

User Centered Design Methodology for Interactive ICT Service System Design

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Abstract: Service system design is the current big challenge for design researchers especially when the services are to be tendered in household setting. Design needs take a whole new meaning due to the complexities in terms of individuals, technology awareness and lifestyles. Service design in particular seems to show a lack of design methodology which is user centered (user characteristics as well context-of-use models). It also does not account for business needs such as revenue models and technological needs such as information flows and device ecologies. This research attempts to resolve the design method paucity as well as propose user-centric service architecture to help design of services. Methods proposed include graphical network analysis method such as Petrinet for simulations as well as UML (software system modeling method) for ensuring repeatability and sustenance of design.

Key words: *Design Research, Service Design, User centered service architecture, computer aided service design.*

1. Introduction

There is an increasing realization that products are a onetime sale opportunity whereas services are steady income generators and therefore renewable in nature. There is fresh demand for innovative user experiences in terms of service offerings. This service economy has created opportunities as well as challenges for the designers of user experience. Especially, interaction designers are under pressure to produce unique and creative service user experiences. Designers are expected to produce tangible results in terms of new user sign ups, positive QoS – quality of service perception and customer loyalty for sustained business. In recent years, due to this increased interest in service sector economy, research is trying to address the service industry problems of service architecture, creation, deployment and quality of service (QoS) assurance via testing. There is also awareness about user centered design principles but the research work in the field tends to be more focused on needs analysis before service creation and usability testing after service creation. There seems to be a general lack of user centered design approach for the service and its whole user experience. Hence, there is an unmet need for research in terms of user centered design methods for Service Design. Service design for us includes needs analysis, ideation, user experience centered system architecture, modeling, concept prototyping, and service touch-point interaction design. Furthermore, the advancements made in the design research field regarding product design can be easily harvested to benefit Service Design.

2. Related Work

Since the early part of this decade the need for research in service sector has been realized by all major corporations and the government authorities. IBM being one of the leaders in (software) service industry introduced a new concept in 2004 known as Service Oriented Architecture (SOA). This architecture promoted what was called the

Service oriented modelin and architecture (SOMA) as part of their SOA and Web services center of excellence [1, 10, 14]. SOMA method can be depicted as follows:

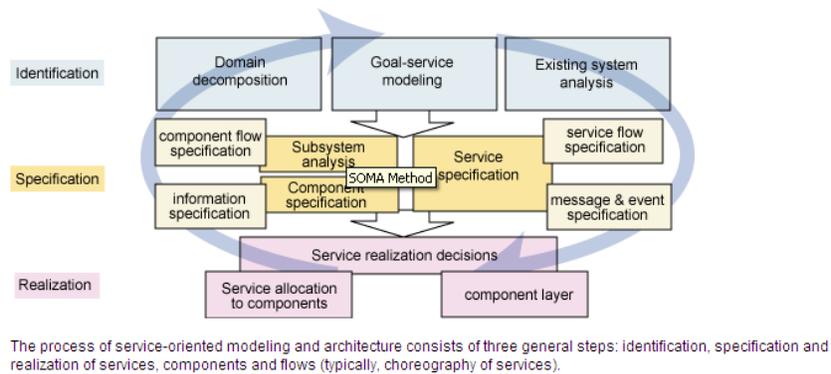


Figure 1. SOMA Method [1]

Another prevalent method to designing information systems and thus can be easily extended for ICT service systems is the SDLC – System Development Life Cycle method. IT consists of the following phases with activities defined for each phase.

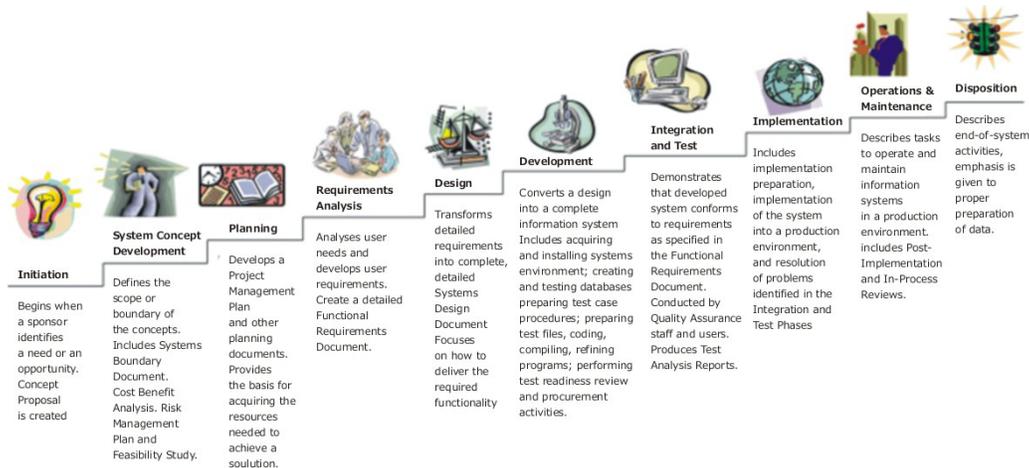


Figure 2. System Development Life Cycle Phases [11]

Even though SDLC [11, 12] and SOMA [1] are popular, they are not user centered. In fact they merely acknowledge the need of usability tests and nothing more. They account well for the business model of the service, domain knowledge, information flow and technological specifications but they do not address factors like context of use, motivation for adoption and continued use – needs which have been proved to be important to product design [5, 8].

Research in HCI and Interactive Systems has attempted to raise and address some of the issues of Service Design. Smith mentions at DIS 2004 that designers need to go beyond inventing useful, neat, cool functions to designing the qualities of interaction so that they are as rich and as satisfying as the other artifacts in our lives [9]. In ubiquitous computing, Nagel et al [7] tackled the design of service which enabled portrayal of home availability information to enhance communication among family members and their social circle. Their data showed people having issues with sharing leisure time data as well as ability to show off socially acceptable availability status. In another position paper at British HCI conference 2008 [13], Dijk emphasizes the importance of service marketing and HCI, saying that service design should take advantage of methods like contextual inquiry and ethnography as well as consumer

behavior research. Also, Ben Fullerton, a designer at IDEO, proposes and justifies “Co-Creation” as good method for service design [4]. In another research, Kounkou et al. recognize the fragmentation in current research activities in service design and address the problem of separation of HCI and Service Oriented Computing (SOC) [6]. Their S-Cube (Software services systems network) research utilizes a services lifecycle which has HCI more explicitly structured into it. Another research from Benyon et al. acknowledges the short comings of current approaches to design of services [2]. They propose a new way of designing interactive services called “Designing by Lifestyles” which focuses on users’ lifestyles and uses video scenarios and Wizard of Oz testing of concepts with users. This proposal is very similar to use of consumer archetypes (not stereo types) for design of products.

3. Research Objectives

The specific problem that this research is targeting is the problem of going from needs analysis and creative ideation for new services (tendered at home) to solution prototyping for consumer evaluations. This design research work will concentrate on service design specifically in terms of theoretical framework, design methods, ecology modeling, service simulation and evaluation. High level Research Questions for this research are:

- I. How can the tangible and intangible functions that exist in the home space be represented in a service architecture and model?
- II. Activity space encompasses physical space, media space as well as service space. So how can service be provided at the most appropriate point of activity, in most appropriate space and time and in the most appropriate interaction mechanism?
- III. How does interaction act as a conduct point in these spaces?
- IV. How can interaction design perspective add value to service system design?

The proposed thesis is original as none of the current research addresses the service design needs of the industry holistically. This design research proposes graphical network analysis and UML for design synthesis phase of service design. This proposition in itself is new and needs deeper understanding and hence research. The evaluation guidelines are sketchy and mostly heuristic in nature and field studies are expensive and time consuming so the evaluation guidelines will be equally important and contribute well to design research.

This research attempts to use best fitting methods as per the requirement of each research phase. Therefore the methodology used for research will definitely be a Mixed Method. For instance, needs analysis is ongoing with data from in-situ interviews, ethnographic observations, focus groups, scenarios and use cases. The modeling of service will use methods borrowed from software engineering (UML), research in operations management (ARENA kind of simulations) and computer aided design field as well. Also the modeling will be inspired from work in cognitive task analyses and work centered system design methods of Human Factors and Cognitive Psychology. Solution prototyping work will be based on design school thinking of “needs” based and “activity” based design conceptualizations.

4. Progress and Future Work

During the last year, two studies were completed. One was a focus group study involving 24 users (6 people X 4 groups) where advanced TV concepts for the living room were discussed. A lot of social needs were discovered along with interaction needs from TV based services. Responses in general gave importance to privacy among individuals within the household, shared usage of devices, media consumption via recommendations and social awareness of each others’ activities. The study was conducted using storyboards which had future conceptual designs of user interaction with services. The second study was a features study where things that are currently available were studied to understand how people might use similar future features that are much more advanced in terms of technology. People were interviewed in their homes for current practices around chosen technologies such as Netflix subscription, DVRs, PCs, Shopping via PC etc...Data showed very prominent social practices around each service adopted by the household. For instance pay per view was used exclusively for Saturday get-togethers

with friends and family and shopping was quite personal so was use of devices like iPod. The study results motivated both the thinking and ideation for services which in turn motivated the research around service design.

The next step is to model the user data from the ethnographic study and understand the various needs and motivations for adoption of new devices and services. From the needs and motivations, service offerings will be conceptualized. This research will attempt to model and simulate service using new tools and techniques such as Petrinets and UML. There will be investigation of availability of any theoretical frameworks for service design followed by our own service architecture and modeling effort. Here, some automation and computer aids will be developed [3]. Simulation or service prototyping and user evaluation will be carried out which will lead to guidelines for other designers.

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