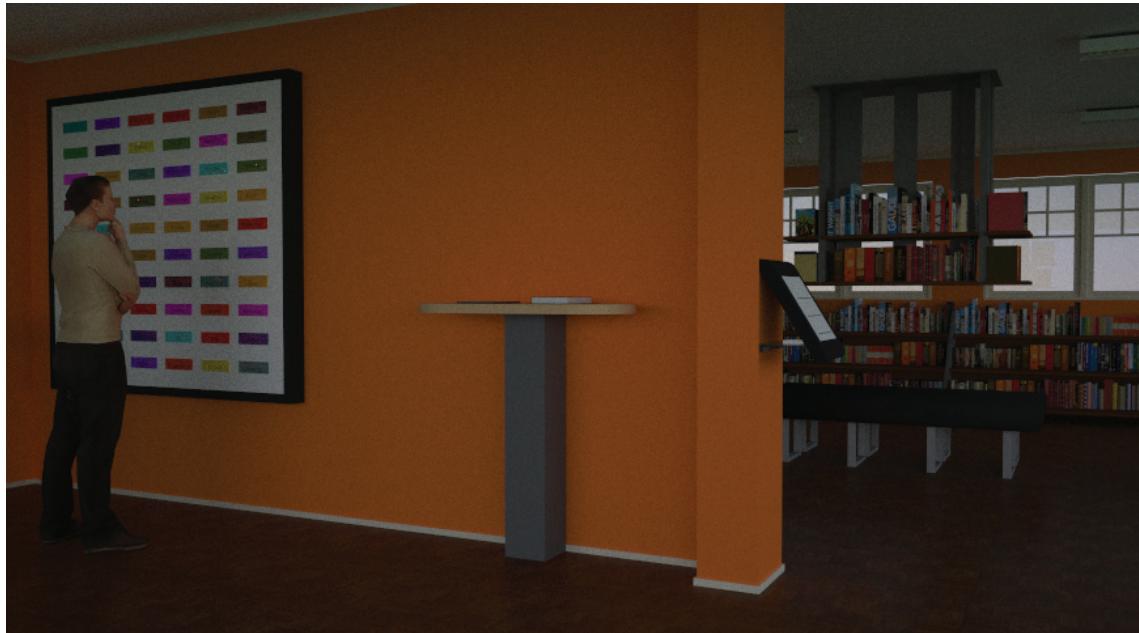


# CHALMERS



Conceptualizing interactive installations to enrich  
the experience of public library users

*Master of Science Thesis in Interaction Design and Technologies*

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Department of Applied Information Technology  
CHALMERS UNIVERSITY OF TECHNOLOGY  
Gothenburg, Sweden, 2013  
Report No. 2013:142



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Cover:

Rendered image showing an example arrangement of the developed concept for the installation. See page 59.

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# Abstract

The role of public libraries in society is evolving due to the continuous development of new technologies that support the dissemination of knowledge; however, this does not mean that libraries are disappearing. In order to keep providing access to knowledge, among other things, libraries must embrace and integrate both physical and digital space in their identity and in the way users perceive them.

The purpose of this Master Thesis has been to explore the opportunities for integration of physical and digital spaces through the design of interactive installations for public libraries. Specifically, the project consisted in the design of a concept for an interactive installation for Hisingen's Library in Gothenburg using co-design workshops and other activities for user involvement. In addition to the aforementioned design, a series of recommendations for concept design and methods for the design of interactive interventions in libraries has been compiled in order to inform further work in the topic.

The concept that was developed served as an example of future possibilities for public libraries in which user participation and integration of physical and digital services improve the way people search and experience content.

Keywords: public libraries, interactive installations, participatory design.

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# 1 . Introduction

## Background

Three decades ago libraries did not house any computational devices; their value was in the printed resources they acquired. Today, they are in a stage of transition as the use of digital means to disseminate information rises and printed words become outdated faster than ever before. It is possible that, in the future, libraries will reach a paper-less stage but that does not mean that the physical library will cease to exist, as it holds important social value.

For several years, libraries have been adopting new technologies to help them catalogue their resources and offer access to new types of information, all while acting as important promoters of computer literacy. At the same time, due to the increasing availability of web resources and the perception that these resources are equally available to all sectors of society, general opinion has declared the public library a dead institution. This extreme declaration, however, seems to be far from the truth, as exemplified by initiatives such as the Ideas Stores in London (Tower Hamlets Borough Council, 2009), Urban Mediaspace in Aarhus (Aarhus Municipality, n.d.) and the new main library in Oslo (Mithassel, 2011), which place public libraries as important drivers for urban development.

Public libraries are complex institutions that have the critical mission of serving very different sections of the population. The key to their value is in providing equal access to everyone, regardless of their circumstances. To their core they are aimed at providing access to information and cultural growth, through resources and services. The quality and the reach of the knowledge they provide is more important than its format. Furthermore, they function as meeting places and as extensions of homes and offices for many members of the communities they serve. It is easy to see that the role of public libraries cannot be

filled merely by digital resources provided through a web browser.

At any rate, the current state of affairs is unprecedented. It is impossible to predict what will happen to public libraries in the next years. Creating innovative means to provide and promote access to knowledge and technology is a way in which libraries can assert their value in society. Interaction Design can help renovate the image of the library by creating new ways for people to experience content and to contribute with ideas of their own.

## Aim and research questions

In today's landscape, both the digital and the physical space are part of the identity of the library, even if they are often disjointed. Many public libraries struggle to inform their users about the availability of digital content, such as databases and ebooks, since these elements are difficult to integrate in the general understanding of what a library is. The exploration for this project is aimed at unifying both spaces in order to provide a rich library experience for the users.

The following **research question** has been formulated to drive this project:

**How can interactive installations enrich the experience of public library users by bringing together the physical and the digital space?**

The project has two dimensions: one relates to the impact of the end result and the other one relates to the process and methods, as well as how they can be used in the context of libraries. The results are summarized in recommendations for strategy and concept design and recommendations for tools and methodologies that could be used.

## Scope and limitations

The objectives of this project are informed by a previous project: 'Design opportunities for academic libraries' (Cuello & Raats, 2013), which explored different ways in which digital technologies can be used to expand the services and experiences offered by academic libraries, using the library at Chalmers University as the main object of the study. This exploration is important for libraries in general given that they are fighting to stay relevant in a world in which information is more widely available than ever. Libraries offer vast amounts of digital information to their users but often fail to create a connection between the digital and the physical resources. Introducing new ways of experiencing these resources could help libraries reach further into the communities they are serving.

Hisingen's Public Library (Hisingens resursbibliotek), located in Lundby, part of the municipality of Gothenburg, was chosen for this intervention because they have future plans for relocating and renovating their image. It is possible that in the following years they will move to a new library building, which creates the opportunity of involving innovative ideas from the beginning. The results from this project will potentially inform future decisions for the design of the new library.

This project aims to look into opportunities that add value to the library on top of providing access to resources and sitting space. Scope is a critical limitation for this project given that libraries are complex institutions that also host a wide array of activities, like language meets, talks with authors, etc. However, that aspect of the library will not be fully

addressed in this project as its focus is on enriching everyday use. Since public libraries cover so many functions and have a wide user base, it is extremely difficult to target all of them with one project. This thesis focuses on exploration but it also attempts to propose concrete solutions to different issues found in the library.

Furthermore, the main object of this project is to explore possibilities for new library services and environments for adults. Much work has been done related to creating new experiences for children and families, such as Eriksson & Lykke-Olesen (2007) and Eriksson (2010), and designing better online services, e. g. Zhang et. al. (2008). However, it is my understanding that the attitude towards literacy among adults is, for the most part, left to their own devices and seldom encouraged or challenged. By selecting adults as a main target for this intervention, the intention is not to diminish the importance of encouraging curiosity, through reading and other activities, for the education of young minds. However, supporting curiosity and creativity in adults is important as well. The mere existence of libraries and other cultural institutions with materials ready to be consumed is not enough. They need to be proactive and show people the possibilities of what they have to offer.

The public for the solutions created during this project and the public for this report are not the same. As it was said above, the concepts generated during the design process are aimed towards adult users in the library, which still implies a wide diversity of users. On the other hand, the public for the report is both design professionals and library professionals in general and, specifically, the staff at Hisingen's library and Lundby District Administration involved in future plans for the library.

Since the resulting design is specific to the context and conditions of Hisingen's library, the intention of this intervention is not to propose a one-size-fits-all solution for all libraries. This project is meant to be taken as an example of how the process can be applied to other libraries while taking in consideration their unique traits.

## Structure overview

The exploration of this issue is by no means new and further information and related work is presented in the 'Background and Theory' section of this report. Several authors, including Besser (1998), Lougee (2002), and Campbell (2006) have voiced their concerns about the future roles of libraries in education, research and everyday life. However, if there is something to learn from the existing literature and examples is that libraries, though some more than others, have been successful in adapting to the challenges brought on by digital technologies. For example, as early as 1994, Richmond Public Library in B.C., Canada developed a strategy to reposition themselves. This strategy included offering internet training and education, launching a newspaper column about the benefits and relevance of the Internet and creating a website that met customer's needs rather than the organization's needs (Mcneely, 1999). On the other hand, they also act as a reminder that libraries must continue to evolve.

Analyzing the problems that libraries face in the digital age and proposing methods to integrate the digital and the physical dimensions of the library are important elements of this project. After studying the context and the stakeholders, several concepts for interactive installations will be presented with the intention of arriving to developed

solutions that could be implemented in the library. Further discussion about methods and work process can be found in the sections 'Methodology and planning' and 'Design process'.

The definition of the project has been evolving along the way, as a better understanding of the possibilities and needs of the users in Hisingen's Library is being reached with every step. The section 'Design process' narrates the evolution of the project from the beginning, since understanding the decisions that have been made and why is essential to understand the final results. The project was divided in three main stages: The first stage dealt with the exploration of the context, both through literature and through interviews and field studies in Hisingen's Library; the second stage focused on generating various concepts based on the findings of the previous exploration; and finally, the third stage consisted in defining and evaluating one concept and assessing the viability and potential of its implementation.

Recommendations on how libraries can apply interaction design methods to enhance the experience of their users are presented in the "Results" section. Finally, the 'Discussion' and 'Conclusion' sections reflect on the results of the project in terms of the developed concept and the methodologies used.

# 2. Background and theory

## Context: Public libraries

Libraries have existed in different forms for almost as long as the written language. In this context, the public library as we understand it today is a relatively new development. In 'The Story of Libraries', Lerner (2009) recounts how the public library came to be. It evolved from the subscription library, which served the upper -middle class, and became an institution dedicated to raise the education levels of the lower classes of society, as well as a key tool to socialize immigrants in the new urban industrial society.

Public libraries, to their core, are aimed at providing everyone in the community access to cultural growth, in the shape of information, be it books, films, online databases, etc., or services, like computer courses, lectures, book readings, among others. Furthermore, public libraries serve as important meeting places for people, as well as places for personal use. Public libraries are complex institutions and are becoming ever more complex due to the developments brought on by information technologies.

Aabø, Audunson & Vårheim (2010) and Aabø & Audunson (2012) present an interesting overview of the role of public libraries as meeting places and their capacity to allow users to move between the private and public spheres. This flexibility gives users the possibility of fulfilling a wide array of instrumental needs, for instance consulting didactic material, checking e-mail and printing, while also opening people up to sharing with others, being exposed to different kinds of people and participating in activities with friends and strangers. Moreover, libraries are trusted institutions, which puts them in a position where they can greatly influence people's lives. Data from 2008 shows that, in Sweden, libraries are trusted by more people than any other institution in society (Swedish Library

Association, 2010). Furthermore, Swedes are more content with libraries than with other municipal services.

Being aware of the potential impact of public libraries in society, it is not a surprise that new library buildings constitute massive architectural endeavors. However, it is clear that public libraries are more than just buildings and require the contribution of many different disciplines. It seems that more than a new building, what modern libraries have set out to create is a new identity. In fact, many modern libraries try to distance themselves from the traditional perception of what a library is by adopting new names, such as Urban Mediaspace in Aarhus, Denmark (Aarhus Municipality, n.d.), the Idea Stores in London, UK (Tower Hamlets Borough Council, 2009) and the Discovery Centres in Hampshire, UK (Hampshire County Council, 2012). That said, this trend in library naming is probably the result of a search for a more meaningful description rather than pure re-branding, given that, even when the identity of the library surpasses the etymology of the word, its origin does refer to a 'collection of books' or a 'place for books' (Online Etymology Dictionary, n.d.).

A report authored by Ken Worpole and released by the organization Building Futures (2004) argues about the factors driving this change in the way we define libraries and library services. The rapid advancement of technology is one notable and often discussed reason, but it is not the only one. Other factors, such as the increase of people's interest in environmental sustainability and the increase of one-person households that leads to a search for new places for social interaction, are also significant in transforming the mission of public libraries.

For centuries, books were at the center of the library's mission; not so much now, as users are taking the stage as main protagonists. The concept of participatory library advocates for a model that fosters user participation in the library's every day operations. This participation is made possible through online services such as social media and through activities and services in the physical space (Nguyen et. al., 2012). This model facilitates continuous improvement in library services and provides valuable contributions that inform future library design. In order to build a library that really serves the needs of a community, it must be designed with user participation, for user participation.

Initiatives such as the Urban Mediaspace Aarhus and the new Oslo Public Library have followed the participatory path in order to create a meaningful place. For instance, the design team for the Oslo Public library has explored possible services along with the stakeholders using activities that encourage them to share their ideas (Mithassel, 2011). In the case of Urban Mediaspace Aarhus, community involvement has been part of their core strategy from the beginning, with activities being performed since the project started in 2001 (Eriksson, 2013).

A different approach to library design is exemplified by the Texas BiblioTech, defined as a bookless library and set to open its doors in fall 2013 (Halverson, 2013). It will be comprised of computers and ebook readers available to loan. The concept has been built around the idea of lending ebooks, instead of physical books, but it has been presented as an enhancement to the traditional library system, not a replacement. It must be mentioned that this initiative has been received with a mix of excitement and skepticism, given the delicate relationship between public libraries and ebook publishers.

The demand to provide access to ebook downloads is a pressing issue faced by libraries today. One of the most critical challenges has to do with coupling people's expectations of what should be made available in the library, and indeed the library's own desires to make it available, with the artificial limitations posed by publishing houses. Documents published by the IFLA and Civic Agenda (2012) shed light on the legal constraints when accessing digital material, specifically concerning lending of trade books. They also highlight the difference between the relationship academic libraries have with digital resources and the publishers of these resources and the one public libraries have, which is more fragile and uncertain.

When we talk about scholarly publications, which are a large portion of the catalogue in academic digital libraries, digital distribution through libraries is currently the norm (Solomon, 2013). Independent customers seldom decide they want to purchase access to academic journals. Furthermore, MyLibrary and Ebrary, two of the platforms for eLending that have more accessible and user-friendly systems, specialize in academic content which means they cater to academic libraries rather than general public (Civic Agenda, 2012).

Providing eLending services to their patrons is far more difficult for public libraries because of the nature of the content they provide. For public libraries, providing access to popular trade titles is important. Unfortunately, the ebook market is still fairly new, which means copyright laws and publishers interests are a big obstacle for public libraries that want to provide digital access to those titles (IFLA, 2012). As this landscape suggests, the situation of electronic resources in public libraries is neither mature nor clear. This limits the options of what could be done with the digital material in terms of displaying and distributing it. Until eLending becomes consistently accessible, libraries cannot realistically consider basing their structure around them.

## Related work: Interactive installations

Interaction Design is defined by Preece et. al. (2002) as "designing interactive products to support people in their everyday and working lives. In particular, it is about creating user experiences that enhance and extend the way people work, communicate and interact." In the context of libraries, Interaction Design has the potential of extending traditional library services in a way that takes in consideration what users want from them and allows people to use them without viewing newly introduced digital elements as obstacles.

More specifically for this project, the main concept that needs to be defined is what an interactive installation is. There is no specific literature defining interactive installation, even though the outcome of several projects is defined as such. For this project, I have examined examples related to museums, interactive furniture and interventions in public spaces, sometimes more closely related to art than to interaction design, looking for the elements that define an interactive installation. Three apparent characteristics stand out:

- **Scale and mobility:** The size comparison between the artifact and the user's body as well as how much the user is allowed to move the artifact from its original location seem to be central traits when qualifying something as an installation. Take, for instance, StorySurfer and BipPhone (Eriksson, 2013), two projects with similar objectives. StorySurfer is defined as an installation as it allows full body interaction and it is not possible for users to move it to a different location. Conversely, BipPhone is defined as

a device because users are able to hold it with their arms and move it around.

- Conversation: Interactive installations facilitate conversations, directly or indirectly. In the book *Digital Ground*, Malcolm MacCullough (2005) talks about interaction as “exchange of messages”. In that sense, we can say that something is interactive only if there is a ‘conversation’ going on between the artifact and the participants or communication between two or more participants is being mediated.
- Combination of physical and digital elements: This is well illustrated by museum installations. The main purpose of museum exhibits is to teach about a specific subject, which can be done with or without using digital information. However, by using digital information, designers are able to incorporate a digital layer in the physical space and accomplish experiences difficult to replicate through physical means. In Campos et. al. (2009), for example, a set of interactive installations was used to complement the content of an exhibition mainly comprised of printed panels. Elements such as timelines are perhaps better presented in an interactive format that allows users to explore, rather than observe.

In the context of this project, two areas of study that I consider part of Interaction Design serve as sources for inspiration: interactive architecture and tangible interaction. Interactive architecture relates to the creation of responsive environments, relying heavily on the use of sensors to create spaces that adapt according to user input and behavior (Croci, 2010). The approach of interactive architecture is to create private and public environments that are capable of transforming, modifying the dynamics of how people relate with the space and with each other by changing the traditionally mostly static nature of architecture – excluding adaptability through mechanical means (Fox & Kemp, 2009).

Among the most notable examples of interactive installations within architecture we find media facades, which consist of large scale intervention that transform public places into huge canvases for expression and participation. SMSlingshot (Fischer, Zöllner, Hoffmann et. al., 2013), for example, is a media facade intervention consisting of several keypad devices in the shape of slingshots and a common public projection. The slingshots are passed around to the users who can type messages and ‘throw’ them at the facade. What is interesting about this facade is how the designers decided to depart from the use of mobile phones for the creation of the messages. With the slingshot devices, the interaction is novel and playful but also straightforward.

The use of alternative physical means for input, as in the case of the previous example, and output is also of great interest in the field of tangible interaction. Tangible interaction emphasizes physical representations of data, whole-body interactions and interfaces that support the context in which they act (Hornecker, 2009). The tangible interaction approach supports two important goals for this project: generating ideas that transcend the use of screens to convey digital information by integrating it on the physical space and finding physical means to manipulate digital information that blend with the context of the library in ways that are more meaningful than those of conventional input devices.

In the context of design for public libraries, projects such as StorySurfer and BibPhone constitute notable examples of how the resources present in the library can be integrated with technology in order to create new ways of experiencing them. StorySurfer consists of an installation that allows children to explore the collection of books in the library

using their bodies and BibPhone is a device that allows children to annotate the books in the library using audio recordings. Even though the results are quite different, the core objectives of these interventions were the same: to use information technology as a material in the library space and to define new user interactions. This shows how playing with different aspect, such as scale and number of users can create a diversity of interesting possibilities for interaction in libraries.

Moving away from the library space, projects such as Listen Reader (Back et. al., 2001) and People in books (Follmer et. al., 2012), are relevant since they were aimed at redefining people's relationships with books, a key element of the traditional library. Listen Reader is an augmented paper-based book in which the reading experience is enhanced using ambient sounds that adapt to the moods and scenes of the story. The project explores different senses that could be used for storytelling through books. A downside is that it provides little opportunities for input from the users. People in books, on the other hand, is a system aimed at supporting families reading stories while in different locations, by allowing them to act as characters in children's storybooks. In this case, the immersive environment created for the book serves as a communication device for the family, instead of a holder for information.

In the field of museum installations, a collaboration between the Museum of Modern Art in New York and the MIT Media Lab concluded with an interactive installation for the Un-Private House exhibition, a showcase of architectural projects. It was designed so as to enhance the physical objects with electronic information about the projects and consisted of two parts: an interactive welcome mat and an interactive table that was activated using coasters as physical icons (Omojola et. al., 2000). The objective of intertwining physical and digital elements in one room is the most notable aspect here. The information displayed in the interactive table was complementary to the projects being exhibited rather than aimed at standing on its own.

# 3. Methodology and planning

## Project structure

The work during the project was structured in three stages: 1) Exploring the context, 2) Ideation and evaluation of alternatives and 3) Designing the installation. This division was made to differentiate the scope. The first stage deals with activities that provide background for the design, the second stage is about exploring different alternatives and the third stage focuses specifically on one concept and how it could impact the library space.

### **First stage: Exploring the context**

This stage was marked by activities aimed at getting to know the library: physical space, digital space, services and users. At this point, the objective was to find out what the library's relationship with the different technologies is and what the needs that can be served through them are. This was done mostly through ethnographic methods, specifically interviews and observation. However, results from the workshops that were done in the following stages helped expand the findings from this stage.

At the same time, a heavy exploration of related literature was done. Of course, literature was studied during the entire project; however, most of the main sources were reviewed at this stage. This includes theory related to library history and characteristics, interactive installations, interactive architecture and tangible interaction, among others.

### **Second stage: Ideation and evaluation of alternatives**

During the second stage, the focus was on the generation of concepts that could be evaluated along with the library staff. This was done by using several idea generation methods and using a co-design workshop with the library staff in order to evaluate and

expand the concepts. The purpose was to narrow down the possibilities to one concept that could successfully allow the user to experience the digital space of the library by integrating it in the physical space.

### **Third stage: Designing the installation**

This stage focused on a concept, refined with collaboration from the library staff and visitors. A concept selected from the previous stage was further expanded with the library staff during a workshop. Afterwards, a clear visualization and explanation of the concepts was consolidated. The main conclusions from the project were drawn in this stage. With this project, it was possible to study how interactive installations could be used to enrich the library experience.

## **Methodology**

As a basis for its methodology, this project is assuming that user involvement is both beneficial and necessary for the development of new library experiences. The users in this case are both library staff and library visitors. During the project, they have been involved by means of observation, as workshop participants and by providing feedback to the proposed concept.

During the different stages of the project, my role as designer and researcher has changed. In the initial stage, I acted as an observer, without interfering with people's activities, especially during the observation studies. On the other hand, in order to learn about their motivation, some inquiry was needed, which took me out of the role of a passive observer to an active one. Later, during the ideation stage and the development of the concept, my role changed as I expected to actively modify the library space.

For data collection, two methods have been used: interviews and observation. One initial interview with Katrin Ryrfeldt, director of Hisingen's library, was conducted in order to elicit basic information about how the library operates and what they perceive as their needs and issues. The interview was conducted as a dialog, with a rough outline of the topics to be covered, i.e. it was a semi-structured interview with open ended questions, in order to give room for interesting remarks to arise. The interview was accompanied by a tour of the library during which it was possible to ask specific questions about the space and the users. Further contact with the library staff was done through workshops and during the observations.

The interview had two main outcomes: a series of observations about the library that will be summarized on the following section and a list of topics that needed to be investigated further in order to understand key elements of how the library operates and why.

The observation study was aimed at both the physical space and the users. The structure of the study was based in Aabø & Andunson (2012), Aabø et. al. (2010) and Given & Leckie (2003). These works contain useful guidelines on how to execute observations on library environments.

The observation was comprised of ten hours divided in three days in different areas of the library during morning and afternoon hours, along with photographic documentation. The compiled information was qualitative rather than quantitative, as it was not as important

to compile numbers of how many people attend the library as it was to know what they are doing and how. The following items were inquired about during the observation: Physical distribution of elements in the library and activities performed by the visitors and for how long.

In addition, an analysis of the digital resources of the library was conducted. This exploration of the digital space of the library was very useful to understand the levels in which they communicate with their users outside of the library's physical location.

During the second and third stages, two workshops were conducted with the explicit objective of involving the library staff in the design process. The workshops give a combined outcome of further knowledge about the context, idea generation and evaluation of alternatives.

To structure the workshops, the framework provided in Sanders et. al. (2010) was used in order to clearly define its objectives and the materials that would be used. Toolkits for both workshops were carefully coupled with activities that would aid the participants in thinking critically about the alternatives being presented and coming up with new alternatives. The toolkits contained several decks of cards, inspired by Halskov & Dalsgård's (2006) Inspiration Card Workshop. This method proposed the use of technology and domain cards for idea generation during co-creation workshops.

The creativity cards used for the activities during the project summarize different elements present in the library (for example, furniture), types of media and available technologies, along with key use objectives for each stage of the project and pictorial representations of users of the library. Cards can be used in activities such as storytelling and role-playing, as well as to guide discussions, using cards as references and inspiration.

To analyze different aspects of the installation, the Four Space Model (Eriksson, 2013) was used. This model helps organize different elements of the installation according to the design spaces in which they operate. It was used mainly to analyze the design taking in consideration the existing constraints, especially those related to the technologies and resources available and the possibilities of modifying the core structure of the library's physical layout and cataloging system. Briefly, the four spaces are:

- Interactional Space, which includes the technologies used, what they can do and how they relate to the abilities of the human body;
- Social Space, where relationships between the users take place;
- Physical Space, where the artifact takes a physical form and spans everything that the users can perceive in the space around them; and
- Digital Space, where feedback from the digital system is formed and presented to the user.

# 4. Design process

The design process was constituted by three main stages, starting with the general study of the context to the development of a concept for an interactive installation for Hisingen's library. An overview of the design process can be seen in Figure 1.

## 1. Analysis: Exploring the context

Observation of physical and digital space of Hisingen's Library  
Literature review

Definition of strategy and requirements

## 2. Ideation: Generation and evaluation of alternatives

Brainstorming; generation of various concepts  
Co-design workshop 1; evaluation of concepts and enrichment of research

## 3. Refinement and evaluation: Designing the installation

Co-design workshop 2; refinement of selected concept  
Individual development of scenarios and storytelling  
Visualizations of the concept (sketches, diagrams, 3D models)  
Feedback from users at Hisingen's library

Figure 1 • Overview of the design process

# First Stage - Exploring the context

As was stated earlier, two main analysis activities were carried out during the first stage: Inquiry and analysis of the current state of Hisingen's Library and literature review. The study of the current state of the library was done using two basic methods, an interview and an observation study, along with the review of pamphlets and online resources of the library.

Hisingen's Library is located in Wieselgrensgatan 11, 417 21 Gothenburg. The findings of this stage are summarized in the following section.

## Hisingen's Library, current state

### Physical space

The current library space consists of one continuous floor. The resources are all in one large room with the exception of the young adult and medicine and health sections. It also has rooms for computer courses.

There is not much variation of environment in the library, with the notable exceptions of the children section, the magazine section and the young adult section.

The main arrangement for the library is parallel shelves, as can be seen in Figure 2. In order to break the monotony of the shelves, they place some books facing the front. The idea is that this arrangement will be more interesting than showing just the spine cover of the book.



Figure 2• Non-fiction section

There are some open sections with sofas for reading and desks for people to work, as seen in Figure 3. It was observed that people wanting to work or do quiet reading would go towards the magazine section, which is farther away from the entrance. The magazine section is very visited during the afternoons by people who stay around 20 minutes before either leaving the library or moving on to something else.



Figure 3• Workspace and reading space near the magazine section

A large portion of the library is dedicated to books in different foreign languages, see Figure 4. English is not included in this group since the general collection contains many books in English.



Figure 4• Literature in foreign languages

A section of the library contains resources for learning Swedish, see Figure 5. People borrow them but also tend to use them in the library for extended periods of time.



*Figure 5• Literature in foreign languages and didactic material in Swedish*

The room for young adult literature, shown in Figure 6, has the most differentiable arrangement, aside from the children's section. It contains books for young adults, fiction and non-fiction, and comic books.



*Figure 6• Room for young adult literature*

The room for medicine and health, Figure 7, contains resources related to health and medicine. It only has two sofas to sit and it was observe that some people go there to read, perhaps looking for a place with less people. Calm music plays during the day.



Figure 7• Room for medicine and health

There are three information desks, two in the entrance, see Figure 8, and one in the children's section. Most users go to the information desk the first time they visit, according to the staff. They go with questions regarding resources they are looking for but also, increasingly, with questions regarding how to log into the computer, wi-fi network and other technical questions.



Figure 8• Entrance: Information desk

Some visitors only use the library to pick up reservations and return them. Figure 9 shows the self check-in/out desks in the entrance. The DVDs are placed nearby. It was pointed out by the staff that many users borrow DVDs consistently towards the end of the week.



Figure 9• Entrance: Check-in/Check-out desks and reservations

A wall directly visible from the entrance is used to display recent acquisitions or books the staff thinks are interesting, see Figure 10. There is also a bulletin board. It was discussed during the interview that they would like to place a screen there to feature digital content.



Figure 10• Entrance: display of newest acquisitions

The children section, shown in Figure 11 is placed in one end of the library floor. It has lower shelves that children can reach. There is a corner for storytelling where children can sit around someone reading aloud. It also contains a sub-section with parenting magazines and books.



Figure 11• Children's section

A section of the library has computers for public use, see Figure 12. A lot of users, who presumably have no access to a computer at home, spend around 2 hours or more on a computer accessing their email and social media, playing games or doing personal work. Some users might use them to print or quickly check their email account, which takes 5 minutes or less. More computers are scattered around the library. Most are for public use and around four computers are available exclusively to search the library catalogue.



Figure 12• Computers for public use

Users have access to a copy machine and a printer, Figure 13. To use them, they must purchase credits. The staff often gets questions regarding how to do this.



Figure 13• Workspace / reading space / copy machine and printer

An information desk at the entrance of the library, shown in Figure 14, offers general information about the district, not related to the library.



Figure 14• Entrance

## Digital space

The digital space of Hisingen's library is often shared with the other libraries from the municipality of Gothenburg and managed by the City library (Stadsbiblioteket). This makes influencing this space a complicated endeavour. This digital space also includes mobile sites and social media.

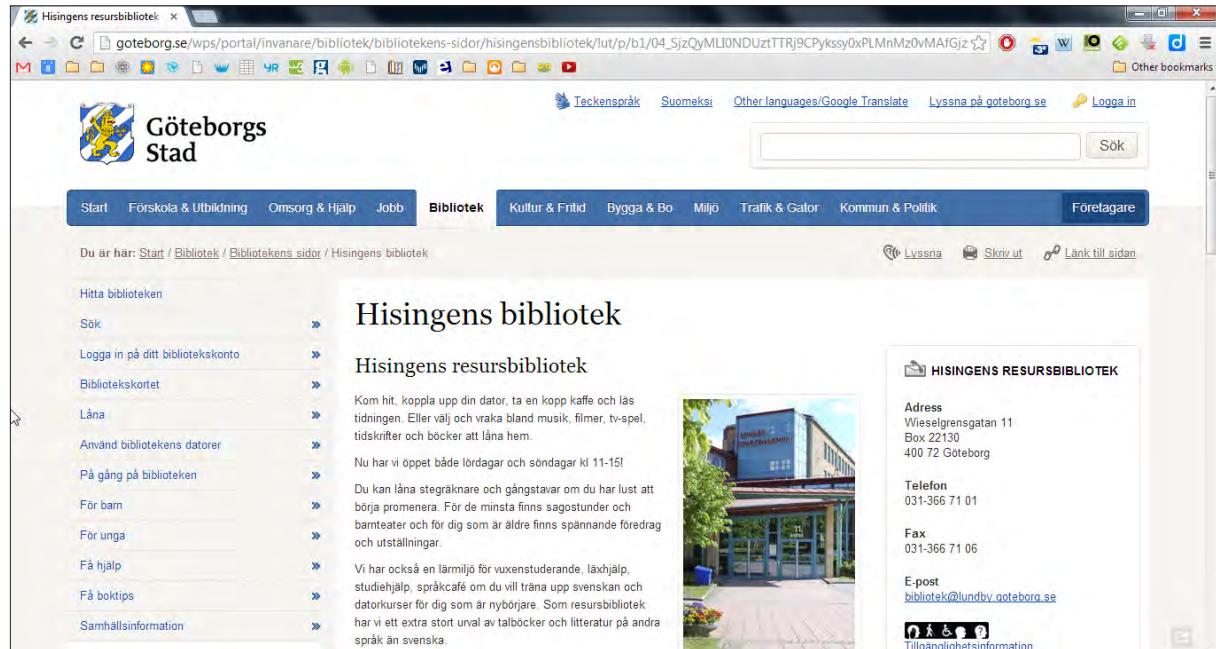


Figure 15• Official website for the library (<http://goteborg.se/wps/portal/invanare/bibliotek/bibliotekens-sidor/hisingensbibliotek/>)

The official website for the library, shown in Figure 15, offers general information about the library, including address, contact information and opening hours. Profiles like this one exist for every library in the city.

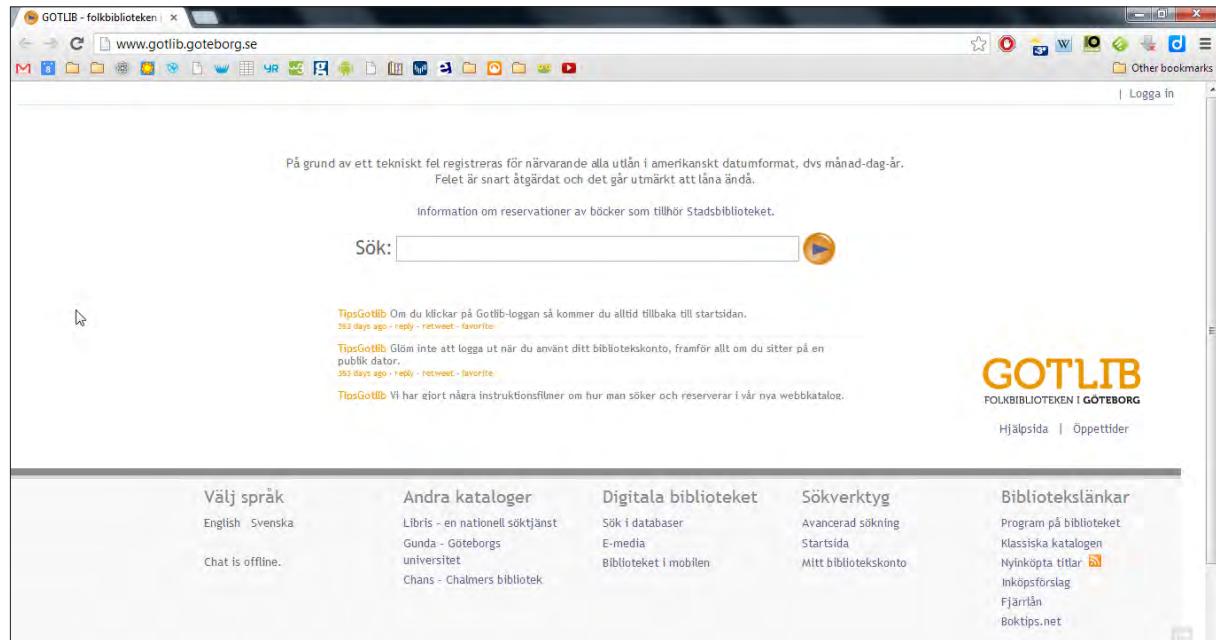


Figure 16• Central catalog search page and account (<https://www.gotlib.goteborg.se/>)

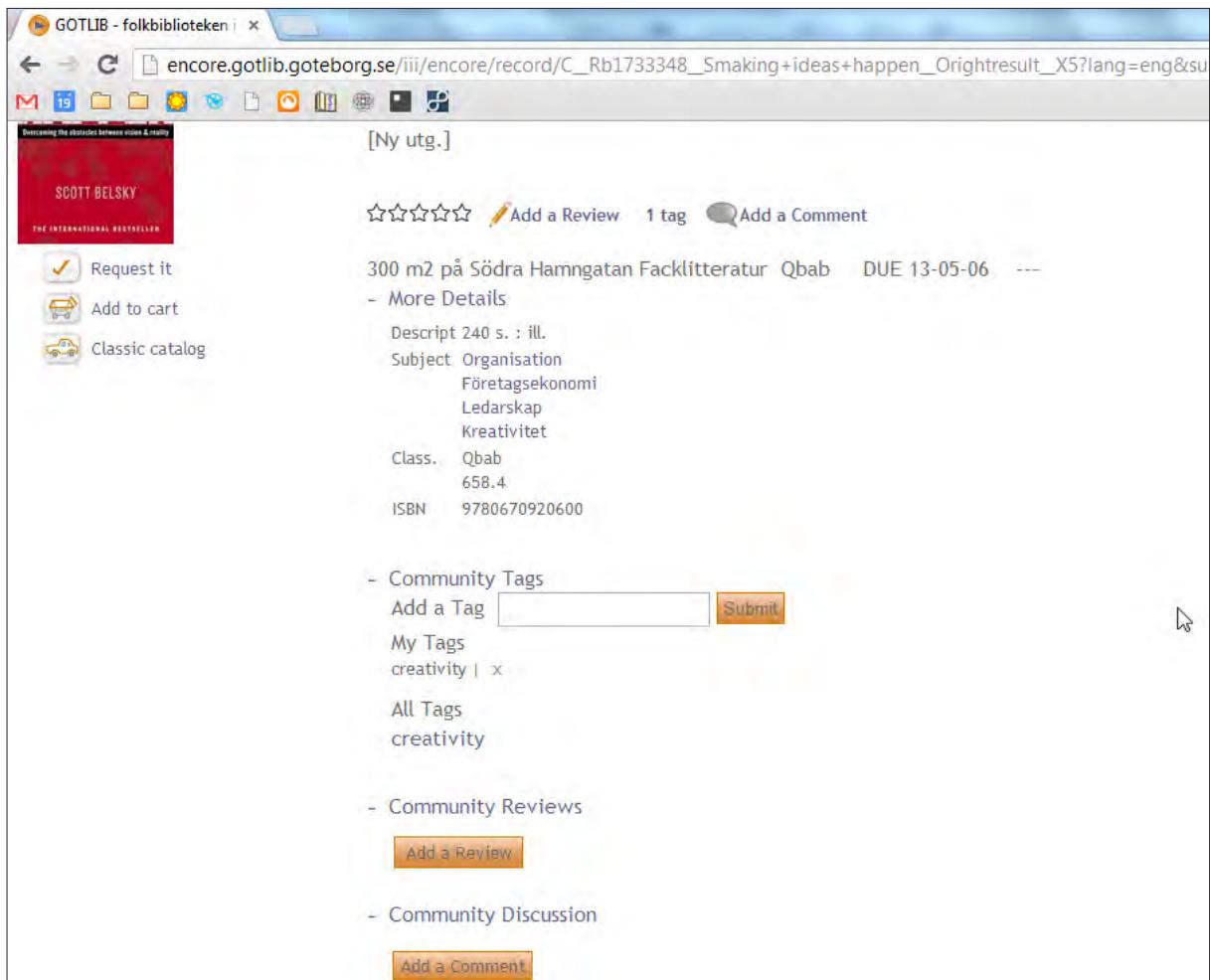


Figure 17• Search results

Figure 16 & Figure 17 show the main site for all the libraries in Gothenburg. People can use it to look for resources, manage their loans, request material, etc. The results in this website include books, DVDs, audiobooks, e-books, music, magazines, etc. It excludes databases, which will be referred to later.

User accounts allow people to request resources to pick them up at the library and renew their loans online. It also records people loan history but they have to opt in for this option.

In terms of user contributions, their current system allows users to give a rating based on five stars, add reviews (“Community reviews”), add comments (“Community discussion”) and add tags (“Community tags”). Even though the option exists, a walkthrough of several resource pages show that these options are seldom used. My assumption is that they require effort from the users but offer very little back, which means they do not have enough motivation to use these options.

The resources also have tags (called subject) in the catalogue. These are not present in every item. When subjects and community tags are clicked on, the system performs a search with the phrase. The results are not items that have been marked with the tag, just general results. The distinction between subjects, community tags and keywords is not consistent, since they all have the same type of results.



Figure 18• E-Library catalog (<http://www.elib.se/library/default.asp?lib=40>)

Libraries in Sweden outsource the service of lending ebooks to eLib, shown in Figure 18. This site gives access to ebook downloads (for a 28-day loan period) and audio books (for streaming) to users with a library card. The website serves the whole country but has a specific site for each main library. The books downloaded from this site can be read in the computer using Adobe Digital Editions and applications for iOS and Android devices. The library staff has no influence on the content that is available in this site; the company works independently.

The library offers access to 29 different databases. A directory of these databases is accessible in a site separate from the rest of the resources. Their content is not included in the search results of the general catalogue. Only 13 of these databases are accessible outside of the library, the rest require the user to be connected to the library's network.

The staff has pointed out that users generally do not know about them and that they have courses to teach people how to use them. Landguiden, with information about countries, and Alex, with information about authors, are the most used and recommended by the staff.

To access any database, unless the user is aware of one of them in particular, there are at least three steps:



Figure 19• Link to the main page for databases

1. Locating the link at the bottom of the main page, see Figure 19.



The screenshot shows the main search interface of a library website. On the left, there is a sidebar with a 'Sök' button and several links: 'Sök i bibliotekskatalogen', 'Sök i databaser' (which is highlighted with a blue box and a red border), 'Databaser A-Ö' (also highlighted with a red border), 'Logga in hemifrån', and 'Släktforska'. The main content area is titled 'Sök i databaser' and contains text about the library's database collection, including a link to 'Databaser A-Ö'.

Figure 20• Link to database directory

2. Accessing the directory of databases, see Figure 20.

3. Locating a database that covers the required topic.



The screenshot shows the 'Databaser A-Ö' page. It contains a section titled 'Artikelsök' with text about the database, a 'B' section, and a 'Biography in context' section. Both the 'Direktlänk' and 'Logga in hemifrån' links in the 'Biography in context' section are highlighted with red boxes.

Figure 21• Links for accessing a database inside the library (left) and outside the library (right)

4. Clicking to access the database site, separate links for accessing in the library and at home, as shown in Figure 21.



The screenshot shows a mobile browser on an iPod touch displaying the library catalog website. The interface includes a search bar, a 'Placering' dropdown set to 'Hela katalogen', and a 'Sök' button. Below these are links for 'Sök i katalogen', 'Information om biblioteken', and 'Katalogens webbplats'. At the bottom, there are language links for 'English' and 'AirPAC © Innovative Interfaces, Inc.'.

Figure 22• Mobile site for the library catalog (<http://m.gotlib.goteborg.se>)

The mobile site, Figure 22, allows users to search and reserve materials, renew loans and other services from the website. This is a web application, not a native application.



Figure 23• Facebook page (<http://www.facebook.com/hisingensbibliotek>)

In terms of social media, the library maintains a Facebook page shown in Figure 23. The purpose of the Facebook page is to communicate with the users. As of April 22, 2013, the site has only 229 “likes”, which means they have limited reach. It is possible that library users do not feel the need to follow the library in social media because they do not post information that is not available elsewhere. I believe social media is not a requirement unless there is a clear strategy behind its use. If they do not have a clear reason to use social media, the amount of people following their Facebook page is not significant to an analysis of their online presence.

## Services and activities

Both catalogues, physical and digital, are shared among all the libraries in Gothenburg. As one entity, they offer:

- Books in several languages for children, young adults and adults
- CDs (music)
- DVD (films)
- Video games
- DAISY (Digital Accessible Information System), which are special audiobooks for people with learning disabilities
- Ebooks
- Audiobooks
- Magazines
- Newspapers

Through a centralized system, people can reserve material and request that it is send to the library closest to them.

In their facilities, they have:

- Access to computers
- Sitting place for working and reading
- Magazines and newspapers
- Snackbar

The administration of Lundby District releases a program every 6 months with different activities. Many of them are hosted in the libraries around the area (Hisingens bibliotek, Älvstrandens bibliotek and Kyrkbynds bibliotek). These activities include:

- Film showings for all ages
- Knitting circle
- Theater performances for all ages
- Workshops on different topics
- Book club (in different languages)
- Visits by authors
- Exhibitions
- Language meets in Swedish
- Homework support for students of all ages
- Computer courses for beginners
- Book readings for children
- Courses about computers and internet surfing for seniors

## **Conclusions from the first stage**

When it comes to computers and other devices at use in Hisingen's Library, their reach is limited and the staff gets constant questions about how to use them. Issues include problems with the self check-out/in desk, confusion about how to book computers to use the internet and how to purchase printing quota. Apart from these additions to library services and the use of RFID tags in all the materials, its characteristics are in accordance with the traditional view of a library.

Hisingen's Library is not on a phase where the digital collection surpasses the physical collection, in size or relevance. Visualizing the digital library is not their most pressing issue, even though they have not been successful informing patrons of the possibility of accessing ebooks. The most pressing issue at Hisingen's library is one of visibility and communication. There are several layers to this issue, including an unfavorable location, lack of proper publicity for the library and the general decline of the level of literacy in young people. Finding a solution to these issues is, of course, beyond the scope of this project. Nevertheless, part of the solution to the library's visibility problem might be adding value to the library experience.

The following is a description of the different challenges and limitations that the library is facing:

- Libraries do not own the digital resources they offer online, they just provide access to them. This is especially relevant in the case of trade titles for public libraries since publishers have not arrived to an agreement that will facilitate eLending. As a consequence, at least in the case of ebooks, libraries have very restricted power over the titles they offer and when.

- Libraries currently offer a great amount of physical and digital resources, including various types of media. However, there is not a connection between the digital resources and the physical space, which results in the digital and the physical library being perceived as two different entities. The physical library should facilitate the exploration of the content of both the physical and the digital collection in ways other than typing in a search field.
- The library has problems communicating to the community all the services and resources that are available. Many library users are not aware of the possibility of accessing digital resources outside of the library. The library should find a way to communicate with the community in new ways that will invite them to use the library resources inside and outside of its walls.
- The arrangement of the physical space in the library is very traditional. The setting is static and monotonous, which does not inspire users or invites new users. The library should offer an environment that inspires and motivates people.
- Information is widely available online and as a consequence libraries do not stand out as offering something unique, i.e. they are not the only ones offering free access to information for everyone. Libraries should provide new and exciting ways of experiencing the content they offer. Making it available and having it on display is not enough.
- The users have only limited say on what the library offers and how it works. It is possible to make suggestions to the staff and on the website but not everyone knows about it and it has a limited reach.
- The library is used by people in the community as a meeting place. People visit the library to share with others even if they do not intent to borrow a book or use a computer. Public libraries offer people the opportunity to share with others since they are available to everyone. Yet, the environment does not support spontaneous conversations and connections between users. Libraries should support ways in which people can connect with each other and socialize.

Based on the findings described above, I have concluded that the design proposals to be created in the following stage should motivate one or more of the following actions in the library users:

**Explore** – Explore the content of the library

**Socialize** – Socialize with other library users

**Get inspired and motivated** – Get inspired and motivated to look at new things

**Participate and influence** – Participate and influence the library's content and how it operates

**Feel invited** – Feel invited to visit the library and use its resources

**Experience** – Experience the content in new ways

# Second Stage - Ideation and evaluation of alternatives

Several concepts were created taking in consideration the lessons from the previous stage. At this point, the objective was to explore different possibilities and directions in which the project could go. For this reason, I strived to propose basic ideas that admitted considerable room for variation and that were essentially different from each other. The expectation was to assess the potential of each idea by presenting them during the first workshop with the library staff.

The generation of ideas was done using basic brainstorming, guided by the objectives listed above, that were later organized into 6 concepts using a structure inspired by affinity diagrams.

## Concepts

### 1- Browsing the library with crowdsourced identifiers

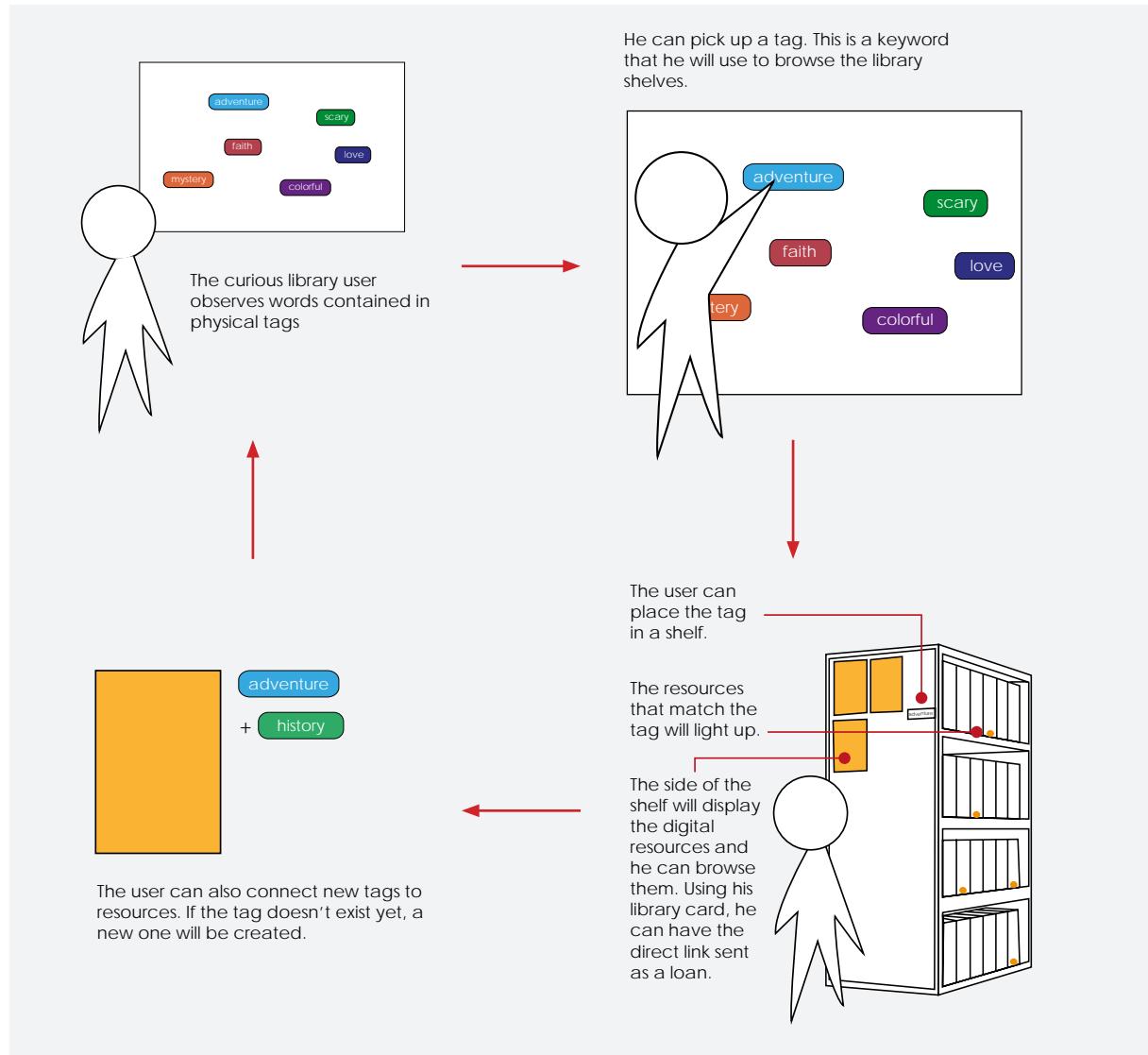


Figure 24• Concept diagram for 'browsing the library with crowdsourced identifiers'

**Objectives addressed:** Explore, participate, get inspired, experience.

This concept is aimed at supporting the exploration of the library content, both digital and physical, provide library users with means to influence the library space by presenting them with the opportunity to identify resources in a way they consider appropriate and give users new ways of experiencing and being inspired by the media available in the library. This also gives the act of tagging the resources an actual effect on the space which serves as a motivator for doing it.

**Who:** Library visitors of all ages.

**What:** A system that allows people to use keywords to physically locate all the related resources. They can also create new keywords and connect them to the resources.

**When & Where:** In the library, during opening hours.

**Why:** To encourage people to browse the library and experience the content in a new way and to give them the opportunity to identify resources in a way they think appropriate.

## 2- Extension of the library into the community

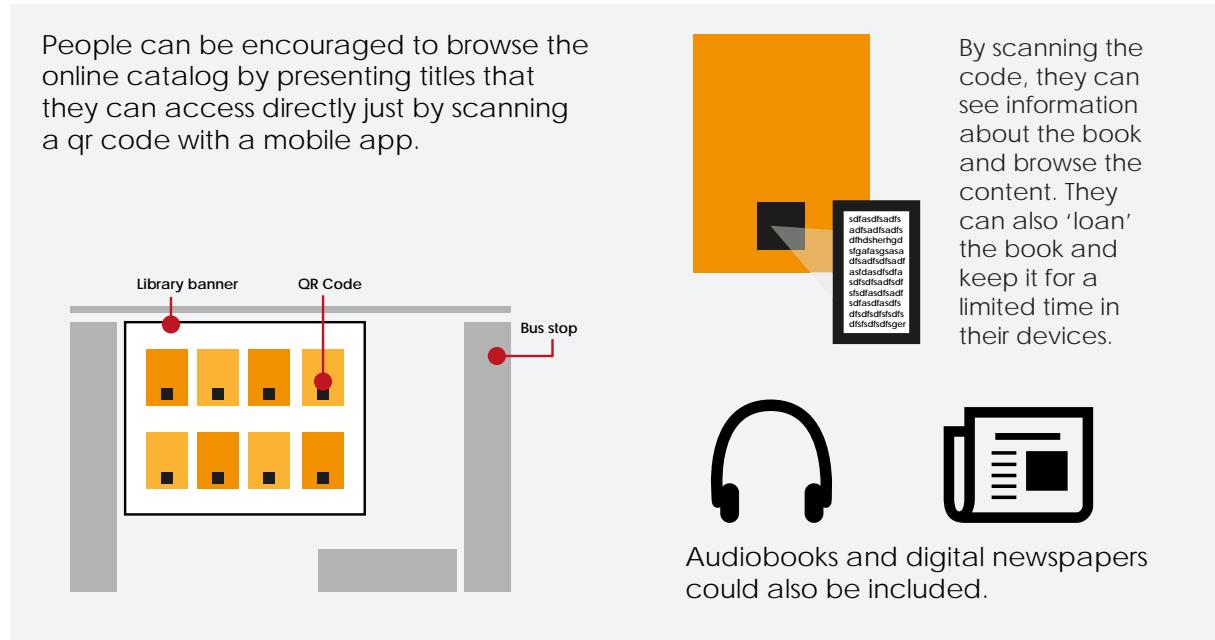


Figure 25• Concept diagram for 'extension of the library into the community'

**Objectives addressed:** Feel invited, experience, explore.

The aim of this idea is to inform people about the availability of online resources and to encourage their use. It provides a direct route to access the resources and mimics the experience of browsing physical titles. It takes the digital library closer to the public by making it visible in their everyday routine.

**Who:** General public outside of the library; people who own a smartphone.

**What:** A campaign that encourages people to access the library's online catalog and browse the content, accompanied by a smartphone application.

**When & Where:** It can be accessed at any time at different points of the city, such as bus stops, schools, and playgrounds.

**Why:** To inform people about the availability of online resources and to encourage their use. To provide a way to access the resources more easily and mimic the experience of browsing physical titles.

### 3- Library resources have personality

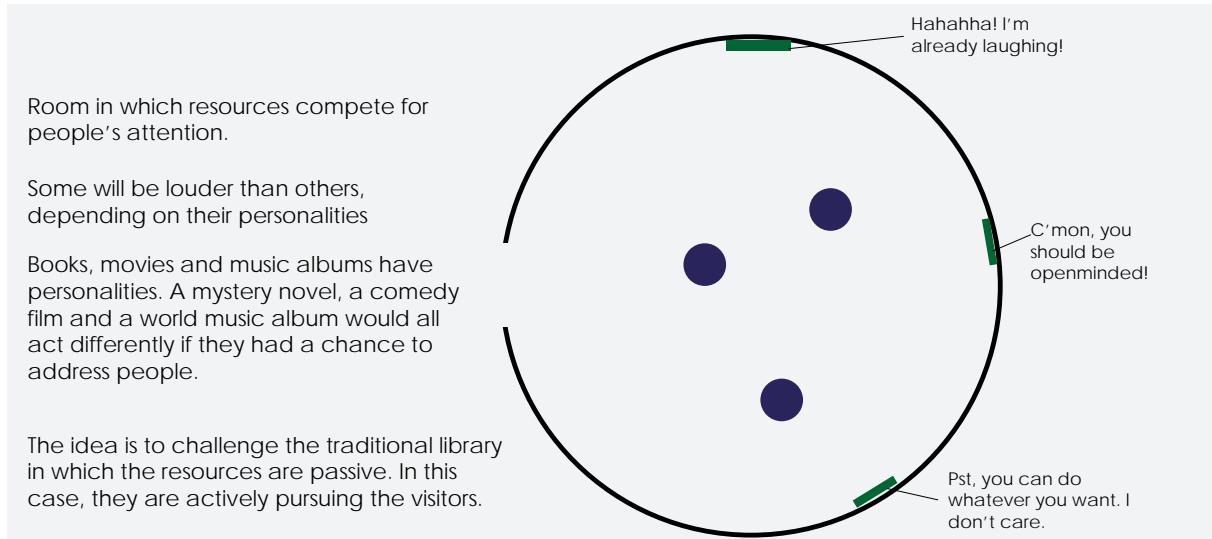


Figure 26• Concept diagram for 'library resources have personality'

**Objectives addressed:** Explore, get inspired, experience.

The purpose of this installation is to create an environment in which the library resources are more than passive objects waiting to be noticed. The themes for this concept are mainly inspiration and playfulness. It does not serve a practical purpose, as it focus on creating what Nikolovska and Ackermann (2009) refer to as 'small moments', noninstrumental interactions meaningful for people's social development.

**Who:** Library users of all ages.

**What:** A room in which library resources compete for people's attention according to their unique personalities.

**When & Where:** In the library, during opening hours.

**Why:** To create an environment in which the library resources are not just passive objects waiting to be picked up.

### 4- Users can extend the content of books

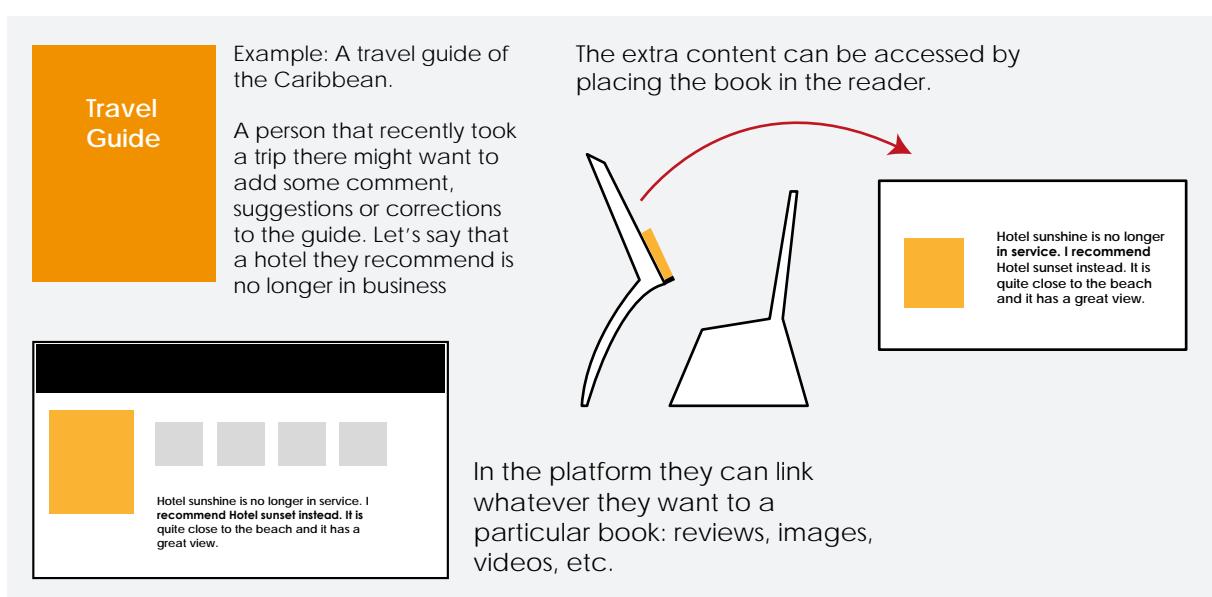


Figure 27• Concept diagram for 'users can extend the content of books'

## Objectives addressed: Participate, influence.

In this case, the objective is to give the users tools to influence the content in the library and share their views, while also giving them access to what others have to say. The basic concept is to allow the users to expand the content and then give them a way to view what other people have added. The system illustrated above is an example of how it could be. The idea is that users can have a way to relate the physical object to the user-generated content. By not being confined to the website, the idea of contributing with reviews, comments, etc., could be made more appealing.

**Who:** Library users of all ages.

**What:** A system that allows users to extend the content of books with reviews updates images, etc. and lets others view the new content along with the book.

**When & Where:** At the library during opening hours or at home (or where they have internet connection) at any time.

**Why:** Lets the users influence the library content and share their views. Lets the users see what others have to say.

## 5- Tracks of what the user does are left in the library

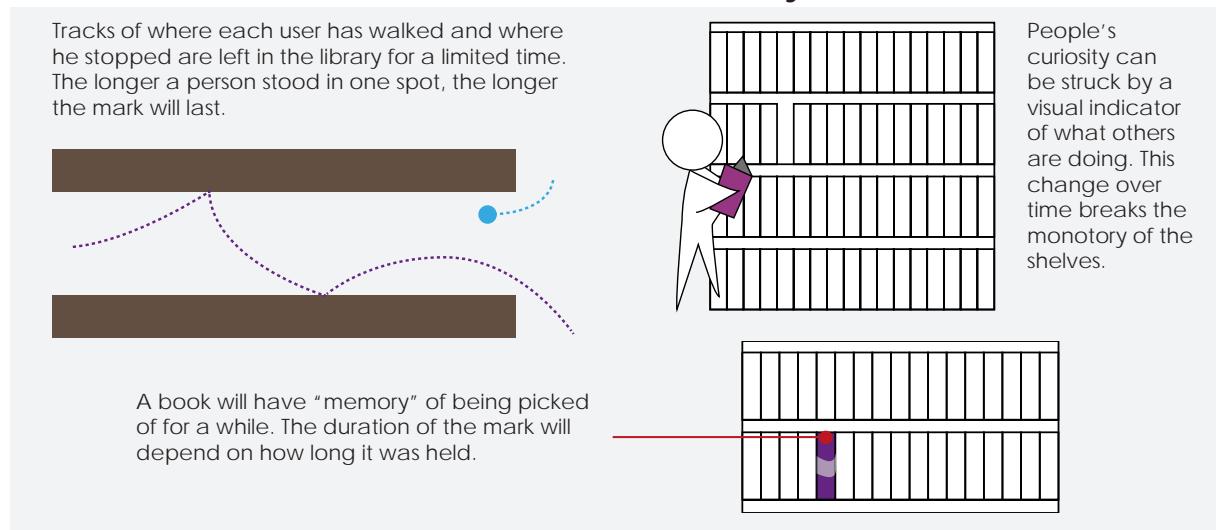


Figure 28• Concept diagram for 'tracks of what the user does are left in the library'

## Objectives addressed: Explore, socialize, get inspired, experience.

The purpose of this concept is to break the monotony of the shelves, ignite people's curiosity and give the library the character of a living, changing place. The main theme is giving people the opportunity of sharing with others through the content they are consuming in the library. This serves as an explicit representation of what Björneborn (2011) calls behavioural traces, which are marks or traces left by users that may guide others to find and use information resources.

**Who:** Library visitors of all ages.

**What:** An installation that collects tracks of where the user walks in the library and the books that are picked up.

**When & Where:** In the library, during opening hours.

**Why:** To break the monotony of the shelves and ignite people's curiosity and to give the library the character of a living, changing place.

## 6- Interconnected sitting space

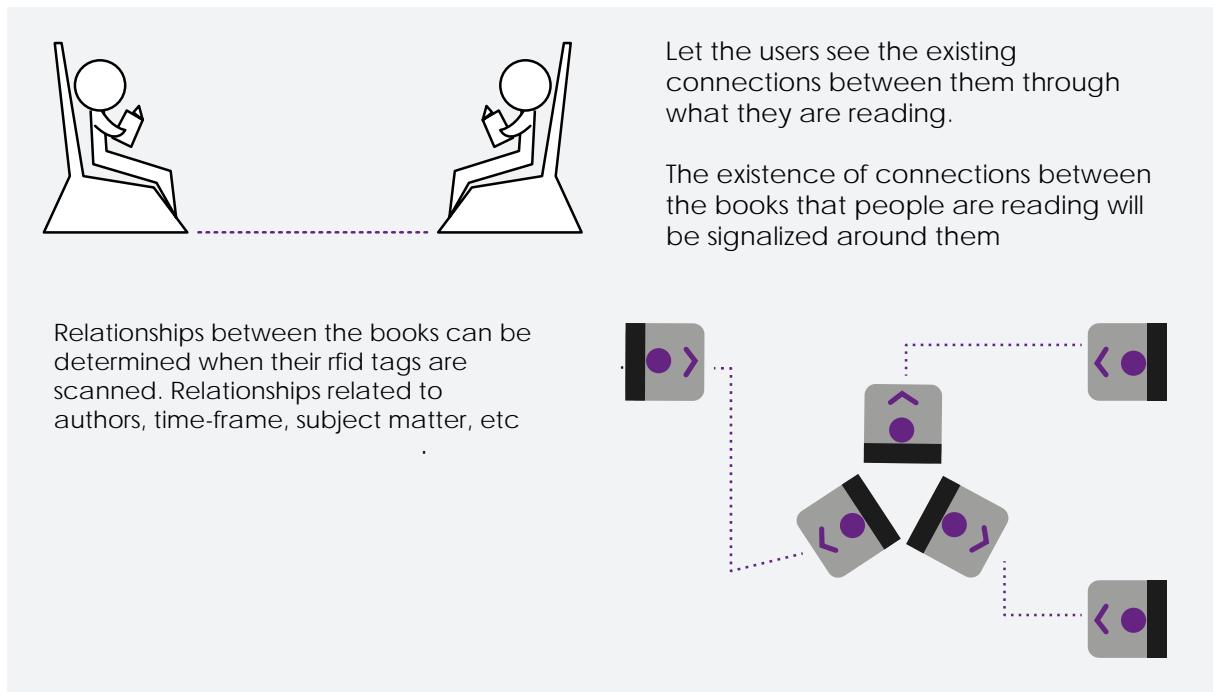


Figure 29• Concept diagram for 'interconnected sitting space'

**Objectives addressed:** Socialize, explore, get inspired.

This concept is focused on allowing users to see the existing connections between them through what they are reading.

**Who:** Library users of all ages

**What:** Sitting space that recognized the books that the people are reading and displays the connections between those books. Connections related to authors, time-frame, subject matter, etc.

**When & Where:** In the library, during opening hours.

**Why:** Lets the users see the existing connections between them through what they are reading.

## Workshop 1

This workshop was selected as a method for research, ideation and evaluation of alternatives. It acts as a complement for the previous activities in the project. After the initial analysis, it was necessary to tie the issues considered important with the main concerns of people who affect the daily workings of the library. A workshop is an effective tool for this because it allows people to listen to each other's ideas and build on them. Listening to what others have to say about certain issues triggers ideas and memories, something that is more difficult to accomplish in one-to-one interviews. Additionally, the workshop format is flexible and allows for clarification, which is useful when dealing with open-ended questions that could be intimidating in other formats, e.g. surveys.

The plan for the workshop was prepared using the framework proposed in Sanders et. al. (2010). Three activities were planned using specific tools. The main toolkit for the workshop contains a collection of cards aimed at helping the workshop participants discuss the issues in the library and propose solutions for these issues. The purpose of the

cards was for the participants to use them during the discussion as inspiration for their ideas and to support and illustrate their arguments.

The goals for the workshop were to understand their experiences, generate ideas and evaluate pre-conceived ideas. This was to be accomplished by encouraging the participants to discuss and act scenarios using the cards.

## Plan

Objectives:

- Complement previous analysis of the situation of library with the views of the library staff in order to arrive to a shared understanding of their particular issues and challenges.
- Get feedback on the concepts that have been developed so far. The purpose was to better understand how these ideas fit in the specific context of Hisingen's Library and to delimit or expand them as a result.

Participants: 4-5 members of the staff of the library.

Location: At Hisingen's Library

Duration: 2 hours

Toolkit:

Introductory presentation

8 sets of cards covering different aspects that the participants can use to support their ideas and get inspiration. The cards cover:



Figure 30• Current state cards

Current state: The cards will be blank and they will use them to write down their views about negative and positive traits of the library.

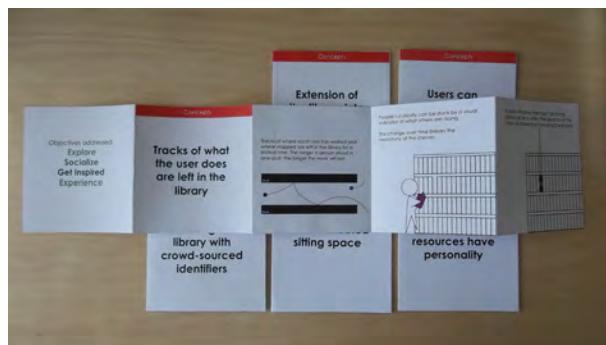


Figure 31• Concept cards

Concepts: Illustrations of the 6 concepts defined above.

Key use objectives	Key use objectives	Key use objectives
Explore the content of the library	Experience the content in new ways	Get inspired and motivated to look at new things
Key use objectives	Key use objectives	Key use objectives
Feel invited to visit the library and use its resources	Participate and influence the library's content and how it operates	Socialize with other library users

Figure 32• Key use objectives

Questions	Questions	Questions	Questions
How can we support connection and communication between library users?	How can we transform the content in ways that inspire the users?	How can we motivate the community to visit the library?	How can we support a meaningful exploration of the library's content through the way it is displayed and arranged?
Questions	Questions	Questions	Questions
How can we motivate the community to use the resources that they can access from home?	How can the users of the library help select its content?	How can the users of the library help expand its content?	

Figure 33• Question cards



Figure 34• Technology cards



Figure 35• Library element cards

Key use objectives: The 6 main objectives defined in the previous stage.

The objectives, as well as the questions, might overlap; however, the purpose is not to create clearly separated categories but to provide tools to think about the issues in a structured way.

Questions: 7 questions related to the most prominent issues present in the library.

Technology: 8 cards representing technologies that can be used to implement their ideas, such as RFID tags, projection mapping and social media.

Library elements: 10 cards representing different objects (mostly furniture) that are normally found in the library, for example shelf, sofa and information desk.



Figure 36• Type of media cards

Types of media: 10 cards representing different types of media that the library provides access to, for example books, ebooks and magazines.



Figure 37• User cards

Users: 15 images of different people that they can use to represent the various user groups in the library.

Documentation:  
Audio and video recording.

Activities (Details will be presented in 'Execution and results'):

- Introduction to the project and the workshop (15-20 minutes)
- Activity 1 – Exploring the current state of the library (15-20 min)
- Activity 2 – Feedback session for the existing concepts (30 min)
- Activity 3 – Ideation and open discussion: (50 min)
- Conclusion (5 min)

## Execution and results

Overall, I consider the execution of the workshop to have been successful. There were 4 participants, from 5 expected participants and all the activities stayed within the planned time frame. The attitude of the participants was positive, receptive and helpful.

In order to initiate the workshop with critical thinking, the participants were asked to write down one positive and one negative aspect of the current state of the library. This was done at the beginning to keep them from modifying their ideas after they had heard the introductory presentation.

As part of the introduction, I presented the topic of the project and my motivations for working on it, as well as the objectives of the workshop. Finally, I presented my findings from previous stages, including the problems that I identified in the library, and the

concepts developed so far. This served as a starting point for the subsequent discussion.

The purpose of the first activity was to enrich my observations of the library with the views they wrote down on the current state cards at the beginning of the workshop. Each participant presented and justified what they had written in their cards. I think the initial task was constructive since it allowed them to consider the library from two opposite points of view. Surprisingly, they expressed difficulty finding positive aspects in the current state of the library. I think this highlights the value of the exercise as it is important to have them consider not only what works and should not change, but also how we can take those positive aspects and use them to support the new ideas. During this activity I was able to collect more insight regarding the current state of the library, its issues and their plans for the future.

The feedback session proved very beneficial. I received valuable feedback for my concepts that gave me ideas to move some of them forward and discard or transform others. The participants were not afraid to question what I was showing them and they had a positive attitude towards the diversity of possibilities.

On the other hand, even if we had a very interesting discussion, few new ideas were brought forward during the third activity. Furthermore, the cards created for this section of the workshop were barely used by the participants, with the exception of the questions, concepts and library elements. Most of the discussion was done by talking and gesturing rather than referring to the cards for visual aid, as shown in Figure 38. I was able to encourage some of them to use the cards by referring to them myself, but they were unused for the most part.

I conducted the discussion by going through the questions in the question cards and asking them to think of solutions. Once again, the discussion that followed was useful for understanding the issues but failed to arrive to possible solutions outside from my original proposals. One of the participants commented that they were really good questions but also very difficult to answer. Indeed, the questions posted are fairly complex and I think that for the future of this exploration, the scope should be narrowed down.



Figure 38• Discussion during the workshop

During the first activity, several problems were discussed. Notably, the participants pointed out that the signs and search system are not good enough for users to navigate the library by themselves. A significant number of users ask them for help to find resources in the library but there is also a portion of users who would like to look for things without their help and this is not so easy.

The problem of users not knowing that there are materials available online was also discussed. They believe this is associated with the modest presence of computational devices in the library. Computers are available for visitors to use for personal purposes and to search the catalog but not much else is done with them.

One of the actual advantages of the current library is that it lets in a good amount of natural light. However, the current arrangement of the library blocks the natural light. This observation is important because it suggests that a proposal that takes advantage of the natural light in some way could be useful and enjoyable for the users.

As I mentioned above, the participants had difficulty identifying positive aspects of the library. Three aspects surfaced as strengths of the library: the presence of a qualified staff, the availability of different types of media and the natural light in the building.

The library staff supports the visitors in a wide variety of tasks, from selecting media to using the computers and copy machines. Sometimes they are asked questions related to life in Sweden by newly arrived people, which highlights the role of the library as a place where people expect to find support.

When discussing the advantages of libraries over information available elsewhere (the internet, for example), one of the things that makes the library special is the presence of a staff that supports the users. The reason this is not perceived as an added value is lack of promotion.

## **Feedback session**

This section will review the feedback given about each of the concepts presented during the workshop.

### **Browsing the library with crowdsourced identifiers**

During the feedback session, participants pointed out the challenges of making this system work together with the floating loan system they have with all the libraries in Gothenburg. This system is both an advantage and a disadvantage, since the resources they offer are not exclusive to their library and go around the different branches in the city according to the loan patterns of the visitors. This means that a massive collection of books would need to be entered in this new system. On the other hand, they consider it a good complement to their current system that is confined to the computer screen and an interesting way to integrate search results for digital and physical content.

### **Extension of the library into the community**

The promoting nature of this idea was well received by the workshop participants as they consider it an easy way to take the library to the public. The location of these signs is, naturally, very important and it should take in consideration affluence of people and the profile of the community it is located in.

They also highlighted that this does not need to be tied to Hisingen's Library only and that it could be implemented around the city for all the libraries. Unfortunately, this falls outside of the scope of this project but it is an important quality to keep in consideration.

### **Library resources have personality**

The workshop participants regarded this idea as fun but better suited for a new library building. It is, as one of them remarked, "something you might want to explore as a user even if you don't use it all the time". Ultimately, the fact that this concept does not present a practical approach to a particular issue of the library made it of little interest to the workshop participants. It would be an interesting experiment in the context of a larger project for new library or as a temporary installation. However, as it is, it does not fit with the current situation in Hisingen's library.

### **Users can extend the content of books**

The main conclusion regarding this idea is that users are not likely to be interested in a contribution that requires a significant investment of time and conscious effort. The way in which the idea is presented requires the user to consciously decide to add content, go to the website and invest considerable time creating the entry. There are plenty of services online that allow people to share their ideas and this does not give them opportunities that are not available elsewhere. Their current system supports this view. It gives the option to rate the resources people borrow but it is seldom used.

Another limitation for this idea is the fact that they are not allowed to change the online platform as it is part of the city's library system. Although, it was also pointed out that the website could be re-designed to include these new options in a way that is more attractive than the current rating system.

On the other hand, the idea of providing ways in which people can extend the content is something they are interested in but in a form in which it does not require great effort from the side of the user. Variations using audio recordings were discussed, for example.

**Tracks of what the user does are left in the library and Interconnected sitting space**  
I have grouped these two concepts together since they are both directed towards motivating social interaction and the discussions about them reached similar conclusions.

A critical problem quickly surfaced when discussing these ideas: integrity and privacy. It is clear that not everyone would like to show other library users what they are doing and reading, which leads to a big risk of alienating people if they are forced to do it.

The library is a social place and a space to have contact with other people; nevertheless, a portion of users is not interested in engaging with others while they are in the library. The library environment must find a balance between catering to those who want to be connected with others and serving the users who want to be left alone.

The library serves those who want social interaction by hosting different types of event where people can meet others with similar interests. Concepts aimed at facilitating interaction among users would work better if they support these events rather than attempting to create interaction between people who are not looking for it.

## Open discussion and ideation session

The question cards served as a starting point for the third activity as different questions brought particular issues to the front of the discussion. As a main outcome of this discussion, I was able to prioritize the questions and objectives according to the interests of the library staff. I must note that up to this point all the issues were given the same weight, meaning that I had not decided which problems were more relevant to solve.

The concern of how users of the library can help select its content was complemented with the matter of to which extend they should. Currently, they take buying suggestions from people and follow trends according to the books being reserved on the system and the general success of the titles. However, their influence is limited to acquiring or not acquiring content. It was noted that with features like tagging the content and tracking what users read inside the library, two features present in the discussed concepts, they would be able to predict more accurately what the users want to see in the library.

By tracking which books are used inside the library they would be able to assess the popularity of titles that, for reasons related to their size or value, people do not take home. This draws attention to a possibility I had not considered regarding the 'user tracks' concept, outside from its initial purpose of encouraging social interaction.

When it comes to motivating members of the community to visit the library, their thoughts went immediately to the location and the façade of the library building, which falls out of the scope of this project. It is evident that this is a central issue for them, hence the interest in the concept about extending the library into the community. On the other hand, as the concept is defined now, it reminds people that the library exists and is available for them but it does little to make them feel invited. If the project was to take this direction, it is imperative that the solution gives the users a more active role and a feeling of ownership over the library space.

The issue of extending the library into the community is closely related to the matter of motivating the usage of the resources they can access from home. I think the main problem is that E-Lib, the provider of electronic titles for all libraries in Sweden, is in fact another institution. The staff of the library is not involved in the selection of the titles that are available and does not have control over how the system works. The challenge here is to build a unified image of the public library, which is why the need for creating a single solution for both problems was stressed during the discussion.

Questions related to transforming and expanding the content were not considered as critical as the issue of transforming the space to support the exploration of the content. Their selection of content is broad and comprehensive and, as I said earlier, they believe library users would not be interested in actively expanding the content.

The affordances of the physical space, on the other hand, are critical for the development of the library. Considering the range of library users, it is important to provide a space that supports people who need help from the staff as well as people who prefer to explore the content by themselves. What the library staff wants to offer is a space that informs the users about all their options. The library is a place to get information and the form that the information takes depends on the user and the experience they want.

The possibility of creating rooms with different 'personalities' to accommodate the different types of users was discussed as well. One of the main worries regarding the differences between users is that some visitors have expressed that they are happy with the traditional setting of the library. Whether they would reject or not the introduction of new features with IT as a central material requires deeper study. Nevertheless, there seems to be friction between users who want the library to be a lively social place and users who want a silent and more traditional library. Hence the idea of creating rooms to take in consideration everyone's preferences.

The idea of supporting browsing through 'augmented' shelves resonated with the participants; perhaps because they could relate it to technologies they know, e.g. tablets and smartphones. Their interest in the idea highlights how important this issue is for them. However, I am weary of limiting the solution to a screen where the users can browse the content. I would like to explore further solutions aimed at supporting browsing and discovery in the library that are not limited to touch interaction with flat surfaces, even if they contain these elements.

I touched the topic of supporting interaction between library users above. As I said earlier, the main conclusion related to this issue is that people should not be forced to interact when they do not want to. Supporting the activities organized by the library seems to be a good way of ensuring that the people involved are looking to connect with others.

Non-traditional furniture –in shape or functionality – was proposed as a good starting point for supporting social interaction in the library. They would be interested in a space that can be transformed for different activities, for example for movie showings, books clubs and author talks. This would create a flexible environment that is both practical and stimulating. Moving forward, I would like to explore this idea of flexible furniture, not only to support social interaction but also to tackle the other issues that have been discussed.

As a summary, the issues regarded as more important during the workshop were motivating the use of the library, both the physical library and the online resources, and supporting the exploration and discovery of content. Of course, none of these questions exist in a vacuum and a solution in one direction will have consequences on most of the aspects that have been discussed so far.

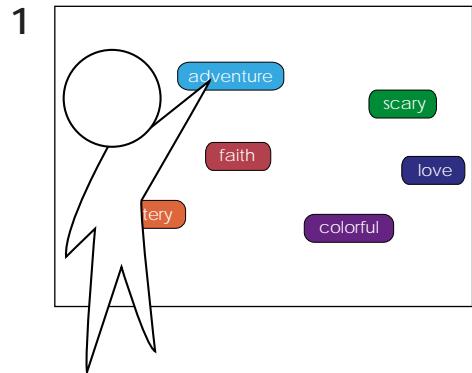
## Third Stage - Designing the installation

After analyzing the different concepts and the objectives, I decided to move forward using the basic idea of 'Browsing the library with crowd-sourced identifiers', while expanding it with the stronger details from some of the other concepts. If we evaluate it using the questions defined earlier, it is clear that it has the potential of addressing most of them. It supports the exploration of the library's content, both the physical and the digital, while also giving users the opportunity to expand the content of the library by applying their own classification system.

It should be noted that the use of tags created by the library users supports indirect social interaction in which people are able to connect through what they have seen without compromising their privacy. By using the installation, new patterns of interaction between users may arise that should be interesting to study later on.

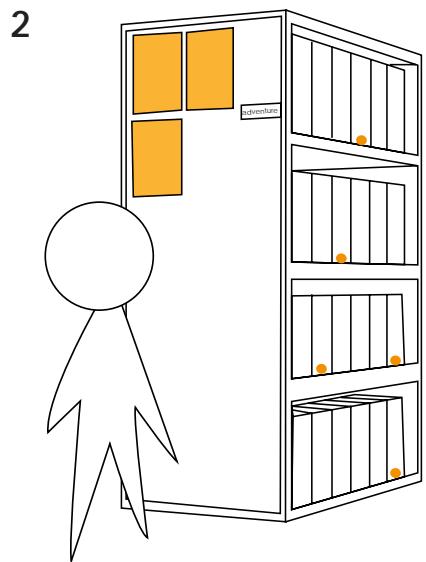
Furthermore, as it was noted during the workshop, by encouraging visitors to tag resources, even if they do not leave the library, the staff would have a new source to inform themselves about what people are using and which titles they should acquire. This empowers the users in the process of selecting the materials of the library in a way that has not been possible before.

In short, the installation is meant to serve as a new interface to navigate and explore the content of the library. It consists of three modules:



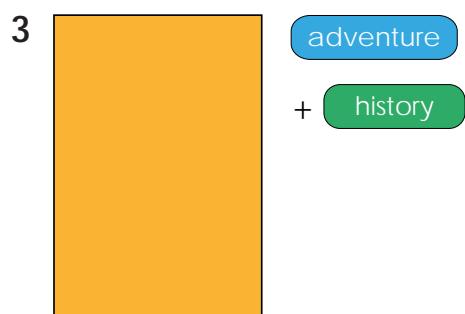
Display of the tags: The users can explore and select tags they would like to browse in.

Figure 39• Display the tags



Location of the resources: The users can use the tags to locate the related resources (digital and physical) in the physical space.

Figure 40• Location of the resources



Tagging the resources: The users can mark resources with existing tags or create new ones.

Figure 41• Tagging the resources

## Workshop 2

Once again, I selected the workshop format to explore the possible impact of the installation on the users and the library space. The purpose was to discuss specific features that could be interesting to include. I also wanted to get input on how the different modules of the installation could communicate their functions to the users and how the users could communicate with them. Details of which steps users must take to accomplish the different tasks still needed to be defined and were meant to be explored during this workshop.

In order to avoid the limitations brought on by the participant's reluctance to hand-sketching, storytelling was chosen as a main activity for the workshop. It was framed as a game, with the object of keeping participants engaged in the conversation and having fun. The toolkit was designed to give them elements to refer to during the storytelling, with the library users as protagonists in these stories. During the stories they were meant to give personalities to their users and motivations to visit the library, followed by accounts of how and why they would use the proposed installation. The expectation was that with these stories the participants would be able to express their ideas without worrying about the quality of their drawings and arrive to critical points that would not come up otherwise.

## Plan

### Objectives:

- Explore possible use dynamics that might arise among the different user groups.
- Generate ideas on how the system and the users will communicate with each other and on possible ways of defining the interaction with the different elements.
- Explore the possible effects of the solution on the users and the space at large.

Participants: 4 members of the staff of the library and 2 designers, including me.

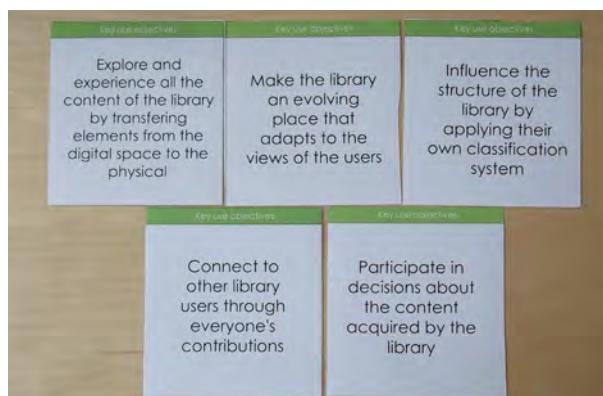
Location: At Hisingen's Library

Duration: 2 hours

### Toolkit:

For this workshop, I modified the toolkit from the first workshop to fit the activities. (The full toolkit can be seen on Figure 45):

Concept explanation: 3 A4 cards explaining the main components of the installation.



Key Use Objectives cards: The initial main objectives have been reduced to 5 and reformulated to refer specifically to the selected concept.

Figure 42 • Second iteration for Key Use Objective cards



Figure 43• Action cards



Figure 44• Sensory information cards

From the previous workshop: Technology cards, Library elements (The deck was expanded to include elements that surfaced in the previous workshop), Types of media and User cards.

A2 paper and colored paper figures as stage for the storytelling

Other materials: Post-its, markers, paper

Documentation: Audio and video recording, photographs

Activities (Details will be presented in 'Execution and results'):

Introduction to explain the selected concept(15 minutes)

Activity - Storytelling (1 hour 30 minutes)

Conclusion (5-10 minutes)

## Execution and results

For this workshop we had 5 participants, including 3 members of the library staff and 2 designers. As an introduction, I presented the selected concept and how it could enrich the use of the library. I also presented the new Key Use Objectives since they are directly related to the concept instead of the general project.

Action cards: 9 cards including actions that the user can take within the installation. It relates to their immediate goals.

Sensory information cards: 12 cards including different ways in which information can be conveyed as inspiration when defining the dialog between users and system.

For the activity, the purpose was to create stories using the User cards as a starting point. The use of storytelling was very useful, especially for describing the different user groups in the library and the activities they perform there. It was very interesting to analyze how their use of the library would change with this installation and the different features that they would use.

I was pleased with the decision of using the user cards as a starting point for the story. The cards consist of a single drawing of a person without any defining characteristics but the participants were able to create a considerably rich story by using them to refer to actual users they have met. The most interesting part was that when arguing about things like the type of resources they would look for or what they would do in the library, they all seemed to have an understanding of who they were talking about. For example, when talking about Peter, the student in his early 20s, they all agreed that he would go to the library to study, taking his own laptop and headphones, and would ask for their help finding material for school but would prefer to look for the resources on his own if it was for private use.

During the activity, several points came up related to how different types of users would use the tags and how and when would be best for them to add the tags to the resources. Their role as librarians in the flow of the installation was also discussed. For example, Bertil, an elderly user who is fond of history and sharing his opinions with the staff, would probably like the idea of adding tags to the material but would like assistance from the staff to do so.

Overall, I think the format of the workshop was successful and was deemed as fun by the participants. The beginning was slow, as everyone arrived to an understanding of what we were doing. However, after a few minutes we all started asking questions to move the story forward and started thinking of our characters as actual users of the library. Figure 46 illustrates how the activity was conducted. It was noticeable that after addressing around 4 different user groups, the discussion devolved into stereotyping and there did not seem to be a lot more left to say.

Next I will describe the ideas related to the installation that surfaced during the workshop, which have been divided in two main categories: searching and tagging. It is important to



Figure 45 • Setup at the beginning of the workshop



Figure 46• During the workshop

clarify that these ideas assume that the system exists and is working with a numerous selection of tags. Some are followed by questions that arise from the proposal. Details regarding which ideas will be used moving forward are left for the next section.

### Searching:

- Users should be able to use more than one tag at the same time in order to narrow down their search and find resources that match their interests more accurately.
- Allow two or more people to interact at the same time, that way the staff can assist users and teach them. By principle the system should be very easy to use and learn but some people is expected to want help from the staff.
- Some users ask for tips rather than specific information. The installation fits well in this pattern of use as they would like for general information about parenthood, for example, and are not looking for specific resources.
- As I have said previously, the objective of this project is to design for adults. However, it begs mentioning that the staff believes that this system would be useful for them when they are helping children select what they want to read, since they often start by asking them about things they like. They do not speak in terms of specific genres, like mystery, but look for certain key words like football or horses to recommend resources to the children. With this system, children could learn to search for themselves using this type of parameters.
- If this was to be implemented in the library, it would be necessary to create different tag pools for different demographics. The staff considers desirable for children, young adults and adults to be able to search separately. This is because, as they understand it, these group process information differently and their tags would look very different from each other.
- People like to be able to find similar things. It would be interesting if users could also scan the resources, via their RFID tags, and get directions in the space for similar resources. This could be resources with the same tags or resources that the staff or

the visitors themselves mark as similar.

- Another suggestion was the inclusion of a mobile application that people could use to browse and select tags wherever they are and then use in the library space to locate the resources. The user could select tags they like at home and then enter them into the system in the library and see where they take them.
- Databases are left out from the general results. It would be interesting to include them in the results when using the tags, i.e. to allow people to tag databases for others to find. If it is not possible to tag specific resources inside the databases, maybe tagging the database in general would be useful to at least increase their visibility.

### **Tagging:**

- Give people quick access to the tags they have added. If the tags are physical, people could collect physical tokens of the tags they have added. This suggestion was discarded during the discussion since the participants felt that tagging would be something that people do for others, not themselves. Therefore, knowing the tags they have added would be of no interest or use for them.
- While discussing how to give users effortless access to the option of adding tags to the resources, it was suggested that we could include the option of tagging resources in the self check-in desk. However, this was not a popular idea since it was pointed out that users would not have time since most people returning books are already in a hurry. A preferred idea was to provide a way in which people can add the tags while reading a book, for example, as if making notes on it. This is an interesting idea but it carries the question of how this could be done technically and how it would work for other resource, like films or audiobooks, which are not consumed in the same way as books.
- Provide a way in which the staff can add the tags along with the users, for example elderly people, who would like to add tags to share their thoughts but are not that comfortable with using the technology. During the workshop we talked about elderly users and how a lot of them visit the library with the motivation of talking to people. For them, the idea of searching for resources through this installation rather than asking the staff would not be interesting. However, some of them like to talk about what they have read. These users might be interested in adding tags but might prefer assistance from the staff while doing so.
- People learning Swedish read easy Swedish books. Perhaps the system can allow them to mark the difficulty in the language of the books to let others know.
- Since the library gets so many users that come from other countries, the idea of allowing the inclusion of tags in different languages was suggested. They have resources in several languages and it is possible that the people that read them would want to tag them in their own language. The tags could be filtered by language as well, although the idea of just mixing the tags to show the diversity of the collection was discussed.
- Users could also use pictures, instead of words, to tag the material. This was mostly suggested with children in mind. Defining which image applies to a particular

resource could be difficult to define, though, and the source of the images must also be defined. Would they create the images or search for them? How would they assess if this image applies to any other resources?

- When discussing the role of the staff, it seemed useful that the staff would also contribute by adding tags regularly and perhaps heavily in the beginning. This would create some accurate tags that connect resources and later the pool could be grown by the visitors.

## Refinement

For this stage I used the cards as a tool to define the structure of the installation and to create a model that served as a set for use scenarios. I used video to record the session and keep track of the decisions I made in the process. From these scenarios, I have extracted use situations that will be presented later. The purpose of the exercise was to define which scenarios could be used to explain the installation, what needs to be illustrated and fill in the missing details of the setup.

First I used the action cards to create the general layout. The arrangement of the elements was defined by what the user would do there. Then I added other elements around the action using the cards for technology, library elements and type of resources. The purpose was to define which furniture or devices would be used and which technologies would power them, as well as which resources (digital or physical) were being manipulated.

After the general setup was laid down, I started working with the user cards. With each user, I followed different paths that they could take, adding new elements and making decisions along the way. The result was a complete diagram of all the elements of the installation and several scenarios describing different possible outcomes and what the users would do when navigating the system. Figure 47 shows the process of placing the cards and the final outcome.

While I was telling the stories, I decided some things according to what seemed fitting for the situation and added elements as the need for them surfaced. This helped me structure the system in a consistent way. It also helped me figure out how sections of the installation would fit within the existing library systems (library's search engine, E-Lib, on-site classification system). Furthermore, it allowed me to foresee limitations in the management of the content that might be at odds with what the installation is meant to accomplish.

## Description

From the final arrangement of the cards, shown in Figure 47, I created a diagram to describe the different sections of the installation and how they connect to each other. The diagram explains the different actions that can be taken within the system.

As part of the refinement process, a model of the installation was created to show a potential arrangement of the elements in the library space. A suggested technological setup is also described in order to illustrate how it could be built.

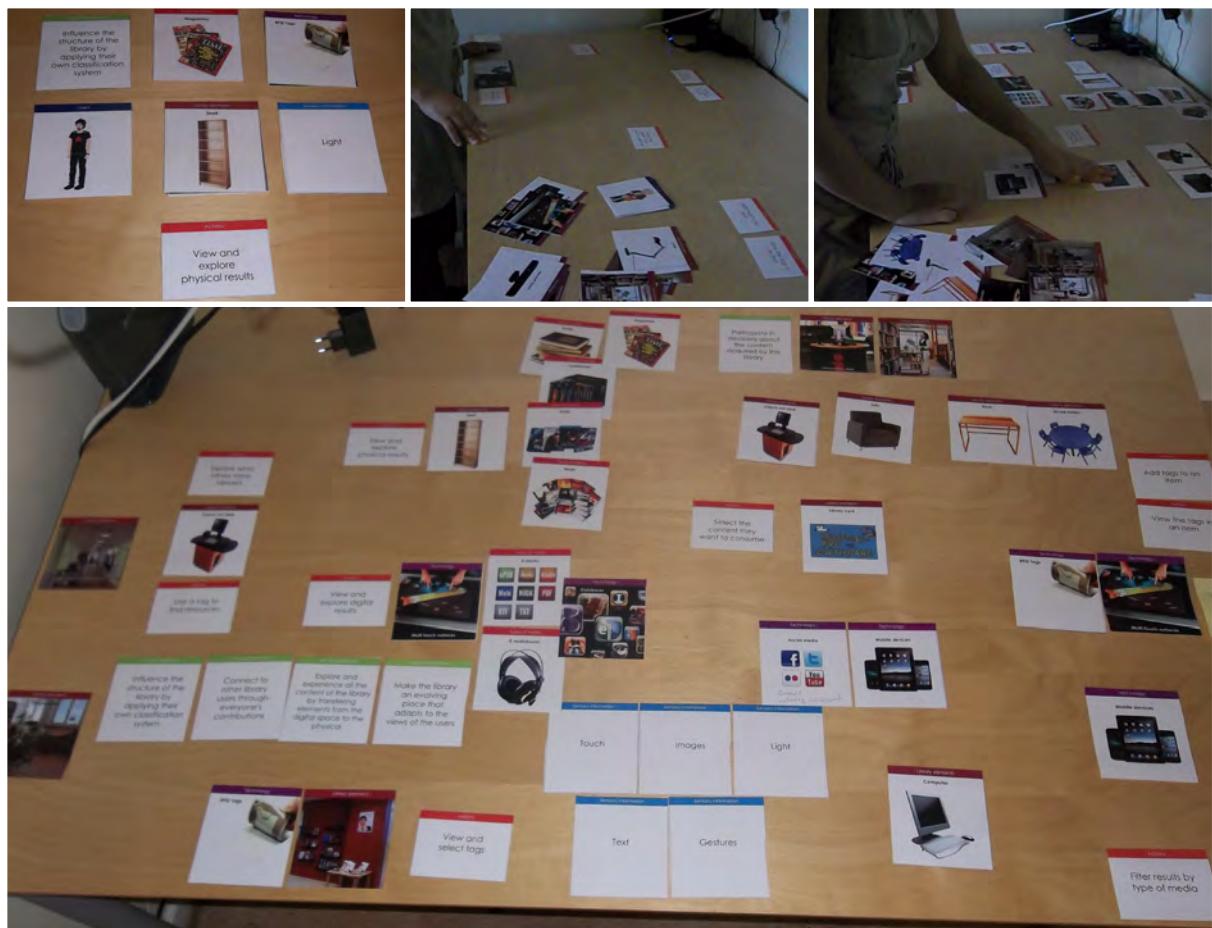


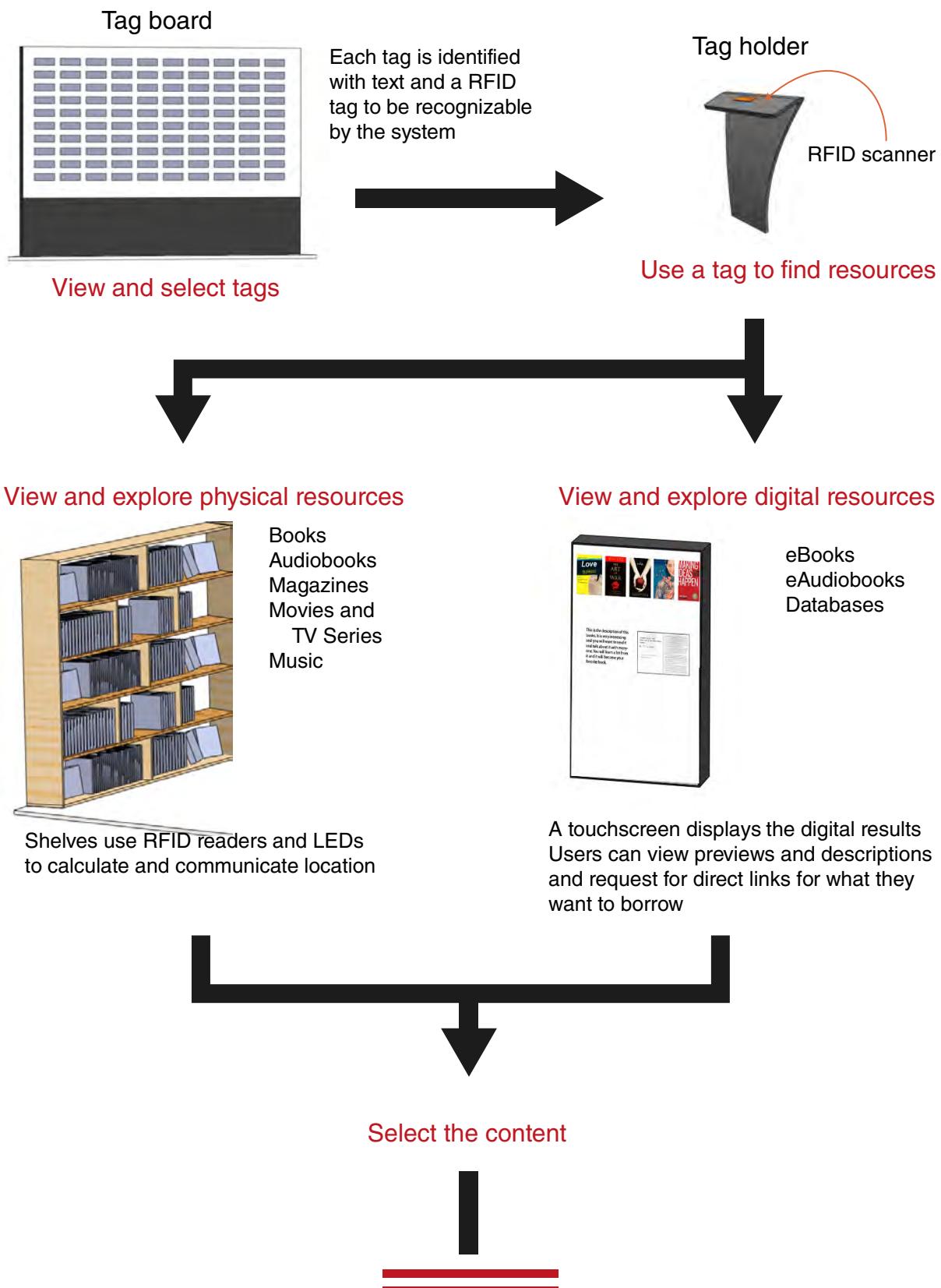
Figure 47• a)The cards, b&c)the activity and d)the final result

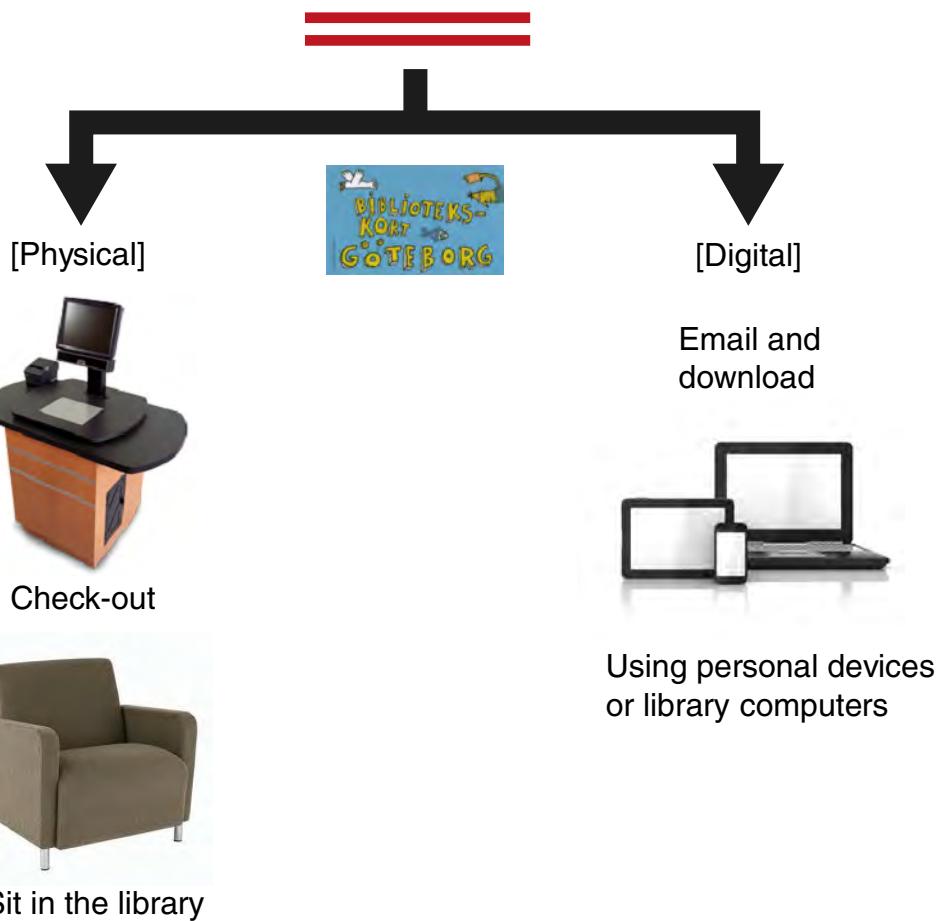
A board with 60 tags is on display in the entrance of the library (Figure 48). The tags will be curated by the library staff on periodical basis, in order to manage the growing number of tags. The tags consist of plastic rectangles, 20x6cm, with RFID tags to store the label name, the printed name on the top and magnets to attach to the board. The board is basically a metal base.

Users can view and select the tags and move on to place them on the reader. The tag reader consists of a RFID scanner to identify the tag, which connects to the database and performs the search. Users can also scan the books and make a search for all the items that have the same tags.

The digital results are displayed on screens where users can view information about the resources, browse the content of the books and send direct links to what they want to borrow through their library accounts (Figure 49). The results' screen shows all the digital items and a library card reader allows for sign-in to send the link for the item they want to borrow. The user receives an email from their library account so they can access eLib and download the book or stream the audiobook.

The physical resources are displayed with lights on the shelves, letting the users know the locations of the items that match their search (Figure 50). The shelves are equipped with a combination of RFID readers and pressure sensors to detect the location of the books and LEDs to signalize the location to the user.





### Add tags to an item

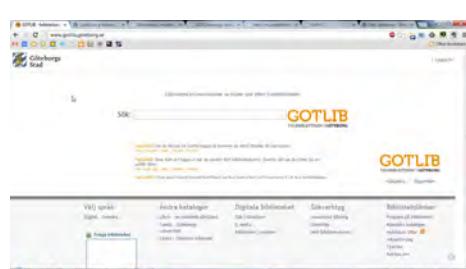
In the library:



Print new tags



Outside of the library:



RFID encoder/printer



In order to add tags to an item, users may use the tagging station at the library (Figure 51) or use the website from outside the library, adding community tags. New physical tags will be created by the library staff in order to manage issues of duplicates. This will also help in the management of the periodical selection of the tags.

A tagging station consists of a RFID reader to identify the item and a tablet that shows the information of the item and allows the user to add new tags if they wish to. Synonyms that are already being used might be suggested if the word is new to avoid duplicates. The app in the tablet also allows searching for specific items in case the person wants to tag something digital or that they do not have at the moment. The library staff will print the new tags and codify the RFID tag. Then, they will be added to the rotation.



*Figure 48• Image showing an example arrangement with the tag board, the reader and the tagging station*



*Figure 49• Image showing an example arrangement with the digital results screen*



Figure 50• Image showing an example arrangement with the display of the physical results

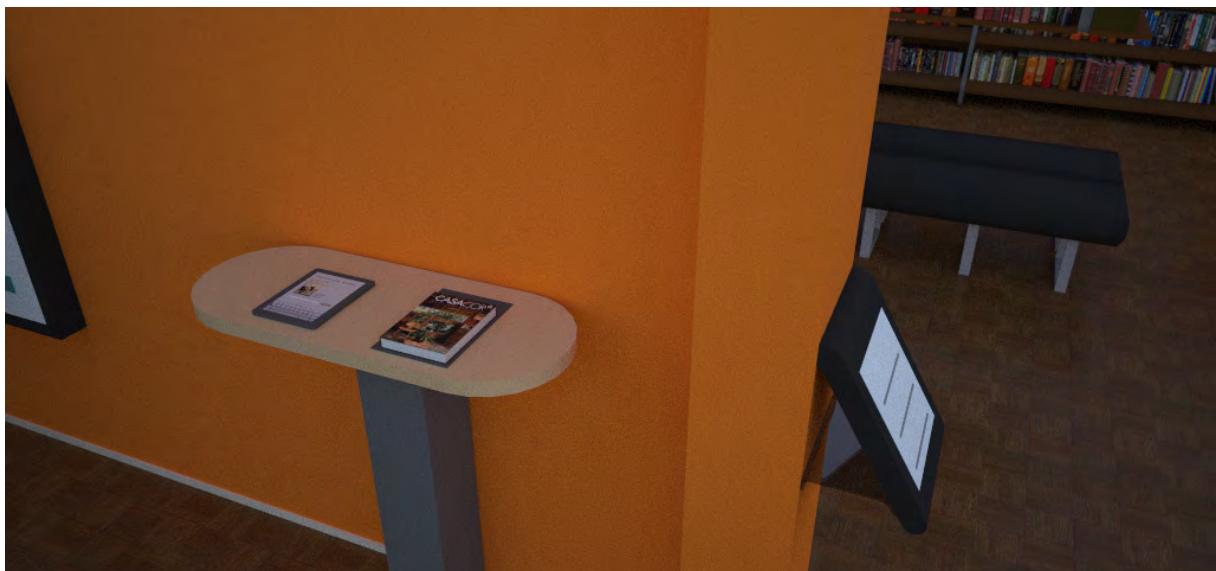


Figure 51• Image showing an example arrangement with the tagging station

## Use scenarios

Several use scenarios were created using the User cards to define different elements of the installation. A selection of them is presented below.

### Scenario 1:

1. A young woman observes the tags and takes one.
2. She places the tag to perform the search. The screen shows the digital results and the shelves light accordingly.
3. She walks up to the screen and browses through the stripe of digital results on the top. She can see results of books, audiobooks and databases\*. She sees something that calls her attention and pulls it to the front to look inside. See Figure 49 for reference.

4. She wants to borrow an ebook so she presses the option "Borrow". She is asked to pass her library card and enter her code. A confirmation then informs her that the link to download the book has been sent to her email address.
5. She uses her phone to check the message, go to her account and download the book to her ebook management app.\*\*

\*Databases could only be tagged in general because they provide their own search engines. When viewing the details for a database, the users can read what the database covers and decide if they want to explore it further by sending the link to their accounts.

\*\*Audiobooks can only be streamed in computers because of limitations on the current system. They are not available to stream on mobile devices. Ideally, this would be possible.

**Scenario 2:**

1. A woman enters the library with her child; she often takes her young daughter to play there while she does other things.
2. She walks around the library and goes to the board. She takes two tags: sports and parenting. She wants to help her daughter become interested in sports.
3. She places the tag sports and looks around the results.
4. She places the second tag. The general results add the results of each tag.
5. She sees a book that is interesting but not tagged. She decides to add the tag for others.
6. She goes to a tagging station, see Figure 51 for reference, scans the book and writes down the tags she wants. There are no new tags so there is no need to print.

**Scenario 3:**

1. A man, around 40 years old, usually visits the library to borrow items in bulk. He examines the board and takes one: religion.
2. He browses the shelves and takes two books and three DVDs to take home.
3. While reading one of the books, he thinks of tags that he could add. He then goes to the website, searches for the book and adds the tags there. If new tags are created, they will be printed by the library staff.

**Scenario 4:**

1. An elderly user takes two or three books every time he visits the library. He likes to speak to the librarian so he goes directly to the information desk to return the books, instead of to the machine.
2. The librarian takes the books and asks him if he wants to add some tags to them. She asks him about the books are about and adds the tags.
3. He wants to choose more books. They go to the board and the librarian helps him look for something he likes.

## Analysis

The following analysis was done using the Four Space Model as basis. Descriptions of different aspects of the installation will be presented in relationship to each of the four spaces in the model.

### Interactional Space

Analysis of the Interactional Space was used to define the different actions that the user must take in order to use the installation. Different points of interaction are present in the installation. Users can alternatively explore the library using the tags and/or add new tag to the resources.

The exploration of the library always starts with the board presenting the physical tags. At this point users observe the tags and take the one(s) they wish to use. Since these are physical objects, no extra devices are needed.

Then, the user must place the tag in a RFID reader that will identify the tag and use it to return the results. The feedback should be immediate and apparent. When a tag is placed on the reader, the change should be visible, in the screen with the digital results and in the physical space.

Next, the user can explore the results. 1)The physical results are communicated with light. The user will know which resources match the search if their lights are on. They can take the resources from the shelves as they would do normally. 2)The digital results are shown in a touch screen. Here, the users can see the results. In the case of books, they can explore the content. If they want to borrow something, they can use their library card and signalize that they want a direct link sent so they can download it in their devices (phone, tablet, pc). The system must not get in the way of users wishing to search for resources in the traditional way which is why it should be possible to move the books in the shelves without interfering with the installation.

To add tags to physical items, users must approach a dedicated station, consisting basically of a RFID reader and a tablet. The tablet will give an overview of the existing tags for the item and present the option to add tags. To add tags to digital items, users must do a search in the tablet and add the tags as with the physical resources, or go to an online catalog where they can add the tags. This is done because the consumption of digital resources typically will not happen in the library.

### Social Space

Analysis of the Social Space was used to speculate about how the installation might impact users' behavior and relationships. This helps define the different opportunities for social interaction that arise when the installation is used in the library. The purpose of using the tags in the physical space is to give library users the option to create their own classification system in the library. This gives them a medium to communicate to other users what they think about the different resources in the library. It also gives people a connection to other users through the tags they can use to navigate. This connection is indirect as people do not know who added the tags. The purpose is to generate a sense of ownership and shared knowledge in the community rather than the individual.

By making the tags physical and unique, two people interested in the same tag could start a collaboration that requires them to communicate, even if silently. The results are visible to

everyone once a tag (or tags) has been placed in the reader. It is not necessary for everyone to select a tag. Instead, they can choose to navigate through the same results someone else has chosen. Alternatively, a dynamic of negotiation might arise in which people discuss together what they want to search for.

The relationship between the staff and the visitors is also expanded. With this installation, the staff could help users find resources they might like by going through the tags with them and asking questions about what they like. This resembles a practice they already have when helping people find information but with the support of the system instead of relying only on their own memory.

The tags that have been created also give the staff more information about what the library visitors like the most; thus, giving them more information about the type of resources they should be acquiring for the library.

### **Physical Space**

Analysis of the Physical Space was used to explain the thought process behind the key physical elements chosen for the installation. The setup is meant to augment the physical space with some characteristics from the digital space. Searching the database is taken out of the screen and put in a format that can be used to navigate the physical space. By creating a representation of the digital space in the physical space, a connection between the digital library, generally represented by the library's website, and the physical library, embodied by the building, is presented to the user.

Tags and tag clouds are commonly used on blogs and online archives. Transferring them to the physical space is a way of making them more tangible and present for the users. The option of adding tags to the resources in the library exists in their online platform already but it is not used, presumably because there are no perceived benefits in doing so. Having a tangible application for them creates a benefit for the users.

The tags are physical in order to provide an experience independent from the presence of a computer or mobile device. By placing the tags in the reader, the results are shown in the physical space instead of in a list of search results. Digital results also take shape in the physical space by allowing the user to view them and select them in a way that resembles how they explore physical content.

### **Digital Space**

Analysis of the Digital Space was used to present selection of technology and constraints that originate from the way the digital library operates. The main communication device is RFID tags, which are present in all the physical resources in the library already and will be used in the tags. RFID is a very accessible technology and library users, specially the staff, are already familiar with it.

The tagged resources will include: [physical] books, audiobooks, magazines, DVDs and music. [digital] ebooks, e-audiobooks and databases. The purpose is to raise awareness of the digital resources, signalizing that they are part of the library as well.

Technical constraints: Different conditions are required to use the digital items. External software (adobe digital editions and some mobile apps) exist to read ebooks, audiobooks may only be streamed from the eLib site and databases require a browser and the login from the library, plus certain databases are only accessible in the library's network.

## User feedback

The aim of this activity is to confirm my objectives and expectations from the installation. I want to estimate the overall impact on the system on how people experience the library. Specifically, I would like to assess the impact of introducing the tags in the relationships between the users, their sense of ownership over the library and their willingness to collaborate. Furthermore, I would like to evaluate how the crowdsourced classification system affects the way visitors navigate the library. Finally, I want to determine if the installation helps in making people more aware of the digital resources and in establishing a meaningful connection between the digital and the physical spheres of the library.

## Plan

Objectives:

- Evaluate the possible effects of the crowdsourced classification system in the way visitors navigate the library
- Assess the impact of the installation in making people more aware of the digital resources and establishing a meaningful connection between the digital and the physical spheres of the library
- Assess users' willingness and interest in collaborating with the creation of the tags

Participants: Library visitors and staff at Hisingen's Library

Toolkit:

- Video explaining the concept (See <https://vimeo.com/69707521>)
- Questionnaire for each participant (See Appendix I)

Activities:

1. Show the video explaining the concept.
2. Question participants regarding how they think the installation will affect the library based on the objectives above and what they consider to be the most important contributions from the installation.

## Execution and results

Getting straightforward answers from the interviewees was difficult because the full implications of the concept were not completely clear for them. Further explanations were needed after showing the video in most cases, which means that the video could have been clearer. It was planned from the beginning to allocate time for questions from the participants because it was very important that the concept was understood before moving on to the questionnaire. However, I got the impression that it was difficult for many people to imagine what was being shown implemented in real life, which might have hurt their ability to assess its possible effects in the way the library is used.

The questionnaire was designed to collect people's opinions regarding their overall acceptance of the idea, how it would impact the way they navigate the physical library, their usage of the digital resources and their willingness to contribute by adding tags. It featured mostly open-ended questions, which was necessary due to the nature of what I was looking for. However, it resulted in many unsure or ambiguous responses since many people seemed worried that they were giving 'wrong' or 'unhelpful' answers. Keeping in mind these limitations, I think the feedback is useful to measure how library users would react to the installation, at least in the beginning.

Regarding people's acceptance of the concept, I noticed excitement over the prospect of introducing more technology in the library. Some people thought the idea was intriguing and said that they could envision themselves using it, at least sporadically. However, there was a great deal of indifference and aversion to the idea, especially from older users. People reacting in this way remarked that it looked interesting but probably not for them, stating things like "I prefer real books", in relation to the screen with digital results. This can be related back to an issue discussed during the workshops about the divide between long-time users of the library who want it to stay just as it is and other users open to change and how the library should accommodate both groups.

There was concern from staff members that people would be afraid to use the installation. Staff members who were being shown the concept for the first time thought that people would have problems using it and that it would be too complicated to learn. However, in the questionnaire section 5 (Appendix I), in which people were asked to rank the installation according to certain adjectives, more responses leaned towards easy and clear, rather than complicated and confusing. There is no doubt that there is a learning curve that will depend on the person's familiarity with different technologies and with the same digital services offered by the library. Nevertheless, I think that fear would diminish with time if this was to be implemented.

Another interesting observation from section 5 in the questionnaire is that the opinions were divided regarding if they thought the experience of using the installation would be impersonal or personal. On one hand, the impersonal qualifier might be due to the use of computers rather than direct contact with the staff. However, some people considered it personal which might be due to a perceived level of customization and its reliance on other people's input. Perhaps it would be necessary to make the community aspect more apparent to get over the perception that this creates an impersonal library, since one of the objectives is to foster people's sense of ownership over the library.

In terms of how the installation would impact the way people navigate the library, the people who said they would use it considered it useful because they could narrow down what they search in the shelves. They thought that this would make it easier to find resources that were relevant to them. Two possible situations of use were highlighted: a practical one, to find information on specific subject; and a recreational one, for people to play around when they have free time. The practical application was noted more often, although it bears mentioning that the usefulness of the tags is very dependent on the judgment of the users when creating them.

It bears mentioning that reading material and audiobooks, which could be grouped with reading material, seemed to be considered more suitable to include in the search results than films, games and music. Even though the purpose of the installation is to support the exploration of all the resources, this is an important observation because not all resources are used and searched for in the same way.

Motivating people to add tags would be the most challenging aspect for the success of a system like this. Most people were doubtful that they would have the time to create tags for the installation. I think the adoption of the featured might be slow as people realize that their contributions make the overall experience better. The possible benefits of community participation in this context seem to be hard to identify by library users upon first impressions since they only appear to be taking time in consideration when

giving their answers about creating tags. An alternative option is to create a pool of topics without requiring user input, relying on the expertise from the staff. This, however, would remove features that are important to the objectives of the project.

In general, people thought this would make them more aware of the digital resources, although they were hesitant to say that it would make them use the digital resources more. None of the people I surveyed identified as users of the digital library and regarding online services, most were only familiar with search and reservation. I think increase in use is a factor that can only be measured over time. By being exposed to the digital resources more often, library users might start seeing them as a more attractive option. Increasing the use of the digital resources is not an objective of this installation on itself; the objective is giving people a clear map of all their options regarding the resources of the library, which it appears to fulfill by giving digital resources more visibility.

Finally, section 10 in the questionnaire was used to rank the objectives of the installation according to people's perception of importance. The following are conclusions from this section:

- The exploration of all types of resources was generally considered the most important aspect.
- Influencing the content of the library was considered of medium importance, however, many people admitted that they had not thought about it before.
- Using other people's opinions was consistently considered more important than sharing opinions. This goes in hand with answers to sections 8 and 9, in which people expressed more interest in using tags created by others as a means of getting recommendation than creating tags themselves because of the time factor discussed above.
- Attracting new people seems to be of little relevance to library users. On the other hand, as it has been stated in earlier sections, it is of great importance to the staff.
- The idea of connecting the physical and digital libraries was not considered as important. However, I believe this connections is necessary to ensure the exploration of all types of resources that was ranked as very important.

# 5. Results

## Library Tags: Interactive installation to drive new library experiences

For a better understanding of the concept, I recommend viewing the concept video at <https://vimeo.com/69707521>.

Two core activities can be done in the installation: Exploring resources and tagging resources. To browse the content, the user must select a tag and use it to get results in the library space. The tagging of the content is done by the users themselves. When doing so, they can select one or more words that they feel represent one particular item and assign it using the tagging stations or the library's website.

The objective of the installation is to enhance the experience of using the library by giving users the opportunity to:

- Explore and experience all the content of the library by transferring elements from the digital to the physical space
- Make library an evolving place that adapts to the views of the users
- Influence the structure of the library by applying their own classification system
- Connect to other library users through everyone's contributions
- Participate in decisions about the content acquired by the library

The components of the installation are as follows:

### Tag board with 60 physical tags



Figure 52• Tag board

The board should be displayed in the entrance of the library since it is the first element users should approach when using the installation. Users can view and grab the tags and move on to place them on the reader.

The tags will be curated by the library staff on periodical basis, in order to manage the growing number of tags. Since new tags are expected to be created over time, it is important to rotate them to ensure that the content remains interesting and fresh for visitors.

The board is a metal base to collect the tags. The tags consist of plastic rectangles, 20x6cm, with RFID tags to store the label name, the printed name on the top and magnets to attach to the board.

### Tag reader



Figure 53• Tag reader

One selected tag should be placed in the reader in order to get results. Users can also scan the books and make a search for all the items that have the same tags. Explorations with multiple tags and multiple users have been left for potential future work.

The tag reader consists of a RFID scanner to identify the tag, which connects to the database and performs the search.

The search results will appear in the library in two ways: digital results will appear in screens and physical results will be marked in the shelves using lights.

### Digital results screens

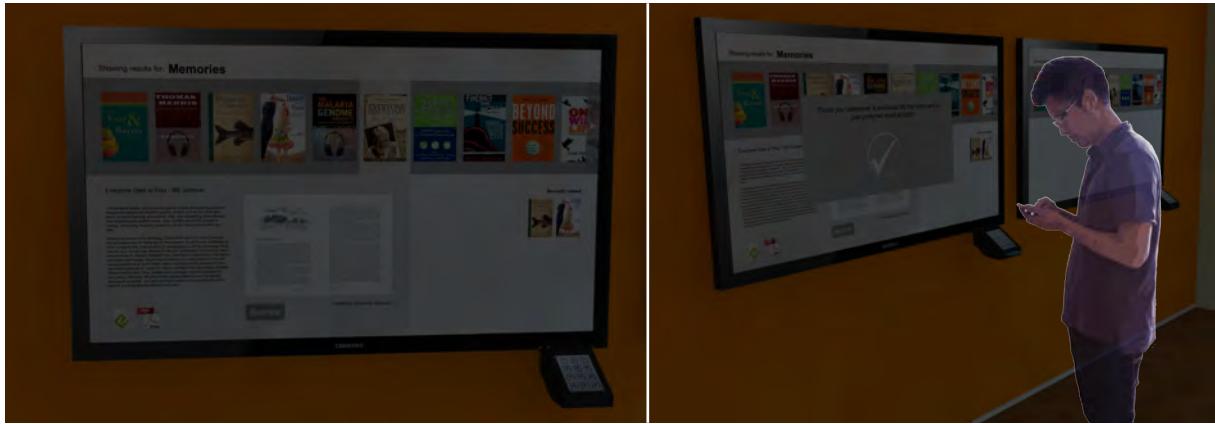


Figure 54• Digital results

The digital results include ebooks, audiobooks and content from the online databases. Users can view information about the resources (e.g. description, date of publication, etc.), browse the content of the ebooks and send direct links for what they want to borrow through their library accounts.

The results' screen shows all the digital items and a library card reader allows for sign-in to send link to items. The user receives an email from their library account so they can access eLib and download the ebook or stream the audiobook.

### Shelves with lights for locating items



Figure 55• Physical results

The physical resources are displayed with lights on the shelves, letting the users know the locations of the items that match their search. The setup for the shelves is envisioned as a combination of RFID readers and pressure sensors to detect the location of the books and LEDs to signalize the location to the user; however, this setup needs to be developed further to make sure that it works properly.

## Tagging stations and library's online catalog

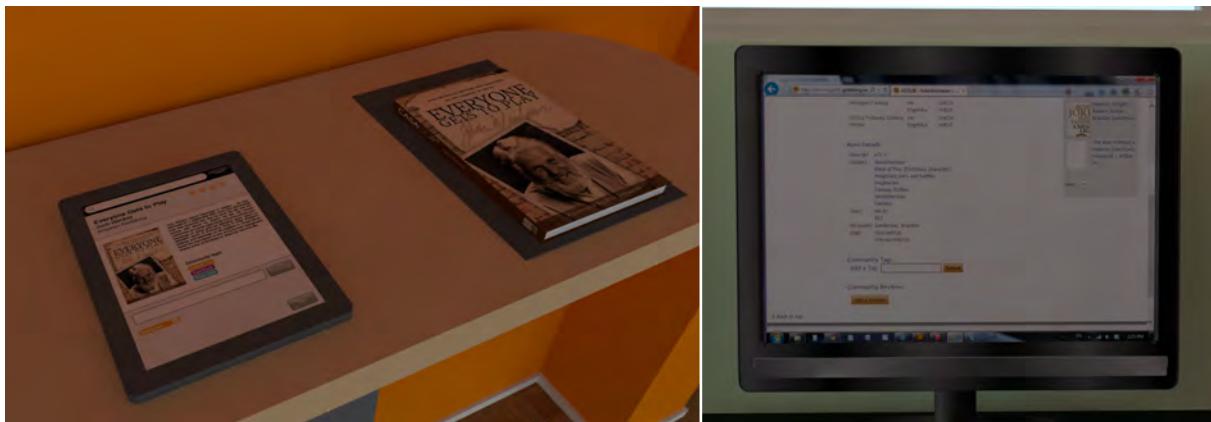


Figure 56• Tools for adding tags

In order to add tags to an item, users may use the tagging station at the library or use the website from outside the library, adding community tags.

A tagging station consists of a RFID reader to identify the item and a tablet that shows the information of the item and allows the user to add new tags if they wish to. The application in the tablet also allows searching for specific items in case the person wants to tag something digital or that they do not have at the moment.

The library staff will print the new tags and codify the RFID tag. Then, they will be added to the rotation. New physical tags will be created by the library staff in order to manage issues of duplicates. This will also help in the management of the periodical selection of the tags.

## Recommendations for the design of interactive installation for public libraries

The lessons learned during the process have been summarized in two sets of recommendations aimed at answering the research question formulated at the beginning of the project:

**How can interactive installations enrich the experience of public library users by bringing together the physical and the digital space?**

## Recommendations for strategy and concept design

The recommendations for strategy and concepts design attempt to support design and librarianship practitioners who wish to explore the possibilities of incorporating novel ways of experiencing digital resources and services within the physical library.

### 1. Support exploration of the entire catalog

Public libraries have several types of resources available to their users. Currently, they are struggling to make ebooks and e-audiobooks more available as the legal constraints are discussed with major publishers. Furthermore, specialized databases on different subjects are available. Unfortunately, the visibility of these resources is very limited in public libraries. It is important for public libraries to raise awareness of the availability of

these kinds of materials. On the other hand, it is important to support the entire catalog, placing equal value on physical and digital resources. It is then up to the user to define the value each type of resource has for them.

A good way to merge the experience of the digital library with the physical library is making what happens in one space have an effect in the other one. For instance, creating tags for resources is a current feature in the online platform of the library. However, this feature is seldom used because users do not perceive benefits from it. In the installation designed during this project, users are able to add tags to all types of resources and use them to locate them on the physical space. By creating a new, perceivable effect of using functions from the digital library, a connection is formed between all users across all platforms, which unifies the image of the library.

A key step in supporting unification of physical and digital space is to make digital materials easier to access. The observed obstacle for easy access to digital materials is that, due to their nature, users need devices to retrieve them. Adding to that the process of signing in and going through user agreements and the wall gets ticker and ticker. I propose, with the installation and as a general guideline, to make these digital resources and services more tangible and reachable in the physical space. The exploration of the digital resources in the physical library has the potential to be as easy as browsing books if elements from the digital space are transferred into the physical space. This gives users independence from their computers when viewing the digital library and gives it more opportunities to be placed in the consciousness of the users.

## **2. Balance the integration of new technologies with traditional library services**

On the opposite site of the spectrum, it is essential to make sure that the new elements being introduced do not alienate the current users of the library. Many users appreciate and welcome the possibilities offered by technology but not necessarily want them to permeate every aspect of their library experience. In this sense, in order to maintain a public library that is welcoming to all sections of the community, it is important that these new services are optional, giving users the opportunity to choose if they want to adopt them or continue to use the library as they have been doing so far.

## **3. Consider the users' plans and patterns when visiting the library**

Different user groups have different needs that can range from quick five minute visits to long evenings. However, it was often pointed out during the workshops that people generally have plans when they go to the library and preferred patterns for how they direct their visits. Since users often have a plan, it is important to consider how what they can do with the installation fits in their plan. The objective should be primarily to fit the user's goals. Enjoyment should be considered as a secondary objective; otherwise people will not use it since it will be a detour from their goal, not an aid to achieve it.

## **4. Provide tools for autonomy while making help available and visible**

One important aspect that came up often during the discussions with the library staff is how many of the users need or prefer help from the staff even when self-service is possible. On the other hand, certain types of users do prefer to navigate the library on their own. Considering the range of library users, it is important to provide a space that supports people who need help from the staff as well as people who prefer to explore the content by themselves. The ideal would be a space that informs users about all their options; seamlessly showing the way around but facilitating assistance when needed.

## **5. Give users agency over how the library is classified and which content is acquired**

Creating a library environment that people can influence is important because it gives them a sense of ownership. The way the resources in the library are classified is static and may not adhere to the way people think when looking for something. With the use of interactive systems, it is possible to create an evolving classification system that adapts to what users want and consider important. In addition, giving users a way to express what they think is important in the library, for instance favorite subjects or popular themes, also gives them a way to participate in decisions about the content acquired by the library since the library staff can use the information they collect to make informed decisions about what the users want.

## **6. Create means for indirect social interaction**

Users naturally leave information behind for others in the library, such as a book left behind or a marked page. These traces are important because they inform people about what others are doing and create a subtle connection. Through explicit but indirect means of communication between users, it is possible to foster a sense of community without breaching their privacy and integrity. Playing with these elements creates the opportunity for the emergence of new patterns of interaction than can make the library a more dynamic and interesting place for users.

## **7. Create new reasons to visit the physical library**

The library is a place to get information and the shape the information takes depends on the user and the experience they want. However, the importance of the library cannot be centered only on access to information anymore. Through interactive installations like the one designed during this project, the intention is to create a library environment that is changing and adapting to what users want, adding a layer of value over the resources they provide. It is not only about information; it is about information and the connections that are formed around it.

# **Recommendations for tools and methodologies**

The recommendations for tools and methodologies are based on my experience during the different phases of the project trying to ensure an accurate and complete view of the needs of the library users.

## **1. Observe and analyze all physical and digital aspects**

The first stage of the project was focused on studying the current state of the library in order to identify strengths and opportunities for change. Considering that the driving argument for this Master Thesis is that the physical and digital spaces of the library are equally important part of its identity, it was crucial to make sure that the analysis for both spaces was thorough. A careful observation of online and offline services was made in order to discover interesting ways in which they could be connected. Giving the same weight to both physical and digital aspects of the library during the research and subsequent phases was important to widen the pool of ideas.

## **2. Pay attention to different ways of using resources they already have**

During the design process, it became apparent that many interesting services and resources are underused in the library. Identifying these aspects can be a great source of inspiration for the generation of concepts.

### **3. Use engaging activities to collect opinions from the staff and users**

During the different activities, the most useful insights and discussions came about when the participants were engaged and having fun. This is, of course, not a new idea but it is worth mentioning because it is easy to forget this and plan activities that can be intimidating instead. For instance, the final feedback activity was less engaging than the previous workshops partly because of the open-ended questions and formal interview-like format. The workshops were treated more like games and participants felt at ease sharing ideas.

One aspect that proved helpful to achieve this engagement during the workshops was the use visual means that they can move around while discussing ideas. During the discussions, provide images that they can relate to the library to focus the conversation and make sure that everyone follows. This will also help in stimulating new ideas and maintaining the flow.

### **4. Take advantage of the knowledge of the staff**

The benefits of relying on expert knowledge in design are often highlighted. In the case of the library, the members of the staff are the experts, even more so than the visitors. When designing for public libraries, use the knowledge of the library staff in order to get to know the users and focus the design process on what they really need.

## **Creativity cards method**

During the project, I worked with different sets of cards that served as reference and inspiration during the workshops and other ideation activities. The cards summarize different elements present in the library (shelves, chairs, etc.), types of media (books, magazines, DVDs, etc.) and available technologies, along with key use objectives for each stage of the project and pictorial representations of users of the library.

Based on this, I would like to propose a method that consists on the creation of cards specific to the context of the design intervention to provide all stakeholders with a common language that they can refer to when studying a particular context, generating new ideas and analyzing existing ones. The cards used during this project are only valid in the context of public libraries. However, I think that other projects focused on user participation could benefit from providing concrete tools like this one during group discussions.

The use of the cards provided several benefits during group activities. They served as visual aid that the participants could refer to while discussing ideas during the workshops. In addition, they provided a common language and ensured that everyone was following the discussion. Finally, the use of the cards was beneficial by stimulating new ideas and maintaining the flow.

## Cards

There are three general types of cards. Not all types all cards might be needed for one activity. The phase of the design process and the expected outcome of the activity are relevant to decide which cards could be useful.

### Context specific

The context specific cards (Figure 57) contain elements related to the space or domain that will be affected by the design. In this case, the context was public libraries and the cards in this category included library elements, types of media, users and current state, which were meant to be populated by the workshop participants. The creation of these cards requires a study of the context to identify the different elements. Items like furniture, for example, are not necessarily relevant in every case.



Figure 57• Context specific card sets

### Project specific

The project specific cards (Figure 58) depend on the objectives of the project and the activity at hand. For instance, for the first workshop this category included explanations of the concepts, objectives for the workshop and questions to answer during the workshop. The objective of the first workshop was to explore the library environment further, to evaluate the possible impact of the proposed concept and to generate new concepts, which is why the cards were general. The second workshop was focused on one concept; therefore the cards included objectives for the concept and actions that could be performed when using the installation.



Figure 58• Project specific card sets

## Field specific

The field specific cards depend on what the object to design is. In this case, we were working towards the design of interactive installations which is why I chose to use technology cards that would let the participants know which options existed and what could be accomplished. For the second workshop, I added sensory information to this category to inspire participants to think of different mediums for input and output of information in the installation. This category could include materials, for instance, if the project called for it.

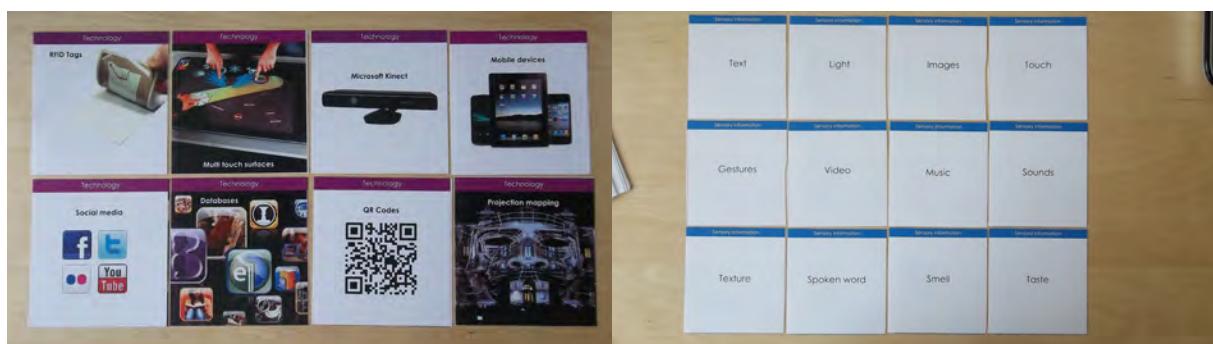


Figure 59• Field specific card sets

## Applications

The cards have several possible applications depending on the phase of the design process. They can be employed to understand the context by using them to guide discussions along with the stakeholders. In this case, they give all participants a common language and images to reference. It is important to remember that there is always potential to improve and expand the sets of cards. If new items arise during the discussion, they should be added to enrich the understanding of the field. This will prove beneficial later when they are used for the generation of ideas.

In the ideation phase, they can be used as inspiration. For example, one of the activities in the first workshop focused on reviewing library elements, types of media and technology and visualizing how they could be modified or adapted in order to achieve the overall goals of the project. Furthermore, having the cards during the workshop compensated for the lack of sketching in the group. Participants were more at ease explaining their ideas when they had an approximate representation at hand that they could “modify with words”.

In addition, they are useful tools in activities such as storytelling to create scenarios and explore possible user behaviour when using a product or system. For example, using user cards as a starting point, scenarios can be created which map different points during the interaction in which the users must make a decision and the effect this decision might have in the experience. Different user cards represent different types of users with different motivations and all participants can contribute with their ideas of what could happen next and why. This format was used for the second workshop and helped define different features of the installation.

The outcome will vary depending on the activity. In this project, activities employing the cards yielded as results a broader understanding of the context and users, new concepts and specifications for existing ones and use scenarios for the concept being developed.

# 6. Discussion

## On the concept

The exploration during this project had several objectives that answered to different issues observed in the library and its users. I wanted to create concepts that would encourage users to explore all the resources of the library and inspire them to re-think what the library has to offer and how they experience its content. Furthermore, the concepts were aimed at creating a connection among library users and encourage them to participate and influence the library's content and operations. Finally, one of the main goals was to create a space where non-users would feel welcome. These objectives were summarized in the Key Use Objectives that were used as a guide during the generation of alternatives.

The six concepts discussed during the second stage of the project had each a different approach to the objectives. For example, some focused on supporting current library services, while others addressed the possibilities for creating social connections in the library. The final concept was selected because it was the best fit for the priorities of the library staff, which were an important source of feedback. The concept that has been developed during this project, along with the initial proposals and all alternative features presented during the workshops are meant to illustrate the possibilities of incorporating alternative means of interaction in public libraries.

From the initial concept for an installation that allowed the users to browse the library with user generated tags, what resulted was a fairly complex system with several interconnected elements, which made a big challenge out of maintaining consistency among all parts. During the development, considerable effort was put in outlining technical details of the installation, even when the implementation was not part of the project. This was done to show that implementation is possible. Nevertheless, the interaction and dynamics

that might surface in the library are the most important aspects, which is why some details were left undefined. It is worth mentioning that a number of decisions regarding implementation are better suited for professionals in other disciplines.

There are several expected outcomes from the use of the installation, which have been discussed at length during the third stage. One of the most important ones is how the transference of digital elements creates new affordances in the physical space. These affordances, namely the physical tags, the display of digital results and the lights for the results in the shelves, can be used to support the classification system in the library, enhancing the signs and search system that are often confusing for visitors. The installation makes use of physical space and physical pieces, graphical interfaces and mobile devices. The whole library and everything connected to it becomes part of the experience of the installation.

However, it is important to note that the current classification system is not meant to be phased out. The system proposed in this installation is meant to work on top of the existing classification system to add a level of participation from the side of the users. Organization from the part of the librarians would, of course, still be necessary. The tags will not rearrange the library but serve as tools to find items in the space. This complementary role also serves to create a balance between the integration of new technologies and the preservation of a more traditional library that does not alienate current users. The importance of this balance was emphasized repeatedly throughout the design process, both by the staff during the workshops and by the library users interviewed during the feedback activity.

This supportive classification system would also serve to give users a feeling of ownership over the library. It has been noted before that one of the current online services for the library is a platform that allows users to add community tags, which is seldom used. The purpose of using the tags in the physical library is to give people a way of seeing the effects of their contributions and thus motivate them to participate. The sense of ownership is expected to build up with time, as well as people's interest in contributing with tags of their own. Even if they are not inclined to create tags from the beginning, it should become apparent that the experience of using them for search becomes better if people contribute and if they do so in a conscious way.

The installation would also allow the staff to predict what the users want to see in the library. The staff could get important data from fast growing tags and commonly used tags, which could inform them on topics that are popular among the users. This empowers the users in the process of selecting the materials of the library.

The expectation is that it would make the library easier to navigate and that it would give new tools to prioritize the content when browsing the library. With this system, they can narrow down according to current interests without looking at a specific item. It also integrates the digital resources in the space and effectively makes them discoverable in the physical space. The potential for enhancing the navigation of the physical space and supporting discoverability of the digital resources was supported during the feedback activity by the participants. It was generally accepted that the design could successfully assist in finding relevant resources and in making people more aware of the availability of ebooks and e-audiobooks.

If we consider the impact on interaction among users, as I have said before, this installation would create a dynamic of indirect social interaction in which all users are connected through what they search and what they tag but without making direct contact with each other. These kinds of interactions are characteristics of libraries. Björneborn (2011) has studied them in what he calls behavioral traces. In this case, the installation is facilitating indirect user-to-user mediation that allows users to communicate personal ideas about the resources they use. On the other hand, more direct interactions may arise. For example, users might feel the need to deliberate about which tags to place in the reader since all current visitors will be affected.

The relationship between the visitors and the staff is also important to explore. As it was unveiled during the first workshop, one of the main strengths of public libraries is the availability of their staff. The purpose of this installation, or the one of any new artifact created for libraries, should never be replacing the staff. Rather, the aim should be to work with them and support the different tasks of attention to visitors that they perform.

The ideas of using the installation to help children select content and to help the elderly share their opinions with the community are examples of how this installation could be used to support work they already do with the help of new models of interaction. In the case of children, the basic concept of the installation could be used to create a system to aid children when deciding what to read. A system like this for children would not necessarily be about them creating the tags but about librarians assigning the tags that children can later use to find what they would like to read.

## **Limitations**

Several obstacles arose during the development of the concept that are worth keeping in consideration when evaluating its feasibility. I took these limitations in consideration as much as possible during the project but attempted to look pass them during the generation of the concepts to avoid hurting the quality of the ideas. These issues are listed below:

- Floating system – Since all libraries in Gothenburg share one book collection, the resources in each of the libraries are always changing. This is generally positive since people in one community are not limited to what their local library has. However, the implementation of a system like this in one library would mean that the amount of items that needs to be tagged exceeds the capacity of the users using the system.
- Licensing of ebooks - The tight constraints on the licensing of the ebooks would make it difficult to create an interface in which users can swiftly explore the content of the books. This feature in the installation is assuming special permission to display the books inside the library accompanied by the need to present the library card if the person wishes to read the book elsewhere, as it happens with the physical books.
- Streaming of audiobooks – To ensure a consistent experience it would be ideal if users were able to stream audiobooks on their mobile devices using direct links sent from the digital results screens in the library. However, E-Lib does not allow this and it is only possible to stream the audiobooks directly from their website. As with the previous item, the inclusion of this feature would assume a modification in the licensing terms of the company providing the service.

- Use of databases - The inclusion of the databases in the results also poses challenges. It is not possible to tag particular entries on each database as they operate individually and each requires different search parameters. In addition, some of the databases are not available at Hisingen's Library. Several of the databases are too specialized to be of general interest or to inspire people to add tags to them in general. An option could be to integrate a 'You might also want to check' link or button on the interface in the library that informs users about the existence of databases, which is needed to increase their use.

## On the methodology

An in-depth analysis of the physical and digital space of the library was the first major step in the design process. At the same time, the literature review was ongoing and the observation of users' activities in the library served as confirmation for observations presented in works such as Aabø, Audunson & Vårheim (2010) and Aabø & Audunson (2012), in which people's motivations for using public libraries are discussed at length. In this case it was important to analyze not only the physical space but also all their digital outlets and services. The analysis of the digital space showed that a lot of features are not being taken advantage of and publicized, which was important to know which elements could benefit from more visibility in the physical space.

The most valuable outcome from the first stage was the Key Use Objectives, which outlined what I expected to accomplish with the concepts that would be generated in the next stage. For the different concepts, the strategy was to give more or less weight to each objective while trying to consider as many as possible. The concepts would also serve as discussion triggers for the participants during the first workshop.

With the workshops the biggest challenge was to create activities that would ensure the fluidity of ideas. This proved difficult during the first workshop because the participants adopted the solutions that were presented and had few ideas that could be transformed into new concepts. This was an expected danger but I chose to bring my own ideas to the workshop to make sure that the type of ideas that we were looking for was clear, as the participants were unfamiliar with Interaction Design.

Nevertheless, the workshops were successful when used for evaluation and analysis of the ideas. The feedback I got related to the concepts and the problems that I had identified was very useful. The library staff knows a lot about their users and about how the library operates and they are able to envision how something that is presented to them would impact the library. The second workshop was used to expand the final concept for the installation and the exploration of the different elements and different types of users was pivotal for deciding which features would be included in the final design.

Working with the library staff was incredibly valuable because they have knowledge of their visitors that would be impossible to get with such a short period of study. While I had my initial assumptions and conclusions from the initial observation phase, sharing my ideas with them expanded what I knew and corrected misconceptions that still existed at that point of the project.

An important tool during the workshops and my individual activities during the refinement stage were the creativity cards. The first iteration of the cards was developed for the first workshop in order to provide visual aid during the discussions. The idea was to use them to guide conversations as reference by, for instance, pointing to a shelf instead of drawing one. Using the cards compensated for the lack of sketching in the group, which can sometimes be intimidating for participants. Without the cards, people would just talk while referring to invisible objects. With the cards, there is a reference and people are better equipped to follow the conversation. For the second workshop, the cards were used for storytelling in order to create scenarios and explore possible user behavior when using the installation.

Even though their use was limited during that first workshop the cards served as valuable reference material during the project in order to ensure that all aspects of the library and the project goals were being considered. In my opinion, this highlights the usefulness of concrete visual aid during ideation and could be an effective tool for continuous ideation in teams. The cards were especially used as inspiration by going over the library elements, types of media and technology and visualizing how they could be modified or adapted in order to achieve the overall goals of the project.

It is important to note that, even though user feedback was procured for the concept in relationship to the objectives, opinion-based feedback might not be reliable to measure people's acceptance of the different aspects of the concept. For instance, the possibility to explore the library using the tags was received with more enthusiasm than the possibility to create tags for the resources. In this case, people were giving their opinion based on how they currently use the library. Evidently, in order to accurately measure if the feature would be adopted, prototyping and testing is required.

# 7. Conclusion

The purpose of this master thesis was to explore how Interaction Design, in general, and interactive installations, specifically, can be used to enhance the experience of public library users. The main driving theme being the unification of physical and digital spaces of the library in order to create a well-rounded experience that takes advantage of the possibilities brought on by the latest technologies.

As it was stated in the beginning, libraries are evolving and various efforts are being made around the world to make sure that they continue to provide relevant, useful and stimulating content to the communities they serve. I believe it is important to point out that the intention has not been to prove that technologies can be incorporated in libraries for the sake of promotion or marketing. More accurately, it has been to explore the possibilities of linking two elements generally perceived as incompatible; libraries, with their ancient connection to knowledge, and digital technologies.

The work done during this master thesis yielded two main results: a concept for an interactive installation that establishes a connection between physical and digital space and concrete recommendations to guide future interventions in the library space. The concept was developed for and with Hisingen's Library in Gothenburg, Sweden. The development of the project started with a careful analysis of the physical and digital dimensions of the library, followed by the creation of several concepts that were later evaluated and narrowed down through workshops with the library staff.

The purpose of framing the design solution as an interactive installation was to break free from the exclusive use of screens to convey digital information by integrating it on the physical space. Furthermore, the objective was to find physical means to manipulate digital information that blended with the context of the library in more significant ways

than conventional input devices. In this sense, the final concept, as well as the initial alternatives, serve as a re-imagination of the experience of exploring the content in public libraries without losing the positive aspects of traditional libraries.

The lessons learned during the process were summarized in recommendations with the purpose of answering the research question '**How can interactive installations enrich the experience of public library users by bringing together the physical and the digital space?**' Recommendations for strategy and concepts design are aimed at supporting design and librarianship practitioners who wish to explore the possibilities of incorporating novel ways of experiencing digital resources and services within the physical library. The recommendations for tools and methodologies, on the other hand, are based on my experience during the different phases of the project trying to ensure an accurate and complete view of the needs of the library users.

It is important to keep in mind that the design alternatives explored during the project are not meant to be taken as absolute solutions but as examples of how the process can be applied to the context and conditions of public libraries. For this reason, a variety of possibilities were taken in consideration and discussed along the way. Moreover, the recommendations presented in the 'Results' section are aimed at guiding professionals interested in similar interventions by compiling the lessons learned during the process in an approachable format. These recommendations not only admit but could greatly benefit from further expansion.

In addition to the design alternatives and recommendations, a method for participatory activities has been proposed, in the shape of creativity cards, which were used since the initial workshop and refined along with the concept. Even though the initial objective of the project was not the creation of new design tools, the use of the cards generated important results by facilitating communication between participants and widening the understanding of the context at hand.

I believe that, in order to stay relevant, libraries need to establish a culture based on providing novel experiences that help users expand their knowledge. It is not enough to offer the latest best-sellers in the shelves or to host monthly author readings. People of all ages and segments of society rely on public libraries as extensions of their home/office and as spaces to develop their social lives. Modern libraries are expected to be vibrant, inspiring and up-to-date with technology, which is why the exploration of new alternatives needs to be continuous and receive as much input from library users as possible.

# References

Aabø, S. & Audunson, R., 2012. Use of library space and the library as place. *Library & Information Science Research*, 34(2), pp.138–149.

Aabø, S., Audunson, R. & Vårheim, A., 2010. How do public libraries function as meeting places? *Library & Information Science Research*, 32(1), pp.16–26.

Aarhus Municipality, n.d., Urban Mediaspace Aarhus. Available at: <http://www.urbanmediaspace.dk/en/project> [Accessed May 14, 2013].

Back, M., Cohen, J. & Gold, R., 2001. Listen reader: an electronically augmented paper-based book. In *Proceedings of the SIGCHI Conference on human factors in computing systems*. CHI'01, pp. 23–29.

Besser, H., 1998. The Shape of the 21st century Library. In M. A. Thomas, P. Ensor, & M. T. Wolf, eds. *Information Imagineering: Meeting at the Interface*. Chicago: American Library Association, pp. 133–146.

Bjørneborn, L., 2011. Behavioural traces and indirect user-to-user mediation in the participatory library. In *Proceedings of ISSOME 2011, International Conference on Information Science and Social Media*. Available at: [http://pure.iva.dk/ws/files/31329686/Bjorneborn\\_2011\\_preprint\\_Behavioural\\_traces.pdf](http://pure.iva.dk/ws/files/31329686/Bjorneborn_2011_preprint_Behavioural_traces.pdf) [Accessed April 4, 2013].

Campbell, J., 2006. Changing a Cultural Icon: The Academic Library as a Virtual Destination. *EDUCAUSE Review*, 41(1), pp.16–31.

Campos, P., Dória, A. & Sousa, Magno, 2009. Interactivity for Museums: Designing and Comparing Sensor-Based Installations. In T. Gross et al., eds. *Human-Computer Interaction-INTERACT 2009*. Berlin: Springer Berlin Heidelberg, pp. 612–615.

Civic Agenda, 2012. *Libraries, eLending, and the Future of Public Access to Digital Content*, Available at: <http://www.ifla.org/node/7447>.

Courage, C. & Baxter, K., 2005a. Affinity Diagram. In *Understanding Your Users: A Practical Guide to User Requirements Methods, Tools, and Techniques*. San Francisco: Morgan Kaufmann, pp. 714–721.

Courage, C. & Baxter, K., 2005b. Interviews. In *Understanding Your Users: A Practical Guide to User Requirements Methods, Tools, and Techniques*. San Francisco: Morgan Kaufmann, pp. 246–311.

Croci, V., 2010. Relational Interactive Architecture. *Architectural Design*, 80(3), pp.122–125.

Csikszentmihalyi, M. & Hermanson, K., 1995. Intrinsic Motivation in Museums: Why Does One Wants to Learn? In J. Falk & L. D. Dierking, eds. *Public institutions for personal learning, Establishing a research agenda*. Washington, DC: American Association of Museums, pp. 67–77.

Cuello, A. & Raats, K., 2013. Design opportunities for academic libraries. In *9th Student Interaction Design Research conference (SIDeR'13)*. Aarhus, Denmark: Aarhus University. Available at: <http://sider2013.au.dk/fileadmin/sider2013/0107-paper.pdf>.

Eriksson, E., 2013. *Intertwine and Play: Techniques and Tools for Multi-Scaled Interaction design-Experiences from Public Library Space*. Chalmers University of Technology. Available at: <http://publications.lib.chalmers.se/publication/174220> [Accessed April 3, 2013].

Eriksson, E., 2010. U.F.O.scope!: families playing together at the public library. In *Proceedings of the 8th ACM Conference on Designing Interactive Systems*. Aarhus, Denmark, pp. 344–347.

Eriksson, E. & Lykke-Olesen, A., 2007. StorySurfer – A Playful Book Browsing Installation for Children's Libraries. In *ACM Conference Proceedings of Interaction Design and Children '07*. Aalborg, Denmark.

Fischer, P. et al., 2013. Beyond Information and Utility: Transforming Public Spaces with Media Facades. *Computer Graphics and Applications, IEEE*, 33(2), pp.38–46.

Follmer, S. et al., 2012. People in books: using a FlashCam to become part of an interactive book for connected reading. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*. New York, New York, USA: CSCW '12, pp. 685–694.

Fox, M. & Kemp, M., 2009a. Introduction. In *Interactive Architecture*. New York, NY, USA: Princeton Architectural Press, pp. 12–21.

Fox, M. & Kemp, M., 2009b. Adaptable Space. In *Interactive Architecture*. New York, NY, USA: Princeton Architectural Press, pp. 94–105.

Given, L.M. & Leckie, G.J., 2003. "Sweeping" the library: Mapping the social activity space of the public library. *Library & Information Science Research*, 25(4), pp.365–385.

Gonçalves, L., Campos, P. & Sousa, Margarida, 2012. M-Dimensions: a Framework for Evaluating and Comparing Interactive Installations in Museums. In *NordiCHI 2012, Nordic Conference on Human-Computer Interaction*. Copenhagen, Denmark, pp. 59–68.

Halskov, K. & Dalsgård, P., 2006. Inspiration card workshops. In *Proceedings of the 6th ACM conference on Designing Interactive systems - DIS '06*. New York, New York, USA: ACM Press, pp. 2–11.

Halverson, N., 2013. Nation's First Bookless Library Set to Open. *Discovery News - Gear and Gadgets*. Available at: <http://news.discovery.com/tech/gear-and-gadgets/nations-first-bookless-library-130114.htm> [Accessed April 23, 2013].

Hampshire County Council, 2012. Discovery Centres are more than just libraries. Available at: <http://www3.hants.gov.uk/discoverycentres> [Accessed May 14, 2013].

Hornecker, E., 2009. Tangible Interaction. *The Encyclopedia of Human-Computer Interaction*. Available at: [http://www.interaction-design.org/encyclopedia/tangible\\_interaction.html](http://www.interaction-design.org/encyclopedia/tangible_interaction.html) [Accessed May 15, 2013].

IFLA, 2012. *IFLA E-Lending Background Paper*, Available at: <http://www.ifla.org/publications/background-paper-on-e-lending-2012>.

Lerner, F., 2009. Chapter 10: Libraries for the people. In *The Story of Libraries: From the Invention of Writing to the Computer Age*. Continuum, pp. 125–140.

Lougee, W., 2002. *Diffuse libraries: emergent roles for the research library in the digital age*, Washington, DC: Council on Library and Information Resources. Available at: <http://www.clir.org/pubs/reports/pub108/pub108.pdf> [Accessed April 3, 2013].

McCullough, M., 2005. *Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing*, MIT Press.

Mcneely, C. V, 1999. Repositioning the Richmond Public Library for the Digital Age: One Library's Perspective. *Library & Information Science Research*, 21(3), pp.391–406.

Mithassel, R., 2011. Oslo Public Library - Designing service. Available at: [http://presentations.aakb.dk/urbanmediaspace/oslo\\_designing\\_services.pdf](http://presentations.aakb.dk/urbanmediaspace/oslo_designing_services.pdf) [Accessed April 22, 2013].

Nguyen, L.C., Partridge, H. & Edwards, S.L., 2012. Towards an understanding of the participatory library. *Library Hi Tech*, 30(2), pp.335–346.

Nikolovska, L. & Ackermann, E., 2009. Exploratory Design, Augmented Furniture. In P. Dillenbourg, J. Huang, & M. Cherubini, eds. *Interactive Artifacts and Furniture Supporting Collaborative Work and Learning*. Springer, pp. 147–166.

Omujola, O. et al., 2000. An installation of interactive furniture. *IBM Systems Journal*, 39(3.4), pp. 861–879.

Online Etymology Dictionary, n.d. Library. *Online Etymology Dictionary*. Available at: [http://www.etymonline.com/index.php?term=library&allowed\\_in\\_frame=0](http://www.etymonline.com/index.php?term=library&allowed_in_frame=0) [Accessed May 14, 2013].

Preece, J., Rogers, Y. & Sharp, H., 2002. Interaction design: beyond human-computer interaction, Chichester, UK: Wiley.

Sanders, E., Brandt, E. & Binder, T., 2010. A framework for organizing the tools and techniques of participatory design. In *Proceedings of the 11th Biennial Participatory Design Conference*.

Solomon, D., 2013. Digital Distribution of Academic Journals and its Impact on Scholarly Communication: Looking Back After 20 Years. *The Journal of Academic Librarianship*, 39(1), pp.23–28.

Swedish Library Association, 2010. Swedish Library Association presentation brochure. Available at: <http://www.librarylovers.se/english/EnglishPresentationSBF.pdf> [Accessed April 22, 2013].

Tower Hamlets Borough Council, 2009. *Idea Store Strategy*. Available at: <http://www.ideastore.co.uk/public/documents/PDF/IdeaStoreStrategyAppx1CAB290709.pdf> [Accessed May 14, 2013].

Worpole, K. & Building Futures, 2004. *21st Century Libraries: Changing Forms, Changing Futures*, London.

Zhang, X. et al., 2008. Effects of interaction design in digital libraries on user interactions. *Journal of Documentation*, 64(3), pp.438–463.

# Appendix I

# An interactive installation to drive new library experiences

## User feedback questionnaire

*Hello! My name is Amanda and I am an Interaction Design student at Chalmers University. For my Masters' Thesis, I have been working on designing an interactive installation with the purpose of enhancing the way people experience content in public libraries. I am very thankful for your help by answering this questionnaire. Please feel free to ask me if something is not clear.*

### About you

1. In what year were you born? \_\_\_\_\_

2. Do you own a smartphone or table? Yes / No

3. How often do you visit the library? (Select 1)

- Very often (Once a week or more)
- Often (Once or twice a month)
- Sometimes (Every two months)
- Rarely (Once every six months)

4. Are you familiar with the library's online services? Yes / No

Which of the following have you used? (Select all applicable options)

- Search and reservation
- Community reviews, tags and rating
- Loan of E-books and E-audiobooks
- Databases

5. Which type of resources do you commonly use? (Select all applicable options)

- Books
- Audiobooks
- Movies
- Music
- Games
- E-books
- Newspapers
- Magazines
- Other \_\_\_\_\_

## About the installation

1. Would you use a system like this to navigate the library? In what circumstances? (For instance, when you have a lot of free time or if you are looking for a specific subject matter)

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2. Do you think this would make it easier to find resources that are relevant to you? Why or why not?

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3. Do you think this would make it difficult or uncomfortable to use the library? Why or why not?

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4. For which resources do you think this would be useful or interesting to use? (Select all applicable options)

- Books
- Audiobooks
- Movies
- Music
- Games
- E-books
- Newspapers
- Magazines
- Other \_\_\_\_\_

5. Mark the options in the scale that best describe your opinions about this concept. I think using this installation would be:

Useful	<input type="radio"/>	Useless				
Amusing	<input type="radio"/>	Annoying				
Unhelpful	<input type="radio"/>	Helpful				
Pleasing	<input type="radio"/>	Frustrating				
Boring	<input type="radio"/>	Fun				
Effective	<input type="radio"/>	Superfluous				
Easy	<input type="radio"/>	Complicated				
Convenient	<input type="radio"/>	Inconvenient				
Tiring	<input type="radio"/>	Inspiring				
Assisting	<input type="radio"/>	Worthless				
Desirable	<input type="radio"/>	Undesirable				
Monotonous	<input type="radio"/>	Exciting				
Dynamic	<input type="radio"/>	Dull				
Enjoyable	<input type="radio"/>	Unpleasant				
Confusing	<input type="radio"/>	Clear				
Personal	<input type="radio"/>	Impersonal				

6. Do you think this would make you and other people more aware of the availability of digital resources? Why or why not? Do you think this would make you use digital resources more than you do now?

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7. Do you think it is important to share your ideas about the resources with other library users? Why or why not?

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8. Would you be interested in using the tags created by others? Why or why not?

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9. Would you be interested in creating tags for a system like this? Why or why not? What would motivate you to do so?

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10. Please rank the following items according to how much they can impact your experience in the library. (6=least impact to 1=most impact)

- All types of resources are easy to find and browse (digital and physical)
- You can influence what content is acquired by the library and how the library is organized
- You can connect what you do in the physical library with what you do online in an consistent experience
- You can express what you think different resources are about and share it with others
- You are able to use other people's opinions to inform your decisions in the library
- The library is a dynamic place, always attracting new people