

UNIVERSITY LIBRARY AS A LIVING LAB: INNOVATING WITH STUDENTS

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ABSTRACT

Ubiquitous and pervasive technologies are part of everyday life, including the portion of it that has something to do with the university libraries: all students use personal mobile technology and all books have embedded sensors. This paper describes three years long experience with student-lead innovation of student-oriented university library services. Students, as library users themselves, have a potential to initiate changes in the existing practices, or offer novel technological solutions based on ubiquitous and pervasive technologies that are easy to adopt and use for this user group. Within the project described in the paper, the library was established as a living lab for a student-lead innovation. At this stage, the innovators are recruited among interaction design students. The approach shows very promising results, some of which are showcased in the paper.

KEY WORDS: Innovation, Service Design, Interaction Design, Library Services

1. INTRODUCTION

The university library as an institution balances a fine line between being traditional and being innovative. The acquisition and the loan of academic books are a centuries old tradition. Rapidly changing information technology strongly influences how this traditional work is being done. The question whether libraries should simply adapt to the changes dictated by technology or be innovative in their own right is an old one. Addressing the issue of innovation in libraries (Olaisen et al., 1995) say: *“Even though it would be foolish to argue that all innovation is beneficial or that continual change for its own sake is desirable, there is evidence in the business literature that innovation is necessary for both development and survival. ... Libraries must ask the penetrating questions: Is innovation necessary? For what can innovation theory be used in libraries?”*

The disruptive innovation in the book delivery system, see (Christensen & Raynor, 2010), forced by the appearance of disruptive technologies such as eBooks first and tablet later (Culén et al., 2011; Culén & Gasparini, 2011a), has practically forced the libraries to innovate. Ubiquitous and pervasive technologies are part of the library ecologies today. In terms of pervasive (sensor based) technologies in the library, paper books are all embedded with RFID tags. The use of ubiquitous, personal and mobile, technology in Norway is widespread: 97.2% of Norwegian population is using the internet, see (“Norway - New Media Trend Watch Europe,” 2013), and 63% of the whole population uses social media. For the student population, Internet access is 100%, and although we do not have data for social media use, it is significantly higher than that for the general population. Students routinely use their smart phones for access to information, social media, e-commerce, m-commerce, gaming and even TV watching.

Students are a savvy group who likes cool things, and value for their time or money. It is not easy to provide services for this user group that would be widely accepted and used, see (Culén & Gasparini, 2012). For example, the results from an upcoming master thesis (Edvartsen, 2013) show that 45% of 244 users that participated in a survey around the use of library services, do not use the library web site at all. This lack of interest in library online services is also supported by a larger research done by JISC (Rowlands et al., 2008), where one of the findings is that today's students, being digital natives, generation Y or millennial generation, rely heavily on search engines like Google, rather than specialised, curated, library search engines providing only the material that passes quality control. The low level of awareness around the quality of information is also resulting in poor search strategies, (Rowlands et al., 2008). The most numerous user group of the university library are students. Thus, it was reasonable to try to create a context in which students can contribute to service innovation, leading to increased and better use of library services.

Three years ago, we offered students possibility to become innovators of library services, through academic instruction in interaction design, see (Moggridge, 2007; Saffer, 2010; Sharp et al., 2007) for an introduction to interaction design. This also implied innovation in teaching. Although the book "Creating Innovators" (Wagner & Compton, 2012), appeared on the market two years after we have set in practice similar ideas, it confirms that these are the ideas whose time has come. (Wagner & Compton, 2012) cite the results of GE's 2011 survey on innovation, stating that 77% of those interviewed considered that *"the greatest innovations of the 21st century will be those that have helped to address human needs more than those that had created the most profit"*, and 69% agreed that *"today, innovation is more driven by people's creativity than by high level scientific research."* The logical question that authors then pose is: can innovation skills be learned? The authors state: *"The DNA of innovators might be considered a set of skills that are essential elements in design thinking"*. Design thinking, see (Brown, 2008), is changing the innovation scene, but also education within some fields that are not traditional design fields, see (Culén et al., 2013). Thus, through the context of the course, using creativity and design thinking, students were enabled to take the lead in designing new or re-designing existing library services.

The main concern of this paper is thus discussion of how to involve students in innovation and service design (Polaine et al., 2013) processes within the university library. The idea is simple: allow human-computer interaction design students to take a lead in innovating student-oriented services at the library. We will describe our methodology, the context for innovation situated in a physical location as a living lab. Further, we will present some examples of students work throughout the innovation process, from ideation, to implementation. The stage set out for this work is truly multidisciplinary and involves fields of innovation, interaction design, education, library science and service design.

The paper is structured as follows: Chapter 2 presents the Living Lab as a concept used to raise awareness of innovation processes within the library. Chapter 3 gives an overview of the work done during the last three years while chapter 4 discusses in depth one specific project. Chapter 5 present findings so far, and chapter 6 discussion, followed by the conclusion in Chapter 7.

2. LIVING LAB AS FRAMEWORK FOR RESEARCH

We consider a Wikipedia definition of a living lab ("Living lab - Wikipedia, the free encyclopedia," 2013) to be a good definition, even though our scope is a bit narrower: *"A living lab is a user-centred, open-innovation ecosystem,^{[1][2]} often operating in a territorial context (e.g. city,*

agglomeration, region), integrating concurrent research and innovation processes within a public-private-people partnership.” The citations in the definition relate to highly relevant work of von Hippel, Chesbrough and Bilgram et al. (Bilgram, et al., 2008; Chesbrough, 2003; von Hippel, 1986). We have used the Living Lab as a research concept and as a framework within which we could contextualize, study and understand the effects of the design of student lead innovative processes within the library. The Living Lab as a concept implies building of awareness among stakeholders around activities related to innovation. It also implies a specific context where the action happens and evolves through time (Schumacher & Feurstein, 2007). This sensibility can be used to validate and refine solutions in multiple, and similar context, but requires a very high level of observation and participation to enact new activities (see Figure 1). The Living Lab has been widely used as a research framework during the last years, even though it is quite new. Other researchers have used this framework to conduct analysis of online community activities and grasp how innovation, cooperation and voluntarism enact when the stakeholders are developing, for instance, open source software (Brandtzæg et al., 2010; Følstad, 2008a). The Living Lab framework is also used in design and deployment of welfare technology for the elderly (Thiesen et al., 2009).

Figure 1: Participation and Context of Innovation

		Knowledge Focus	
		Single and Controlled Contexts	Multiple and Emerging Contexts
Degree of Participation	High: Observation and Creation	Traditional Lab Experimentation	Living Lab Experimentation
	Low: Observation	Traditional Empirical Social Science Research	Ethnographical Observation

Source: (Eriksson et al., 2006)

The “context” is an interesting attribute of the Living Lab framework. In the case of Living Labs, one can operate with two different notions of context (Følstad, 2008b). The first notion, the “Familiar context”, implies that the ambient is set up to support users through the concept of familiarity. For instance, the living lab for designing with elderly may contain objects that they were familiar with in their youth and use those to build their competence with something new. The second notion, the “Real-World context”, implies that the living lab is taking place in the actual situation of practice. This approach of is highly discussed, pointing out the novelty of this field (Thiesen et al., 2009) and the complexity (Markopoulos, 2001).

Regarding our research and use of the living lab, we have settled on the use of the Real-World context and given it a physical space, the university’s science library. Observations of several different layers of library practice are carried out in this setting. First, the interaction design students do surveys and interviews with diverse library users, getting feedback and data around changes in the use of the library. The second layer consists of a series of observations and interviews done by

researchers with the students participating in the interaction design course, thus collecting data on how they work. Finally, interviews, observation, focus group with librarians and library leadership are carried out by researchers, collecting data on how the innovation is perceived and what are the effects of it in the science library.

3. PRELIMINARY WORK IN THE SCIENCE LIBRARY

Three years ago the science library at the University of Oslo decided to take a deep look into its organization, operation and the meaning of technological changes on the way these operations are taking place. As one of the consequences, several small libraries were merged into one, at a new location, in March 2012. Another change that took place was a decision to adopt the user centric view and redesign or develop new services that better serve users' needs. Libraries have a long history of offering services to users. Preserving, keeping acquiring and lending books and other information material are very old, globe wide agreed upon practice. Usually free of economic interest for end users, libraries worldwide cooperate on keeping this practices a live (Matheson, 1995). Therefore, the introduction of new user centered services implies the necessity to align them to a strong, long-lasting main practice.

In order to investigate the users' needs and let users develop services that they are interested in, the leadership of the science library established cooperation with the institute of informatics, group for design of information systems. The class in interaction design was chosen in order to explore the idea of new service design with students, for students. The framework to achieve this innovative user centric idea was then established, and during the past 3 years, several student-lead projects have informed the library of the kind of services students see as valuable.

The first year of users involvement towards informing the library started in the fall of 2010. This was the year when the iPad came out and many have seen tablets as disruptive technology that will change the education. The library was interested in finding out how it would be for students to have an entire curriculum on the iPad; is it really a game changer (Culén & Gasparini, 2011b)? They also wanted to establish a new practice around the acquisition and distribution of documents on this new platform. The role of interaction design students was to observe how a graduate level class in geoscience, equipped with iPads, and an undergraduate class in economy, equipped with an e-book reader Boox, used these devices and reading materials on them (Culén et al., 2011). The period when the project started was quite uneasy for the library since the e-book reader and the iPad represented two disruptive technologies, which could cause major changes in how the library works in the future (Culén & Gasparini, 2011a). Those technologies opened also for other possibilities, for instance an eco-friendly aspect of using these devices was the possibility to reduce the prints-out of diverse materials, including research articles, power point presentations for courses etc. The interaction design students found these side effects of the use of tablets interesting.

The second year, in the fall of 2011, before the new science library building was completed, interaction students were challenged to investigate ways of organizing new services for the library. There student projects were defined, and the central tension was around whether one should use the old way of organising services in one large web-based portal, or are some things much better done using mobile phone applications. For two of the project groups, the main idea was to mirror the services offered on the web site of the library, arguing that familiarity would aid adoption. The third group used a different strategy, making a prototype of an app that would be very useful in situ, at the

new library. The services included “book a librarian”, “book a study-room” or “see the map of the library”. See (Student Projects, 2011) for all three projects.

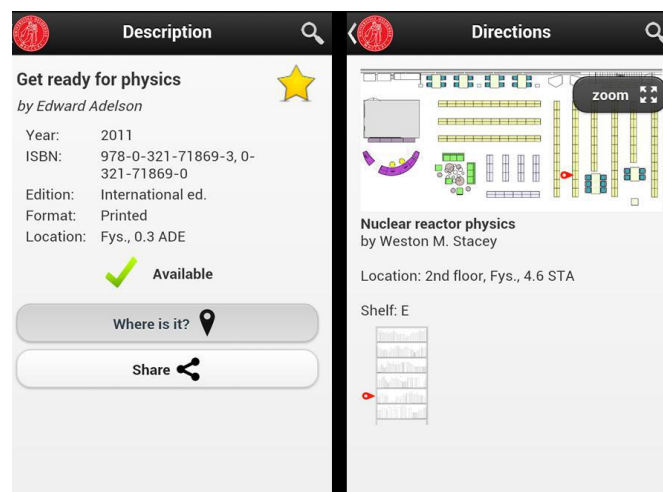
The third year, in the fall of 2012, the library had opened its doors at a new location and helped provide a better context for students work. The library started a more formal project “User Driven Innovation” (BDI, 2012), and also sought external funding to support the students efforts. What happened in this period regarding innovation is the focus of the next section.

4. THE CASE STUDY

In the third cycle of cooperation between the library and the department of informatics in the fall of 2012, the organized support to facilitate students work increased substantially. Three library staff members had weekly meeting with students, again organized in three project groups, and the instructor for the interaction design course. In addition, the library organized a daylong meeting with a professional user-experience consultancy company (Netlife Research, Oslo), where students presented projects and get feedback. The library staff helped project groups with programming competence, library management system interface issues, as well as with simpler contextual help such as booking rooms for focus group or interviews, and some financial aid for gifts to the respondents. The projects, in turn, were really exciting. The results were, naturally, not fully developed systems or applications, but the way towards completion was clearly charted. An app that one of the project groups worked with is released and available at AppStore and Google Play, while the second application is ready for implementation.

The interest with these projects was not only in novelty of ideas for services or implementation of those. It was also methodological. Two of the project groups have used Participatory Design approach (Sharp et al., 2007) as their design strategy, where selected users are participating in the entire design effort. The last project used user-centred Design (Sharp et al., 2007) where needs and interests of users are always in focus. The methods and techniques employed with all stakeholders were based on interviews, questionnaires, focus groups and workshops. The design was also supported by observation and user based testing. The three project groups have managed to engage diverse groups of participants, with diverse skills that were well used during the design process.

Figure 2: App for book search and possibility to scan ISBN barcode.



Source: (Reistad et al., 2012)

The first project, “Bookworms”, developed a smartphone app, which helps users to find physical books on the shelves in the science library. If the book is also available in electronic edition, the user has an opportunity to choose this option. The students said that they were motivated to work on this project because the library was a place they often used, and they were excited about possibility to innovate “... *since the library has essentially been the same for many years, without much innovation.*” (Reistad et al., 2012) The students also point out that the library staff was positive and interested to help, and their involvement in the project was very crucial for their choice of project (Reistad et al., 2012).

The second project, the “BibApp”, was related to the access to the knowledge resources of the library, from student’s perspective. The smartphone app they designed checks their curriculum and tells them which books and articles the library has. The BibApp also enables a user to discuss and comment on the resources. The students stated that the motivation for this project was the following: “*The background for this project was to help the University of Oslo Library adapt to the society and the student’s demand...*” (Arnesen et al., 2012).

The last project, “Minesweeper”, focused on a task that combined value-based design democratizing the existing room booking system, with social aspect based in wide spread use of social media. The booking system was to work in situ, one could at glance get overview of rooms in use. For those that were in use, but had some empty seats, the users using the room could post the topic discussed and number of available seats on a feed shown on a large screen by the entrance to the library. Tweets were enabled as well, possibly attracting friends from the same class to come. For the project group the motivation was to “...*increase the library’s appeal.*” (Sætre et al., 2012)

5. FIRST RESULTS AND EFFECTS

One of the first effects of the User Driven project was a seminar at the end of the 2012, where students presented the projects for interested guest from the University, the University library and other libraries in the country. The interest was overwhelming, and the conference room was more than full. At the end of presentations a vivid discussion started about the need of the library to make changes and let the users participate in the innovation processes.

The results presented by the involved students, contributed to making the library leadership to commit to give economic support to a new larger research project to monitor and understand the results from these student-lead innovation projects, and finally to continue working with students. The aim of the larger research project, which started in February 2013, is to monitor and understand the effects of these efforts on the library. The first results from the data-gathering through interviews with leadership show that the leaders of the library are willing to fail with some of the student projects. They are also willing to learn from them. Further they state that some of the innovative results do not need to last. If a service is obsolete, or users point out a need for change, closing down such a project would not be seen as a failure. Faster changes would be enabled.

For the science library, the awareness around users needs that students’ projects have raised is relevant. With interviews, focus groups and surveys, the students have gained a new understanding of how the library services work at present, and the possibility to influence and participate in the future of the library. The science library, by committing to student lead innovation projects, also

committed itself to close cooperation with the institute for informatics, which in itself opens new possibilities for multidisciplinary cooperation.

Analysis of the project reports from 2010, 2011 and 2012 shows that the results were the strongest in 2012, both in terms of how innovative ideas were and how close to being finished products the prototypes were. This, of course, can be in part due to the increased interest and support that the library has given, but may be also in part contributed to other factors such as overall increased interest in service design as a field.

6. DISCUSSION

In Section 4, some of the motivation factors for projects were presented. The first results obtained from the interview analysis with involved students show that proper motivation was important for our innovators/users. This is also in accordance with the large body of literature on motivation to innovate. For example, research on what motivates workers in a high technology company like Apple, states that one factor is a very high focus on specific goals, and as another example states that company often keeps hidden some disturbing elements, such as bad economy, from their employees (Lashinsky, 2013). Describing a young innovator, Wagner states that: “... *people worked incredibly hard, not because of any compensation package, but because they believed in what they were doing.*” (Wagner & Compton, 2012). Analysing motivation factors of interaction design students, we find that the fact that they are designing better solutions for themselves and for future generation of students who would have seemilar needs, also had a large impact. On being given the support and encuragment to innovate, as one of the groups stated in Section 4, was an important motivation factor. In the literature, see (Hoholm & Araujo, 2011; Stevenson & Jarillo, 1990), support as motivating factor is discussed, pointing out that this also affects the innovators. In our case, the students have not shown inclination to be drastically innovative. Rather, they were trying to improve the existing services and making them easier to use. This may be the consequence of the support given and a desire to design a service that would also be valued by the library. This topic will be taken further and explored in interviews with this year’s students participating in the project.

By observing students at work, we could get a close look at how they thought about innovation. We noticed that they are focused on practical issues of their student life in the library such as easy access to syllabus or a simple search interface into the library resources. Usefulness and functionality are more important to them than, for example, to make the library into a cool place to be. The course in interaction design did not mandate the focus on design of services; students could have chosen many other approaches, e.g. tangible interactions. In a different study, we have found out that the “cool” factor was important for the typical student age group (18 – 25) (Culén & Gasparini, 2012). The “cool” factor includes fun interactions with technology, joy in the process and it stimulates cool behaviors. However, no student projects so far have tried to use the “cool” technology and make it be part of some library service.

Some researchers argue that the library is an institution that often tries to be innovative, see for example (von Hippel, 2005). Von Hippel points out the need for the library to develop services and systems that reach their intended user groups. In order to do so, von Hippel claims that they have to use the latest technology. The User Driven project supports this approach well.

The experience the library and the leadership had with this last iteration with innovation projects from 2012, was much like that of supporting a start up company. Supporting the interaction students

in their work also has the effect that, with each new generation of students, the library learns about how students use new technology. This in turn supports and inspires the development of new practices and services built on the latest technology in the library. From the researchers point of view, this is a framework offering good conditions for research, since some attributes are constant, and some are changing, but the change can be observed within the context of the Living Lab. This, according to (Winthereik et al., 2009) is precisely when living labs work the best.

When we revisit the discussion from the introduction around the necessity of innovation in the library, see also (Olaisen et al., 1995), our conclusion is that there really is not other alternative for the libraries but to innovate. Been passive in responding to users demands may cause the library to become obsolete, and at the end, only a museum containing old and almost valuable books.

7. CONCLUSION

The student innovators have been quite careful, nearly conservative, in choosing what and how to innovate library services. They have, though, accomplished several positive results, resulting in positive input to the research related to this project.

Making students and library employees aware of the possibility to innovate, has changed the way both students and the library look at existing services and identified opportunities for future development. The empowerment of the library users, by let them innovate for the users is quite complex, so the effect it has on the services will be interesting to monitor in future cycles of the project. Using the Living Lab as a framework will gives us the possibility to monitor what enact the users, and gives the library the possibility to prepare and support future cycles of innovation.

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