Journey from Service Value to Business Opportunities: Re-designing Voluntary Water Quality Monitoring – Sanna Peltonen, Tommi Siljamäki, Miia Lammi

Sanna Peltonen

Researcher

Aalto University School of Arts, Design and Architecture/Western Finland Design Centre Muova

Wolffintie 36 F 11

65200 VAASA Finland

Tommi Siljamäki

Designer

Aalto University School of Arts, Design and Architecture/Western Finland Design Centre Muova

Wolffintie 36 F 11

65200 VAASA Finland

Miia Lammi

Development manager

Aalto University School of Arts, Design and Architecture/Western Finland Design Centre Muova

Wolffintie 36 F 11

65200 VAASA Finland

Abstract

In Finland, the gathering of information about water systems has been heavily dependent on public organizations. However, decreasing resources have emphasized new cost-effective ways to produce statutory information. The voluntary work of citizens is raised as a potential resource in supplementing official water quality monitoring. Engaging citizens require deeper understanding about the value of monitoring activity for potential participants.

The purpose of this paper is to present a methodology for building new understanding of value creation in the context of voluntary water quality monitoring. The methodology also describes how the value creation acts as a driving force in identifying service concepts and business opportunities. The methodology integrates service design methods and utilizes information and communication technologies (ICT) in contributing a meaningful value for customers.

Volunteers in environmental monitoring

In Finland, the process of gathering information about water systems has heavily relied on public organizations. Decreasing resources as well as the implementation of environmental directives (such as the EU Water Framework Directive) have called attention to the need for more cost-effective ways to produce the information. The voluntary work of citizens was raised as a potential resource in supplementing official water quality monitoring in the monitoring strategy of the Ministry of the Environment in Finland (Ministry of the Environment 2011).

The previous research in citizen science, studies the participation of volunteers from the conservation strategy point of view. Citizen science engages a network of volunteers to assist in professional research using methodologies developed by or in collaboration with professional researchers. (Cooper, Dickinson, Phillips and Bonney 2007) Citizen science has been considered suitable for studying large-scale natural patterns, which require a vast amount of data to be collected across an array of locations over an extensive time span. (Hill et al. 2012, Bonney et al 2009)

Additionally, the focus for research on environmental volunteering has covered the motivations, barriers and benefits of volunteering in environmental issues (Gooch 2003, O'Brien and Ebden 2008). The perspective of volunteering emphasizes a user-centered point of view, because the reliance on volunteers creates a need to find tools to elicit and maintain their motivation (Anderson, Cairbcross 2005).

However, the current research seems to lack business perspective. In the future, there could be self-sustainable service systems that bring value to engaged citizens and service providers. Instead of authorities managing voluntary work, there could be companies and organizations from the third sector providing desirable services for customers. The business approach highlights the need for identifying service value for future customers as well as for creating meaningful services.

In this study, the user-centered approach, and more precisely, service design, was used as a guiding framework for examining the volunteers in water quality monitoring and revealing new business opportunities. Service design places user experience at the center of development and focuses on creating platforms, processes, and contact points for interacting with service providers. Uncovering the components and evolution of user experience is an important starting point for design, when the aim is to develop policies and services which address customer needs. (Holmes 2011)

Objectives and research methods

The aim of the current research was to study how service design methods contribute to identifying service value, creating service concepts and discovering business opportunities. This paper is based on the exploratory case study and the data was collected during the academic concept design project conducted 2011-2013 at Aalto University.

As a result of our exploratory case study, we propose a methodology for identifying service value and transferring this knowledge into concept design. The methodology contributes to (1) identifying the key elements of service value, (2) finding ICT-based service concepts that create value for the customer, and (3) discovering business opportunities in the field.

The academic concept design project constituted a setting for the case study. The study was based on the hypothesis that value creation is a perquisite for creating meaningful service concepts as well as spotting business opportunities. This assumption raised a question: *How should the participation of volunteers and businesses be encouraged in the context of voluntary water quality monitoring?* The research question is twofold. Firstly, it implies the need to understand the volunteers as users of new services in order to propose factors creating value for volunteers. Secondly, it raises the identification of new service and business opportunities to the scene.

Case study for identifying and transferring service value

In Finland, official voluntary water quality monitoring is organized by local Centers for Economic Development, Transport and the Environment. In addition to the public organizer, different local societies for water conservation are important actors in the field. The review of previous literature denotes that volunteers in water quality monitoring have not been comprehensively studied in Finland. Deeper understanding of volunteers is urgent because organizers of voluntary activities, whether public or private, share the concern of finding and keeping committed volunteers. (Peltonen, Siljamäki, Lammi 2012)

In this paper, voluntary water quality monitoring refers to monitoring of water transparency conducted by volunteers using Secchi depth as a tool. Secchi disk measurements reveal how deep sunlight can reach into the water and thereby indicate general water quality conditions. Measurements are typically taken twice per month during the open water season. (Hudson 1998) Secchi has been adopted widely as an appropriate method for volunteers to participate in water quality monitoring.

From a citizen's point of view, water quality monitoring can be considered a leisure time activity. Spare time is a scarce resource that dispenses with different hobbies and activities (Timonen 2005) – and

only the most satisfying and rewarding activities win the race. Also, voluntary work has to find its place in this arena. The leisure time context provided a comprehensive perspective for identifying attractive elements of monitoring and for creating interesting activities. Discovering the desirable elements for citizens, it is possible to increase the business value of water monitoring.

The design process conducted for the case study was exploratory and iterative in nature. Despite an overlapping flow of methods, for simplicity, the process is presented here as consecutive phases. The design process covered three main phases: Research, Interpretation and Creation, which are described herein in more detail.

The Research phase included data gathering in order to understand the motivations and value creation of volunteers participating in water quality monitoring. The purpose of this phase was to build a rich knowledge bank for informing the latter parts of the design process. Additionally, the Research phase acted as a guide and inspiration for the design team (Kumar 2012). Traditional user research methods (interviews and a survey) were strengthened with a more design-led research method, Design probes. The methods used in the Research phase are presented in Table 1.

Table 1. Methods used in the Research phase.

	PROCESS	RESULTS
Background study	Background study was based on internet sources and covered previously published information about the topic of interest: How can citizens participate in water monitoring at the moment?	• The framework for the study was defined • The pre-understanding of the phenomena (voluntary water quality monitoring) was created
Expert interviews	Expert interviews were conducted by semi-structured phone interviews. Experts represented different areas related to voluntary water quality monitoring, other environmental volunteering as well as long-term volunteers.	• The current process of voluntary water quality monitoring was defined • User experiences and problem areas were identified • Revealed subjects that can be learned from other fields of pro-environmental activities
Survey	Survey was conducted as an online questionaire with a snowball sampling as a method to collect responses. Questionaire was targeted to voluntary water quality monitoring participators and others who are interested in the condition of and in conserving their local waters. Total of 361 valid responses were received.	• New understanding of factors motivating people to participate in water quality monitoring was generated • Increased understanding of other related themes such as experiences of volunteers and barriers to entry • Three clusters of volunteers based on their motivation and experiences were identified
Design probes	A probe kit, included diary, camera assignments and open-ended questions covering the whole water quality monitoring process. A target group for probes study was those individuals who indicated in the survey that they are willing to participate in the qualitative part of the research. Probes kit was sent to 15 volunteers based on three criterion: they are doing the monitoring at the time of design probes, both genders and age groups identified in the survey are represented. Total of 14 diaries were returned filled out correctly.	• Constructed understanding of the activity from the users point of view • Provided the means for volunteers to explain the reason for participating in their own words and use their own expressions concerning the motivating factors as well as experiences and ideas for improvement

The methods used in the Research phase contributed to the understanding of users in voluntary water quality monitoring and current use context. The studies related to the present monitoring explored organization of the activity and the ways the activity appears to users. The motivating factors of volunteers were seen as a key starting point for identifying value. The context of leisure time framed the activity towards outdoor activity instead of volunteering. The Research phase revealed three types of volunteers differing in their motivation and experiences. (Peltonen, Siljamäki, Lammi 2012)

The next phase, Interpretation, entailed sense making of the gathered data and structuring the findings from the Research phase. The main methods in the phase were processing the data, analysis, reframing and finding key insights. The interpretation considered use processes, users, and the value elements of the activity. (Kumar 2012) The goal of this phase was to turn key insights into actionable principles for idea generation and concept development. The methods used in the Interpretation phase are presented in Table 2.

Table 2. Methods used in the Interpretation phase.

	PROCESS	RESULTS
Service journey	Phases and touchpoints of the service were identified by analyzing the data gathered previously in the Research phase of the study. The journey of a service user was described.	• Framework for identifying gaps and jamming points in current service and finding opportunities for increasing service value with ICT-based solutions
Personas	In K-means clustering analysis of the survey data, three clusters of volunteers were found. These clusters were presented in the form of personas. Personas described the main content of each cluster, summarizing the differing features of each cluster.	• Each of the three clusters were described and visualized as a user persona • Compressed a broad range of information and contributed in communicating the main user research results
Elements of service value	Using persona descriptions as reference material, the various dimensions that affect the value perception in this context were identified and classified. Defined elements of service value were persona-specific.	• Factors creating value for each persona were made apparent in the form of service value elements
Design drivers	Persona related service value elements were classified into five groups based on their similarities. These groups were transformed into design drivers: they were named and described in more abstract terms.	• Five service value based design drivers were identified and described

The purpose of the methods in the Interpretation phase was to structure the understanding generated in the preceding phase. The information was analyzed in order to provide manageable abstraction of reality. The methods facilitated the creative transition from understanding to service design solutions. The Interpretation phase contributed to identification of motivations for volunteering. The motivating factors were modified to the elements of service value. The value elements were abstracted into design drivers, which were unrelated to specific user groups, in order to define the driving forces for the design process. In addition, the visualization of service journey concretized current use processes and activities provided by organisers of voluntary water quality monitoring.

And finally, the purpose of the last phase of the design process, Creation, was to generate solutions for identified needs and service value elements. The solutions were visualized in the form of service concepts. In order to identify business opportunities, it was found important to describe the combinations of future services and potential service providers. Therefore the concepts were built into a system of concepts. A systemic approach contributed to clarifying the business opportunities. The methods used in the Creation phase are presented in Table 3.

Table 3. Methods used in the Creation phase

	PROCESS	RESULTS
First service images	After background study and expert interviews, the first service ideas were presented as service images. Service images describe an idea of the main features of the service concept. Service images were tested with consumers by including them in the survey.	• To create dialogue with the users and potential stakeholders • Discussion facilitated the evaluation of prominent aspects of ideas and developing ideas further
Trend mapping	Trend mapping was conducted as desk research providing inspiring information for concept generation. All relevant trend information was collected and categorized.	• Provided inspiration • Currently existing solutions in related fields could be included into concepts • Revenue generation models in related fields were identified and adapted into service concepts
Brainstorming with service journey	Service journey, and especially the identified jamming points, were used as a starting point in creating ideas for new ICT-based value creating solutions for the customer. All development ideas were documented to post-it notes and attached to the corresponding phase in the service journey.	• Service-journey-based idea mind map • Problem-driven ideas • First layer in a future service journey scenario
Brainstorming with personas	Also Personas were used in brainstorming possible ICT solutions. Service journey was examined from the perspective of each persona. Ideas were documented to post-it notes and attached to the corresponding phase within the service journey.	• Persona-based idea mind map • Value-driven ideas • Second layer in a future service journey scenario
Brainstorming with design drivers	In the next brainstorming session, service journey was examined with design drivers. In this session the purpose was to focus especially on service value. Also existing ideas were evaluated and developed further from the service value point of view.	• Design driver based ideas expanded the future service journey scenario • Value-driven ideas
Brainstorming with design probes	In the last thematic brainstorming session, service journey was examined with design probes. The purpose was to focus on service value and service experience factors.	• Design-probes-based ideas expanded the future service journey scenario • Experience-driven ideas
Future service journey scenario	All ideas created in thematic brainstorming sessions were compiled into a future service journey scenario which models the potential service journey of a user by representing advanced phases of the service and augmented touchpoints characterizing the user's interaction with the service.	• Future service journey scenario as a platform to collect ideas • Platform provided a tool to evaluate ideas and group them together for concept creation purposes
Final service images	Main features of the selected service concepts were presented in Service images.	• Four service images were visualized and described
Service offering map	Selected service ideas were combined into a system of concepts and visualized. Service concepts were presented in the form of service offering map in order to describe in a synthetic way what the service offers to its users.	• Organizes the system of concepts into a coherent entity
Actor map	Based on the service offering map, actors needed in service system were identified.	• Hypothesized system of actors with their mutual relations needed for the service concepts were identified

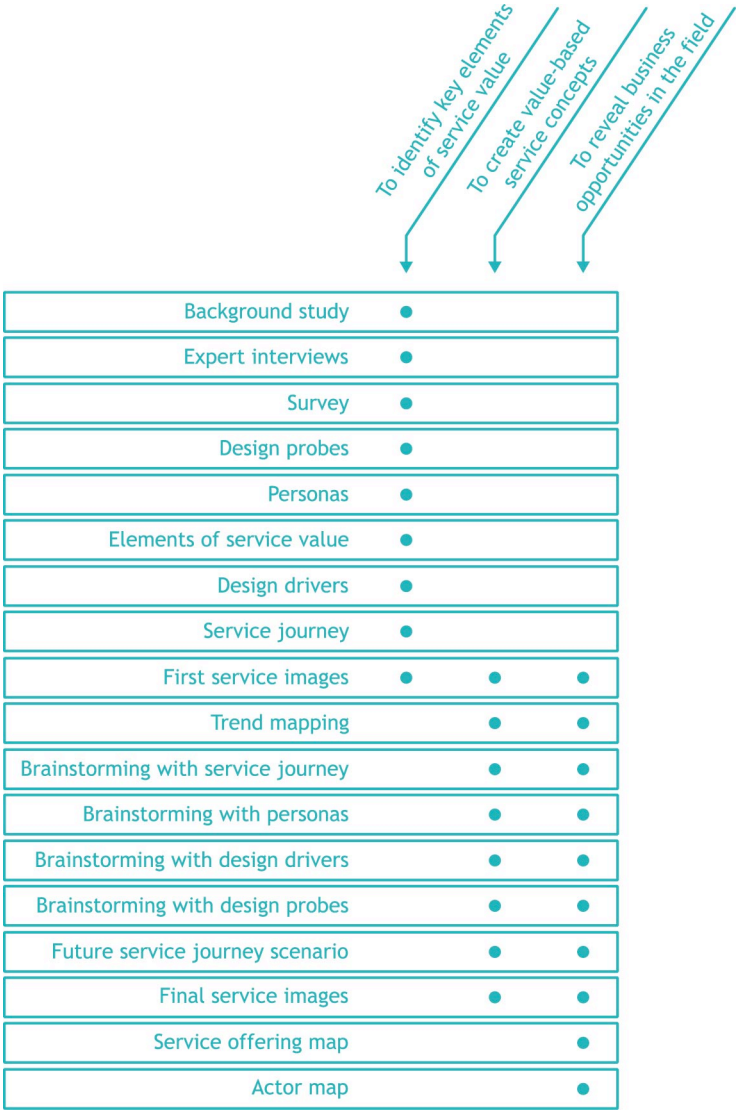
Analysing the contribution of methods

The analysis of the case study consisted of the classification on the methods based on their role and contribution to the pre-specified themes: (1) Identification of key elements of service value, (2) Creation of the value and ICT-based service concepts and (3) Revealing of business opportunities in the field. The methods used in the Research and Interpretation phases mainly contributed to identifying key elements of service value. The methods in the Research and Interpretation phases

focused on the construction of the understanding about the current activity and users, their challenges and the possibilities ICT technology could bring to the use process. The created understanding established a foundation for the Creation phase and offered sources for new solutions.

In the Creation phase, brainstorming was used for creating new services ideas. The driving themes for the brainstorming rose from the service journey, personas, design drivers and design probes. The sequenced brainstorming methods contributed to the creation of value-based service concepts. The service-offering map and actor map, on the other hand, contributed mainly to revealing business opportunities. The methods and their primary contribution area are presented in Table 4.

Table 4. The main contribution of methods used during the case project.



Results

Based on the case study it seems that the methodology is applicable in (1) identifying the key elements of service value, (2) finding service concepts that create value for the customer, and (3) discovering business opportunities in the field. The methodology describes the critical phases for developing new business for water quality monitoring.

The methodology is constructed from four major elements: Understand and Identify, Generate ideas and Explore possibilities, Frame solutions, and Apply network approach. The first element, Understand and Identify, creates comprehensive understanding of the present context and the value

creation of the users. Interviews, survey and design probes offer tools for providing vivid and diverse understanding of value creation, which is suitable for creating new services.

The second element, Generate ideas and explore possibilities, included thematic brainstorming. The brainstorming is carried out in stages, which gradually increase understanding about service value and opens new ideas. The analysis of the case study proposes that problem, value-driven and experience-driven brainstorming provided an integrated approach for including customer value into the design process. On the other hand, ideas stemmed from the identified problems in the current service journey. Trend mapping boosted idea generation by envisioning the future context.

The third element in the methodology is Frame solutions. Service ideas are combined into service concepts and these service concepts are organized into a system of concepts. Service images and a service-offering map were used to describe and visualize the service concepts and the value for the customer. The methods contributed to the crystallizing of the business opportunities in a concrete way.

And finally, applying a network approach contributed to identifying network partners and defining the value for each potential member in a network. Applicable methods were found to describe actors, their roles and interests in the service network. In our case, the actor map was used as a key tool for network development. Applying a network approach to the system of concepts provided a way to create a vision of service ecology for the future. The methodology suggested in this paper is presented in Figure 1.

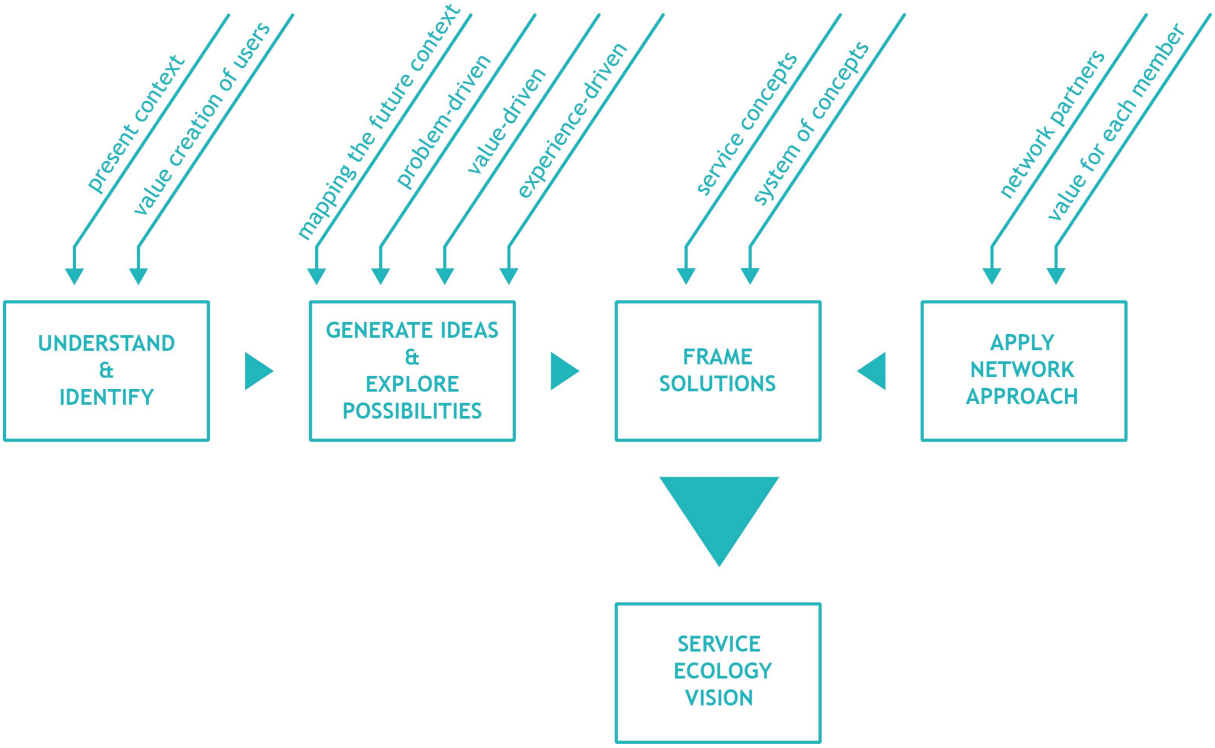


Figure 1. Methodology for identifying the key elements of service value, finding service concepts that create value for the customer, and discovering business opportunities

Based on the case analysis, we suggest that the business opportunities can be discovered through the service concepts, which also indicate the potential for business. We argue that service value can act as a driver for the design process in finding service ideas as well as in identifying business opportunities. The value-based approach connects the creation of meaningful services and identification of business opportunities. Especially, problem, value and experience-driven idea generation methods contributed to finding service concepts as well as to revealing business opportunities. Mapping the future context contributed to both objectives as well.

Conclusions

This paper describes a methodology for value-driven design for creating new business in the field of voluntary water quality monitoring. The methodology was created based on a case study in which service design methods were used for identifying service value, creating service concepts and discovering business opportunities. The case study describes how understanding expanded from motivational factors of volunteers into the vision of service ecology. Our results imply that the methodology acts as a framework for creating new business in the underdeveloped field of industry. Therefore, the results offer solutions for reducing authority-driven water quality monitoring and at the same time opening new markets for businesses.

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