

# A Tool for Evaluating Service User eXperience (ServUX): Development of a Modular Questionnaire

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## ABSTRACT

Currently, there are no tools designed specifically for evaluating user experience (UX) of modern web-based services, e.g., crossmedia services featuring Web 2.0 characteristics. This paper describes the process and outcome of developing a modular questionnaire for evaluating Service User eXperience (ServUX). The questionnaire is constructed of modules, each addressing distinct aspects of ServUX: cross-platform and crossmedial interaction, user-driven service composition, social communication and construction, dynamic content and functionality, contextual computing, and other ServUX-related issues such as trust and privacy. We have applied the questionnaire in two field studies, investigating a total of four systems/services in Finland and in the US. This position paper reports the background and development of the first version of the ServUX questionnaire as well as initial experiences of how it worked in these studies.

## Keywords

User eXperience (UX), Service User eXperience (ServUX), Web 2.0, crossmedia, evaluation, questionnaire, field study.

## INTRODUCTION

Recent developments in web-based computing have lead to the continuing emergence of various types of new web services that interweave with the everyday lives of millions of people forming various communities. These services share many characteristics that have been described through the concept of Web2.0. Web 2.0 has no formal and widely accepted scientific definition but according to [1], key concepts and technologies associated with Web 2.0 are 1) Web as platform, 2) architecture of participation, 3) rich user experience, 4) blogging, and 5) wikis. Web 2.0 has also been defined as “*a set of novel technologies and philosophies that use the Web as platform to deliver services that emphasize user participation*” [2].

New electronic services are however not anymore fostered only in the conventional web environment with browsers and network access. Web 2.0 services are beginning to reach across a range of other technologies, sensors, devices – including mobile and wearable terminals – and applications for a broader coverage of people’s lives and activities. We call this kind of expansion cross-platform or crossmedial computing and it is increasingly apparent in modern systems and services.

User eXperience (UX) has been defined in several frameworks as a holistic, dynamic phenomenon that is influenced by a multitude of factors depending on the user’s internal state, the system and the context of use [3, 4]. An essential aspect of UX is that in addition to the instrumental or *pragmatic* qualities of use, more *hedonic* user motivations need to be supported by the system to enable emotionally satisfying UX [5].

Human-computer interaction associated with Web 2.0 incorporates desktop-like interaction elements into the browser environment. Web usability has been addressed e.g. by Nielsen [6], however, a usability-oriented perspective focuses rather on the level of interactions than broader, experiential issues in use. Holistic UX of web services is affected by several additional themes such as cross-platform and crossmedial interactions, user-driven service composition, social communication and construction, dynamic content and functionality, contextual computing and other issues such as the ones regarding trust and privacy. User experience is constructed dynamically from a variety of elements that cannot be extracted only from the service user interface, but from the contexts of use which it supports and the social networks that it is fueled by. Current approaches and tools for evaluating user experience in such diverse and dynamic environments are not sufficient and thus, our aim is to develop tools that respond to the diversity and dynamic nature of such services.

Questionnaires are generally useful tools for collecting larger amounts of user data around a distinct theme and for iterative improvement and benchmarking of products and services [7]. Even though questionnaires alone are not

optimal for gathering in-depth understanding of subjective experiences, they are useful as complementary, “lightweight” tools in quick-paced, iterative development of services. In this position paper we describe the development of the first version of the service User eXperience (ServUX) questionnaire. We explain the basis of its scope, structure and content. We also present its first version that was created as a result of a conceptual development process, as well as the initial experimental use of the questionnaire in two field studies of altogether four modern web services. Thus the purpose of this position paper is to introduce the first version of the ServUX questionnaire and subject it to broader discussion and further development.

### **PRIOR WORK ON SERVICE USER EXPERIENCE AND CROSSMEDIA SYSTEMS**

The concept of Service User eXperience (ServUX) was first developed and introduced in 2008 to address the distinct aspects or characteristics of Web 2.0 services that essentially influence how users experience interactions within them [8]. In 2009 this conceptual work was further complemented by research around crossmedial interactions [9, 10]. The main aspects of ServUX were derived based on an analytical exploration of existing services as well as from related research and literature. The current collage of ServUX dimensions includes:

- *Usage and creation of composite services.* Service components may originate from various sources in the service ecosystem. Users can mix and match these components and create personalized “mash-ups”.
- *Cross-platform and crossmedial interactions.* Functionality is channeled through or distributed across diverse platforms and media. Users can migrate their tasks across platforms and interact with systems/services through a variety interfaces.
- *Social interaction and navigation.* Services/systems enable direct interactions and communication between users (synchronous and asynchronous). Users can navigate in the service by following each others’ activities.
- *Temporally dynamic service features.* Functionality of services/systems changes frequently through i.e., runtime-updates and content evolves dynamically through users’ activity and contributions.
- *Context-aware services and contextually enriched content.* Services/systems have capabilities that enable contextual sensing and automatic collection of meta-data. Services can adapt to different situations and contextual metadata can be added to enrich content.

An initial study with the Nokia Sports Tracker ([sportstracker.nokia.com](http://sportstracker.nokia.com)) was carried out to explore these concepts [11]. In addition, an expert evaluation of UX was conducted with three modern web services; Nokia Sports Tracker, Facebook ([www.facebook.com](http://www.facebook.com)) and TripAdvisor ([www.tripadvisor.com](http://www.tripadvisor.com)) [12]. One of the essential

characteristics of the evaluated services was that they could be used via both a PC/laptop and a mobile terminal (which in these cases was running a Symbian-based S60 user interface). Based on the expert evaluation, eight design and evaluation heuristics for Service UX were concluded that addressed: composite services; interactions across diverse platforms; social interaction and navigation; changing aspects of the service; contextual aspects; service usability; trust and safety; technical issues and service and content suitability. These heuristics were taken as a starting point for the development of the ServUX questionnaire.

### **DEVELOPMENT OF THE ServUX QUESTIONNAIRE**

Various evaluation questionnaires have been developed for measuring UX. Hassenzahl [13] has presented AttarkDiff as a tool to measure the attractiveness of a product by word pairs. Roto & Rautava [14] have developed a questionnaire for the evaluation of pragmatic and hedonic qualities of a personal mobile product. ProEmo [15] is a tool which uses visual icons to represent emotional states based on which the respondents assess their emotional responses with the evaluated product. The existing measurement tools and questionnaires are based on generic issues of basically any interactive product. Our aim was to develop an evaluation tool that would focus on issues more specific to modern web-based (Web 2.0) services that are accessible or extend across multiple platforms. In the following we describe the purpose and the structure of the ServUX questionnaire as well as the different modules that it is currently composed of.

#### **The Purpose of the ServUX questionnaire**

The purpose of the ServUX questionnaire is to help collect and organize data for assessing the capabilities of modern web services in promoting and supporting positive and engaging user experiences. The questionnaire can be used for evaluation, research as well as development purposes of web services. It identifies several factors or focus areas that constitute the essence of dynamic, social and crossmedial information services. It will also provide a platform for including new, emergent aspects of web services as they evolve from Web 2.0 to Web 3.0 and so forth. This flexibility is achieved through a modular approach to structuring the questionnaire.

#### **Managing Diversity through Modularity**

Modern web services are many and varied. They may share certain characteristics, however even the shared characteristics may appear distinctly in the individual services. Being able to compare different services in terms of their UX quality requires that the assessment tool is unified but still adaptable for each service, and that the shared characteristics can be clearly identified. Furthermore, regarding the pace in which current services are changing and evolving, creating a static and fixed architecture for a research instrument would not be useful in long term. Thus, the main requirements for how the ServUX questionnaire tool should function were: 1) It needs to be easy to adapt for different service configurations and 2) it needs to be easy to develop and

complement the questionnaire as services evolve. Both of these requirements can be met by incorporating *modularity*, i.e., the questionnaire consists of individual modules that address the different aspects of modern web services. The modules can be selected and applied respectively of the case. Individual modules are comparative, however, the overall results (or the overall assessment of a service) from using the questionnaire will also be easier to compare as they are formed relative to each service.

### Structure of the ServUX questionnaire 1.0

The modules of the first version (1.0) of the ServUX questionnaire were based on the exploratory analysis of distinct characteristics of modern web services and on the Service UX heuristics developed in our previous research (see above). Table 1 presents the six main modules of the ServUX questionnaire 1.0 and their subsections. The (P) or (H) after each module and sub-section refers to the pragmatic or hedonic nature of questions it contains. Each module addresses aspects that the service (to which it applies) is expected to support.

#	ServUX module name and its subsections
1.	<i>Cross-platform and crossmedial interactions</i> 1.1 Service/system composition (P) 1.2 Functional structure (P) 1.3 Consistency across media (P) 1.4 Continuity of interactions across media (P)
2.	<i>User-driven service composition (P/H)</i> [Sub-sections under development]
3.	<i>Social communication and construction</i> 3.1 Social interaction and communication (H) 3.2 Contact and social network management (P) 3.3 Social expression (H) 3.4 Social navigation (P/H)
4.	<i>Dynamic content and functionality</i> 4.1 Adaption to developer-driven changes (P) 4.2 Contribution of content (P) 4.3 Managing content updates (P) 4.4 Dynamic updates and liveliness (H)
5.	<i>Contextual computing (P/H)</i> [Sub-sections under development.]
6.	<i>General-level issues</i> 6.1 Trust & privacy (H) 6.2 Summary of pragmatic issues (P) 6.3 Summary of hedonic issues (H) 6.4 Overall summarizing questions (P/H)

**Table 1:** The modules of the ServUX questionnaire 1.0. As this is work-in-progress, some modules are still under development.

Each subsection in a module will in the final questionnaire consist of at minimum four items through which that

particular subsection can be evaluated. Each item is in the form of a statement, such as “It is easy to transfer data between the system/service components”. The user is asked to indicate his/her agreement with each statement on a 7-point Likert scale. Statements can be adapted to suit the characteristics of the individual service that is being evaluated, for example, “It is easy to transfer data from the heart rate monitor to the web service”. This should be done in order to ensure that the statement is relevant and concrete enough for the user to understand it. However the meaning of the statement should not be altered. Table 2 shows two examples of statement sets in the ServUX questionnaire 1.0.

4.1	Adaption to developer-driven changes: How well does the system support users in adapting to runtime updates?  <ul style="list-style-type: none"> <li><i>The system/service informs me about upcoming changes to its functionality and content.</i></li> <li><i>The system/service informs about recent changes in its functionality and content.</i></li> <li><i>The system/service allows me to influence/ participate in its future development.</i></li> <li><i>The system/service allows me to give feedback about recent changes in its functionality and content.</i></li> </ul>
3.3	Supporting social expression: How well does a web service with social media characteristics support users in, e.g., leveraging presence in the service?  <ul style="list-style-type: none"> <li><i>I enjoy contributing content (i.e., updating my status information) in the system/service.</i></li> <li><i>I enjoy the feedback from others to my content.</i></li> <li><i>I enjoy the contents created by other.</i></li> <li><i>I can express myself to others through the system/service.</i></li> </ul>

**Table 2:** Two examples of statement sets in the ServUX questionnaire 1.0.

The questionnaire contains a fairly large number of statements (over 110), however, not all of them will be used for evaluating an individual service. The most appropriate modules will be selected and applied for each case based on the nature of the evaluated service. The main questionnaire thus functions as a pool of items that can be used in different cases.

### ServUX QUESTIONNAIRE 1.0 IN EVALUATION: INITIAL EXPERIENCES

The questionnaire has been used in two field studies of altogether four web-based services during March-May 2009. In one of the studies, three cross-platform web services were evaluated with end users (8 users each) in Tampere, Finland: Nokia Sports Tracker, Facebook and Dopplr ([www.dopplr.com](http://www.dopplr.com)) over a five-week period. In the second study, a crossmedia system – the Polar FT60 heart rate monitor and the interoperable Polar Personal Trainer web service ([www.polarpersonaltrainer.com](http://www.polarpersonaltrainer.com)) – was evaluated with 30 users in Stanford, US over a three-week period. All of the four cases included several characteristics

of modern web-based information services, many of them which they shared. For example, all of the cases comprised a mobile and a browser-based interface. However, as is characteristic to web services, there were also differences. Some services relied more on social interactions, whereas others were primarily constructed around activity tracking. In all cases, statements of both pragmatic and hedonic nature were applied.

When exploring experiential phenomena that are based on individuals' experiences and subjective interpretations, complementing questionnaire data with interviews, diaries and observations will yield a more profound understanding of the experiences that a service evokes. In our initial field studies alongside the questionnaire, other data collection methods, such as user diaries and interviews were also applied, 1) in order to obtain a broader view of the user experience process in each case, and 2) in order to validate the ServUX questionnaire by testing questionnaire data against other, qualitative data for the degree of correspondence.

In both field studies the users filled in an online version of the questionnaire containing modules that applied to the particular case. Statements in each module were also carefully adapted for each case in a way that would not compromise their content. In the Finnish field study, the users filled out the ServUX questionnaire twice: approximately one week after the study had started and at the end of the study. In the US-based trial, the users filled out the questionnaire at the end of the study.

Our initial experiences indicate that the questionnaire has been fast and easy to respond to. We believe that the modularity works well also in case of comparison between the services. However, the field studies are still in progress until May 2009 and thus we will be able to present concrete results and more thorough experiences of the usage of the ServUX questionnaire in the UXEM workshop. We will also draw implications on how to modify the ServUX questionnaire for future usage in evaluation of UX of modern web-based services and systems. Finally, we will need to assess the validity and reliability of the ServUX questionnaire by a large-scale quantitative study across different types of web services.

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