elementary details of a user interface, such as a single user interaction with a UI control or color gradient chosen by the designer to perfect the visual representation of a screen element. Details matter in design, as famously put by industrial designer Charles Eames – "The details are not the details, they make the design". If the details are delightful and effective, then their success accretes up into the overall user experience, making the product more delightful and humane as a whole [16].

5.2 Reflections on UX Design Model

Great designs come from great designers, not from great design processes [3]. Although this article concerns primarily with the refinement of design models for user experience design process, the role of design model in creating products with great user experience design quality should be considered with sufficient nuance for the following reasons:

First, by its very nature, a design process is conservative. Much like other process models, a design process focuses on replicating past success rather than producing new ones. Design process model aims at reducing risks involved in the product design, build and go-to-market processes by blocking 'bad' ideas and catching oversights. Hence the design process following any model has the natural tendency to smooth out highly innovative designs, and as an outcome, regress the overall design quality to the average level commanded by cost estimation; sales forecast and scheduled delivery date etc.

Second, one of the major challenges to user experience team to adopt a particular UX design model is that we become dogmatic in what we do, apply what worked last time and avoid what didn't work. As with any process or tool, appropriate use yields superior results. Each project comes with unique goals and constraints, there is no single design model the design team could follow to repeatedly accomplish great designs. Within each design situation, there is opportunity to analyze the needs based on current context, and make choice of appropriate design approaches and method.

Third, because of the engineering culture of product development, user experience design is usually approached as an exercise of problem solving. A typical design might start with Step 1: problem definition, followed by Step 2: solution generation. This also has something in common with software engineering tradition of requirement collection and implementation. But what if some of the challenges facing user experience design are not best described as problems to be solved? Not all design is about solving problems. User experience designers may revisit a UI control, an interaction, or a workflow that has already been successfully designed many times before. In this case, the value does not lie in solving an unsolved problem. Designers return to ubiquitous designs in much

the same way that musicians revisit and reinterpret old tunes. The results of these open-endedly explorations often embody a distillation of their own design philosophy. Similarly, designers distill an element of art in user interface design beyond fulfillment of user needs. Outside a design culture, within the dominantly problem-solving environment of Agile software engineering, this artistic exploration maybe misinterpreted. User experience design may benefit from a more balanced view between problem-solving approach and more open-ended, artistic exploration in design. The diversity of design exploration may serve as a powerful counterbalancing force to the conservative nature of design models.

6 Conclusion

This paper has defined the spiral UX design model as an inclusive and collaborative design process model centered on a lead designer. The definition was sharpened by presenting key design and organizational factors influencing the productivity and quality of user experience design work, and illustrating how the spiral UX design model incorporate their solutions compared to other available design models.

The spiral UX design model has been quite successful in its application of developing a mobile toolkit for professional coaches. Overall, it achieved a high level of user satisfaction in a very short time and provided the extensibility necessary to accommodate higher volume of requirements to incorporate the mobile app into wider product family. The model is not yet as fully elaborated as the more establish models. It needs further elaboration in areas such as supporting open-ended creative exploration in a dominantly problem-solving product culture; counterbalancing conservative nature of design process to allow more radical designs to be fully usable in all situations.

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