NAVION

SERVICE DESIGN APPROACH TO GENERATE WAYFINDING SOLUTIONS

A Case Study with The Black Diamond

PROCESS BOOK

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SERVICE SYSTEMS DESIGN

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Abstract

The project was done in collaboration with the Royal Library (known as the Black Diamond). The process report describes each step of solving an particular problem of wayfinding in a real case by applying service design thinking and user-centered design method to the entire process. This report also brings the discussion of the role of the library and the chanllenge the library has.

Keywords: service design, user-centered, wayfinding, libraries, digitalization, Beacon

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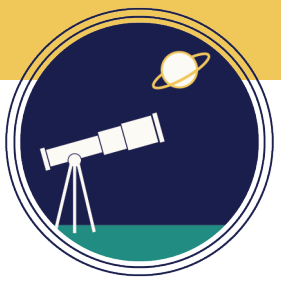


INTRODUCTION

SERVICE DESIGN APPROACH IN GENERATING WAYFINDING SOLUTION

CALL FOR SERVICE DESIGN

During the past years, there has been an increasing desire for service design thinking in various design fields. Service design brings the solution that describes the connection between stakeholders and environment, the interaction between humans and technologies. Furthermore, service designers make it possible that the customers' actions create value for service providers. (Forlizzi & Zimmerman, 2013)

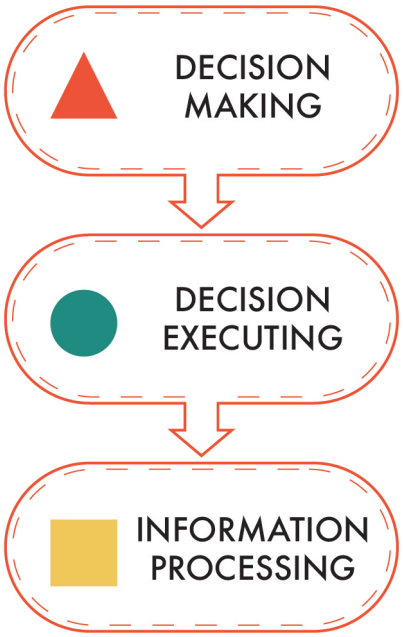
WAYFINDING: BEFORE AND NOW

Particular design such as wayfinding system design is originated from signage, which consists of signs and marks on specific places. The terminology of 'way-finding' was defined by Kevin Lynch in 1960 as 'a consistent use and organization of definite sensory cues from the external environment'(Lynch, 1960).

"In the process of way-finding, the strategic link is the environmental image, the generalized mental picture of the exterior physical world that is held by an individual. This image is the product both of immediate sensation and of the memory of the past experience, and it is used to interpret information and to guide action." ---- Kevin Lynch

'Way-finding' was used to refer to maps, signs and other 'way-finding' devices. That is why there is a misunderstanding that wayfinding is the same as signage. In fact, signage deals with graphics, materials, while wayfinding addresses the underlying process of how people find their way (Muhlhausen, 2006). In other words, all the factors that affect wayfinding: people, environment, and information.

An entire wayfinding process contains three stages: decision making, decision executing and information processing (Figure 1).



PROBLEM ARISE:

For first-time visitors, decicions cannot be made without relying on available information.

People cannot recall or identify the route they took before.

The indoor environment or the previous wayfinding system has changed.

Figure 1: Three key processes in the wayfinding process (Great Britain NHS Estates., 200)

DESIGN A WAYFINGDING SERVICE

The development of information technology increases the complexity of the costumer demands, challenging the corporate strategies to transit from the production of goods to the provision of systemic solutions (Morelli, 2002). Accordingly, the focus of wayfinding design has also been expanded from the colors, symbols or materials to a systemic planning of wayfinding products and services.

An ideal wayfinding service should be able to assist the user through the whole process, with the minimum interruption of the entire journey. For instance, a system that can predict the users' needs at each step. To place users in the center of a service, we need to know who are the users. By designing with users, it helps to gain the information that helps to give the users what they need when they need it (Polaine, Løvlie & Reason, 2013).

Thus, the role of a service designer in a wayfinding project is to introduce a service design mindset and to apply the user-centered design and design thinking approach to the entire design process based on a deep understanding of this field.

THE BLACK DIAMOND: THE ROLE, THE SERVICE AND THE CHALLENGE

The extension of the Royal Library of Denmark with the modern building designed by the Danish architect Schmidt Hammer Lassen, resulted in the creation of a new cultural center: The Black Diamond.

THE ROLE

As a cultural center, the Black Diamond has created an entirely new concept of a library, where a high standards research library merges with diverse cultural activities to engage tourists and citizens in discovering the wonders of history, art, science and politics.

The strong emphasis on promoting cultural activities, combined with an advanced library and a beautiful building facing the canals of Copenhagen, attract millions of students, citizens, and tourists every year, converting the Black Diamond in a distinguished landmark of Copenhagen (Larsen, 2000).

THE SERVICE

The Black Diamond organizes its services in two parts: the library part and the cultural part. The library part -with an important contribution by the Library University of Copenhagen- focuses on creating a good working environment for students and researchers, offering pleasant reading rooms and access to a wide collection of reading and graphic materials. The cultural part hosts diverse cultural activities and provides exhibition and conference rooms, as well as a concert hall and the National Museum of Photography. Also, the building also contains a bookstore, a small and functional cafe and a larger restaurant and canteen, offering, on the whole, a great opportunity to experience the Danish culture.

THE CHALLENGE

Due to the dual nature of the Black Diamond, it faces additional challenges to the ones found in traditional libraries and culture centers.

In the context of the Copenhagen University Libraries, the Royal Library also faces the same challenges as the traditional research libraries do. The development of digital technology has had and will have direct influences on the way of doing research and education, and on the forms of presenting information to the public, as well as the ways of working (Denmark's Electronic Research Library, 2009). A traditional research library is a building containing books, research sources, and journals classified by various catalogs, this kind of library is improbable to remain the dominant form in the digital age. The increased digitalization of information sources is replacing the traditional physical books, as they can be easily accessed anywhere at any time. In addition, it also changes the needs of researchers, teachers, and students gradually. For that reason, what is traditionally meaningful for libraries is not the same as what is meaningful for modern library users (Harbo & Hansen, 2012). Meanwhile, the development of information digitalization also brings the demands of new services that could link the users better with sources and materials, as well as a chance of building a new bridge between users and physical environment.

On the other hand, the cultural part of the library faces the challenge of attracting the new public to get engaged in the cultural activities. In this regard, significant progress has been made during the last years. Nowadays, the Black Diamond hosts more than 100 events per year and attracts around 1.6 millions of users (Danmarksstatistikdk. 2015). Additionally, the Black Diamond's organization 'Students Only', which involves students in social and cultural activities, already gathers a network of 9000 members. However, according to the rules of the Ministry of Culture, the Black Diamond is not entitled to apply for any additional grants in the cultural events, meaning that the library must account for all the expenses. This situation poses the challenge to maximize the possibilities of the building, promoting activities and engaging people on them, to generate income to enhance the cultural part. At the same time, it is also important to minimize the effects of the cultural events in the library activities, ensuring the library as a pleasant place to study.

In this context, an improved wayfinding system in the library stands as an absorbing service with potential to overcome some of the challenges faced by the library, enhancing the both parts of it and improving the user experiences of all types of visitors.

OBJECTIVES OF THE PROJECT

STUDY GUIDE

According to the study plan, the students have to demonstrate the acquisition of competencies, skills, and knowledge that allow them to master the profession of service design. Students have to obtain the following qualifications:

Knowledge:
• Must have knowledge about the possibilities to apply appropriate methodological approaches to specific study areas.
• Must have knowledge of design theories and methods that focus on the design of advanced and complex product-service systems.

Skills:
• Must be able to work independently, to identify major problem areas (analysis) and adequately address problems and opportunities (synthesis).
• Must demonstrate the capability of analysing, designing and representing innovative solutions.
• Must demonstrate the ability to evaluate and address (synthesis) major organisational and business issues emerging in the design of a product-service system.

Competencies:
• Must be able to master design and development work in situations that are complex, unpredictable and require new solutions (synthesis).
• Must be able to initiate independently and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility (synthesis).
• Must have the capability independently to take responsibility for own professional development and specialization (synthesis)

(Aalborg University, Faculty of Engineering and Science, Board of Studies for Media Technology, 2012)

PERSONAL GOALS

In addition to the study guide, there are also several personal goals that I want to achieve after the whole project:
• To present the concept of service design to public institution
• To approach users from various background, and to involve users in each step of the design process
• To experiment service design thinking in specific problems in a real case
• To accomplish a whole design process individually

METHODOLOGY

DOUBLE DIAMOND

Inspired by Double Diamond Model (Figure 2), the project is conducted in the following phases: Discover, Define, Develop, and Deliver, on the user-centered design principles base. The Double Diamond divides a complex problem-solving process into four consecutive stages. The reason for choosing this process model is not only because it's structured in a systematic way but also comprehensible to be presented to the client, which in this case, are the contact person of The Black Diamond and the other library personnel.

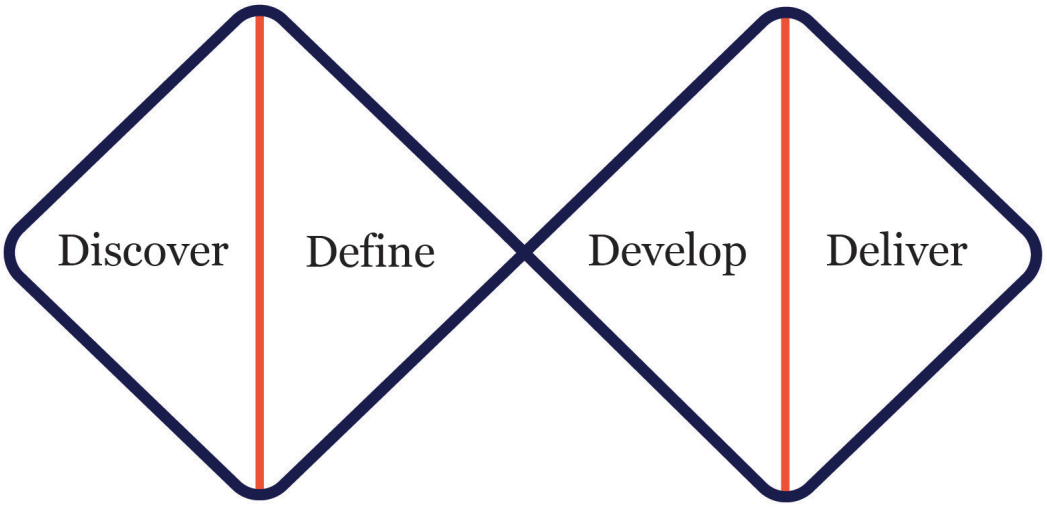


Figure 2, The double diamond model (Design Council, 2005)

As a matter of fact, during the actual design process, there are unpredictable factors that might slow down the expected plan. In this case, particularly, the designer has to work as a whole design team, which requires a fast reaction and a systemic thinking to execute the plan and to adjust the plan to the actual progress.

FEBRUARY

DISCOVER

MARCH

DEFINE

APRIL

MAY

DEVELOP

JUNE

DELIVER

JULY

CASE: DESIGN A NEW WAYFINDING SYSTEM IN THE BLACK DIAMOND

CASE INTRODUCTION

The project is in collaboration with the Royal Library of Denmark (known as the Black Diamond). The project focuses on the indoor environment of the library building. The Royal Library houses many facilities, different exhibitions and activities are held inside the building continuously. Meanwhile, the building itself has become one of the landmark architectures in Copenhagen, which attracts millions of Danish and international visitors every year. One of the problems that the library has at this moment is an ineffective indoor wayfinding system, which sometimes causes the confusion of the users.

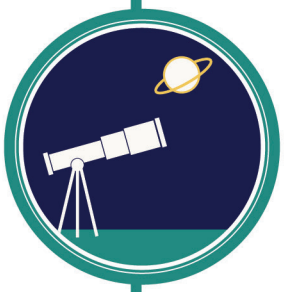
The project was initiated by the contact person Maria Christensen, who was working in the cultural department at the Royal Library. The chance of collaboration came from the interest of both the library and myself. The cultural department of the Royal Library are curious about service design. They are interested in involving design students in some cases. It's also an opportunity for me to apply service design learning on a real case, and to experience solving a similar problem -wayfinding in a different way compare to the previous study I did in environment art and design.

The first meeting was held with the contact person Maria from Black Diamond early this year. The problem and the needs of the library were briefly mentioned at the very beginning. The building of Black Diamond contains various functional areas, where the indoor environment is complex, requires an explicit signage system. However, the current signage is not very visible. Visitors often have problems while looking for directions. The Cultural Department where Maria works has already been working on improving this situation to guide people more efficiently moving inside the building.

Before starting the project, together with Maria, we had a walk around the library. During the tour, we talked about some specific problems regarding the 'wayfinding' in the Black Diamond. For example, the map at the entrance is difficult to understand for the visitors, the information desk is hidden inside the bookstore and the differences between two information desks are not evident. People also have problems in finding toilets. We also discussed several cases of other libraries and museums, as well as airports where the indoor navigation system plays an important role of the whole visiting experience.

One of the challenges that the Black Diamond faces is the requirement to maintain the original architecture and the design of the building. For that reason, many solutions that have been used in other cases cannot be implemented in the Black Diamond.

The activities during 'Discover' phase were intended to gather inspiration and insights, to identify the user needs, and to develop initial ideas (Davies & Wilson, 2013). The process started with the first interview to Andreas Schuster, who completed a similar project in Copenhagen Central Library two years ago. This helped to gain a clear overview of navigation in the whole context of libraries, and to be aware of the differences between a public library (the Central Library) and a research library (the Royal Library).



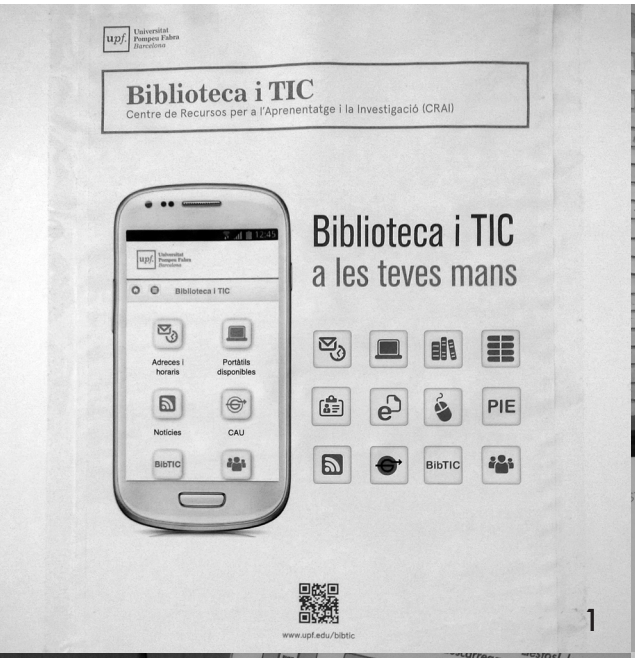
DISCOVER

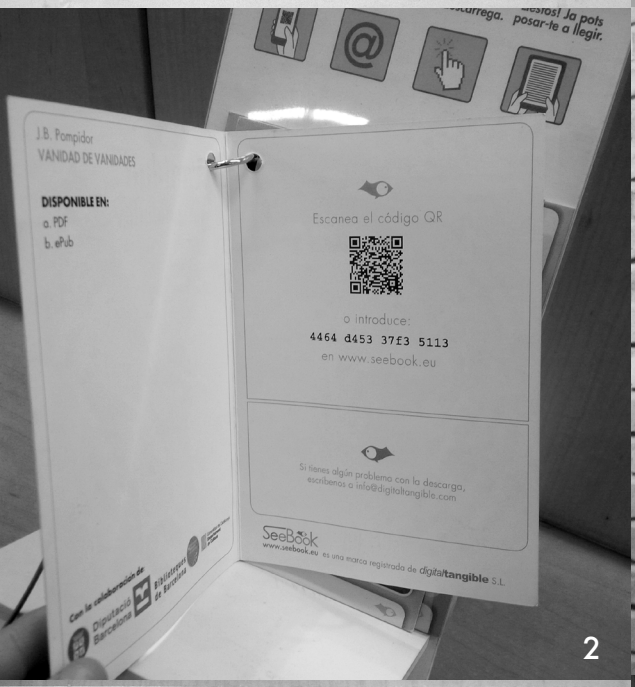
FEBRUARY

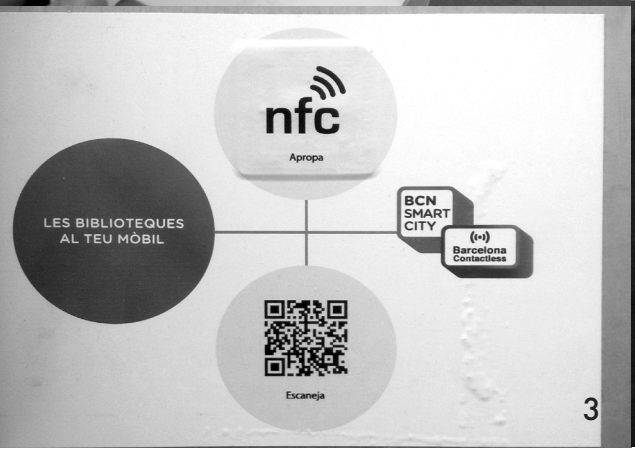
- Tour around the Black Diamond
- Interview with Andreas Schuster
- Tour of Statsbibliotek/ Aarhus University Library (Aarhus)
- Expert interview with Jane Rasmussen and Jesper Kikkenborg Rossel (Aarhus)
- Tour of DoKK1(Aarhus)
- Observation and shadowing at KB
- Interview Uffe Paulsen
- Questionnaires #1
- Questionnaires #2

MARCH

- Tour of two university libraries, one public library, and one museum in Barcelona (BCN)
- Interviews with librarians (KB)
- Interviews with information desk (KB)
- Test and Shadowing







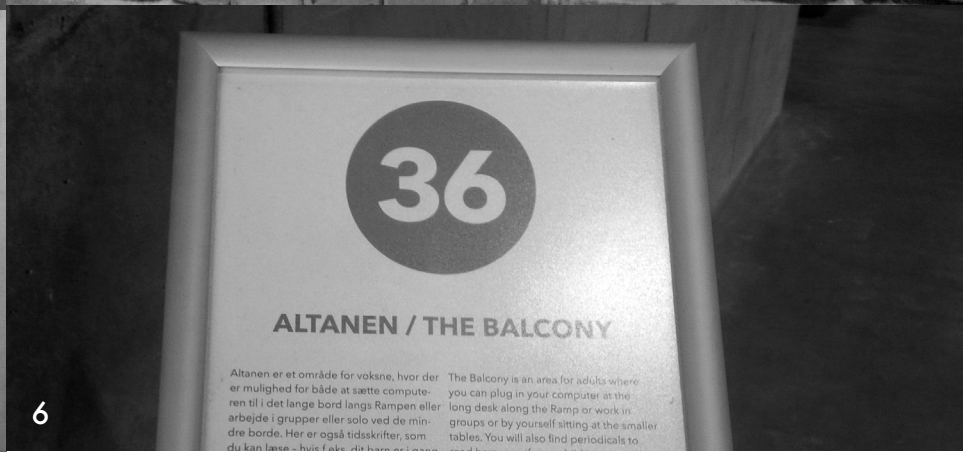


Figure 3, 1. web service of Library of UPF (Barcelona); 2,3. digital service at Biblioteca Jaume Fuster (Barcelona); 4,5. wayfinding system at Stats Bibliotek (Aarhus) ; 6. visiting guide system at Dokk1 (Aarhus).

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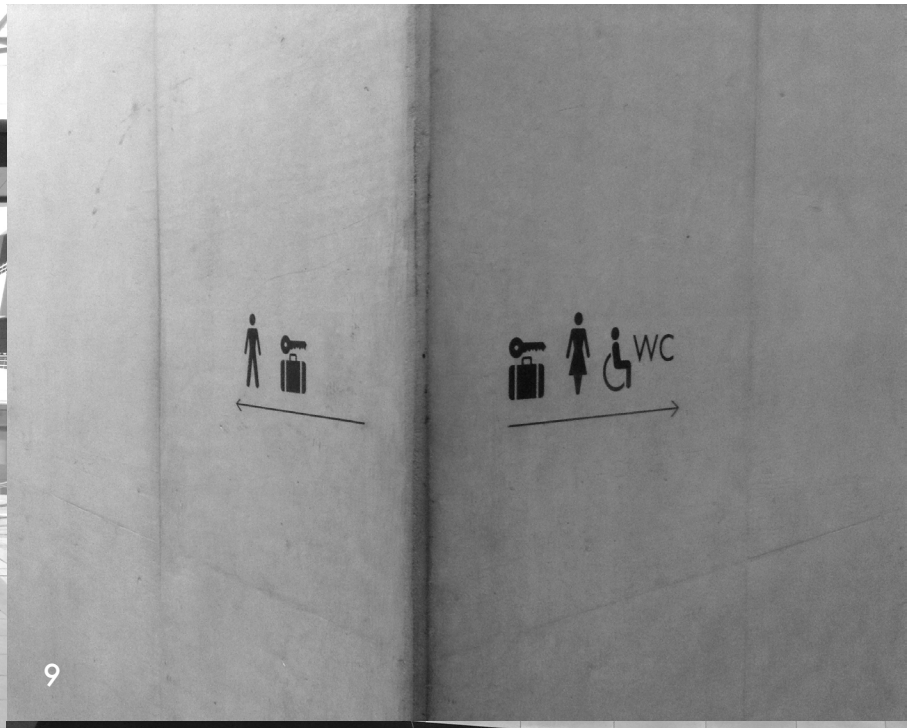

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Figure 3 continue, 6,7,8,9. maps and signs in The Black Diamond

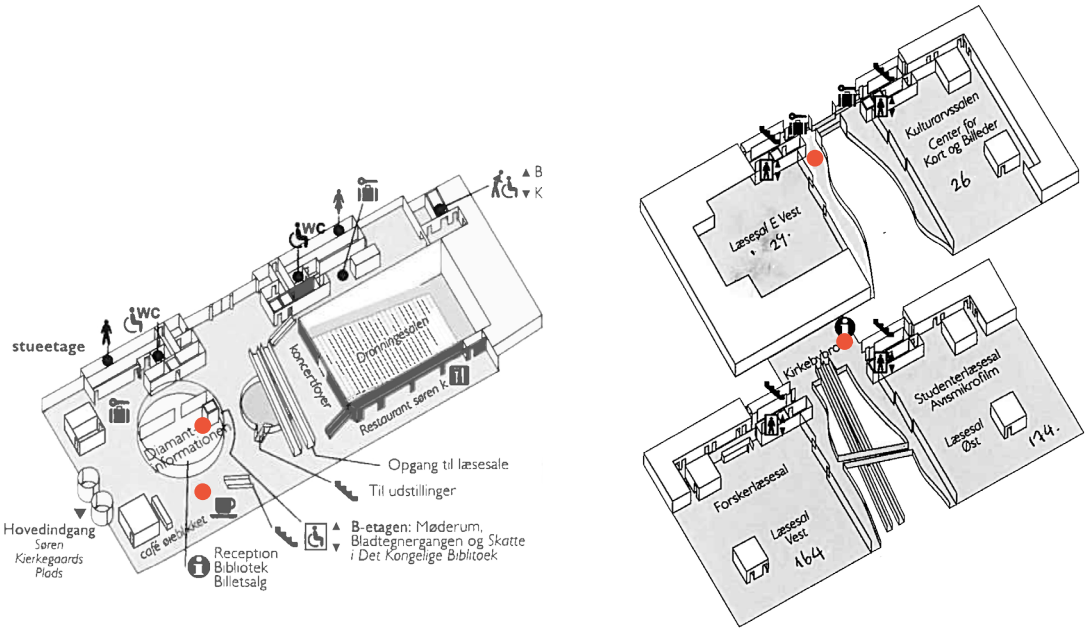


Figure 4, Observation spots

Shadowing helps to spot the moments and places that the problems arise. Spending some time to observe visitors and library staff is the best way to gain a holistic view of the whole service operating at this moment (Stickdorn & Schneider, 2011). The observation was done at different parts inside the library: at the cafe, at the main entrance, at the information desk in the book store, in the bridge that connects both buildings, and at the areas around the reading rooms (Figure 4).

For a first-time visitor, it's very easy to get confused at the entrance of the library where massive information appears in front of them. Despite the floor map right at the entrance, most of the visitors chose to move forward and to find someone to ask, or try to figure out by themselves. There are three information desks that can be reached in the library. Two of them are inside the bookstore at the ground floor (A-level), and one across the bridge at C-level. For people who know about this library, they are also aware that the information desk on C-level is for research use, where there's always an experienced librarian who can answer very academic questions. The two other information desks are for general questions: books, tickets for exhibitions, tourist information, etc. As it was also the week of 'Copenhagen Dining Week', there were an increasing amount

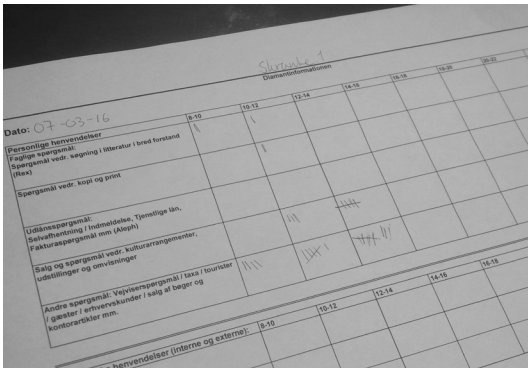


Figure 5, Log file of the questions kept by the information desk

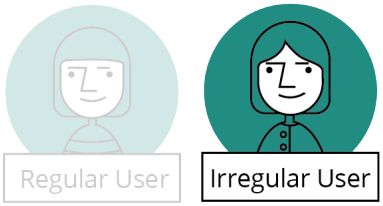
Figure 6, Selected spots where the questionnaires took place

of visitors asking specific questions such as where is the restaurant Søren K or where can they park their cars.

The information desk keeps a table that marks the times different types of questions are asked (Figure 5). It showed that 'other questions' such as tourist information, looking for a place inside the library are the most frequently asked questions, which indicated there's an actual problem on wayfinding (Figure 6).

To get deep insights to the current service and potential problems, as well as to map out who are those visitors, the next step I took was to make a contextual questionnaire. Similar to the contextual interview, the questionnaires are conducted inside the library. The spot I chose is next to the escalator where people are most familiar. The contextual environment helps testers to feel more comfortable while they are answering questions about specific details. It also allows the researcher to gain a holistic understanding of the entire surrounding of the service, compare to regular online surveys or street interviews. The questionnaires lasted two days, the reason for that was all the data I collected on the first day is from students and researchers, whom I grouped as the 'regular users'. Lacking data from the 'irregular users', I extended the questionnaires for one more day. Instead of standing at the 'popular' spot, I walked around in the library, talking with tourists. Tourists were very easy to be identified, and most of them were willing to talk.

KEY FINDINGS



THE PROBLEM

While talking about user experience in an indoor public space, wayfinding is something that is alway interesting to have a look. As a user of the Black Diamond myself, I also experienced the complexity of this indoor environment at the beginning. However, after becoming a regular user of the library, the wayfinding is no longer a problem for me. This thought was proved by the activities that have been done at the 'Discover' phase. 'Wayfinding' is a problem both too big and too small. One the one hand, it plays an important role in visiting the space, on the other hand, it's not an issue for people who are already familiar with this space.

According to the three key process of wayfinding (Authur & Passini, 1992), when people can identify the route by themselves, the indoor environment does not change significantly. The problem regarding wayfinding rarely arises.

THE SERVICE

Libraries are first and foremost places of learning (Marquez & Downey, 2016). The Black Diamond provides books, public computers, access to the internet, print and copy machine, as well as places for studying, group working and meeting. Furthermore, as a cultural center, the Black Diamond also offer various cultural activities and events. An effective wayfinding system will be like a net, linking all the information and bringing it to the public.

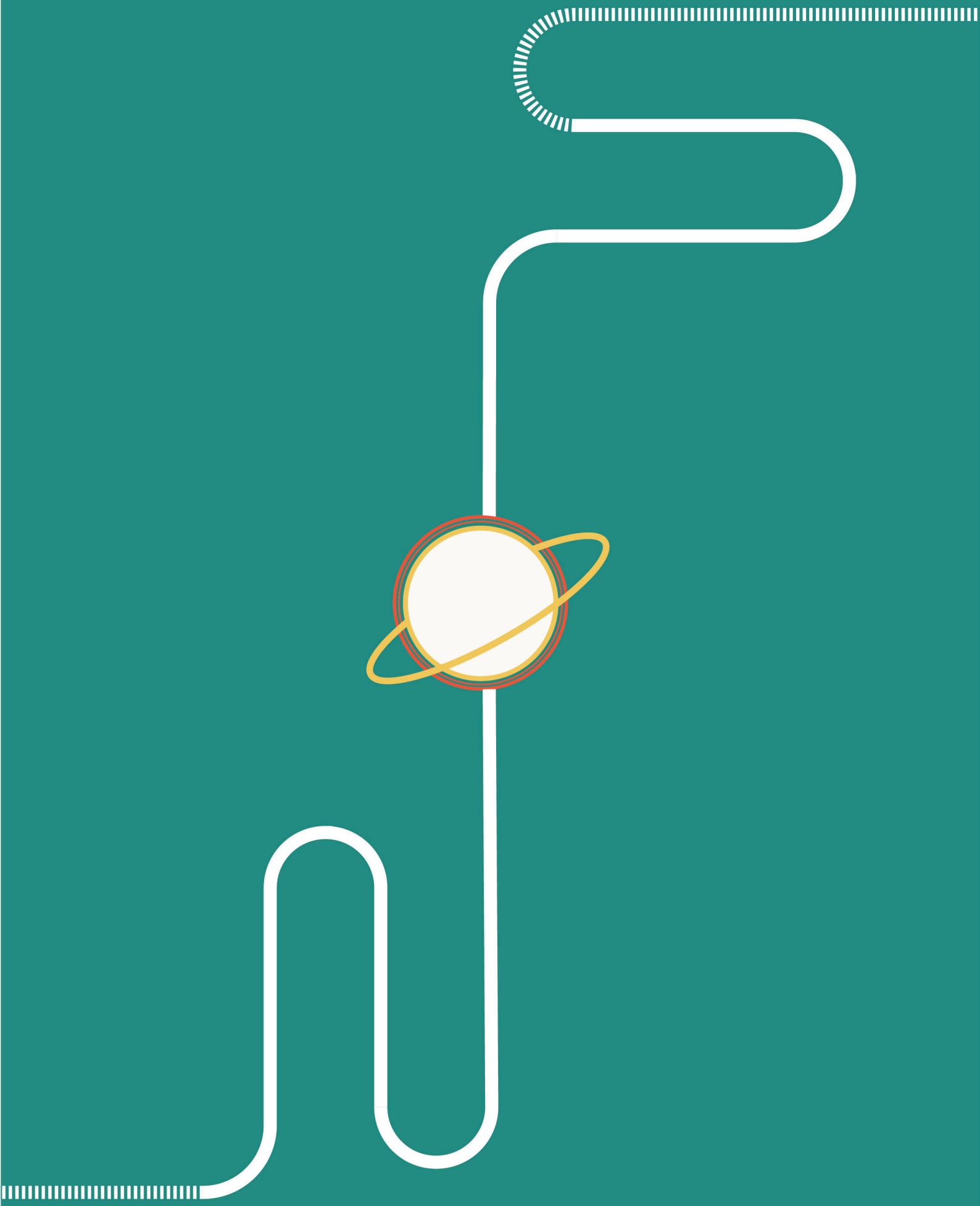
The current wayfinding service stays on physical maps and face to face communication. Physical maps present the layout of each floor. However, those maps do not contain updated events information. Communication with information desk is helpful but sometimes lack of efficiency.

THE TARGET GROUP

Who are the visitors?
Who should I focus?

Those questions appeared at the early stage of the design process. As mentioned before, the visitors can be divided into two main groups: the 'regular users' and the 'irregular users'. The 'regular users' refers to the ones who often go to the library, and who are already familiar with this space. The 'irregular users' are on the opposite side, which refers to the ones who occasionally go to The Black Diamond, including participants of conference and events, customers of the restaurants, as well as tourists.

By finishing the 'Discover' phase, the 'irregular users' was chosen to be the target group of the future 'wayfinding' service, since there's more potential improvement of current service of this group.



DEFINE

- [x] Interview 'Top 10 Questions'
- [x] Customer journey mapping with Booking Department
- [x] Customer journey mapping with Booking Department
- [x] Interview with Anne Corlin
- [x] Personas and scenarios
- [x] Problem defined and present to Cultural Department

The 'Define' stage addresses the problems and opportunities that were identified through the 'Discover' stage, where the mass of ideas and findings are analyzed and formed into a set of problem statements.

(Davies & Wilson, 2013)

TOP 10 QUESTIONS*

INTERVIEW WITH LIBRARIANS, INFORMATION DESK STAFF AND CONFERENCE BOOKING DEPARTMENT

The first steps of 'Define' phase was a series of interviews called 'Top 10 Questions.' The objective of 'Top 10 Questions' is to narrow down and define the problem statement by collecting and analyzing the most frequently asked questions.

1. Where can I find the toilet?
2. What is the exhibition about?
(Where can I buy tickets for the exhibition?)
3. Where are books?
(How can I borrow books?)
4. Who painted the roof?
5. Where can I find an ATM?
6. How can I go to ...(somewhere in the city) ?
7. How can I print/copy?
8.Where can I park the car?

*' TOP 10' refers to the most frequently asked questions, the actual number of questions might not be 10. It is because some of the questions are repeated.

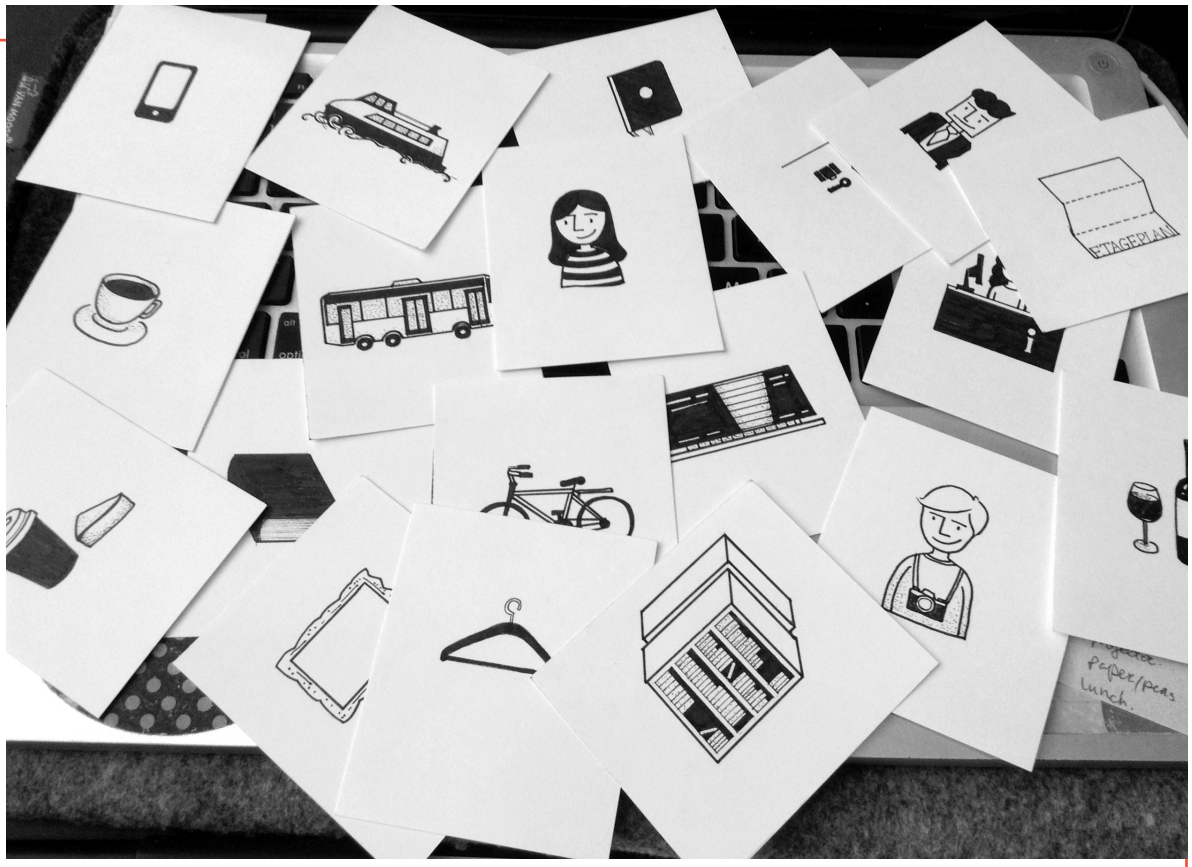


Figure 7, Cards for user journey mapping

CUSTOMER JOURNEY MAPPING

In order to approach conference participants, several interviews were arranged together with Louise and Helene from the Conference Booking Department. There are five conference rooms inside the Black Diamond, including the Queen Hall, which can host 600 people. The other four rooms can host from 6 up to 100 people. These four rooms are named after the four writers: Thit Jensen, Saxo, Holberg, and Blixen. Each room has been decorated with photos and pictures related to each corresponding writer, bringing to each conference room a strong cultural identity, which attracts different types of companies.

Conference booking provides direct revenues to the library. balancing the expenses on cultural activities and converting the conference participants as a main focus group for the Black Diamond.

Normally companies book the conference rooms through booking agencies or by directly contacting the Booking Department. As a part of the whole booking and conference experience, all the participants will receive a voucher of free entrance to the exposition that is on display in the exhibition hall.

Except the Queens Hall, the other four conference rooms are located on the B-level, which is not shown on the map at the entrance of the library, neither

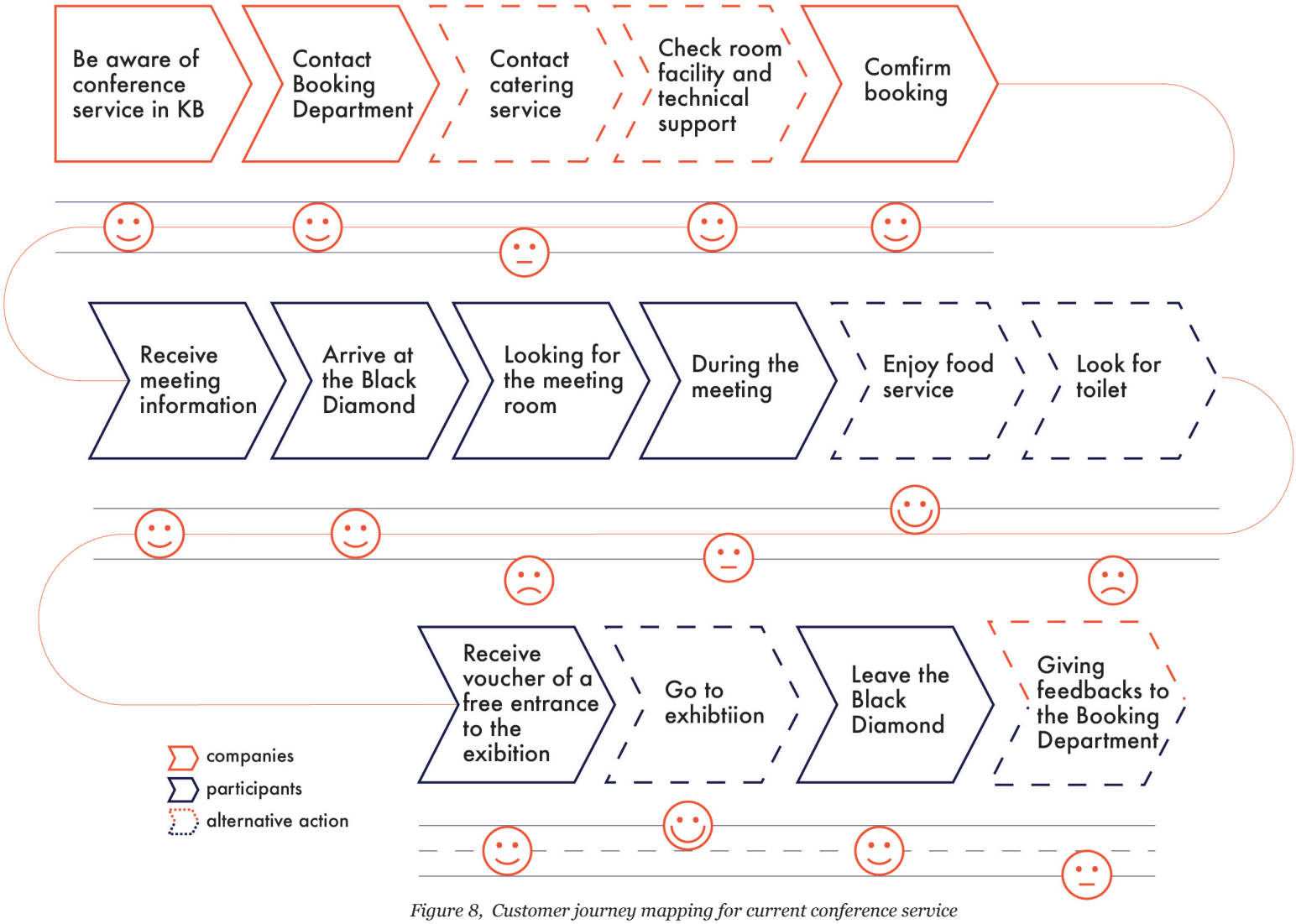


Figure 8, Customer journey mapping for current conference service

on the physical maps. The only sign is a board with four printed pictures next to the stairs. Therefore, during big conference an additional information desk (settled either by the library or by the companies) is required to guide the participants to the corresponding rooms.

The second interview with the Conference Booking Department was conducted with a card sorting activity. The cards were made based on the previous research, picturing different visitors, transportation, catering and other facilities. (Figure 7). The activity aimed to map out the current customer journey of an entire experience from how a company or individual contact the Black Diamond to when they finish the meeting and leave the building. The customer journey mapping is a visualized representation of the steps the user takes while using a service (Marquez & Downey, 2016).

The customer journey map of the current conference service (Figure 8) shows that the participants have a good overall experience, but some parts can still be improved, mostly related to wayfinding..

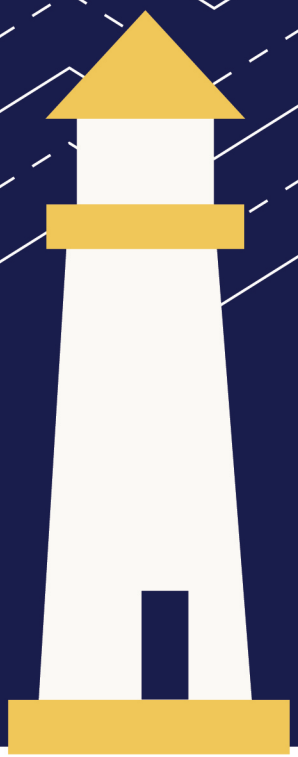
The current wayfinding service in the Black Diamond relies on reading physical maps and face-to-face communication. To develop a new wayfinding service, it is not just redesigning a set of signs or redraw the floor map. Wayfinding strategies should communicate with people with a broad range of sensory channels, as spatial orientation is affected by many factors such as cultural background (Hunter, 2010), age or gender (Lin & Huang, et al. 2012). Moreover, age-related and cultural differences also influence spatial cognition and wayfinding process.

During an interview with Anne Corlin about her wayfinding project (Anne, 2014) in the Middelfart Sygehus, a novel concept of 'wayshowing' was introduced. Based on Lynch's 'wayfinding', 'wayshowing' was first used by the Danish designer Per Mollerup. It is mentioned that 'wayfinding' refers to people's ability to find the way, whilst 'wayshowing' refers to organizations and communications of information that facilitates the wayfinding ability of human beings. In other words, the executors of 'wayfinding' are people; the executors of 'wayshowing' can be information presented through different mediums. 'Wayshowing' creates a chance to present the intangible services that have not been noticed by visitors to the front-desk.

It is the moment now to take a step back to the definition of the target group. In the previous chapter, the target group was defined as 'the irregular user' since those are the one who have more needs on a wayfinding assistance. However, due to the technology development, the terms of 'wayfinding' is no longer limited in a physical space. It can refer to how people get from one place to another through a physical space, as well as from one place to an intangible service. In this case, according to the previous research, 'regular users' also have the needs of 'wayfinding assistance'. Instead of specific spots in the physical space of the library, they are rather looking for the access to printing service, loaning a book and digital library, as it shown in the 'Top 10 Questions'.

Furthermore, for a building as the Royal Library, with around 1.6 million of visits every year, there are various types of services offered to all kinds of visitors. It is important to have a holistic service that everyone can benefit from. An ideal system for visitors should include both terms of 'wayfinding' and 'wayshowing': in order to lead the visitors to the places they are looking for and to present the available services that haven't been noticed.

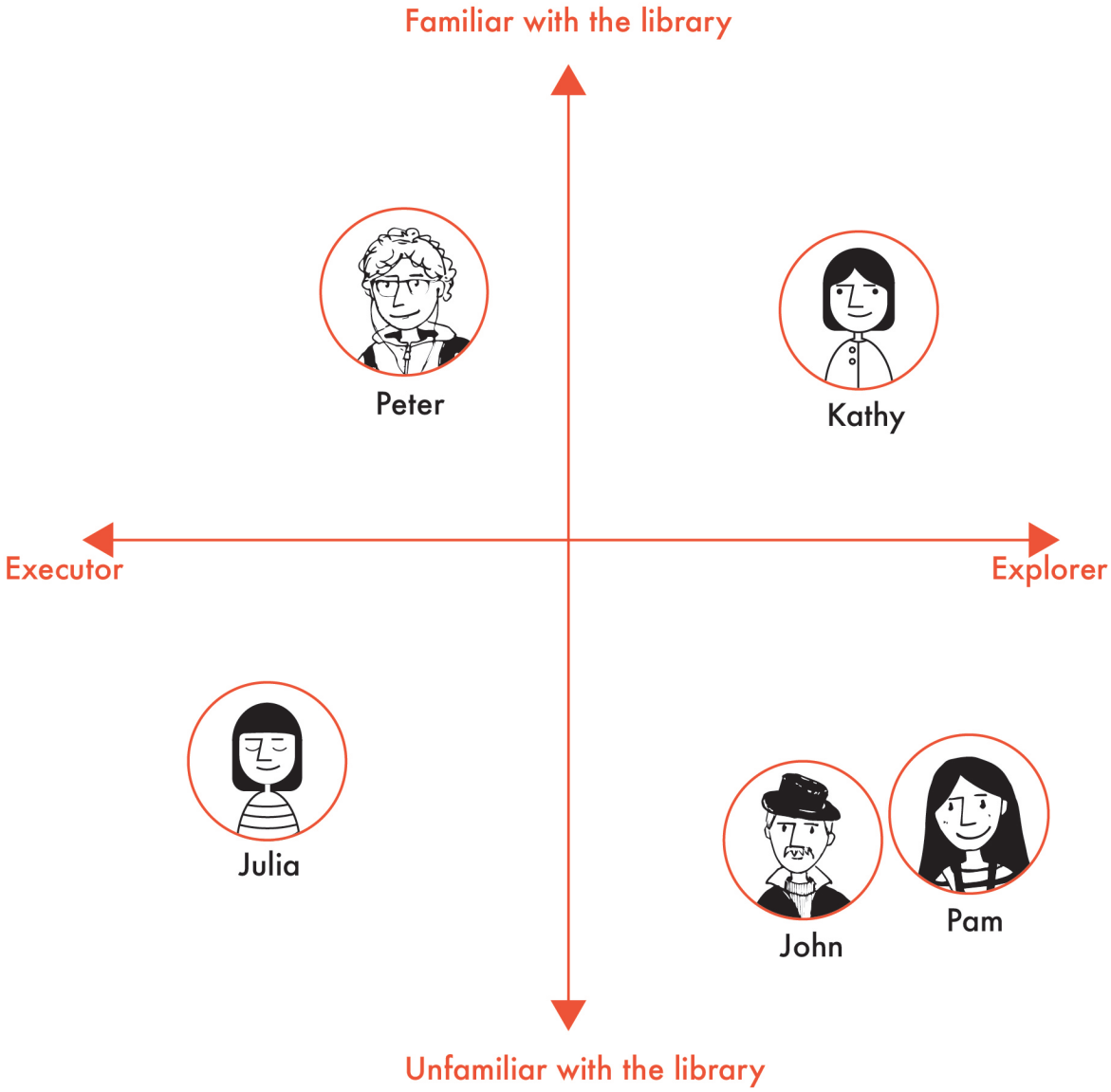
PROBLEM DEFINITION



How might we improve wayfinding and information dissemination in a complex indoor environment?

The research analysis and findings were presented to the library to get more feedbacks. Several personas were made to represent different groups of users that the service is aiming for; another tool 'scenarios and expectation mapping' was introduced to provide the user expectations in certain situations.

The purpose of the presentation is also to define a scope of this project by both sides. The scope drives the depth and duration of the project, what kind of tools to use, and whom to involve. Due to the limited time, a clearly defined scope is essential to the entire project. (Marquez & Downey, 2016).



PERSONAS

* ‘Executor’ refers to people who use the service they already knew;
‘Explorer’ refers to the one looking for more offesr to get best experience

PAM

29 years old,
Freelance photographer Lives in Germany

●Decisive ●Independent ●Outgoing

"Everyone has his own way to memorize a trip."

Pam likes to travel, she believes traveling will bring her new inspirations.

She often goes to different cities visiting museums, famous architectures during her vacations. She is good at finding great spots for photo shooting, which helps her record a unique experience of the trip.

It is the first time Pam comes to the Black Diamond. She read the recommendation of the Royal Library on her travel guide and she like the building very much. Pam picked a map at the entrance and walked around the library.

JOHN

62years old,
Draft Brewer, British, but livs in Malmø

- Wise
- Picky (sometimes)

"Don't trust smart phones, they steal all your information.."

John is very interested in cultural events and he always goes to different museums during his free time.

He likes good quality things, and he likes to feel he is being treated with respect.

John came to the Black Diamond for a meeting.
He has been to the library once several years ago and he could not remember anything about the library except there is a bookstore at the entrance.

PETER

22 years old,
Student of KU, studies Computer Science

- Hardworking
- Social

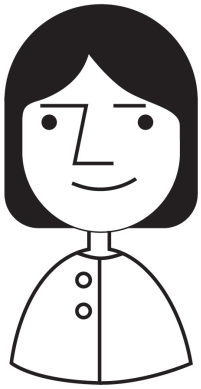
"I hate wasting my time looking for a seat in the study room."

Peter likes all the new techniques and he is an App-experts. He likes to download and try different apps, but he only keeps the one he thinks it is necessary.

He especially likes functional digital platform with Interactive and attractive interface.

Peter used to go to the Black Diamond to study. He knows very well about the reading rooms and he has his favourite area to seat. He notices sometimes there are events inside the library but he never pays attention to that.

KATHY



25 years old,
Danish, Student of Acedamy of Art

● Creative ● Social ● Hardworking

Kathy is a member of 'Students Only' club. She likes to attende different kinds of cutural activities. For her, it is also a good chance to meet new people.
Kathy comes to the Blakc Diamond very often, both to study and to do group work. She likes the atmosphere in the library.

JULIA

37 years old,
Italian, Office worker

● Routine ● Introvert

Julia has a very routine life style. She is not very social and prefer to stay at home during her spare time. She was invited to a dinner to the restaurant inside the Black Diamond by her friends. She hasn't been to the library before and she doesn't know there is a restaurant inside the library.

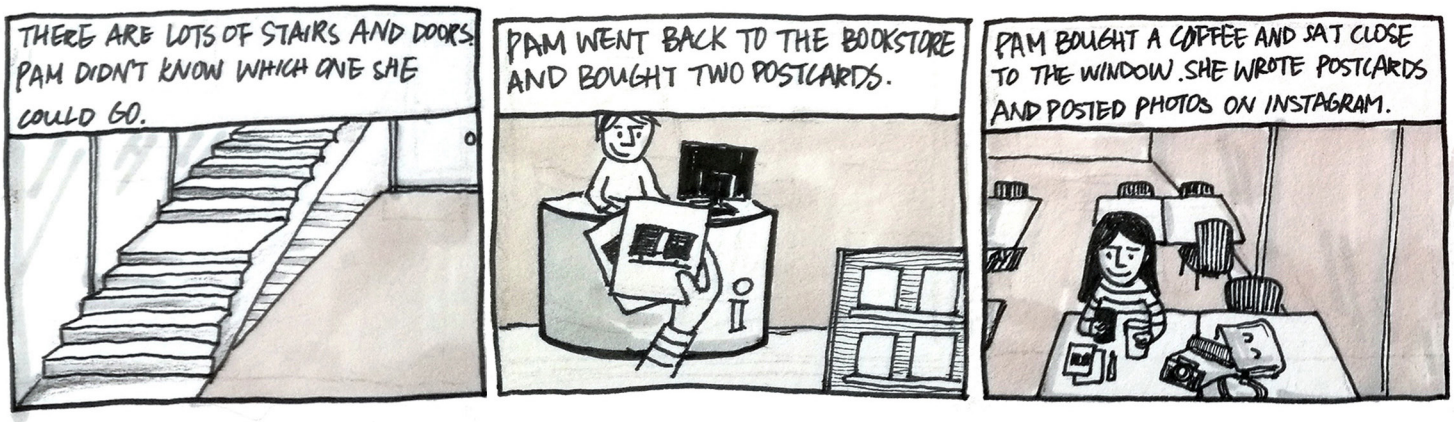
Three scenarios are made correspond to three of the personas based on their needs and relativity to the research problem. They are scenarios of a 'partly active' conference participant, an 'active' tourist and a 'passive' student. In other words, they are 'active irregular users' and 'passive regular users'. The reason for choosing those three is that the 'active irregular users' are more open and more like to discover new things, they are easy to get involved if a new service is promoted. Even though they do not regularly come to the library, they still have a higher potential to become 'active regular users' in the future. While the 'passive regular users' are also easy to approach, due to the frequency their use of the library. They have different needs than visitors, and there's also a chance to encourage them to become more active users.

Each scenario is presented by a storyboard. With the annotations under specific situations, explaining the possible problems and user expectations, as well as prospective solutions.

What kind of information does Pam would like to got when she enter the building?
And through which way she would like to receive those information?

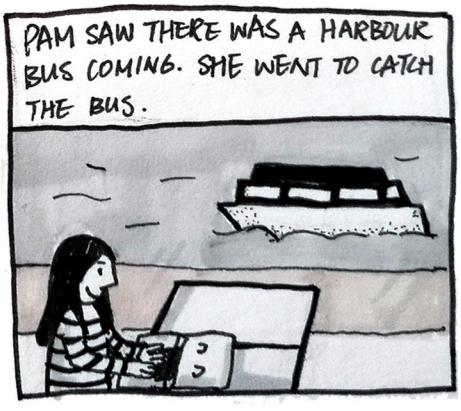
Leaflets or small cards with information.
Webpage that shows the information.

What's the connection between the new building and the old one?



We can provide a digital/physical map that shows the function of difference area, marks the path for visitors.

Pam wondered where she can get stamps and send those postcards.



Can Pam check the harbor bus timetable while she was inside the Black Diamond?

We could provide information about services in the area surrounds, such as post office, bus/harbor bus time table.

SCENARIO & EXPECTATION

PAM

Was the map at the entrance too hidden?

Was the map clear to everyone? Is there any other way we can show the direction of the house?

We can provide a digital/physical map that points out important spots inside the building, such as meeting room, information desk, toilet.

The meeting room was decorated with photos of Thit Jensen. John feels curious about her.

A link to the website or to the Diamond collections which are related to her.

John wonders when and what the next exhibition will be.

An "Event Calendar" will be nice to provided.

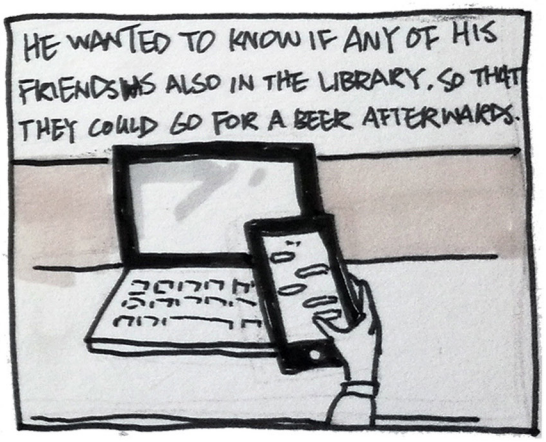
SCENARIO & EXPECTATION

JOHN

Is it possible for Peter to see the if there are available seats without checking all the room?

A map that indicates the capacity of each area will be useful.

A service points out the canteen and updates the menu everyday.



Are people willing to share their location while stay in the library?

We could provide Real-time location in specific area between friends.

SCENARIO & EXPECTATION

PETER

The presentation went very smooth, and the outcomes of the previous research were highly approved by the library. The focal point of the discussion was the target group and the scope of the project. Maria, the contact person, suggested focusing only on conference participants and make a solution based on physical signs and materials, it is reasonable because the time limitation of the project.
It conflicted with the initial intention of the project of developing a systemic solution with focusing on a broader target group. The situation was addressed by evaluating the pros and cons of targeting a wider user group and by presenting the possibility of a service that could satisfy different groups of users.

IDEA GENERATION

Before reaching the idea, two workshops was arranged with both service design students from Aalborg University and with the library.

To generate possible solutions for future wayfinding services, the IoT service Kit (Futurice, 2015) was introduced to these two workshops. The kit allows designers to explore the future in different scenarios and to merge physical and digital realities into digital services.

The original map from the kit was replaced by a floor map of A-level and B-level of the Black Diamond. There are five types of cards: sensors, interaction, users, open city API and service. By asking people to place those card on the map, a frame of digital service with connected components is getting shaped. There are two reasons for conducting this workshop with service design students. First, most of the students themselves are users of the library, both irregular and regular, and with a thorough understanding of the problem as well as user needs. Second, the service design students are coming from multi-disciplinary backgrounds with a solid service design skills; it brings a wide variety of inputs in the process of idea generation.

There are several ideas collected after this workshop, including redesigning the map, captive portal and implementing Beacons.

Those ideas were brought to the second workshop with the cultural department at the Black Diamond, together with the previous inspirations got from libraries in Aarhus and Barcelona (QR code and NFC).

All ideas were presented, and the IoT service kit was introduced as well. This kit encourages people to try and to talk. After placing all the element that she thought it might be necessary, Maria and I had another walk around the phycial space of the Black Diamond agian, and checked all the ‘decision points’.


JOHN

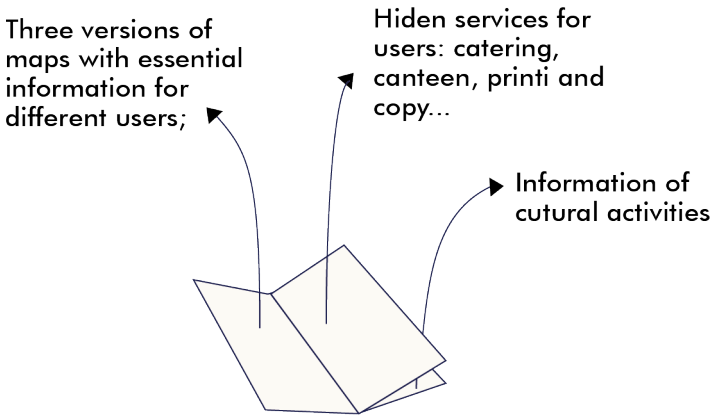

PAM


POLSKA

CONCEPT 1

Redesigned Map

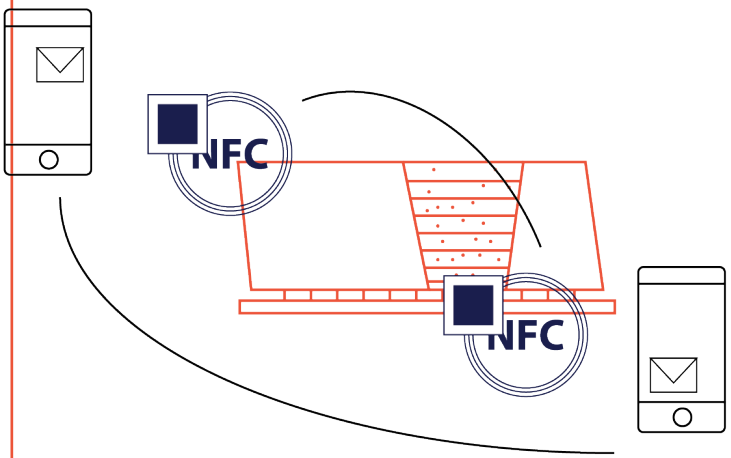
A new indoor map that redesigned based on users needs and people's behavior of reading a map.
The new map will be three different versions, targeting conference participants, tourists and students/ researchers. Each map consists three part: the first part is a map pointing out meeting rooms/ things to see/ reading rooms depends on the version of the map; the second part is services that offer to target group; the third part is information of cultural activities.

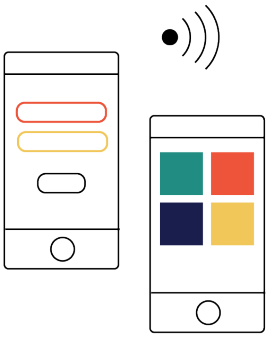


CONCEPT 2

QR & NFC

By implementing QR code and NFC stickers inside the library, visitors can get information by scanning the code or place the phone close to the tags. Depending on the places the code and tags are placed, the information could be the upcoming events at the concert hall, the story of the building or even a hint for a treasure hunt.

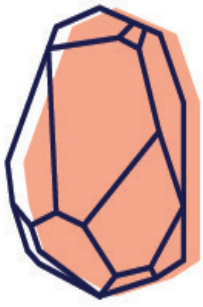




CONCEPT 3

Captive portal

To add a new landing page between a user connect to the Wifi in the Black Diamond and start using internet. The landing page creates a new communication channel between the library and the visitors, where the information of the service can be presented.

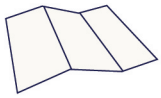


CONCEPT 4

Beacon

Beacon is a new technology has been widely used in indoor environments. It works with small BlueTooth Low Energy devices that sending data to a particular range. Beacons can be used in both situations of indoor positioning and information dissemination.

A table was made to compare the advantages and disadvantages of each idea.



Redesign map

Advantages	Disadvantages
· low cost, · easy to reach	· difficult to update · not very sustainable · few interactions between users and the library

QR & NFC

Advantages	Disadvantages
· low cost, · easy to update information	· do not contain location information · 'old fashion' · smart phone requires

Captive Portal

Advantages	Disadvantages
· medium cost (high cost if add wifi location service), · easy to update information	· do not contain location information · easy to be ignored · smart phone requires

Beacon

Advantages	Disadvantages
· medium cost, · easy to update · attractive · Interaction between users and the service	· consume time and money; · system has to be maintained · Smart phone requires

Figure 9, Pros and cons of initial ideas

Each idea has been presented with pros and cons (Figure 9) to the contact person, she showed a great interest in both the map and the Beacon solution; she also pointed out that this two solution were not contradictory. The final concept can be a combination of both digital service and physical maps.

DEVELOP

Concept:

Combination of Physical maps and Beacon Implementation -NAVION

Tools:

Service ecology map

System map

Motivation matrix

Video prototype

User Test

SERVIC ECOLOGY MAP

Service ecology map is a useful tool in the early stage of design a service. It provides an overview of the whole concept, as well as how different actors interact with the service, and to map the interconnections in and around a service environment (Polaine, Løvlie & Reason. 2013; Marquez & Downey 2016).

This service ecology map illustrates six parts of the service clockwise with the service in the center:

WHO- who are the actors?

In this map, the cultural, the conference booking department and both group pf users are placed in the first circle, since they all have a close relation and a direct interaction with the service.

WHEN- when will the service been used?

The service is a combination of both digital and physical part. The digital part is also divided into two: real-time indoor location and proximity function, and information subscription. The first part of digital service, as well as the physical map, can only be reached during the library opening time, while information subscription can be reached at anytime.

WHERE- where will the service been used?

The same as 'Where', the proximity function and the physical maps can only be reached inside the library physical space. Information subscription works online, and it dose not have place limitation.

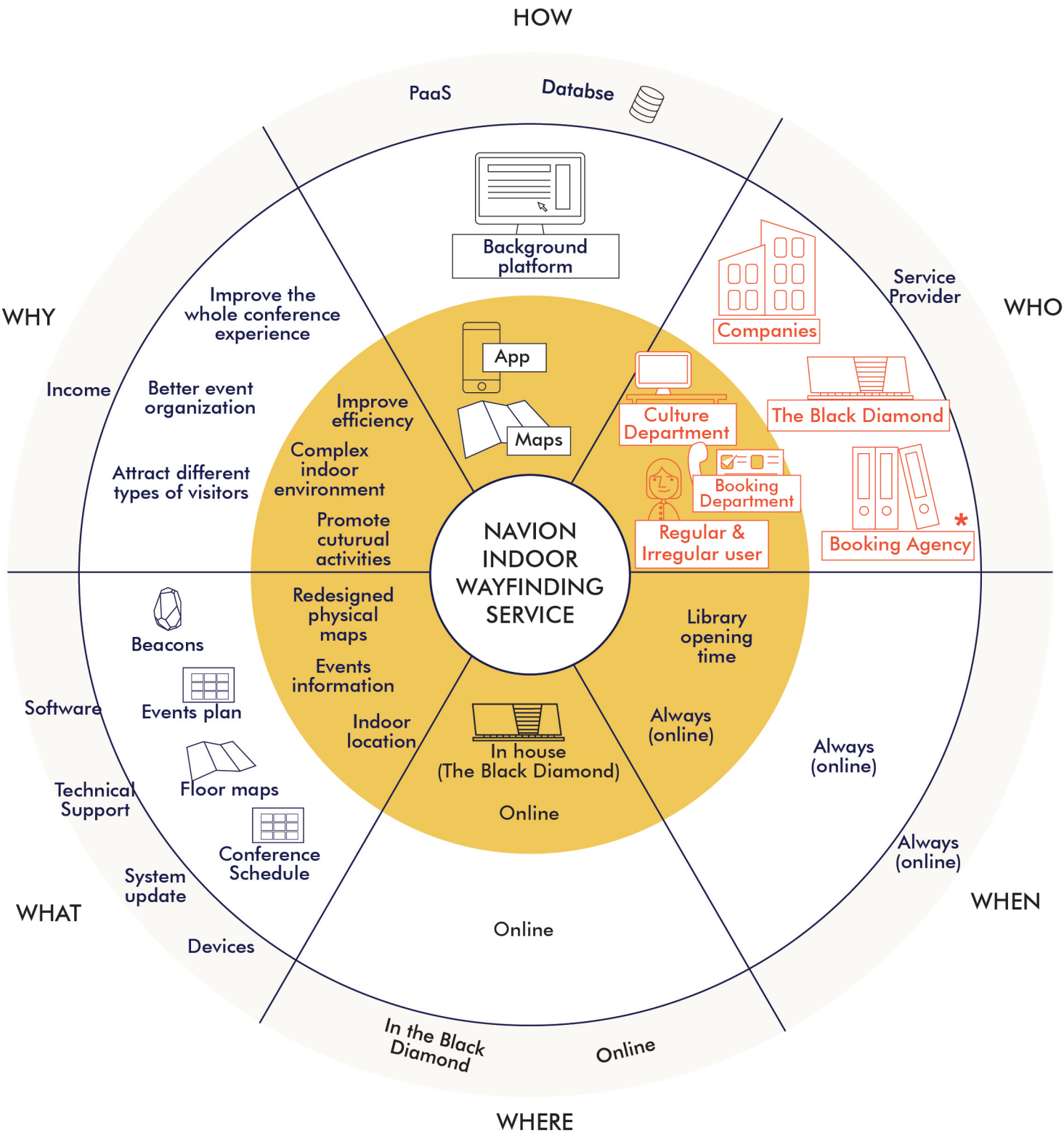
WHAT- what part of the service will the actors reach first?

WHY - why they are motivated to use the service?

HOW- how do different actors use the service?

WHY 'NAVION' ?

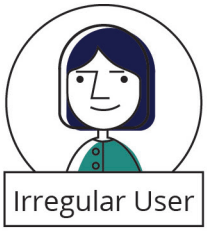
The service was named 'navion' simply based on its function of 'naviagtion'; 'On' can also be translated as the action is on.

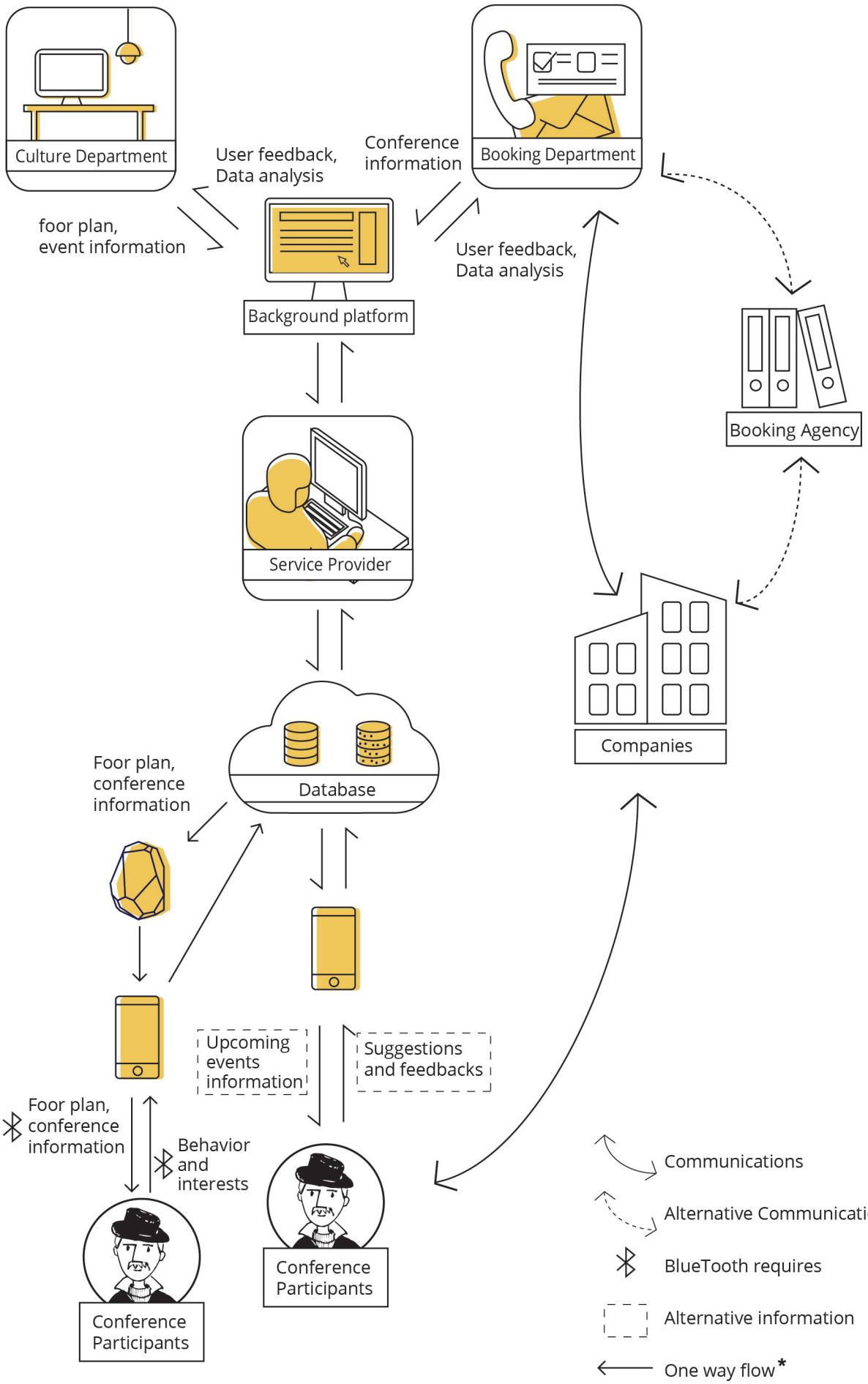


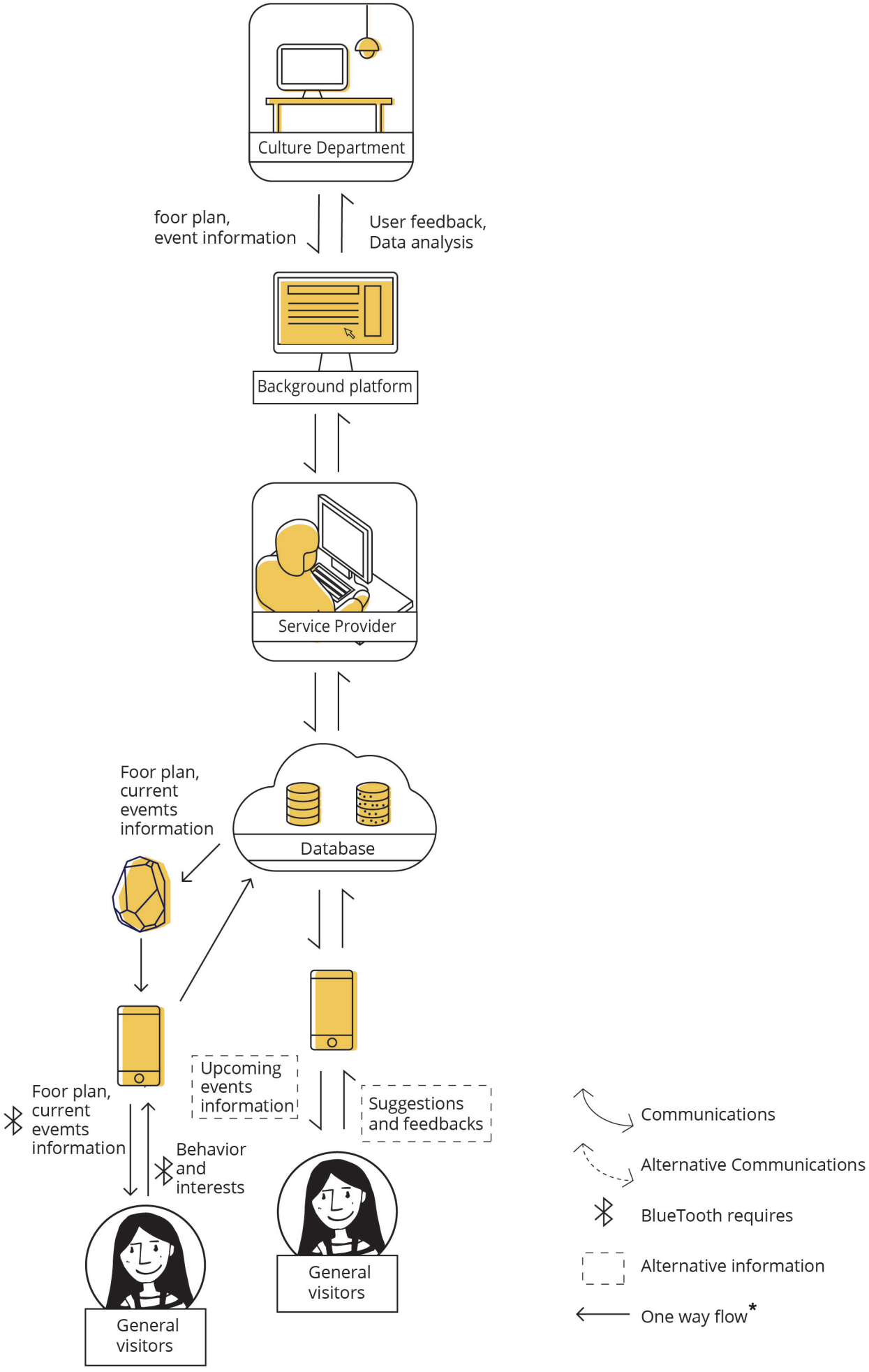
** Booking Agency: the organizations that help companies look for and book conference room based on their requirements.*

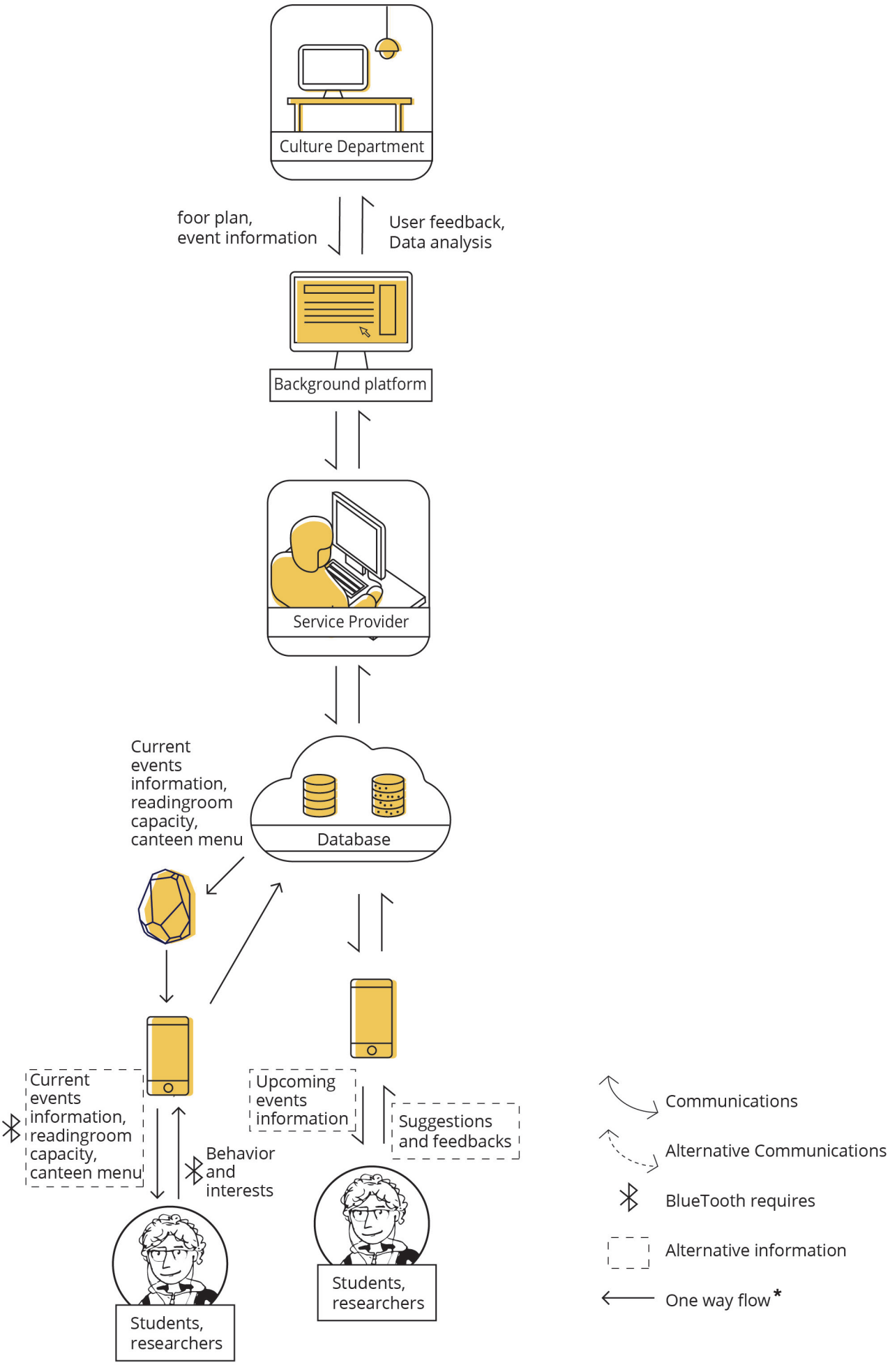
SYSTEM MAP

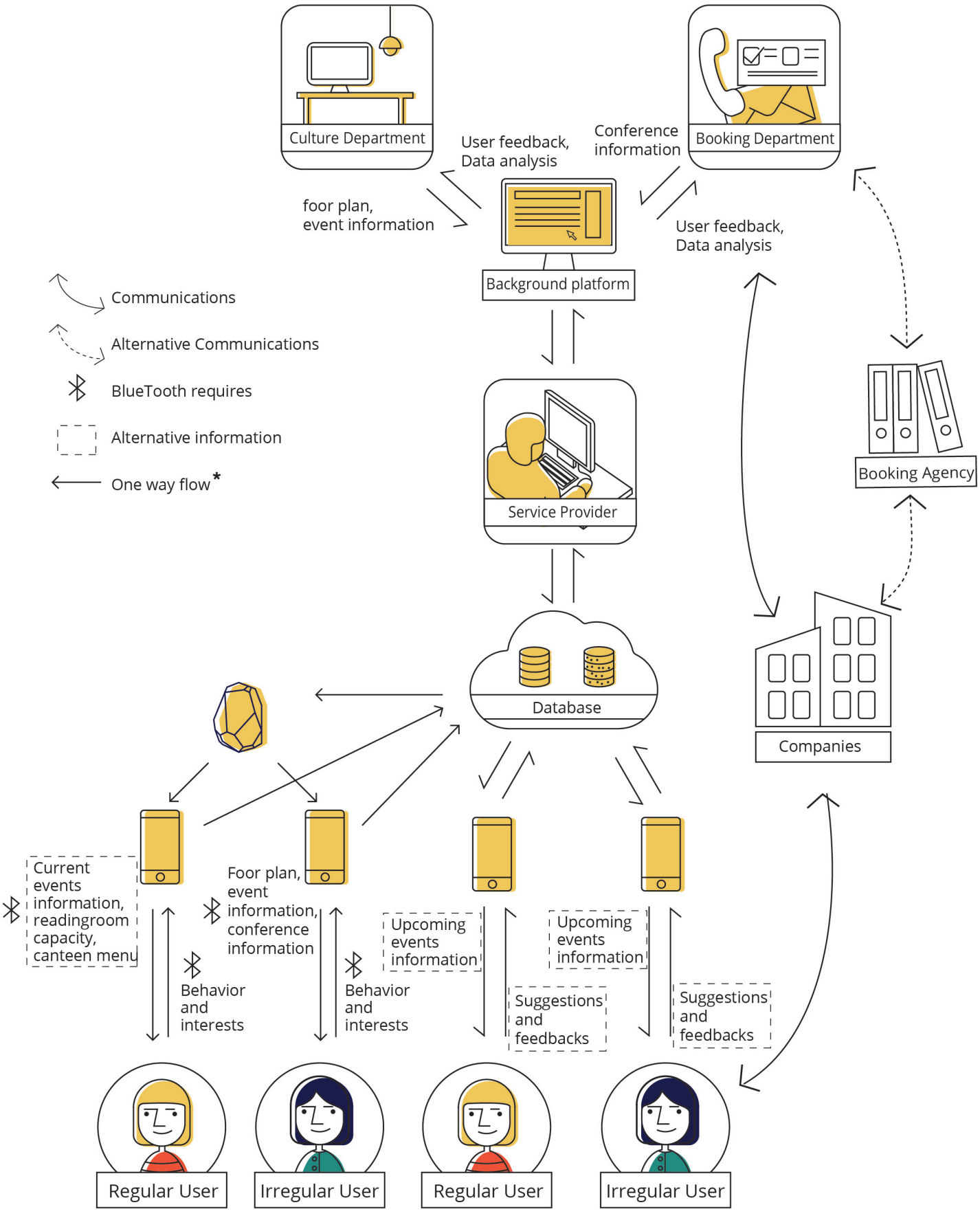
The system map depicts the links and flow of materials, information through the system the system between different actors involved (Morelli, 2007). The following figures describe in three different situations and the interaction and relation between actors and the service system, and the last figure is the combination of particular cases, maps the general service system.




Culture Department
User feedback,
Data analysis
Conference
information
Booking Department
foor plan,
event information
User feedback,
Data analysis
Background platform
Booking Agency
Service Provider
Companies
Database
Foor plan,
conference
information
Upcoming
events
information
Suggestions
and feedbacks
Foor plan,
conference
information
Behavior
and
interests
Conference
Participants
Conference
Participants
Communications
Alternative Communications
BlueTooth requires
Alternative information
One way flow*

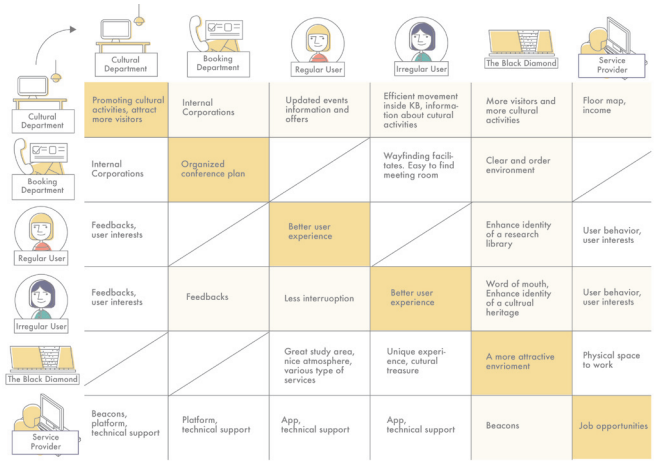

Culture Department
foor plan,
event information
User feedback,
Data analysis
Background platform
Service Provider
Foor plan,
current
evemts
information
Database
Upcoming
events
information
Suggestions
and feedbacks
Foor plan,
current
evemts
information
Behavior
and
interests
General
visitors
General
visitors
Communications
Alternative Communications
BlueTooth requires
Alternative information
One way flow*


Culture Department
foor plan,
event information
User feedback,
Data analysis
Background platform
Service Provider
Current
events
information,
readingroom
capacity,
canteen menu
Database
Current
events
information,
readingroom
capacity,
canteen menu
Behavior
and
interests
Upcoming
events
information
Suggestions
and feedbacks
Students,
researchers
Students,
researchers
Communications
Alternative Communications
BlueTooth requires
Alternative information
One way flow*



* *BLE Advertising used by beacon is a one-way communication method.*

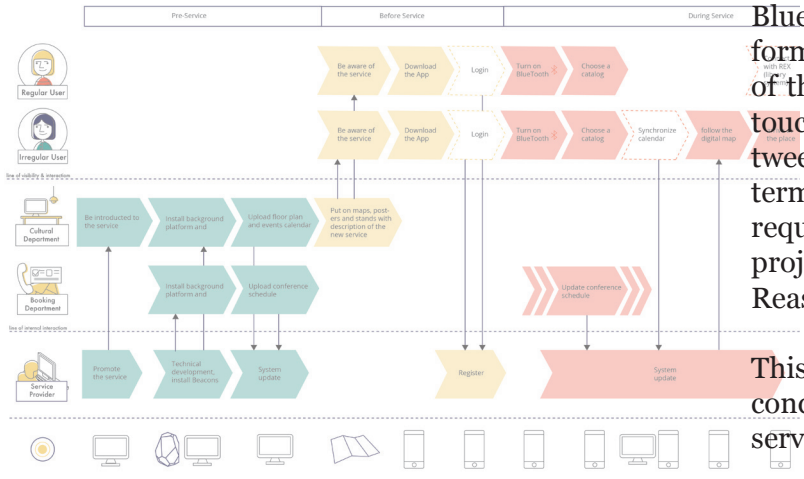
MOTIVATION MATRIX



The motivation matrix visualizes the functional relation between actors that participate in the service. It helps to clarify the motivation of each actor as well as the expectations between them (Morelli & Tollestrup, 2007).

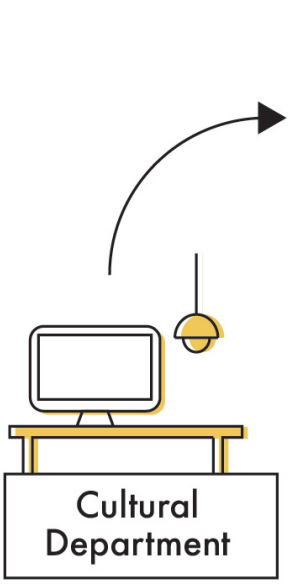
The use of motivation matrix (Figure 10) is to make it clear which actors provide what to each other, as well as to present the client that the service is able to fit the needs of different actors.

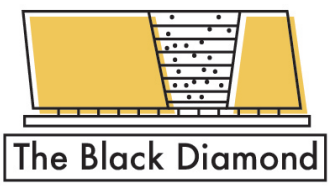
SERVICE BLUEPRINT



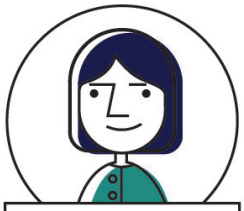
Blueprint describes how a service is performed; it provides a comprehensive view of the service with presenting interactions, touchpoints, as well as information flow between different actors. There's no standard terminology of a service blueprint, it often requires changes depending on different project and it's purpose(Polaine, Løvlie & Reason, 2013).

This service, the blueprint (Figure 11) is conducted in four stage: pre-service, before service, during service and after service.

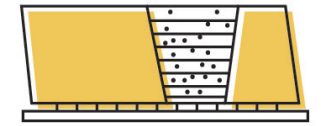




Promoting cultural activities, attract more visitors	Internal Corporations	Updated ev information offers
Internal Corporations	Organized conference plan	
Feedbacks, user interests		Better user experience
Feedbacks, user interests	Feedbacks	Less interruo
		Great study nice atmospl various type services
Beacons, platform, technical support	Platform, technical support	App, technical sup



Irregular User

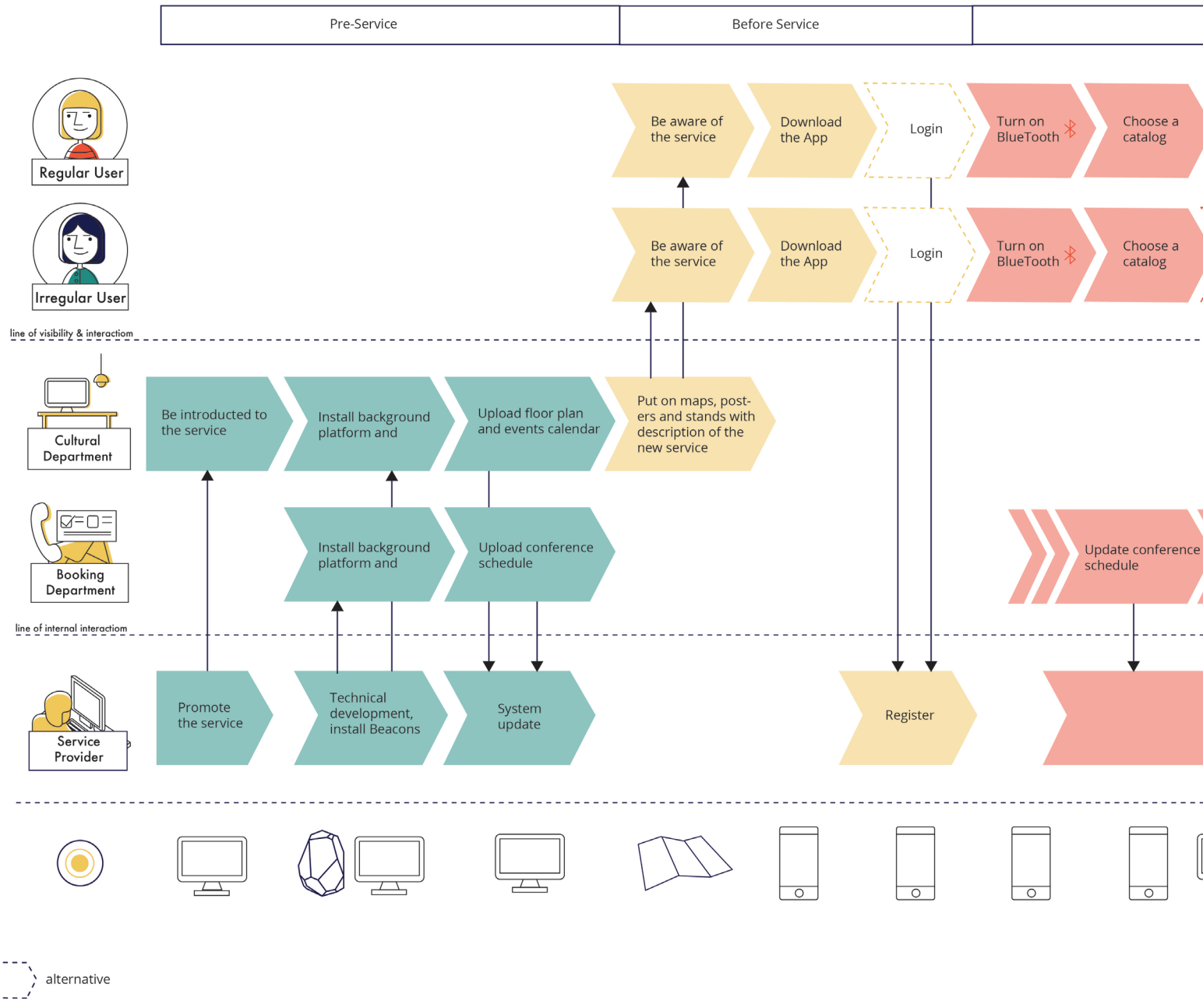


The Black Diamond

Service Provider

ents and	Efficient movement inside KB, information about cutural activities	More visitors and more cultural activities	Floor map, income
	Wayfinding facilitates. Easy to find meeting room	Clear and order environment	
		Enhance identity of a research library	User behavior, user interests
ption	Better user experience	Word of mouth, Enhance identity of a cultrual heritage	User behavior, user interests
area, here, of	Unique experience, cutural treasure	A more attractive envriomen	Physical space to work
port	App, technical support	Beacons	Job opportunities

Figure 10, Motivation matrix


Pre-Service
Before Service
Regular User
Irregular User
Be aware of the service
Download the App
Login
Turn on BlueTooth
Choose a catalog
Be aware of the service
Download the App
Login
Turn on BlueTooth
Choose a catalog
line of visibility & interaction
Cultural Department
Be introducted to the service
Install background platform and
Upload floor plan and events calendar
Put on maps, post-ers and stands with description of the new service
Booking Department
Install background platform and
Upload conference schedule
Update conference schedule
line of internal interactiom
Service Provider
Promote the service
Technical development, install Beacons
System update
Register
alternative

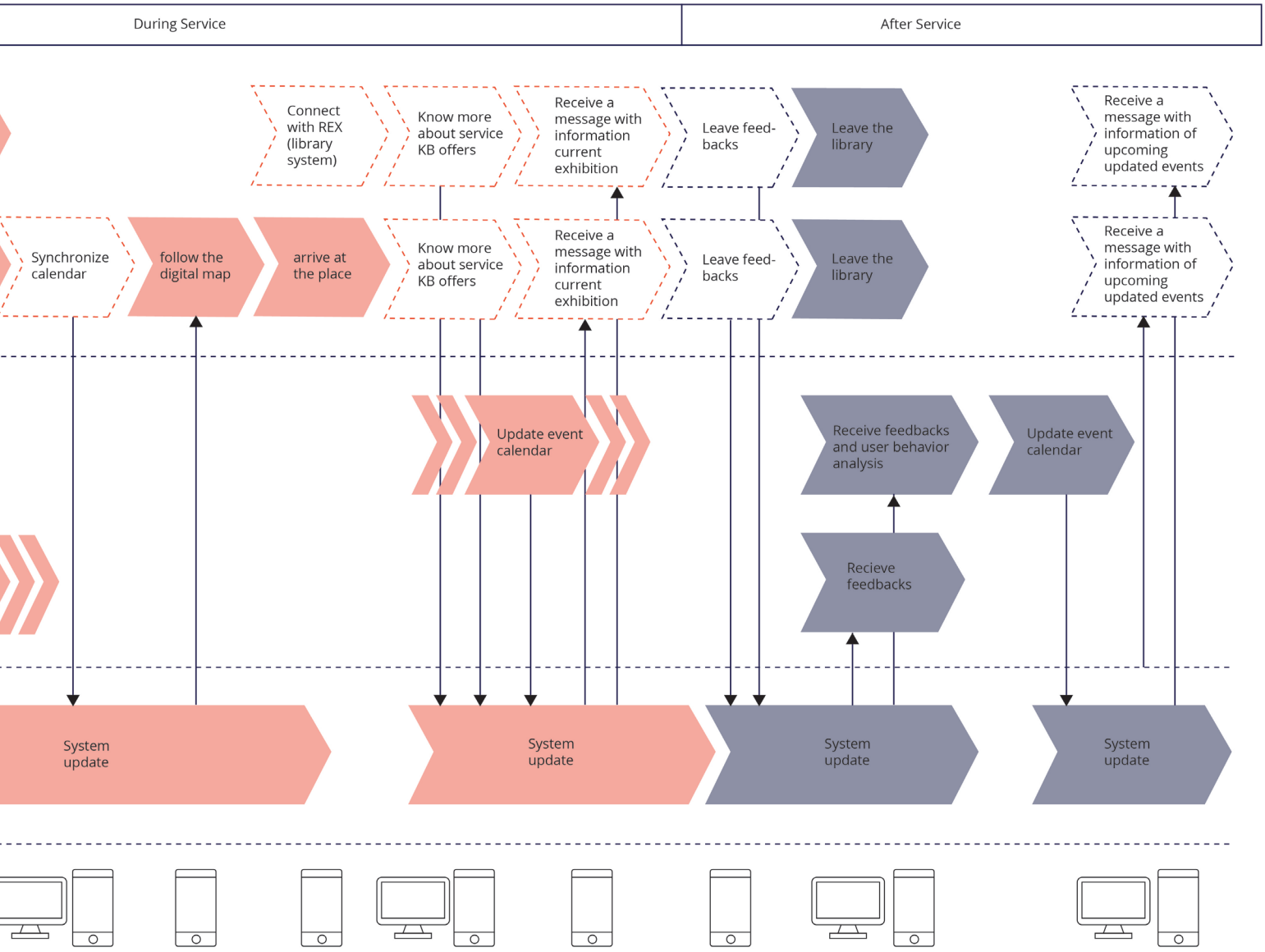


Figure 11, Service blueprint

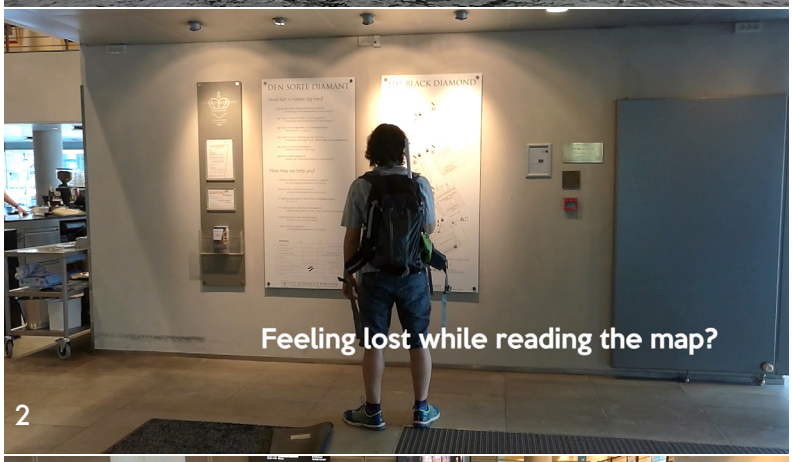
VIDEO PROTOTYPE

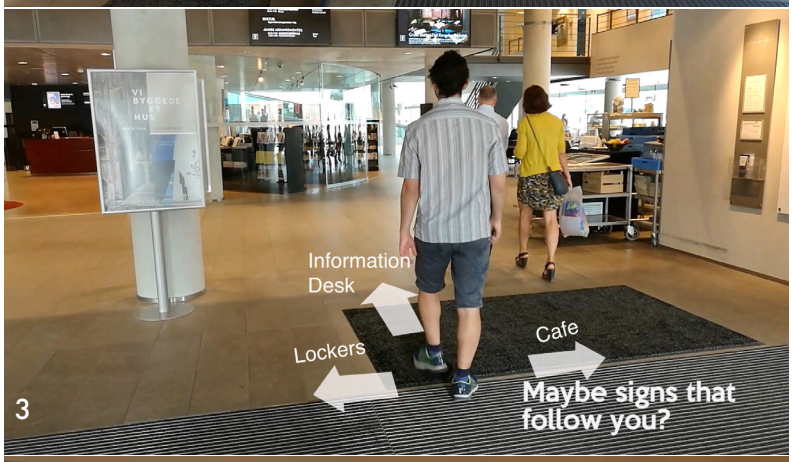
Video Prototyping (Mackay, 1988) is a fast and useful tool to present service concept. Especially in projects requiring high technology development, as well as in projects with some limitations.

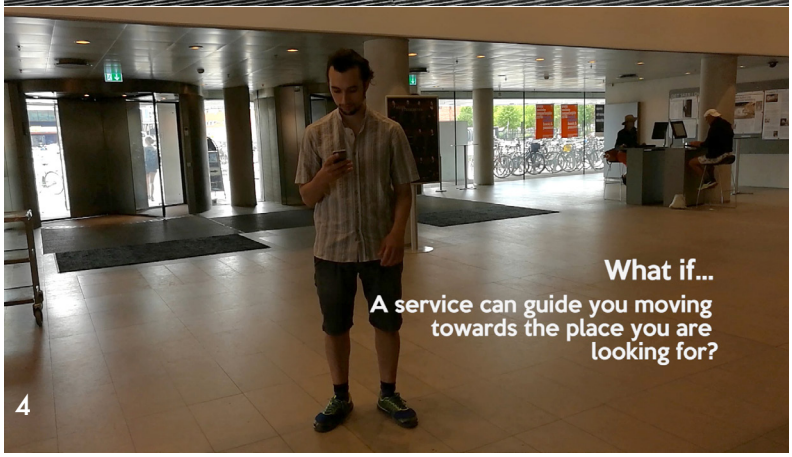
In the case of the wayfinding service, due to developing a real Beacon implemented solution longer time and involving professional technical companies. One of the best ways of validating the concept is through presenting a concept video.

The video clip was filming in the real physical space of the Black Diamond, it makes it easier for people to follow the context of the project.

The eight screenshots represent the key scenes of the video (Huang, 2016).







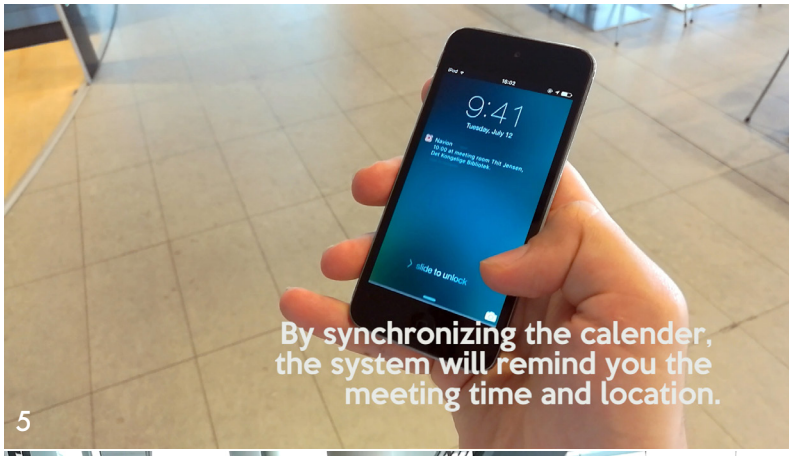
1. The introduction of the library;

2. The actual wayfinding problem the library has;

3. The idea solution for the wayfinding problem;

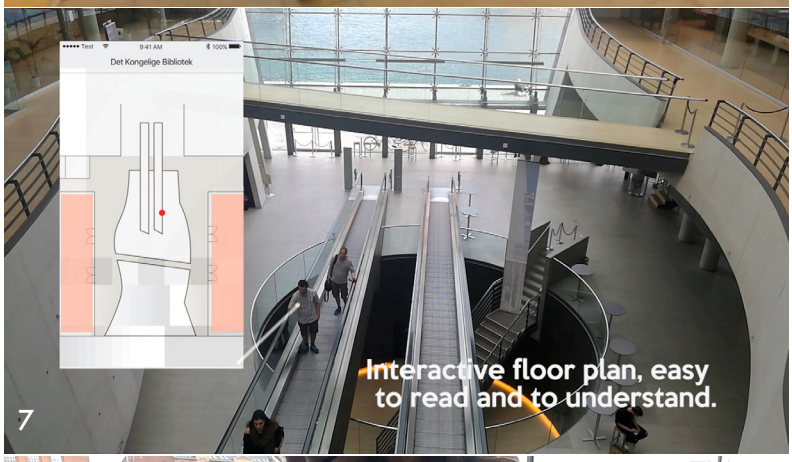
4. Service concept - the notification;

5. The system reminds the user the event time and location;

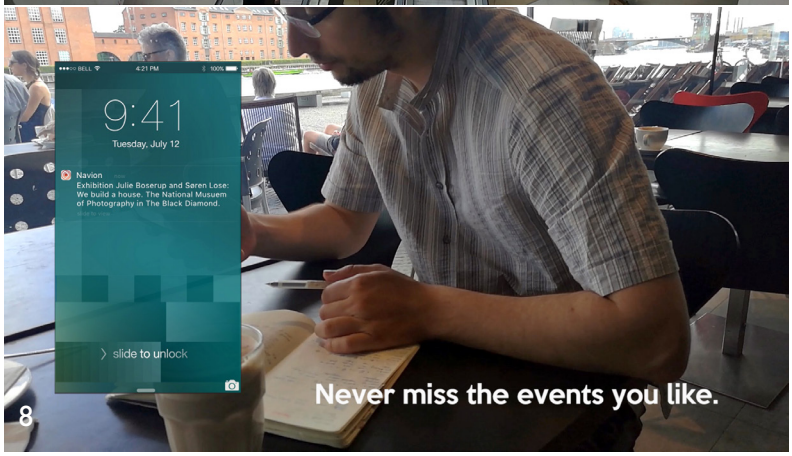


6. The real-time indoor map leads the user to the destination;

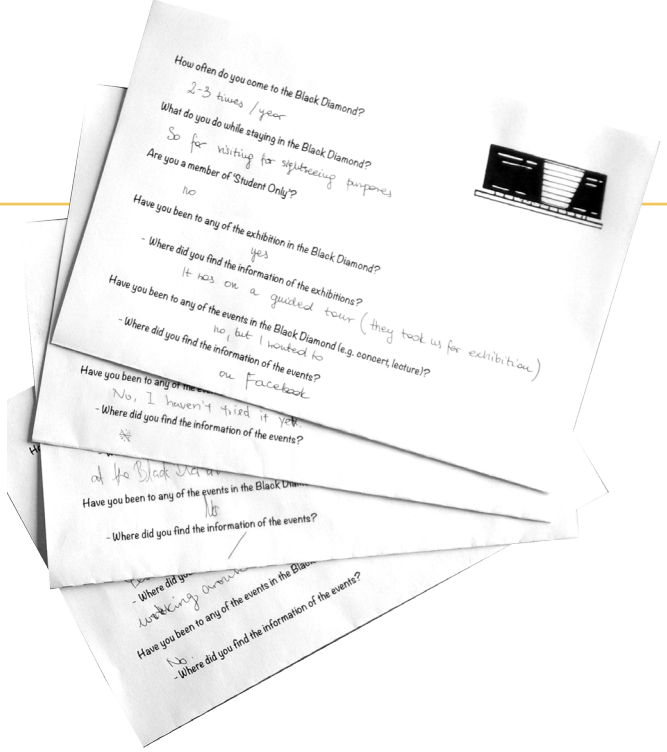
7. The interactive indoor map in dicates different area inside the library;



8. The proximity function pushes information of cultural activities to user.



USERE TEST



USERE TEST

The purpose of conducting the workshop is to test the validity of the service concept, as well as to get some feedbacks which can be used as inputs for future improvement.

Five participants attended the workshop. Three of them represented the 'regular user' group, and the other two represented the 'irregular group'.

The workshop started with a short interview about the background of participants and how often do they come to the library. The second part was a role play game. There are four user cases prepared on four small cards facing down on the table; each card contained a task related to wayfinding. The participants were asked to pick one of the cards, read the story and to finish the task. The topic of wayfinding wasn't mentioned until the third part of the workshop. The video sketch of the service concept was played to the participants and the physical maps were presented, followed with a questionnaire with particular questions regarding the service concept.

The result of the test is very positive. All participants felt it was very useful to have a service as the video showed and they gave very useful suggestions. There were also some concerns brought to the table, such as data security.


Physical maps templates
Beacons implement suggestiobs
Future de-velopment
Product report
Interfaces of Application
DELIVER

DELIVER

Physical map templates

Concept video

Product report

Due to the extension of the project, the delivery of the service was conducted in two parts.

The first part delivery was in the end of May, the report included the findings of the research, proposal and a draft of customer journeys of future service, while the final concept was just defined.

The second delivery is by the middle of August with a fully developed concept. Since the contact person left the Black Diamond, it's been very difficult to gain feedback from the Black Diamond. To self-evaluate the project, I have sent the project to library users, students in service design, as well as technical staff work at technology companies.

TTHE TEMPLATES OF PHYSICAL MAPS

There are three versions of the physical maps consists several layers of information, aiming for different user groups.

The form of the map is a small booklet with four pages, based the precedence of user needs while entering the library. The first layer presents information about meeting rooms/ study rooms; the second layer is named 'things you might need', it contains information of services that the library offers; the last layer is about the current exhibitions, upcoming open lectures and other cultural activities.

At the end of last page, there is a link to the Black Diamond website as well as a description of the new wayfinding service.

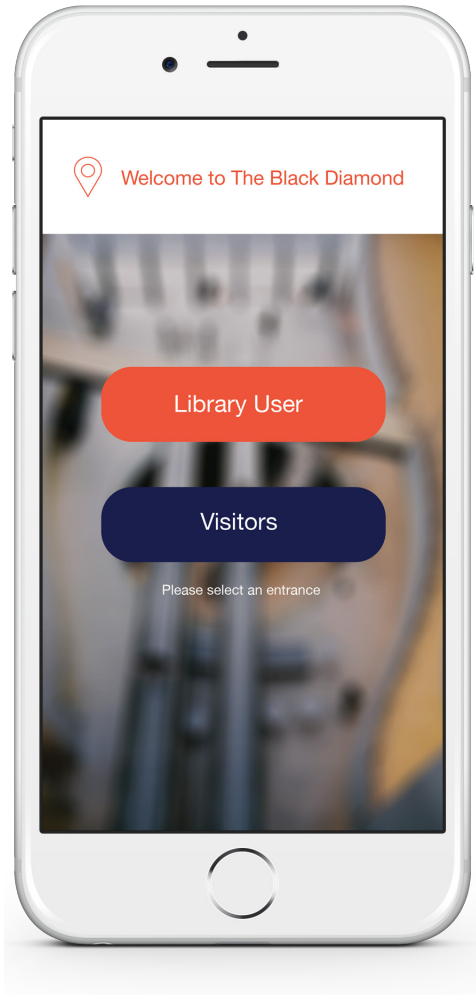
The physical maps have their advantages of easy to reach and they are still the most common used wayfinding assistance in the library. A new map can help spread the information of the new service.

BEACON IMPLEMENT SUGGESTIONS

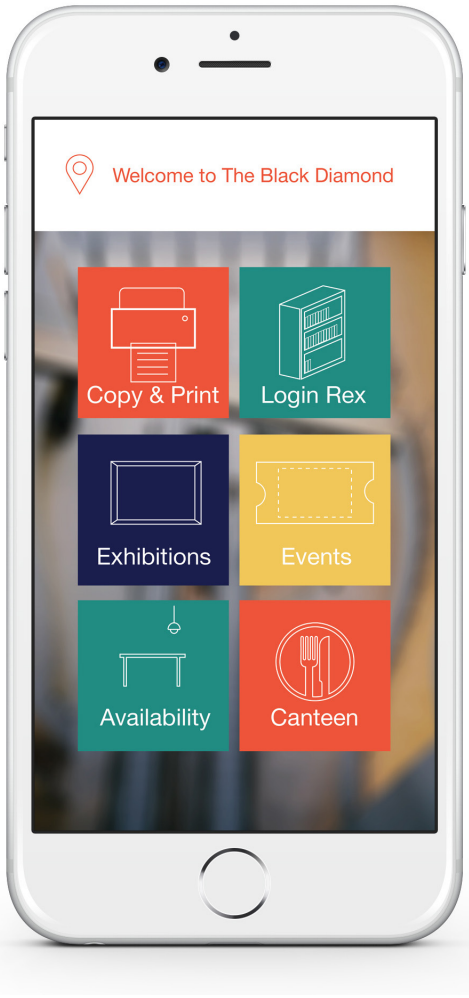
Based on the working requirements of BLE devices, and the test and analysis of 'decision points' in the physical space of the Black Diamond, a map of spots to install Beacons is suggested.

INTERFACRS OF MOBILE APPLICATION

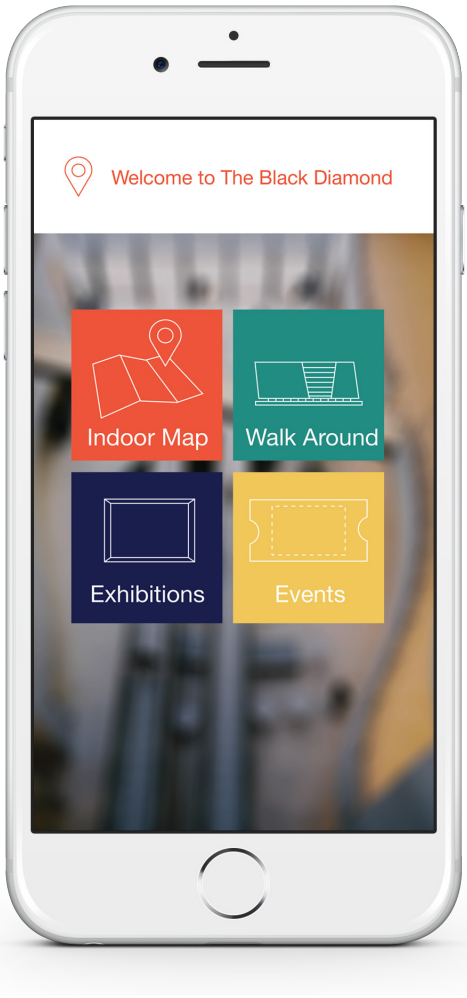
This section presents several interfaces designed for the mobile application, including the interface of choosing the entrance between regular and irregular users, the main menu of each entrance, indoor positioning map, information of the building and cultural activities. The reason of design the key interfaces of the application is to make it easy and clear to present to the client how the future service will look like.



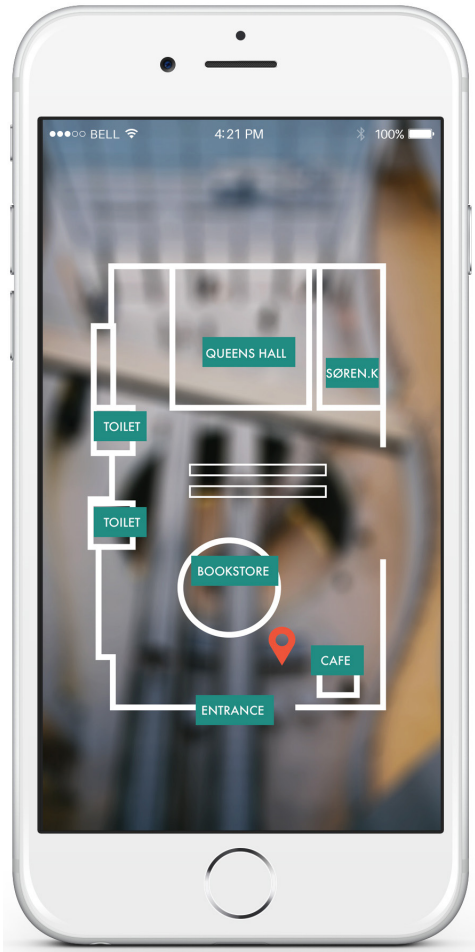
The two entrances for library users and visitors;



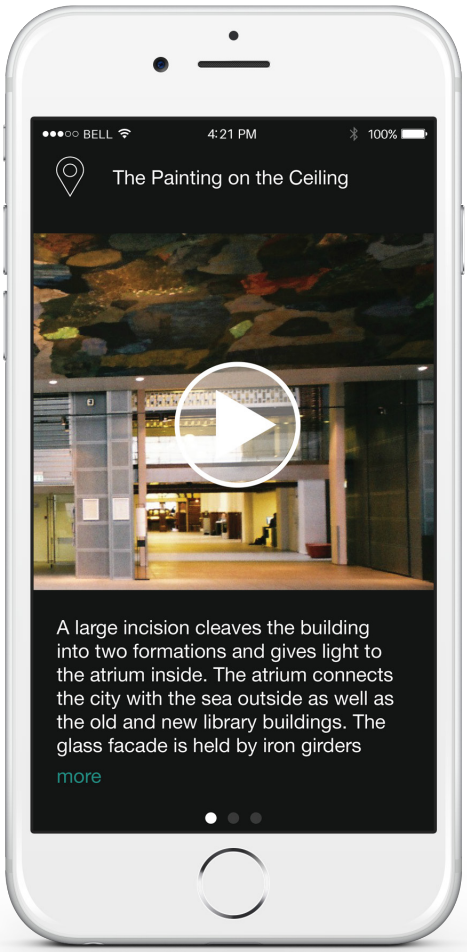
Main menu for library users is based on the library service, including copy and print, the menu of the canteen;



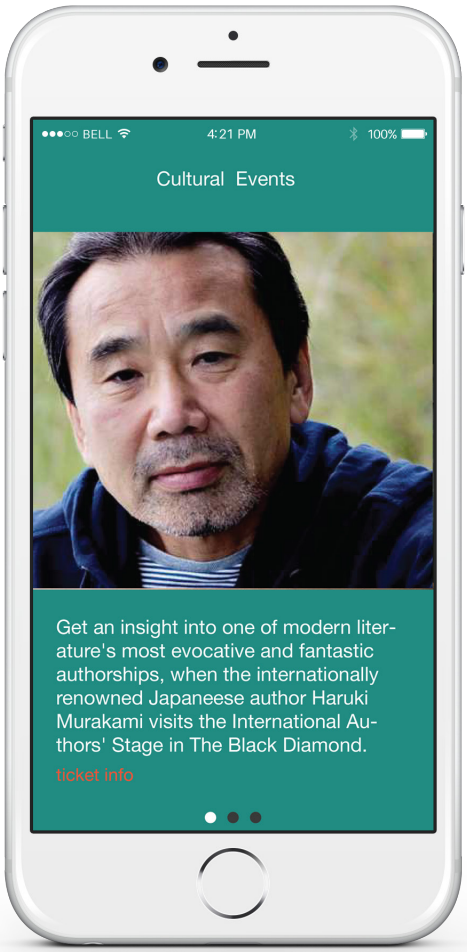
Main menu for visitors is for indoor location use, introducing the building, as well as promoting culture activities;



While a user activate indoor positionning, he/she can see his/her real-time location on the map that presents on the screen;



When a visitor passes by an important part of the library, information of this part of the building will be presented;



With the BlueTooth activated, the user can receive information of current and upcoming events while passes by exhibition hall, concert hall.

FUTURE DEVELOPMENT

Apple first launched iBeacon in 2013 while iOS 7 was released. An indoor positioning system was designed for the retail environment and implemented in Apple's own stores in the same year (McHugh & Yarmey, 2014). During past years, it has been a trend for public buildings to install Beacon based indoor positioning service, including shopping malls, museums, airports, and hospitals. With the increasing popularization rate of the Beacon techniques for personal use, people's behavior has been progressively changed: nowadays it's shown an increasing acceptability of services based on Beacons.

The service developed in this project was design for the Royal Library to solve the problem of indoor wayfinding and information dissemination. Due to the dual identity of the Royal Library, the service has the potential to be scaled in both the research library and the cultural center.

As a part of the Copenhagen University Library, the service can be easily implemented into the other university libraries, with the function of pointing out services and academic events (Statler, Audenaert & Coombs. 2016). Furthermore, an alternative function that can be taken into consideration is the shareable real-time location which can create a new connection between library users.

The library can also take the advantage of the collections and its identity as a 'cultural center'. By expanding the service to other relevant museums, historical buildings and some other spots in the city, the service can generate recommendations according to user interests. It will transform the Black Diamond from the 'cultural center' to a 'cultural hub' that links to cultural attractions around the city.

Another proposal of the future development stands from the service provider's point of view. Inspired by the 'Apple Wallet'/'Apple Passbook' function of Apple, users easily add boarding passes, e-tickets to their phone. This habit can also be adapted to future Beacon services, instead of downloading different apps at different places, the service provider could offer a service that enables users to get access to indoor positioning service when they need. For example, when a user receives a new boarding pass, he/she can add both departure and arrival airports to the app, which permits the app to receive messages and wayfinding assistance when he/she arrives at both airports. The same service can be applied in conference centers, museums, even hospitals and other big buildings, as long as the buildings have Beacon services installed.

Reflection

A LIBRARY IS A SYSTEM

User-centered designed service is not new in public sectors like libraries. However, it's been a shift of user needs over the last decades, from 'the expectation of fundamental performance to a more broadly satisfying experience (Brown & Katz, 2009)'.

Service design started being attracted due to its holistic, scalable, user-centered, and system-based approach that involves actual users in the whole design process (Marquez & Downey, 2016).Libraries, where everything is a service, demand an overview of the whole library ecology while developing a service.

Looking at the library as a system not only provides a view of a whole experience but also evokes the original purpose of the library. A library like the Black Diamond, has already created its unique identity and its own behavior throughout time. To design a service in the library is not to promote an entirely new solution. Instead, it helps the library to adapt to the latest trend (Marquez & Downey, 2016).

A T-SHAPED SERVICE DESIGNER

The concept of T-shaped skill or T-shaped people (David, 1991) was created in his book 'The hunt is on for the Renaissance Man of computing' and promoted by IDEO. The CEO Tim Brown describes a T-shaped person as *'be able to explore insights from many different perspectives and recognize patterns of behavior that point to a universal human need'* (Design Council, 2005). That requires both the breadth and depth of knowledge.

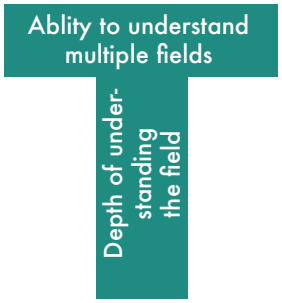


Figure 12, T-shaped skills (David, 1991)

There has been an increasing demand for service designers in different fields, from small size startups to large enterprises and public sectors. To be a T-shape designer, no matter an in-house service designer, or from a consultancy, it's important to have: a deep expertise in design and broader understanding of topics in various areas. While working in a team, T-branches become the bridge to communicate and to understand. The longer the branch is, the easier the communication will be. It also helps a designer adapt faster to a new context of a project.

Meanwhile, during the design process, the T-shaped designer can be translated to 'a thorough understanding of the problem', and 'a breath perceive of user needs.'

A CoP(COMMUNITIES OF PRACTICE) OF SERVICE DESIGN

A library is a system with several interconnected elements (Figure 12). In consequence, many libraries are organized in small departments based on fulfilling the demands of each element. The employees, who are often focussed on the particular tasks of their department, do not pay enough attention to the other departments. In addition, the employees of the library are often not directly connected with their users, creating a gap between those who make and those who benefit from the solutions and services in the library.

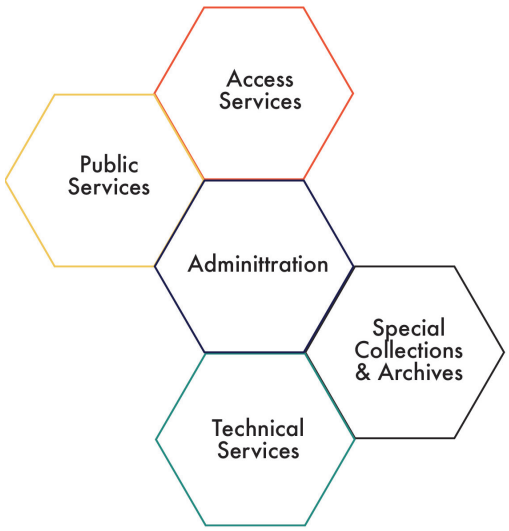


Figure 13, A library system (Marquez & Downey. 2016)

That situation has created a need of a community of practice (CoP), in order to avoid the adverse effects by the division of different departments and improve the working experience as a whole organization. As defined by Wenger, a communities of practice is a 'group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.' (Wenger, 2009). The main differences between a service design CoP, a service design team and a project team are shown in the Figure 14.

	What's the purpose?	Who belongs?	What holds them together?	How long do they last?
Communities of Practice	To develop members' capabilities; to build and exchange knowledge	Members select themselves based on expertise or passion for a topic.	Passion, commitment, and identification with the group's expertise	As long as there is interest in maintaining the group
Formal work groups	To deliver a product or service	Members include everyone who reports to the group's manager.	Job requirements and common goals	Until the next reorganization
Project teams	To accomplish a specified task	Members are assigned by senior management.	The project's goals and milestones	Until the project has been completed

Figure 14, Comparing CoP with other group and team (Wenger, 2009)

At the early stages of the process, my contact person in the Black Diamond, the contact person Maria invited me to a lunch meeting with around 8 other persons, all belonging to the different departments of the library. As a group, they formed a service design CoP and they cooperate to find novel solutions and to improve the experience of the users in the library. As a service designer, it was a pleasure to partake in their meeting, and to see how people with different backgrounds were interested in service design.

During the last half a year, the service design CoP of the Black Diamond collaborated with two student projects in service design (one about wayfinding and another one about user experience), they gained valuable new tools, methods and fresh ideas, updating their knowledge in this field. During the course of the project, it became clear the power that the formation of a service design CoP can become a very versatile and competitive tool applicable to many scenarios.

This experience reveals the importance to form and implement service design CoP, where the passionate members share their ideas to build innovative solutions for each user, from the public sector to large companies and organizations; after all, everything is a service, and service is everywhere.

Conclusion

MY SERVICE DESIGN JOURNEY

During the last half a year, I have done an exciting journey to design a service to improve the navigation in complex indoor environments. During this journey I have applied the service design methodology in collaboration with the Black Diamond. Initially, the collaboration with the library was scheduled to last four months, however, due to the complex nature of the problem, several iterations in the 'discover' and 'define' parts where required, extending the project for two additional months (Figure 16).

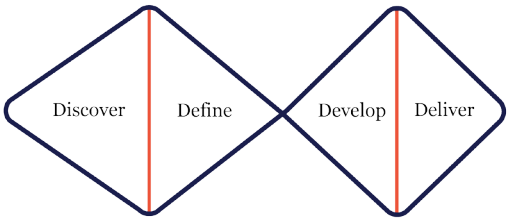


Figure 16, The actual double diamond

This extended project plan posed an additional challenge: the contact person at the Black Diamond changed her job unexpectedly, and I dealt with the project on my own during the last two months. Therefore, I experienced team-work with the interdisciplinary personnel of the Black diamond during the first four months, and I worked independently and took responsibility of the decision making process during the last two months, where I based my actions on the knowledge that I achieved through interviews and questionnaires that I previously did.

As a matter of fact, during this journey I have had a first-hand experience of the complex nature of the service design process (Figure 17). In the first stages, the process is very iterative and uncertain, but the service design methodology resulted very useful to whittle down the different alternatives and to lead to the path of one final solution, based on the user needs. In this context, I have learned that the user needs change permanently with the cultural trends, technological advances, and the constant apparition of new generations of users. This requires the service to be periodically evaluated on whether it matches the user needs, and to be a subject of permanent evolution.

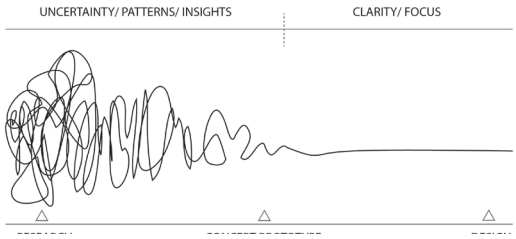


Figure 17, The squiggle (Damien, unknown)

VISUALIZATION - AN IMPORTANT TOOL

During this journey as a service designer, I have experienced the inner complexity of services, which combines many different actors, technological devices, the environment and several organizations. In fact, this complexity often covers the services itselves, limiting their visual evidence. This lack of visual evidence in the services is becoming a critical issue as the number of involved people (stakeholders, experts and users) grows, and also the complexity of the activities. In this context, visualisation tools have been considered as a significant support to improve the communication between the actors involved in the development of services (Diana, Pacenti & Tassi, 2009). By implementing these visualization tools, the communication between the different parts will become more fluent, helping to make the ideas more tangible and understandable. This is the reason why the use visualization tools has been maximized at each step of this project, including the conducting the interviews with the library personnel, presenting the findings and proposals and in the final report that is delivered.

THE CHALLENGES & MOTIVATIONS

Conducting a project of this magnitude on my own, has been a wonderful challenge and motivation at the same time. During the entire process, I have been responsible of playing the different roles in the design team, from researching and analysing, to developing and testing. This experience has helped me to improve my weak points, making me more versatile and resourceful, as I have learned to combine different service design tools.

Overall, I am very satisfied with this project, which I consider as an excellent 'learning-by-doing' experience to consolidate the knowledge achieved during my Master Degree. From a personal perspective, I am also happy that I achieved the personal goals that I had in the beginning of the project.

I am proud to say that all the challenges that I have faced during this project have made me a better service systems designer.

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Appendix

Questionnaires

Leaflet

Feburary 24th, 2016.

&

Welcome to my journey

WHO AM I

Xinyi, who hold a bachelor in Environment Art & Design now is writing her thesis of Service Design. 'Service Design' is about planing and organizing people, infrastructure, communication, media and components of a service, in order to improve its quality, the interaction between service provider and customers and the customers' experience.

I'm very excited to get a chance to collaborate with the Black Diamond, one of my favorite places in Copenhagen and my thesis will focus on optimizing way finding system and information dissemination in side the library.

Unlike public libraries, the Black Diamond is both the National library of Denmark and the university library of the University of Copenhagen. The building houses many public facilities and activities including conference center, concert hall restaurant and three museums. The library hosts various of exhibitions, guest lectures and concerts. Therefore customers of the library are also very diverse.The request of a clear way finding and information presenting system is very desirable.

WHERE WE ARE

WHO ARE YOU

Service design emphasizes User Center Design,
we like to work with users, design with users.
No matter your are:
Students, artists, researcher, tourists...
As long as you are one of the library users,
Your opinions are important to me!

Do you want to help me in future workshops?
Please drop a line to:

kbproject2016@gmail.com

No spam I promise.

WHAT WE DID

You are very welcome to have a look at the process on prokect blog! Feel free to contact me if you have any comments and suggestions!

adventure-in-library.tumblr.com

www.huang-xy.com

Customer Experience in Black Diamond

1. **What's your profession?**

.....

2. **How often do you come to the library?**
请仅选择一个答案。

- ◯ More than three times a week
- ◯ Once or twice a month
- ◯ Only when I have appointment here
- ◯ Just this time

3. **How long do you normally stayed here?**
请仅选择一个答案。

- ◯ Almost a whole day
- ◯ Several hours
- ◯ When I finish the meeting

4. **What do you normally do when you come here?**
请仅选择一个答案。

- ◯ Reading and studying
- ◯ Group work with classmates
- ◯ Meeting friends
- ◯ Join events (including exhibitions and concerts)
- ◯ Go to the restaurant

5. **Where do you normally eat lunch in the library?**
请仅选择一个答案。

- ◯ I bring my own lunch box and just find a place to eat
- ◯ I buy food in the cafe downstairs
- ◯ I go to the canteen on B level
- ◯ I don't eat here

Questionnaires

Questionnaire 1

6. **Where do you find the information about the events**
请仅选择一个答案。

- From the official website of black diamond
- Social media
- The posters inside library
- Others:
- I don't know there's event going on

7. **Have you loaned books from the library? How was the experience?**
请仅选择一个答案。

- Yes, I always loan book from here, it's very convenient.
- I do that sometimes, I prefer to get the book immediately.
- I don't know how to loan a book here.

8. **Have you had trouble on finding an available spot to seat in studying room?**
请仅选择一个答案。

- Yes, always
- Sometimes, especially during exam season
- There is always somewhere to seat

9. **How do you normally find a seat?**
请仅选择一个答案。

- I have my favorite place, I always try to find a place there first
- I don't care, as long as there is a seat
- Ohter

10. **Where's your favorite area inside the library?**

.....

Responses are available on

https://docs.google.com/forms/d/1_UDaQL_KZbBzwBrU5k-TuuO6WWc5aoDreevnwBabsewc/edit?usp=sharing

Experience in Black Diamond

1. **Where do you come from?**

.....

2. **What's your profession?**

.....

3. **What attracts you to come to Black Diamond?**
请仅选择一个答案。

- ◯ I come to join the event (including exhibitions/ conference/ concert)
- ◯ I come to the restaurant Søren K
- ◯ I will meet my friend here
- ◯ I come to see the building
- ◯ I just pass by
- ◯ Others:

4. **Where did you find the information about Black Diamond?**
请仅选择一个答案。

- ◯ From official webpage
- ◯ Tour guide of Copenhagen
- ◯ Social media website
- ◯ Friends recommend

5. **How do you move around in Black Diamond?**
请仅选择一个答案。

- ◯ I follow the maps and signs
- ◯ I just walk around, no specific routes
- ◯ I asked the information desk
- ◯ Others

6. **Are the signs in Black Diamond easy to read?**
请仅选择一个答案。

- ◯ They are simple and clear
- ◯ They are not easy to find, but I can figure out by myself
- ◯ Some of them are in Danish, I feel it's difficult for me to understand
- ◯ It's hard for me to follow, I don't know whether can I go this way or not
- ◯ Other

Questionnaires

Questionnaire 2

7. **Do you feel Black Diamond is more like...**
请仅选择一个答案。

- ◯ A museum
- ◯ A meeting place
- ◯ A study place
- ◯ A library
- ◯ Others

8. **How long you plan to stay here**
请仅选择一个答案。

- ◯ Less than one hour
- ◯ One to two hours
- ◯ More than two hours

9. **How's the trip in Black Diamond today?**
请仅选择一个答案。

- ◯ I would like to join a tour group to hear more
- ◯ I like to explore the space by myself
- ◯ I want to know more about this place
- ◯ 选项 4

10. **What things do you want to know more about Black Diamond?**
请选择所有适用项。

- ☐ The history of Royal Library
- ☐ Architecture concept of the building
- ☐ Information about exhibitions
- ☐ Others

Responses are available on

https://docs.google.com/forms/d/1ZmQ-1cAVklWdHlj0Qhn_Dbbosq33pvZsTVWQO1O5lcU/edit?usp=sharing

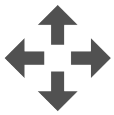
Idea workshop

Cards and map

ENABLER

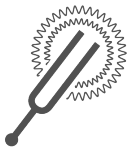
Ligth Sensor

ENABLER



Motion Sensor

ENABLER



Vibration Sensor

ENABLER

Infrared Sensor

ENABLER

Beacon

ENABLER

Smart Beacon

ENABLER

Wi-Fi Network

ENABLER

Sound Sensor

ENABLER

Temperature Sensor

ENABLER

Humidity Sensor

ENABLER

Weight Sensor

INTERACTION

Speakers

INTERACTION

Cameras

INTERACTION

Lights

INTERACTION

Advertisement Display

INTERACTION

Locks

INTERACTION

Check-in Device

INTERACTION

Payment Device

INTERACTION

Urban Furniture

INTERACTION

Screen / Display

INTERACTION

Drone

USER

Wearable


USER
USER
USER
Joker Card
Vehicle
Special Equipment
Smart Phone
CITY OPEN API
CITY OPEN API
CITY OPEN API
CITY OPEN API
Traffic Info
Environmental Info
Parking Info
Water / Waste Info
CITY OPEN API
CITY OPEN API
CITY OPEN API
Joker Card
Tourism Info
Safety, Security Info
Social Media Data
SERVICES
SERVICES
SERVICES
SERVICES
Police
Firemen
Emergency
3rd Party Services
SERVICES
SERVICES
SERVICES
Joker Card
Waste Management
Electricity Management
Water Management

Sensors

What are the Service triggers? What kind of Data you need to collect? What do you want to measure?

These cards will help choose what kind of sensors are the most meaningful for your service.

futurice

User Cards

What kind of assets the User will need to have use of your service? Do they need to own them?

These cards will help you decide what kind of equipment does the User needs to have to interact with your Service.

futurice

City Open API

Can your service make use of public urban data?
What kind of urban information would you need to improve the service?

These cards will help you choose the kind of data you can make use of.

futurice

Service Cards

Can your service incorporate or co-operate with an existing service? Is it public or private?

These cards provides you a starting point for partnership ideas including public and commercial services.

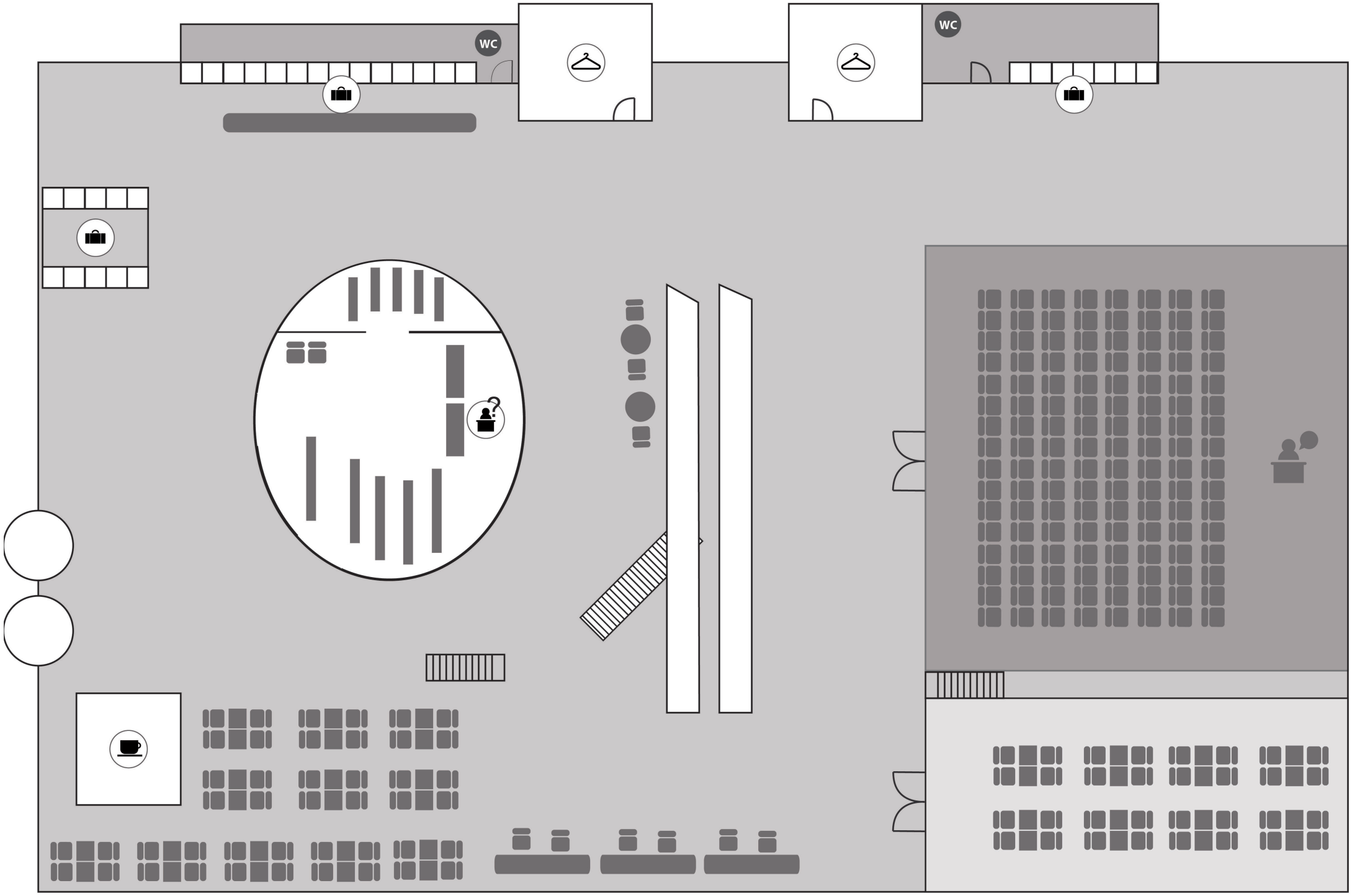
futurice

Interaction

How wil the user interact with your Service? Which kind of equipment do you need to build your service?

These cards will help you choose the ways User can interact with your service.

futurice

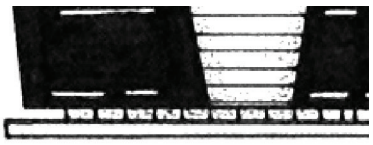

WC
WC

User test

Interview guideline

Questionnaire

Roleplay cards



)hat do you do while staying in the Black Diamond?

ıre you a member of 'Student Only'?

lave you been to any of the exhibition in the Black Diamond?

- Where did you find the information of the exhibitions?

lave you been to any of the events in the Black Diamond (e.g. concert, lecture)?

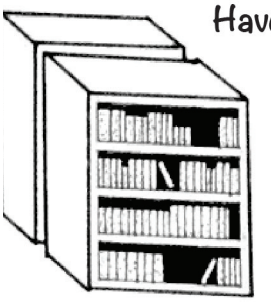
- Where did you find the information of the events?

According to your experience, do you think it'll be useful to have an app to guide you inside the building?

In your opinion, what are the advantages and disadvantages of having a digital map?

What additional functions would you find helpful/ necessary in the service?

Have you heard of/ used similar services (e.g. indoor navigation)?



Have your heard about BLE(BlueTooth Low Energy)?

What will be your concerns about using this service?

Today you came to the Black Diamond early in the morning to write your essay. Now it's lunch time, you realized you left your lunch bag at home. The food in the cafe is so expensive. You wonder if there is places you can find cheap food, or maybe just some snacks ...

It's your first time come to the Black Diamond, you walk around and try to take some nice pictures. You find a panel about a exhibition of the Black Diamond collections. You would like to go and have a look...

Today is Tuesday, you have a meeting at 2:30 in the Black Diamond, the location is: conference room Thit Jensen.

It's the first time you have a meeting at the Black Diamond, now your are standing at the entrance and looking for the conference room...

You have been working hard on your thesis and you are looking for a very important book. You wonder if you can find the book in the Black Diamond and borrow it...

“For the things we have to learn before we can do them, we learn by doing them.”

-Aristotle