Digital Library evaluation in Swedish academic libraries

A critical study

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Abstract
This master thesis aims to critically analyze the state of digital libraries in Swedish academic libraries. With the branching theory of sense-making and the methodology of DELOS and IFLA/UNESCOs digital library manifestos, this thesis hopes to bring to light how far Swedish academic libraries have progressed. By accumulating quantitative data encompassing all digital academic libraries in Sweden, and qualitative data from a select few, conclusions regarding the aforementioned are drawn.

Focusing on content analysis, this thesis analyzed the different components that can be said to constitute the digital library and compared them to the different manifestos that dictate what a digital library can be said to consist of. By employing the elusive sense-making theory as a general modus of mind, one can begin to understand thought-making processes behind the tapping of digital library resources.

Results from this thesis found that some functions and components are present within all academic libraries in Sweden, but that the digital library primarily tends to focus on resource acquisition and not so much on resource presentation. User environments are not prioritized. Different aspects are presented in regards to mobile optimization, social media, information organization, information design etc. This is a two years master’s thesis in Archive, Library and Museum studies.

Abstrakt
Den här masteruppsatsen syftar till att undersöka digitala bibliotek och digitala miljöer på svenska högskole- och universitetsbibliotek. Med sense-making som huvudsaklig teoretiskt ramverk och DELOS och IFLA/UNESCOs olika manifest gällande digitala bibliotek hoppas uppsatsen visa hur långt svenska bibliotek har kommit i relation till det digitala. Via samlandet av kvantitativ data från alla svenska akademiska bibliotek, och kvalitativ data från ett fåtal utvalda, kommer uppsatsen till diverse slutsatser.

Med fokus på innehåll och funktion så undersöker uppsatsen vilka komponenter som kan sägas utgöra det digitala bibliotecket i jämförelse med manifesten och deras ideala digitala bibliotek. Med hjälp av sense-making kan man få en förståelse för tankessättet och hur användare angränsar de digitala resurserna.


Ämnesord
Digitala bibliotek, virtuella bibliotek, digitalisering, vetenskapliga bibliotek

Key words
Digital libraries, Virtual libraries, Digitization, Academic libraries
Table of contents

1. Introduction ........................................................................................................... 5
   1.1 Background and Previous Research ................................................................. 6
      1.1.1 A new library emerges ........................................................................... 7
      1.1.2 Where are we now? .............................................................................. 9
      1.1.3 The loss of spatiality ........................................................................... 10
      1.1.4 Aim and objective .............................................................................. 13
   1.2 Terminology and concepts .............................................................................. 14
      1.2.1 Virtual Environments (VE) ................................................................ 14
      1.2.2 Discovery interfaces/systems ................................................................. 15
      1.2.3 Information design ............................................................................... 16
      1.2.4 Information and Communication Technologies (ICT’s) ..................... 16
      1.2.5 Serendipity ......................................................................................... 17
   1.3 Theoretical framework and methodology .................................................... 17
      1.3.1 Sense-making ....................................................................................... 17
      1.3.2 Quantitative methodology .................................................................. 21
      1.3.3 DELOS Digital Library Manifesto ...................................................... 22

2. Study and analysis ............................................................................................... 25
   2.1 Locating the digital library ............................................................................. 25
   2.2 Architecture and layout ................................................................................. 28
   2.3 Discovery interfaces and library catalogues ............................................... 30
   2.4 Social Media .................................................................................................. 33
      2.4.1 Facebook and Twitter ......................................................................... 35
      2.4.2 Instagram and YouTube ..................................................................... 37
   2.5 User environments ......................................................................................... 39
      2.5.1 Goodreads and LibraryThing ............................................................... 41
   2.6 Accessibility .................................................................................................... 43
   2.7 Information organization ............................................................................... 48

3. Discussion ............................................................................................................. 51
   3.1 The state of digital libraries in Sweden ...................................................... 52
   3.2 Virtual environments ..................................................................................... 53
   3.3 Valuing the digital ......................................................................................... 56

4. Summary ............................................................................................................... 58

Bibliography .............................................................................................................. 60
Published material ..................................................................................................... 60
Attachments .............................................................................................................. 64
   Appendix A: List of academic libraries that are part of this thesis ................... 64
   Appendix B: GU homepage ............................................................................... 65
   Appendix C: BTH homepage ............................................................................ 66
   Appendix D: GU search for “information science” .......................................... 67
   Appendix E: Goodreads home menu ............................................................... 68
   Appendix F: LibraryThing home menu ............................................................ 69
   Appendix G: Resource from GUNDA ............................................................... 70
Abbreviations

BTH  Blekinge Tekniska Högskola/Blekinge Institute of Technology
DL   Digital Library
DLS  Digital Library System
DLMS Digital Library Management System
GU   Göteborgs Universitet/University of Gothenburg
ICT  Information and communications technology
IFLA International Federation of Library Associations
IIS  Internetstiftelsen i Sverige
IT   Information technology
LAM  Library, archive and museum
MARC Machine-Readable Cataloging
UNESCO United Nations Educational, Scientific and Cultural Organization
VE   Virtual Environment

Table of figures

Figure 1, p.11: Trends in University Library Space. Image source: Childs, S., Matthews, G. & Walton, G. 2013. Space in the University Library - An Introduction. In: Matthews, G. & Walton, G. (eds.) University libraries and space in the digital world. Farnham: Ashgate, p.3
Figure 2, p.27: Library link data
Figure 3, p.35: Facebook activity
Figure 4, p.36: Twitter activity
Figure 5, p.37: YouTube activity
Figure 6, p.38: Instagram activity
Figure 7, p.42: Libraries and chat
Figure 8, p.45: GU library accessed via mobile device
Figure 9, p.46: BTH library accessed via mobile device
Figure 10, p.47: Web optimized for mobile devices
1. Introduction

Our lives have become highly dependent and expectant of the digital and the virtual. The technological revolution of the late 20th and early 21st century has brought with it a strata of new possibilities and at the same time new expectations. It is difficult not to be fascinated by the clash of the revolutionary new digital realities and the somewhat opposite that is the field of humanism. Having a deep interest in I.T, ICT’s and overall technology, I find this convergence to be of utmost importance to the development of the library tradition.

Throughout our studies, we’ve come to understand that there are an endless stream of opinions regarding the technical revolution. Some regard them as vital to the evolution of library services and keeping up with the times whilst other downplay their effect as mere tools and assists that should not be central. Many see them as a threat (in some scenarios dubbed technostress, a fear or denial of technology), if not incorporated properly. It is an intriguing and incredibly vital discussion. Since the digital is not a fad or something temporal, every institution has a direct relation to its existence. For libraries, which have typically been the center of information and knowledge, the advent of the Internet has put a question mark on that particular aspect. Much like any other field or institution, libraries have been forced to search themselves.

Aspects such as these have piqued my interest throughout my studies, questions regarding a lot of different entry points have arisen. Even though there is a lot of literature and research concerning different subjects adjacent or adhering to the digital, there aren’t any studies which apply a hands-on critical approach to digital environments (in a Swedish context) which I have found fulfilling. Studies such as these can help progress the concept of the digital library beyond its current status. The exact implication of this will be made clear, for now it suffices to say that this was the main reason for choosing this particular topic.

This thesis attempts to explore the digital environments in Swedish academic libraries by both approaching two libraries in a critical fashion, but also against a backdrop of quantitative data encompassing all Swedish academic libraries. By delving deep into these different aspects, this thesis hopes to propose a status report of our digital competency and how far we have come in contemporary progress. New technologies and possibilities have made virtual environments broad and encompassing, leaving old text-based solutions undesirable. This progress means rapid change for any institutions employing digital solutions as well as users of said digital environments. Libraries are expected to provide digital solutions to a certain extent in this era that suggests a complete reevaluation of the profession of librarianship. In this thesis, I shall dig deeper into the actual services and solutions
employed by different institutions in Sweden in an attempt to understand what the
users are offered in relation to the digital culture outside of libraries.

1.1 Background and Previous Research

Many trace back the history of digital libraries to pioneers such as Vannevar Bush,
F.W Lancaster and J.C.R Licklider. Their mutual understanding was that, even
though their studies differ, there was radical change on the way. Bush stated in 1945
that “a library of a million volumes could be reduced to the volume of a matchbox”
he was referring to what he dubbed the “memex”, a sort of digital contraption he
envisioned would be able to hold data (Bush, 1996, p.40). Likewise, albeit more
recently, Lancaster in his article “Whither Libraries? Or, Wither Libraries” from
1978 expects an evolution from print to electronic form in order for libraries to
develop into the next phase (Lancaster, 1978, p.409). He believed that libraries
would be required to embrace this change and make the most of it lest they perish.
Licklider, in his Libraries of the future took it to himself to study the shape and
form that the digital library could take in the future (Licklider, 1965). In a structural
approach to the issues and detriments plaguing libraries of his contemporary age,
he attempted to tackle a construction and its successive issues. What these all had
in common is of course the foresight to understand and realize the importance of
the digital era that was inevitably upon them. In an effort to be proactive and
embrace their potential, they set out to investigate all possibilities.

The emergence of the computer and in extension, the internet, shook human
professions to their core like nothing else. Few fields were left completely
unscathed or indifferent to the new technologies. Brophy terms it a “revolution”, so
as to point out that it wasn’t a slow change that evolved over time but rather a
massive change that emerged quite suddenly and with immense impact (Brophy,
2007, p.3). A scenario of adapt or become tardy in sentimentality when the post-
industrial society revealed itself (see for example Bell, 1973, which is regarded by
many as one of the first works covering the transition of the industrial to the post-
industrial). Cultural institutions were subject to paradoxical change; their core
business are traditionally inherently physical and spatially bound. How would the
advent of a phenomenon such as the internet, which could supposedly contain
everything, affect libraries? One of the early reactions to the new technologies was
the MARC-format (Machine-Readable Cataloging) which in the mid-1960s aimed
to provide uniformity and automation. But even earlier than that, some libraries had
already visualized possibilities adhering to computation (Seikel and Steele, 2011).
Libraries were quite quick to incorporate their core businesses into technology, in
order to save money as well as keep up with the times. What began with a wish for
automation, digital catalogs and other solutions to aid the daily business evolved.
A multitude of new technologies paved the way for solutions that just decades earlier were unthinkable. The networked communication channels revolutionized the way we live our lives. The digital reality converged separate mediums and formats and produced incredible solutions. One such solution was the digitalization of library material. No longer was a book, paper or magazine bound by its physicality.

Fast forward this development to the 21st century and we will discover that a lot has happened in a relatively short period of time. For a profession which has been largely concerned with the same modus operandi for decades, the late 20th century rocked it to its core. Never before has the definition of a librarian and a library shifted and metatheoretically contemplated as it has been in the last 50 years. Libraries have adapted and reacted, in different fashions. The 80s saw the discussion of the “electronic library” and the rise of the digital. Many saw the digital library as a threat to libraries as we have come to know them (Brophy, 2007, p.4).

1.1.1 A new library emerges

During the late 1990s, the digital library was beginning to garner real attention in the library community. Even though the library had been, by all definitions, digital for a long time, this era marked the start of truly groundbreaking possibilities. The Digital Library foundation was for example founded in 1995 as a reaction to the digital future, consisting of a consortium of American academic libraries and other actors (Johnson and Magusin, 2005).

The threat of the digital gave birth to the digital environments which now play big roles in the library context. No academic library now exists without offering their students access to different databases, periodicals, discovery services, reference management and so on. They vary in design and execution but ultimately aim to provide students and staff with digital services that in some way can replicate or expand upon their physical counterparts. This development hasn’t been entirely evident though, as technology tends to clash with established, primarily humanist, professions. Jessamyn West states that “it’s easier to obtain technology for a library than to obtain technology know-how and enthusiasm” (West, 2007), likewise Brophy claimed that “the technology is complex and librarians have not developed the skills to understand it, exploit it or create it” (Brophy, 2007, p.11). There are many reasons as to why change hasn’t always been appreciated, technostress, technophobia, and a lack of digital literacy etc. are all phenomenon’s which play a part. What these all have in common is the digital as a factor to be feared or a lack of understanding/willpower to inaugurate with the digital. Each year, Internetstiftelsen i Sverige (The Internet Foundation in Sweden), IIS conducts a
thorough and extensive review of internet usage in Sweden. Each year internet usage increases, in all ages. When discussing internet usage, one tends to talk about the digital divide, since we are in a phase in human culture and society where there are those who are born with the internet as an everyday factor, whilst there are those who don’t have an obvious relation to the internet. Age is however only one factor, others can be geographical factors, lack of computers, lack of knowledge etc. (Walterova and Tveit, 2012).

The librarian and the library’s development towards the digital has been subject to these factors, as has any other profession. Forces have struggled against the transition, and forces have promoted it. It is natural then that further into the digital era – the technophobia decreases and the digital divide shrinks, as is apparent by the report on Swedish people and their internet habits. In his book (first published 2001 and then revised in the 2nd edition in 2007) Peter Brophy proclaims the digital as a massive threat to not only the physical libraries and their purpose in society but also to the librarians cemented roles in history (Brophy, 2007). He posits an interesting question and rightly so, even if I don’t quite share the ominous prospects which he anticipated. What he does get quite right is the multitude of new technologies which all have to be considered in a library context. Brophy lists ten points that posit a threat if not handled with in the library; electronic paper, new publishing models, online bookshops, e-commerce, digital television, integrated learning environments, e-universities, mobile communications, print on demand and lastly the unknown (Brophy, 2007). All of these have in some way been realized in contemporary society, albeit under different names and definitions. Mobile communication has for example taken great strides and many have taken note that they are now a defining part of our daily lives, not just as personal communication anymore but as all-around omniscient devices (Fox, 2007, Findahl and Davidsson, 2015).

When one contemplates the digital age, it is hard to pinpoint what defines it as there are so many different possibilities and happenstances which form a holistic creation. Some claim that the digital environments are not only technological products but rather cultural proceedings, Gere means that “digital culture in its present specific form is a historically contingent phenomenon, the various components of which first emerge as a response to the exigencies of modern capitalism” (Gere, 2008, p.18). It is safe to say then, that digital culture is a complex creation dependent on historicity to understand, and its existence in a library context is a convergence of a traditionalistic cultural institution that has developed over the last decades.

Kungliga Biblioteket (National Library of Sweden) published an ambitious study in 2014 that looked at academic libraries throughout the period of 1988-2012 to define and track their development in regards to the digital boom (Wallén, 2014). It is a sweeping study that contains much of interest to this thesis. Not only does it
provide statistics which can show development in numbers but there is also an interesting discussion regarding the different aspects of the digital and its effect on the library as an institution.

1.1.2 Where are we now?

We have traced some of the history of digital libraries, up to the present situation. And what does the present situation, which is the main focus of this paper, entail? Perhaps the biggest difference between 2016 and 2006 is that there is a level of aptitude present now amongst digital libraries in an academic context, which wasn’t necessarily the case in the past. There are certain features which all libraries are expected to have. There is no question as to the importance of the digital to the library any longer, it is prevalent in an academic senses (information retrieval, publication), a social sense (social media, chatting), with great accessibility and rich with features (Johnson and Magusin, 2005, p.29). There are ambitious works that attempt to provide a set of standards and with a structural approach provide libraries with a methodology of digital construction, such as Witten and Bainbridges *How to Build a Digital Library* (2003) or Breedings *Next-Gen Library Catalogs* (Breeding, 2010). The most prominent issue with research on the digital is its longevity. The digital is such a transient and revolutionary phenomenon that defies “standing still” as it is always developing.

It has not quite reached the level of personalized experience that Witten and Bainbridge wished for in their work (Witten and Bainbridge, 2003, p.448-449). As will become apparent in the latter part of this thesis, libraries tend to emulate a sort of personalized workplace but with highly restrictive functionality. The main focus still lies in the same agenda which has been the go-to purpose-defining explanation of the library, namely that libraries are containers and enablers of knowledge. By adhering to that definition, digital libraries tend to primarily construct a bridge between user and databases consisting of different services bought and tailored to fit their particular user groups. In a sense, this is completely natural and expected. Libraries trace a history of centuries where they have been regarded gatekeepers of knowledge, culture, information and wisdom. For an institution which has not undergone massive changes throughout its span in history, the digital era has meant a massive change. Peter Brophys *The library in the twenty-first century* (2007) is an excellent study of the view on the modern library and how the digital is perceived as either a threat or a possibility, with a fair amount of delving into the future and pondering new possibilities. It is therefore not an unsurprising facts that they focus on their roots, even when they are delivered and enabled in new forms.
Gateways to knowledge are of course only one piece of the pie that constitutes the digital library. Perhaps the biggest difference between 2016 and early 21st century is the possibilities for users to interact with content providers. The boom in social media proficiency and availability has constructed a platform which connects user and institution almost seamlessly. This development complies with Witten and Bainbridges view of personalized experiences of the digital library. But more than that, users have come to expect a personalized web experience, as Brophy suggests (Brophy, 2007, p.166). Regular users most likely expect every library to have a Facebook page where they regularly post news, updated opening hours, interact with their users and give advice on their collections. Just as they “subscribe” to any other institution relevant to their life and which they wish to receive updates from. Different technologies have as of late emerged and set a new standard for instant connection and update between user and source. This is where the mobile market is relevant, or as Fox dubs it; the mobile age (Fox, 2007). Information has transformed into an instantaneous commodity, no longer do we have to flip through the phone book to find a telephone number, or consult a physical map for directions. With the increasing number of portable devices (tablets, phones etc.) we have become used to satisfying our information need in an instant. This effects the library, as one can expect, in different ways. Fox finds an opportunity in the mobile age

It’s exciting that recent and forthcoming technological developments facilitate our ability to respond to these patron demands – and even to move ahead of their expectations, becoming leaders in demonstrating and implementing the most effective means of information access, evaluation and use (Fox, 2007, p.3).

In an optimistic sense she wants the digital library to be well suited to the mobile age and provide an environment of conformity. Even though the web is accessible to mobile devices on the get-go, they normally require optimization to be accessed properly tailored for those particular devices. Furthermore, patrons demand access to the catalog even on mobile devices. These features don’t come without demand of resources and is something all digital libraries of the 21st century need consider.

1.1.3 The loss of spatiality

One of the biggest conundrums of the transformation to the digital is the loss of spatiality. There is a power and mysticism to spatiality that must not be underestimated. Merely waving it off as an earthly object that can easily be replaced by something like the digital is naïve and brash.

Peterson, in his work on Indian removal, slams President Andrew Jacksons statement regarding for his blatant refusal to acknowledge or understand the deep meaning that the place in space and time as a deeper connection
To leave one’s homeland, for Jackson, is to leave behind earthly things, things of the flesh, with the direct implication that one is not leaving behind heavenly things or things of the spirit. He denies that the Indian could possibly have a spiritual relationship to the land. (Peterson, 2010, p.8)

In the quotation above, Peterson suggests that President Andrew Jackson hasn’t considered a relationship between man and place beyond the earthly, visible phenomenon. While I don’t want to belittle Peterson’s point by tying the library as place to the same plethora of depth and meaning as the Native Americans had to the land, I believe library users are nonetheless quite attached to the space of the library. As a building and pillar in all communities through time, the library has had its rightful own place. Childs, Matthews and Walton present an interesting time table over trends in university library spaces (figure 1) (Childs et al., 2013, p.3).

<table>
<thead>
<tr>
<th>Time</th>
<th>Trends in University Library Space</th>
</tr>
</thead>
</table>
| Pre-1970s | - Lack of space  
- Growing collections vs open access  
- Microfiche as solution  
- Accommodating catalogue cards |
| 1970s   | - Lack of space  
- Solutions to problems, e.g. microfiche, cooperation, deselection  
- Some reservations about microfiche  
- Separate library space for undergraduates  
- Changes in learning and teaching methods encourage increased use of library space |
| 1980s   | - New technology as overriding concern, e.g. microcomputers, CD-ROMs  
- Staff space also needs to adapt |
| 1990s   | - Technology calls into question need for physical library  
- Library as social space  
- Changing pedagogy, e.g. group work  
- Impact of increased student numbers |
| 2000s   | - Library supports changing pedagogy, e.g. group discussion space, more social space  
- Learning Commons  
- Student population creating uncertainty  
- Shared space  
- Technology as huge driver of change  
- Symbolic importance of libraries comes to fore  
- Rival learning spaces |

Figure 1: Trends in University Library Space (Childs et al., 2013, p.3)

What this brief overview of the last forty odd year’s presents is a concern for the lack of space due to growing collections, to digital spaces quite quickly satiating that need and in itself presenting other questions, such as existentiality. Library spaces have become more concerned with their functions that perhaps used to be
confined to the fringes. In the 2000s, the authors have listed “symbolic importance of libraries comes to fore” which is an important aspect to bear in mind when analyzing contemporary library culture. Symbolic value is always tested when new technologies or other threats unveil themselves, as a way to shield themselves against radical change.

In its spatiality, there are different aspects that stem from varying functions. Purely materialistic objects that enable users to practice their needs and wants are one such thing. These range from enablers such as computers, video games, internet access to information access in the form of books, journals, movies etc. On a purely materialistic level, these serve as the bulk of the library and its physicality. But as Pomerantz and Marchionini argue (2007), place is more than the physical dimensions that it entertains. Being drawn to a place is seldom due to materialistic reasons alone. When one proclaims that some place makes you feel like home, it is rarely because of materialistic objects but rather a sentimental attachment due to different reasons. Reasons differ from historicity, stimulation, attachment, to ideas and so on. Since they are not materialistic in their nature, they become more difficult to connect qualities to and replicate in other forms and instances. Pomerantz and Marchionini define three key elements based on place-making that they use when considering library space; physical-conceptual continuum, the people who hold stakes in the place; and the functionalities that bring people to the place (Pomerantz and Marchionini, 2007, p.507).

The physical-conceptual continuum reflects the physical, materialistic space in time where one employs their physical body to interact and react. This element also encompasses reiterations of the physical in other fashions and mediums (TV, computers etc.) which becomes quite interesting in the construction of the virtual environments, as they are essentially an attempt to replicate the physical-conceptual.

The second element which is the stake holders are generally individuals or collectives with the power to affect and drive the library; users, librarians, boards, administrations etc. The third element encompasses ideas and preservation of ideas which manifest in different types of material and constitute the key functionalities.

In one shape or another, these elements all have impact in the creation of the digital. As Pomerantz and Marchionini suggest “ideas are not space dependent but are manifested in materials that require matter or energy” which then make them viable in the digital as well. While the material dictates the terms of the interaction and spatiality of the user-material connection, the library sets the conditions.

The materialistic dimension of the library was discussed earlier, in contrast we have the spiritual, if you will. This dimension contains the true mystifying power and authority of the physical library which encompasses centuries of practice and availability, thus making it quite difficult to properly justify exactly why the physical library is important in many aspects that circle back to the idealistic nature
of the library in itself. An environment free from commercialism, a free environment where everyone is welcome. A place in space and time where knowledge and free thought is encouraged. How then, will it ever be possible to account for this loss, not only of spatiality but with it spirituality, in the shift over to the digital? Perhaps the answer is that the digital shouldn’t attempt this to begin with, perhaps the virtual should focus on its strengths? In this, I believe that the library can draw inspiration from other institutions, which I shall return to in my discussion.

The virtual environments which we have grown accustomed to rarely replicate these functions to a satisfying degree. As I postulate will become apparent in my analysis, virtual environments in a library context have reached a certain conformity which makes the navigation from a user perspective quite smooth and simple. But unlike other phenomenon and functionalities that are available and employed in other fashions and mediums, the library space is often a hollow shell that is without depth. Why I employ this train of thought will hopefully become apparent, but for now we can with a level of certainty ascertain the following: digital libraries suffer immensely from the loss of spatiality due to its great impact on the purpose of libraries traditionally. There is a challenge and a multitude of choices to be made in the construction of the virtual spaces, which shall become apparent in my research. Since the digital has become such a dominating force in everyday life, it is a problem or possibility that all libraries sooner rather than later have to deal with.

1.1.4 Aim and objective

The current state of virtual environments and digital libraries is a fleeting one, due to the transitive nature of them. A study such as this thus runs the risk of falling in to irrelevance rather quickly after its inception, but nonetheless I believe it to be quite important in the short term as well as the long term to conduct studies such as this. It is no secret, as I hope was made clear in the introduction and background, that the digital is here to stay and evolve even beyond contemporary capacity. The goal and purpose of this study is then to delve into the world of academic libraries in Sweden and analyze them in a critical fashion, aiming to come to some kind of conclusion as to whether they are using their virtual environments to great effect. It is fair to expect that the digital libraries follow suit on other digital solutions which are employed by content providers, I hope to get a general understanding as to how far they have come. By providing quantitative data, a palette of functions are ascertained constructing a backdrop of conformity. And by delving into a select few academic libraries and performing a critical analysis, I hope to give an in-depth picture of what their current states are and how they provide solutions to problems
and use the internet to their advantage, or if it is the case, how they do not take full use of their potential.

Some of the central questions can be posited as follows:

- What is the current state of the digital library in Swedish academies?
- How do the virtual environments function in relation to presentation, attraction and function?
- Is the digital a central point in academic libraries?

It is fair to say that the digital is no longer an opportunity or a fad. What was at first perhaps a naïve fear, or maybe even hope, that the digital was transient and a phenomenon that wouldn’t last, has now been discarded. Attitude towards technology has changed, from an attitude of condemnation and critique to designs that suit even the critics (Feenberg, 2009). Libraries, and in extension society as a whole, has become completely steeped in the digital and no one can wave it off as something optional anymore. What this study hopes to understand is exactly how far the functionality of the digital has come in the library context, their function, and how they compare to contemporary standards and solutions.

1.2 Terminology and concepts

This chapter provides an overview of central concepts and frequently used abbreviations in the thesis. Some of these are well-known, others aren’t. The terminology that is of importance to this paper subscribes to a new modus of language that may be foreign or undefined to the reader, and thus deserves a slight explanation. Certain terms are not elaborated upon but can be accessed through the list of abbreviations.

1.2.1 Virtual Environments (VE)

Virtual Environments (VE) is perhaps the most central concept of this thesis. A virtual environment can be attributed many factors that together define a holistic creation. At the same time, there is no given formula for what constitutes a virtual environment. Instead, one might define it by stripping it down to its core. A virtual environment is a spatial environment in time and space that can be accessed virtually. It is therefore unlimited in its nature. It can be everything from a social media site (Facebook, Twitter etc.) to the lobby of a videogame. A virtual environment is not defined by its sociality but rather by its accessibility. Therefore
it is not limited to the web, as is often the case when researchers explore the possibilities of the Library 2.0 concept. Virtual environments encompass a broad spectra of digital possibilities that all provide a place in time and space that is seemingly omnipresent for users to access. One such place is, obviously, a website. There are different types of virtual environments, see for example Virtual Learning Environment (VLE) (Booth and Clark, 2009), Virtual Research Environment (VRE) (Voss and Procter, 2009), Virtual Reality Environment (VR) (Xiao, 2000), Virtual Work Environment (Bhappu et al.). Each environment has its own particular focus. All of them adhere to the digital, the technologically based solutions.

When I discuss VE’s in this paper, it primarily encompasses all of the subgroups. VE’s are present in all Swedish libraries of the 21st century. In one way or another, all libraries do employ some kind of digitally based service that is in its core a VE. Sometimes, the term digital environment is used instead of virtual environment. The reasoning behind this is that the digital environment is a place in time and space that is digital but not necessarily virtual in a sense of traversing the environment. There are phenomenon’s which may be digital and there are those that may be virtual, for example a piece of literature may be digital in a sense that it has been digitalized and accessible through digital means. This resource is not virtual. Meanwhile the spaces in which the user travels in order to access this resource and the mechanisms allowing for it are virtual. When Gere discusses social media networks, he suggests that the users interact in virtual three-dimensional space (Gere, 2008, p.212). It is an important distinction make, not everything digital is necessarily virtual.

1.2.2 Discovery interfaces/systems

The discovery interface or system has become one of the first things users come into contact with when they access the digital library. A discovery interface, simply put, allows for a single search to become broad, and spread its search string across multiple systems and bring them together as one (Breeding, 2010). A discovery interface highly relies on interoperability, the glue that binds together different sources and presents them in an integrated interface (Brophy, 2007). One of the biggest contenders amongst discovery interfaces is the ProQuest Summon Service, which is quite commonly used amongst Swedish academic libraries. This service includes integrated tools that complete the experience. But do users prefer discovery interfaces in the library context to more universal search engines, such as Google? According to David Nicholas, users more oft than not opt for simplicity and convenience which a service such as Google can offer (Nicholas, 2010).

Functionality in discovery interfaces has remained the same for a while, but factors such as relevancy and resource presentation has developed (Goodsett,
The discovery interface evidently bears great importance to the user’s interaction with the digital library as it often constitutes the first contact.

1.2.3 Information design

The concept of information design bears many different embodiments. Online experience design, experience design, interaction design etc. (King, 2007). They all relate to the same agenda; construction and placement of information in a visual cognition that tries to create a coherent and smooth experience for the user. Being a relatively new concept and approach, information design has been around since the advent of the digital age (Dervin, 1999a). Though the digital era has brought the importance of information design to its peak, the concept and idea of presenting knowledge and information in certain fashions has always been around. Every library presents its own brand of information design. This is of course relative and highly dependent of the interfaces in which they are presented. There is no question however, that this concept is one that all LAM (Library, Archive and Museum) institutions must face and contemplate.

1.2.4 Information and Communication Technologies (ICT’s)

ICT is a term that is used generally to describe (primarily) new technologies which are thought to be of importance if one wishes to keep evolving. ICT’s have been on the agenda for quite some time, Winter traces it to the “interinstitutional competition” of the late 20th and early 21st century “advanced industrial civilization” (Winter, 2009). ICT’s are, of course, not bound to a library context but have rather been so largely incorporated into our daily lives that one doesn’t often contemplate them. But in an institutional context, ICT’s and their integration to your environment is vital. Keeping up with the times and developing means embracing ICT development. ICT’s are of huge importance to libraries. Not only as a boon but also as a detriment, since services are becoming available elsewhere which threaten libraries. Harris sees them as a double-edged blade which on the one hand prove the importance of information and its significance in different aspects, and on the other hand it can act as an alternative to libraries which provides a service that might be inferior but quick to access and free (Harris, 2009).

There is no question that ICT’s play a huge role in the function of the library. Having a grasp on what it means to use these technologies and being prepared for the future has become a skill in its rightful own.
1.2.5 Serendipity

Serendipity is an important factor which has always been prevalent in the context of the LAM. It is built on the foundation that whilst browsing, scanning, strolling or searching for something, one finds something else. Something unexpected that you didn’t set out to find in the first place (Case, 2007, p.89). As Ford and Foster then state, it is somewhat paradoxical to try to capitalize on a concept that is in its nature elusive and unpredictable (Foster and Ford, 2003). I believe it plays an important part in the function of the library and it is something that the user experiences on a daily basis. It could have a role in the virtual environments, but the process becomes less natural when it takes the journey to the digital.

1.3 Theoretical framework and methodology

This chapter provides the outline of my theoretical assumptions and, perhaps, baggage. We all have our own bag of assumptions and axiomatic convictions. Some choose to accentuate these and let them rise to the surface of their studies, whilst others may elect a different path which tries to avoid personal stigma. I subscribe to the first category. To my analytical aid I have focused on two factors: Brenda Devin’s construction of sense-making and DELOS Digital Library Manifesto. The former is the permeating theory whilst the latter is the methodological tool for analysis.

1.3.1 Sense-making

With the sense-making approach, which shall be introduced in this chapter, a foundation of which to analyze the virtual environments is laid out. In the IS (information science) context, sense-making is generally associated with Brenda Dervin. Concerning herself with communication behavior and information seeking, Dervin has constructed several methodologies or theories primarily regarding the interaction between individual and information.

Shortly and simply put, one could summarize sense-making as an attempt to develop different approaches to information behavior, information need, information literacy and information consumption. Whether it is termed a theory, a method, methodology or other types of classification varies. Dervin means that it can generally be either of these (Dervin, 1992).

In sense-making tradition, a set of concepts and methods are combined to create a broad conception of information studies. Sense-making aligns methodologically
and theoretically “between the cracks”, as Dervin states (Dervin, 1999b). She defines two sets of theories; substantive theories and metatheories. Substantive theories favor quantitative approaches and are a product of observation, whilst metatheories are qualitative in nature and constitute the construction of observations (Dervin, 2005). Sense-making places itself in a position that allows it to see multitudes of reality, between “chaos and order, structure and person, facts and illusions, external worlds and inner, universals and particulars” (Dervin, 1999b, p.730). Thus it is both a substantial as well as a metatheory, sense-making wishes to become a third type of theory. This reflects upon the human being as something “in between”. Dervin further explains this

The real is always potentially subject to multiple interpretations, due to changes in reality across space, changes across time, differences in how humans see reality arising from their differing anchorings in time-space; and differences in how humans construct interpretive bridges over a gappy reality. (Dervin, 1999b, p.730-731)

We will note that emphasis is on the user’s ability to perceive different outcomes and potentials. The interest of the sense-making methodology, as it shall be used in this paper, lies in the interaction between subject and information. In sense-making theory, all information is subjective (Dervin, 1999b). The user interprets information and in turn tries to construct sense of reality. In the construction of reality, one could posit the sense-making tradition as positivistic as well as phenomenological and constructivist. A few important major points in sense-making methodology are listed below:

- Construction of reality; the conceptualization of information is bound by time and space. Reality is not a constant, it is *gappy*. Not being constant, there is a discontinuity that needs bridging to be complete. Information is not transmitted but rather constructed as a response to that which exists or is created within time and space. The constructed reality is bound to a certain point in time and space.
- Discontinuity is what Dervin considers a “fundamental aspect of reality” in that it permeates existence. Considering the discontinuity is an important aspect in sense-making and information behavior.
- Sense-making has a dualistic view on information. On one hand, information is a direct result of human behavior (creation). But on another hand, there is a constructivist sense in that it assumes reality itself is in discontinuance which may be beyond human capabilities.
- Information systems dictate the information behavior of the user. Sense-making tries to put itself on the same level as the actor rather than the observer, and in doing that experiences the system in an authentic fashion.
- Internal as well as external cognition and behavior is of importance to sense-making. The state of *being* is an important factor, why is the user seeking
information, what access does the user have, what importance does it bear to his or her life etc. (Dervin, 1983, 1989, 1999a)

Agarwal traces the history and development of sense-making and finds that it draws from the influences of many fields, namely philosophy, sociology, psychology, education, cultural studies, communication, and feminist, cultural and postmodern studies (Agarwal, 2013). This can be found in Dervins acknowledgement of other scholars which have inspired a foundation for sense-making, some of these are Giddens, Habermas, Dewey and many others as Case mentions (2007, p.158).

These are just some of the core aspects of sense-making which bear great significance to my research. Obviously, there’s more to it in a methodology/theory which has been in construction over the last forty years, more than there is an interest and room for in this particular paper.

1.3.1.1 Bridging the gap

Bridging the supposed ”gap” is the most central concept of sense-making. One of the librarians’ penultimate goals is to help the user fill the gap and cross the bridge. But sense-making doesn’t just concern itself with identifying the pre-existing gaps, but also the new gaps that can be created in the bridging (Dervin, 1999b). A potential gap could be a virtual environment of a university, say a website for example. The user approaches the website, probably with an information need, a request (it could of course be serendipity or curiosity; that must also be satisfied) which the user expects to find somewhere on the website. The gap that must be bridged is then the information need. The construction of the website is probably outlined in a way that tries to smoothly help the user satisfy his or her need for information and bridge the gap. When the user approaches the website, there is a sense of being in space and time that always plays a factor in the internal cognition of the user. Being exposed to the website then provides a sense-making experience where the user actively tries to make sense of the new (or old) surroundings. The historicity of the user comes into play and affects decisions, navigation etc. When (if) the user then satisfies his or her information need, the gap has been bridged and the sense-making process completed. It sounds like a linear transaction, but there are quite a lot of factors that weigh in on both the users internal cognition (experience, digital literacy, personal situation, information need, condition etc.) as well as external cognition (layout of the website, feedback, interactiveness, device status and capability etc.) which affect not only time consumption but satisfaction as well as information retrieval (Jacobson, 1999, Dervin, 1992).

It is hard to define general conclusions since sense-making is a methodology/theory that shies away from such assumptions and proposes that each
case of sense-making is unique in that the user’s historicity defines the instance. If we turn our eyes to other projects which have employed the sense-making methodology as their modus operandi, there are many instances; ranging from research about diseases to drug addictions (Dervin and Clark, 1999). One example is Maddens study of householders reaction to environmental messages where the author tracks the sense-making journey (Madden, 1994). The respondents were interviewed with particular focus regarding three factors: the nature of the questions asked, the nature of the strategies used to get the answers and the nature of the answers that they received. In the analysis, Madden dissected the posited questions. Not only what they concerned but also how they were formulated (why, who, what, when, how). The questions asked are of great importance to the information design. Users can define their whole information behavior with simple questions; why is X not Y, where is X, what does X mean, etc. In Madden’s analysis of the householders, she found that their sense-making was primarily plagued by confusion and criticism against the government. By employing the sense-making stratagem, she delved into the questions they concerned themselves with to make sense of the governments messages regarding environmental responsibilities.

1.3.1.2 Sense-making theory in this paper

As has been mentioned before, sense-making is a highly adaptable and non-definable methodology or theory. It has a transformative nature, where it applies to both quantitative as well as qualitative research. Therefore there is a need to clarify the ontological choices in this particular paper. Considering the nature of virtual environments, there are a multitude of paths to tread that would all adhere to the sense-making methodology. A quantitative approach would be equally viable as a qualitative approach. With a quantitative approach, one could receive a general understanding of the sense-making process within a user group. Likewise a qualitative approach could provide in-depth results from users as well as the creators. I considered both options as efficient methods to permeate this research, the arguments proceeded as follows

- The prime interest of this paper is analyzing virtual environments and the decisions guiding their design. A quantitative approach could reveal factors like time spent, resources expended, digital literacy etc. A qualitative approach provides deeper insight from those responsible for the disposition and content.
- Quantitative research tries to provide structure in largely binary questions while sense-making provides a chaotic backdrop. This is not to say that quantitative approach doesn’t provide viable results. Sense-making also
assumes that a user is a “victim” of his or her surroundings and can in effect be analyzed through a systematic approach (Dervin, 1992).

- Qualitative research can provide deep answers with context, both from users and creators which could set the backdrop for the sense-making theory. Since sense-making assumes that there is a discontinuity in all things, it needs to be defined on a case-to-case basis.

Having considered both of these approaches, I elected to base certain approaches on quantitative data. Simply because the nature of this analysis doesn’t ultimately concern whether or not a user will have satisfied his or her information need and bridged the gap. It concerns the situation, the status of the virtual environments in Swedish academic libraries against a backdrop of technical evolution. The sense-making approach will help in certain ways, to determine what the virtual environments are concerned with and the user’s information need and behavior, how they adhere to them. In this sense, I adhere to Savolainens understanding of sense-making as an approach to the phenomena of information use that draws upon the metaphor of gap-bridging. He suggests that “the metaphor of gap-bridging does not suggest a substantive conception of information use; the metaphor gives methodological and heuristic guidance to posit contextual questions as to how people interpret information to make sense of i.” (Savolainen, 2006, p. 1116). The quantitative data, as will be made clear, will show us contextually unbound statistics of certain variables. But it will not construe the main focus of the thesis. Instead, my true empirical material will be the virtual environments themselves. If one had elected a different approach, perhaps solely out of the user’s viewpoint, a mix of quantitative and qualitative methods had served it well.

Electing a methodology is never without qualms. Proceeding with different methods all present their own shortcomings and strengths. Therefore, when choosing to tread a certain path one has to make sure it is to provide a backdrop of information that aligns with the aims of the thesis. The general understanding of methodology in research considers two approaches: qualitative and quantitative studies. Whilst there isn’t room in this thesis to give an introduction to both methodologies, I shall try to explain my reasoning behind my choice.

1.3.2 Quantitative methodology

Quantitative approaches provide more results but are generally imprecise or without context. They are structuralized and formalized in a fashion which provides statistics based on the researchers frame of mind (Holme et al., 1997, p.14). This approach has its own definitive shortcomings and I pondered its usefulness to this thesis for quite some time. It could be used for a lot of things, to provide statistical overviews and quantifiable data. There was one possibility that was on my mind
from the beginning, and that was to employ quantitative methods in an attempt to get an understanding of how much effort is being put into the virtual environments. Attaining this knowledge means constructing a questionnaire with a couple of binary questions that are sent to a multitude of libraries in Sweden. This would probably encompass all academic libraries as well as a large amount of public libraries. But, again, I decided against it. Even though it could provide interesting statistics and be of some use, the questions that are of interest don’t really alter any outcome. Therefore, I compromised and chose to gather quantitative data based on non-interactive studies, i.e. the analysis of how many libraries do this and how many don’t. The critical analysis of the virtual environments will always be the focal point of the paper, no matter if one constructs qualitative or quantitative research, or neither. But the quantitative data provides a good backdrop and overview to put the critical analysis in perspective.

1.3.3 DELOS Digital Library Manifesto

As is evident, there is no definitive method that must be applied, just as there is no definitive theory. In truth, there are a multitude of approaches that could be embraced. I believe that one must tread carefully in this matter, lest the whole paper be twisted and turned to fit a certain methodology or theoretical framework. I have, with this in mind, consciously tried to keep the thesis from being over encumbered by too heavy baggage. Instead, the sense-making methodology will serve as assistance in the critical analysis of the virtual environments. My main reference points for comparing the Swedish equivalent of digital libraries will be DELOS “The Digital Library Manifesto” and IFLA/UNESCOs “Manifesto for Digital Libraries” which both attempt to define some ground rules or suggestions for what a digital library is or should be (Candela et al., 2011a, Candela et al., 2006, Candela et al., 2011b, IFLA and UNESCO, 2010).

These manifestos hope to provide a reference point as a sort of milestone achievement in the development of digital libraries, which have been around for about two decades now. In these manifestos, there are several concepts which will be used in my research to give a general understanding of Swedish academic digital libraries in comparison to the norm. With this in mind, the manifestos are in no way portrayed as the ultimate digital library guide, but rather as an exploration of a consensus of minds who have reached common denominators as to the nature of the digital library, or as it is put “the collective understanding that has been acquired on Digital Libraries by several previous efforts by European research groups” (Candela et al., 2006, p.7).

The DELOS manifesto establishes a three-tier framework which constitutes all digital library systems (Candela et al., 2006). These three tiers are the Digital Library (DL), Digital Library System (DLS) and Digital Library Management
System (DLMS). Together, they correspond to develop the digital library and are essentially holistic in their nature. Apart, they form nothing, together they form the digital library. DL is a component which acts as a container and enabler of information and digital content, whilst DLS is the software system which in turn enables the DL, the DLMS is the underlying processor and architecture which the DLS relies on. They are essentially inseparable.

Perhaps of most interest to this thesis are the six domains which are represented as follows: organization, content, user, functionality, policy, quality and architecture (Candela et al., 2006). These core concepts are according to the manifesto fundamental to every system. They are part of what is dubbed the Content Domain which also includes organization as a concept. Organization is the umbrella term which gathers all the other parts into one. A short description of each concept is in its place.

Content (resource): quite self-explanatory, this term encompasses information, data and everything in-between that the digital library consists of. In the manifesto, it is of great importance since it constitutes direct contact with the user. This concept is perhaps the most relevant one to this thesis as it involves the digital libraries ultimate representation and direct output which it enables for the user to take part of. Content can be multifaceted and very different in its nature which will become evident when researching the digital libraries. With that said, the content could be anything from social media, games and information searching to reference management etc. (Johnson and Magusin, 2005, p.3-11, Brophy, 2007, Gallaway, 2007, Hendrix, 2010)

User: traditionally the user represents the agent which is permitted interaction with something that enables interaction. In the digital sense, this concept is a little more complicated as there are permissions in digital environments which are always to be respected. Some sources permit the user not only to consume but to create information, a possibility that has coined new terms such as prosumer and expanded upon known paradigms to flesh out possibilities of user-centric digital cooperation (Seran and Izvercian, 2014, Chandler and Chen, 2015). The read/write web is one such possibility (Stephens, 2007). The possibilities of user interaction and immersion all ever-growing and the standards now compared to just a couple of years ago is vastly different. The manifesto states that digital libraries must aim to connect actors with information and help them produce new information.

Functionality: interpretation of the implementation of this concept can vary, but in the general sense all libraries offer the same functionality on a basic level. Catalog-search, database-search, browsing, reservations etc. But beyond that, it can be highly varied. Perhaps not as varied in the academic world as it is in the public sphere, but nonetheless with great possibilities increasing as technology progresses. The manifesto claims that this domain is the richest and most open-ended dimension in the digital library world (Candela et al., 2011b).
Policy: rules, understandings, permissions, conditions and guidelines that govern the digital library system (Candela et al., 2011b). Each institution carries with it a unique policy that defines the digital library.

Quality: a complex and difficult mechanism to understand due to the subjectivity of the matter at hand. All content creators are concerned with it, yet defining it is difficult. The manifest claims that one can measure it in a fashion by investigating “how well a Resource performs with respect to some viewpoint”. (Candela et al., 2011b) They are then subject to quality by definition of other artifacts. An aspect of the quality assessment can be derived from user satisfaction.

Architecture: the construction of systems which plays a vital role in the libraries blueprint as a whole. Aspects such as interoperability, ease of use, structure and hierarchy all come into play when determining its architecture. Even if it is quite aged, Lagoze and Fielding establish a couple of different core services that the digital library should always consist of: repository service, naming service, index service and collection service (Lagoze and Fielding, 1998). Digital libraries have become far more multifaceted and dynamic than these interfaces, but they still hold true as to what the digital library typically must consider for its construction. In this thesis, I build upon the concept a tad and include the prospect of architecture within content. That is, not only do I concern myself with architecture in terms of systems but also in terms of output to users.

The Digital Library Manifestos are in no way perfect or extensive enough to consider a precedent for libraries to base their services around, yet they provide us with a general overview of important concepts. Considering these aspects when critically assessing a virtual environment can help to get a structural sense to my methodological approach.
2. Study and analysis

This chapter contains the largest chunk of this thesis and provides a critical insight into the world of digital libraries in Sweden. This part will be focusing on two different aspects; one of which will be the quantitative data encompassing all academic libraries in Sweden, the other focusing on two specific libraries which I have delved more critically into. In these two different forms of presentation, I hope to provide an insight into the trends and focus of the digital libraries, whilst critically analyzing a couple of them in an attempt to find reason and experience them as an ordinary patron might. Since there are so many aspects and entry points to the digital library, finding a reasonable structure isn’t obvious. I decided to present my research in the chronological order a patron might experience it, which means accessing the gateway to the library to begin with. From that point on I delve into varying aspects of the virtual environments, depending of course on what they entail in shape and form.

My choice of libraries to focus on and critically analyze with depth was a hard one to make. It made sense to make a random choice and let the dice fall where they may, but I felt this thesis would benefit from two inherently different digital libraries in terms of functionality and accessibility. With two libraries that tick or don’t tick off different expected functions on DELOS “content” aspect I hope to get different approaches to the digital library and its virtual environments. The two libraries I have elected are thus the University of Gothenburg and Blekinge Institute of Technology, which shall serve as central parts of my critical analysis. These two institutions will from here on out be abbreviated GU (University of Gothenburg) and BTH (Blekinge Institute of Technology). There were a total of 36 academic libraries (appendix a) that were part of my study, I excluded (for obvious reasons) universities that did not have a digital library at the time of the data collection.

2.1 Locating the digital library

For many users, the digital is both the primary and secondary goal for attaining resources or results. This is primarily true for new generations who are considered “digital natives” and have grown up used to having the digital as a tool ready to get them results at a moments’ input (Van Oudenaeren, 2010, p.98). The path from information need to information satisfaction must then be quick. If the digital library is the end goal of a user when he or she is attempting to access something, be it a resource or a contact number, then the first point of interaction between user
and library must be locating the gateway. This particular aspect would relate to many different aspects of the DELOS digital library manifesto, but perhaps most to architecture and policy. The architecture of the institution defines the hierarchy and the stature of the library which in turn is governed by different policies. Most researchers are in agreement that the library website is the library’s digital equivalent, its public face if you will (McGillis and Toms, 2001). Even though the digital library itself is ever-evolving and changing shape, the portal which leads to it is somewhat stuck in the past, reminiscent of the librarians inability to market their abilities and accept a role in the shadows. Being such a huge resource and attraction power to the institution, one feels that the library link on the academy’s website should reflect this and highlight the path to the digital library. This is however often not the case. Wilson suggests that a successful library website doesn’t just act as a sort of activator or delivery mechanism to resources but rather as a promotion tool and an opportunity to showcase library functions (Wilson, 2004). Not having the first point of interaction on the library’s terms must therefore be seen as a failure. No matter how the patron interacts with the interface (different browsers, location etc.) the first point of action (assuming that the digital library is their goal) will be to locate the pathway to the digital library. In some regards, this might seem a minor detail, but marketing analysts, web designers etc. would strongly disagree (see Peterson, 2006, Wilson, 2004).

In my quantitative approach, it was difficult to determine the guidelines for whether the library link was in focus or not, but ultimately I decided that the following set of rules be applied:

- If the link to the library is highly apparent and on parity with other “main” resources on the institutions home page, it is in focus.
- If the link is in a submenu or a top-bar menu (typically slightly out of focus and with a smaller font) it is in intermediate focus.
- If the link is completely out of sight to the degree where the patron has to search for it or scroll the web browser to find it (often in footnotes or links at the bottom), it is considered out of focus.

By accessing each resource individually and approaching it as a patron would, hopefully this representation can be considered fair. These guidelines are of course highly subjective and are difficult to enforce (one individual might make a completely different assessment than another), but I found that the resource in itself is difficult to ascertain without approaching it subjectively to a certain degree. The data was collected by individually accessing each digital library and accessing their resources as an ordinary patron might. With these criteria or terms in mind, the following data presented itself.
Data gathered in this aspect is quite unexclusive as there are libraries utilizing all three approaches to a similar degree, only the ones out of focus being a bit shorter in number. But as we can see, 17 libraries have a path to the digital library that is in focus, 13 have it somewhat in focus but not entirely, and 6 out of focus digital libraries are difficult or frustrating to navigate to. GU (appendix B) and BTH (appendix C) are quite different in execution, when it comes to the library link. GU is in intermediate focus and BTH is out of focus, as I shall explain. Whilst the link to the library is slightly obscure and passed off to a top-menu on the GU website, BTH has two different paths to the digital library. One is through a sub-menu and the other is a link at the bottom of the page, both are equally deteriorating and pass off the library as “just another resource”. If one was to approach this conundrum with Dervins gap-idea in mind, several factors present themselves in the creation of the institutions website and consequently the location of the digital library. Dervin states that “the information-as-construction idea is not a thing that can be transmitted as substance but rather a creation inexorably tied to the time, place, and perspectives of the creator” (Dervin, 2003, p.201) which in this context would entail that a website doesn’t merely exist as a series of loosely constructed pieces of information. But rather carefully designed by their merit and exposed on different levels depending on demand, audience and other factors. In this particular aspect, it is my firm belief that librarians are not doing well at selling the digital library concept. The status of the library is higher than the architecture of the academy often time shows. The result, even for one who is looking for the digital library can
be confusing. Why isn’t it highly prioritized for me as a student or staff at this particular university? Is the “about” page really more important to bring to the spotlight rather than one of the most defining features of an institution? Being the user that tries to construct sense in this framework inexorably collides with the straight-forward nature of library design and access defined within the physical. The virtual concept has not yet caught up with the physical in terms of design and realization, a problematic outcome in many aspects for the users.

2.2 Architecture and layout

End-users arriving at the digital library are instantly greeted with a wealth of resources. These are all governed by what the DELOS digital library manifesto dubs the architectural domain, a domain that presents all other components in a structural fashion (Candela et al., 2011b). This structure has over time become more streamlined and interoperable. In practicality, most digital academic libraries function in the same fashion to the public. The architecture is dependent on components which in turn are defined by their resources, all of which must be presented in some way subject to the institutions policy. Architecture defines the way in which they are structured and branched.

If we take a look at our two libraries, we will find definitive similarities. The most central resource in the digital library is without a doubt the omnipotent discovery interfaces (search engines) which link the input from the user with the output of the libraries resources. Understandably this feature is centralized and in focus. Appendix b and c show that BTH and GU employ this strategy in their design as well, both search bars drawing primary attention from the user whom has just arrived at the library website. Presenting and organizing information in the shape of different material has always been a key component to the librarian’s job, this translates into the digital. It stands to reason then that when some sort of standard is reached as to how a digital library website can function in terms of architecture and layout, that it can become widespread and relatively streamlined (the physical equivalent of classification systems and cataloging). In Peterson’s research, she found that 94 percent of the college and university websites of her study adhered to an academic template (Peterson, 2006). These interoperable interfaces provide the user with a familiarity and emphasizes information retrieval. The information retrieval is designed to quickly and efficiently interpret the wants of the user depending on the input, based on factors such as retrieval algorithms, trends, search engine optimizations, metadata etc. (Koehler, 2004, p.99, Witten and Bainbridge, 2003).

Aside from the search engine, in terms of layout, the digital library tries to centralize what is deemed important and in need of quick access to the patrons. These links usually consist of subject guides, reference management, news,
database and periodical access, opening hours, contact and other shortcuts that tend to vary between institutions. There is an interesting balance to try and adhere to here, between the information sweet spot and the potential information overload. There are a couple of important factors which I believe come into play here. Librarians are not web designers and as often lack the means and capabilities to appropriately cast their own will on the creation of the website. There are a set of components which every library tries to cram into a template that often originates from the institutions standards and the library is forced to submit to. This means that the proposition consists of a certain amount of resources and functionality which someone needs to sugarcoat into the institutions defined theme. There is, in other words, no real correlation between user experience and the library’s resources. What remains is often the pseudo design of a website which merely consists of buttons and information, with no intention of realization of potential. By being part of an academy, the library has to adhere by their policies. Some of these are obstructive in their nature and have a great impact on the colors, shapes, fonts and other aspects of the digital which can have a deteriorating effect. Not only on the website itself but on the creativity of the designer.

Wilson claims that “site architecture should reflect users’ needs and not the organizational structure of the library” which is a bold but in my mind correct assertion (Wilson, 2004, p.22). Being tied to a superordinate in the architecture of the digital presents a wealth of problems, one of the biggest issues is the inability to separate library from institution in cyberspace. Once more, if we have a look at our elected libraries we will find two inherently different but quite similar constructions. Whilst GU separates itself from the university by removing connections (sub-menus etc. that point back to the institution) that lead the user back to their original point of departure, it still carries the stamp of the institution through its template. BTH on the other hand doesn’t cut off the connections back to the institution at all, the main menu is still that of the university. This portrays the sense of the library not being separate at all, but merely an extension in the form of resources.

Whilst there isn’t necessarily a correct way to go about the architectural construction of the web resources of the library, there are certain positive and negative consequences of being limited to the university template. Arguably the most important factor (and most likely what the institution hopes to achieve) is conformity. With the end-user in focus, one would want them to be able to navigate all throughout the university’s resources and collections all the while feeling as if they are comfortable in their surroundings. A complete redesign in architecture and layout when entering the digital library could throw users off. Another important positive note is interoperability and resource management (see for example Peterson, 2006, p.220). Digital libraries are immensely complex and require expert care to function correctly and efficiently, upsetting the taxonomy and hierarchy can
lead to frustration. On the other hand, by being tied to the institution and being unable to steer the library towards a particular direction can hinder its development. The digital keeps evolving and producing new solutions and possibilities that would do very well in library contexts, but without the freedom to explore these possibilities there is an apparent risk of falling behind.

2.3 Discovery interfaces and library catalogues

IFLA/UNESCOs digital library manifesto states that

> The mission of the digital library is to give direct access to information resources, both digital and non-digital, in a structured and authoritative manner and thus to link information technology, education and culture in contemporary library service (IFLA and UNESCO, 2010).

This is a sweeping statement that encompasses a lot which they clarify by stating a handful of goals to accompany the mission. Generally, access to digital resources is the primary objective and that’s where the discovery interface shines. The discovery interface is without a doubt the most central aspect of a digital library. We have touched on the subject earlier and in this chapter I will further present the discovery interfaces in the Swedish academy libraries. Before delving into the analysis, I shall present the data representing how many libraries in Sweden actually make use of such a system. Out of the 36 libraries in this study, 92.8 percent or 31 libraries employ a discovery interface. Three services were dominant; ProQuest Summon, EBSCO Discovery and Ex Libris Primo. Gathered quantitative data suggests that it is a very important and in-focus service of most academic digital libraries.

Discovery interfaces are the bread and butter of a digital library when it comes to enabling a user to gain access to their collections. Since their inception, they have come a long way in terms of ease of use, accessibility and design (Breeding, 2010, p.13). DELOS digital library manifesto places this function under its functionality domain, it suggests that one of the key factors of functionality is tapping resources (Candela et al., 2011b). They state that functions must be implemented or triggered by the actors when interacting with the digital library, for example by using a search engine, and thus implementing a key function in the digital library (Candela et al., 2011a). In most implementations of these interfaces, there is just a hint of the personalized touch of the libraries own functionality. But other than that the user is transported through a proxy (a portal that suggests that the user arrives from a certain location, a university for example) straight into the hands of the new interface. Once here, the library from which the users arrive doesn’t play a big role anymore. For many, this could be bewildering. OCLC (Online Computer Library Center) carried out a survey in 2009 that focused on user experience in digital catalogs and found that the delivery of the resource was as important to the user as
the resource itself (Calhoun and Cellentani, 2009). You could boast the biggest information-repository in the world, but if the user experience is not deemed to be of good quality, then the user might neglect to access your resources anyway. Unfortunately, since discovery interfaces are essentially beyond the libraries control their influence wavers. What they do have influence over is one of the most prominent features in discovery interfaces and perhaps the most difficult one to master; keywords and other search techniques.

In an era of search engines like Google however, keywords, Boolean parameters, truncation etc. is a luxury end users might find overwhelming and unnecessary. In fact, studies show that users prefer the ease-of-use that comes with search engines such as Google over libraries solutions (Gross and Sheridan, 2011, Goodsett, 2014). There are many factors that come into play as to why these omnipotent search engines are not able to compete with the discovery interfaces when it comes to finding relevant resources. Quality, specialization, targeted search queries, advanced searching and so on are all features that discovery interfaces boast over other search engines. There is no denying the increasingly immense user database of Google and the fact that it is their go-to portal for information (Devine and Egger-Sider, 2009, p.17). Should libraries be deteriorated by this development? There is a slight concern in the way the information databases and resources available through the digital library are conveyed to the users. Even though information literacy is more prominent in newer generations of students, there is an obvious need to enable the users to make use of your services. Whether it be through ICT literacy, digital literacy or information literacy is hard to determine, but merely providing the resources without the enabling skills is not enough. In the sense-making theorem, the “gap” is the most interesting concept, as has been discussed. If we translate the gap theory into the library databases and assume a user has an information need, it typically means that the user will attempt to manifest the need into a search query. Bawden and Robinson present a six-point process which outlines the information literacy concept of exploring information need (Bawden and Robinson, 2012, p.289):

1. Recognizing a need for information
2. Identifying what information is needed
3. Finding the information
4. Evaluating the information
5. Organizing the information
6. Using the information effectively

This ties into the premise of sense-making in many fashions. If this journey of information-finding is presumed to be gappy, as sense-making dictates, there is a constant bridge gapping of reality that occurs in the users’ quest. The information
system governs how this bridging is performed and provides the tools and prerequisites to keep the users constantly sating their information need. The academic library has made it their task to guide and educate users in this information retrieval, through courses, guides, help sections etc. Whilst this is an important aspect to information retrieval, when it comes to the virtual environments of the library in this regard – there is still a lackluster approach to user accommodation. Other services that albeit focus on other end goals (see for example LibraryThing and Goodreads) provide a highly personalized experience which is highly graphic and provides more of a helping hand in the users quest. More on the particular end user focus in the next chapter, but I feel it is worth mentioning in regards to sense-making in an information intense environment. The delivery (number three in Bawden and Robinson’s process) is as important as the information itself. Having the resource in itself is not enough, providing a comfortable and satisfying environment in which the information resource can be fully appreciated is too often overlooked. There are many different parameters which end users deem important, according to the OCLC study.

End users expect a seamless flow from discovery to delivery; end users want to know immediately if the item is available and if so, how to get the item. For online materials, end users want more direct links or easier access to the online content, both text and media. (Calhoun and Cellentani, 2009, p.11)

These features are quite common in many senses, but all the same not always that obvious or for that matter well represented to the user. Problematically, there isn’t much of a choice for the library when it comes to the discovery interfaces provided by external solutions. This means that looking at our two libraries (GU and BTH) in regards to these search functions is fruitless as they both employ the same discovery interface (Summon). It makes more sense to take a look at the library catalogue search function instead, as this is an area where the libraries don’t entirely rely on external solutions. BTH doesn’t employ an internal search function unfortunately, which leaves GU and their catalogue dubbed GUNDA. A simple search for “information science” provides us with the following results (appendix D). The first thing we’ll notice is the lack of graphical feedback. In order to understand whether it is a paper, a physical book, e-book, etc. we are presented with a small icon to the left of the title. Other than that there isn’t much in the way of a quick overview. Some records will lead to a full-text accessible resource, whilst others are nothing but metadata. The physical books are more properly represented, but they can also stir confusion. If a copy of the book is available, it is written in black text with the corresponding library location. If there isn’t any available copies or if there is no book whatsoever (in circulation or not), there is no provided information. What we have presented before us then is a guessing game. Often times one will click a link with no real understanding of what is waiting beyond the
hyperlink. Will it be a bunch of metadata without any attached record or will I have struck success and found a full-text version online or the physical equivalent?

Visual feedback is one of the major areas of development in the Web 2.0 era, as Van Oudenaeren suggests (2010, p.101). No longer do digital solutions only employ text-based resources but there is rather a grand mix between audio-visual contraptions and text. Not adhering to these changing shapes of environments counteracts users and their willingness to access your resources. A library is naturally consisting of vast amounts of resources which do in fact tailor to the audio-visual and as such should be quite comfortably providing ample environments for users.

Reality is gappy, as Dervin suggests. But that doesn’t mean that the library catalogue has to be as well. The intrinsic nature of the design leaves the library with having to compensate for the lack of visual feedback by providing users with tools to navigate their resources. A study from McGillis and Toms found this as well: “Participants had trouble choosing from the list of menu options and differentiating from among possible choices. The terminology used in the set of menus was not meaningful despite the fact that it is standard in libraries” (McGillis and Toms, 2001). The semantics and rhetoric employed in the librarians’ universe should not be reflected in temporally different environments. Even though McGillis and Toms study is from 2001, it is quite concerning their observations at large still hold true. The visual rhetoric employed by the digital libraries is still subpar and must develop in order to keep up with other services.

2.4 Social Media

Since this thesis isn’t primarily about social media, it will only concern on-the-surface observations. It is such an important part of what the digital encompasses in contemporary society that it cannot be left out, but at the same time the lack of space means that a deep discussion must be looked for elsewhere. Social media is still underestimated in many regards, particularly in more traditionalistic professions. With the advent of what many dub the second coming of the web (Web 2.0, Library 2.0 etc.) a dynamic structure came into play which wasn’t prominent before; the ability to make a difference or interact directly through the web (Stephens, 2007). This is all part of the rise of digital communication, computer networking that has provided global communication at a rapid speed. Mediums have been blurred to create the so called “convergence of modes” which implies the enabling of one medium to perform what was before only possible through many separate equivalents (Castells, 2009, p.58).

Social media is perhaps the most obvious case of a Web 2.0 environment that includes or has included social networks such as Facebook, Twitter, Instagram,
MySpace and so on (Gere, 2008, p.212). There are varying forms of social media that enable users to interact, share, develop and in many ways impact the digital. Findahl and Davidssons research on Swedish internet usage found that 77 percent of internet users include social media in their internet habits and almost 50 percent of those users do it daily (Findahl and Davidsson, 2015, p.40). What’s important to note here is the multifaceted nature of social media and its development. What was once perhaps viewed as a communication device or image sharing tool has now developed into many individuals main news source, daily entertainment, job-search medium and so on. Few institutions or organizations do not employ social media in some manner, whether it be to directly respond to clients/users, post news, opening hours – the purpose differs. But one thing is certain; social media keeps growing and there is no doubt that it is here to stay.

For this thesis, I took a look at four major players in the social media outlet (Facebook, Twitter, YouTube and Instagram) and many of the Swedish academic libraries utilized this. I wasn’t interested in the academies own Twitter account or Facebook pages as the library is essentially its own entity and in my mind does not need to be tied to the academy in these senses. When looking at the social media, I decided to split the statistics up by terms of usage. Simply having an account but not using it should be reflected in the data. The green bar suggests an activity within the last two weeks, the yellow bar suggests activity in the last 2 months and the red suggests inactivity (this could mean that a library have an account but have not used it for more than 2 months).
2.4.1 Facebook and Twitter

The first and arguably the biggest social media we will take a look at is Facebook. Facebook is a medium which combines all types of media, sound, video, text, imagery and much more.

As we can read from figure 3, the majority of the university libraries have their own Facebook page in which they are quite active. Those who do not employ their own page usually operate through the institutions equivalent, but without the same freedom as they would have if it was their own. Both GU and BTH make use of a Facebook page, albeit BTH were slightly less active (within two months) at the point of data gathering. If we take a closer look at what they use the page for it is primarily news regarding opening hours, new resources, guides etc. But there are also rather interesting attempts to bring the users closer to the library and the librarians by presenting deviating and personal posts. For example, BTH recently posted an update regarding a visit to Rwanda by one of the librarians in order to exchange competency and create bonds (Blekinge Tekniska Högskola, 2016). By providing the users with updates of a more exciting or deviating nature, the user might feel closer to the library.

Likewise, Twitter is a medium which employs a more radical element in that it limits the user to 140 characters per “tweet” (text message) making it a different

Figure 3: Facebook activity
player than Facebook (Zimmer and Proferes, 2014). The rise of Twitter isn’t to be underestimated, in its limitation there is a certain temptation in the stream of data which promises not to steal too much of the users time. Direct contact with users is also made quite smooth through this platform which means it can indeed offer

**Twitter activity**

![Pie chart showing Twitter activity](image)

Looking at figure 4, we can see that this social media platform isn’t as popular as Facebook at the academic library. There is still a fair amount of usage however, which paints the picture of a multidimensional and technologically apt library culture in Sweden. If we take a look at GU’s twitter feed (Gothenburg University Library, 2016), we’ll find that they are primarily focused on researchers and their channel is in fact aimed towards e-publishing, open access, publication, bibliometrics and registration in their publication database. Viewing their feed, they don’t really interact with the users directly, but rather use the page to promote different aspects of their profession. Even though they aren’t necessarily providing a channel for users and patrons to contact or feel closer to the library, it is another way for them to experience an aspect of the library. If one takes Castells definition of communication in the digital age, GU’s twitter communication would be categorized as mass self-communication (a term coined by Castells), a form of mass communication (Castells, 2009, p.54-58). Two older classical forms of
communication are interpersonal communication and societal communication. As interpersonal communication has a designated receiver in mind who then responds and creates a feedback loop and societal communication has the potential for interaction but most likely is one directional, Castells felt the need to produce a new term for a digital era – mass self-communication.

2.4.2 Instagram and YouTube

The last two platforms in this study are Instagram and YouTube, primarily audiovisual mediums that haven’t traditionally been very prominently utilized by university libraries. They too are infallible examples of mass self-communication. Whereas the aforementioned social medias are capable of audiovisual contraptions, the text format is their primary tool. Instagram and YouTube primarily use video and picture to convey their message to the intended audiences. Van Oudenaeren found in IFLA’s 2010 study of digital library futures, that libraries tended to more and more try to place themselves on the same level as the users (Van Oudenaeren, 2010). By using and moving in the same mediums as them, the users can come closer to the libraries. The transformation from text to audio and video hasn’t been that radical though, since most solutions offer both. So, some social medias might be deemed surplus to needs. If we take a look at the number of libraries with their

**Figure 5: YouTube activity**

![YouTube activity pie chart]

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active within the last 2 weeks</td>
<td>1</td>
</tr>
<tr>
<td>Active within the last 2 months</td>
<td>2</td>
</tr>
<tr>
<td>Present but inactive</td>
<td>4</td>
</tr>
<tr>
<td>No presence</td>
<td>29</td>
</tr>
</tbody>
</table>
own YouTube channel for example (figure 5), it isn’t very high. The explanation can most likely be found in resource management and the fact that when a library usually wants to use the medium – the institutions resource is exploited. Still, it can be quite surprising to see that only 7 out of 36 academic libraries have their own channels and that only 4 are consistently active. BTH doesn’t have a YouTube account and as such must rely on their institution if they wish to output videos to this medium. GU, however, are active within these realms. Quite interestingly, they take advantage of YouTube by producing videos on subjects such as Google searching, reference management and other tutorials. These videos bring you closer to the librarians and allow for other forms of education or information output. The reach and popularity of YouTube should not be underestimated, it is by far the dominant video provider on the Internet (Castells, 2009, p.77).

Instagram is a stark contrast to the other mediums as it is probably the one requiring the lowest maintenance. Barring the occasional photography snapped with a camera and the uploading to their servers, there isn’t any other technological mechanism behind it. This Internet contraption is in other terms quite focused on the specific medium of the visual. Adding text to the uploaded artifact is purely optional, which conveys the picture of a medium focused consistently on the visual. The bulk of Instagram’s attraction power is perhaps its focus on the mobile market (Anderson, 2016). Suited to the small screen on the go, there is a natural fit between

![Instagram activity](image)

*Figure 6: Instagram activity*
the phone or tablet and the visual medium of photography. Libraries can utilize it to provide a colorful insight into daily business, new acquisitions, facades etc. It can also be utilized in direct contact with users, as of course is the nature of social media. As we can see from the assessed data, the majority of academic libraries in this study do not have an Instagram account. But due to the simplicity of its functions, I believe, there are a fair amount more that use it in comparison to YouTube.

If we take a look at GU and BTH, we’ll see that the aforementioned is quite active whilst the latter does not have an account. The content differs from photographs of students to current events and other interesting aspects relating to the library. What we’ll notice however, is that the interaction is quite low. Only the odd picture from time to time receives a comment or two, which is quite interesting. The users might not feel that the content posted is interesting enough to actually comment. This could be an indicator as to whether librarians are in fact digitally literate. The usage and understanding of the digital all constitute digital literacy, which is a concept that is becoming more common. If this was a study solely focused on social media and the spaces in which individuals move and react to a phenomenon such as mass self-communication, this aspect would be very interesting to delve into. For now, we’ll settle with establishing that a majority of digital libraries have some sort of connection to social media and that it is a phenomenon that is here to stay and most likely grow bigger.

2.5 User environments

Now that we’ve had a look at some of the more orthodox components of the digital library, the user’s direct relation to the academic library is made more interesting. User interfaces (which in themselves are a very essential form of virtual environment) in Swedish academic libraries are perhaps the most underdeveloped aspect of the digital. As we shall become well aware of, there is a potential here to create a user interface that even trumps the physical in a sense. What we’ve had historically in the digital library as it tries to emulate some sort of place to be for the user, that can somewhat resemble the physical library in space and time, has been fragmented. I still find it to be just that, it seems to me that its evolution has somewhat halted and perhaps been hampered by the ineptitude to realize the potential of the digital. Instead, there is a base in which practically all libraries tend to work with when it comes to the users’ relation to the digital library. This base consists of the creation of an account that has a couple of functions; reservations, extending loans, booking group rooms and requesting interlibrary loans. It is so defined in its nature in fact, that the way to pass through the gates into your “own” interface is often through a link dubbed “my loans”. That is, in other words, the sole function for the user to enjoy that relates to the individual directly. How then, can
we hope to emulate the physical and create an environment digitally that can replace the physical one?

The physicality of space and time do not necessarily need to be replicated in the digital. The library as a place becomes a completely different phenomenon when it translates into the digital, it mustn’t become a placeholder that exists to point back to the physical. They overlap in their existence as Pomerantz and Marchionini point out (2007, p.507), but there is an apparent risk in a fragmented environment when the digital exists to uphold the physical. A digital library is not simply a digitized library, as Witten and Bainbridge put it (2003, p.6). Their collections may define them, but as the digital has developed, new possibilities have emerged. Possibilities to further act upon one of the base traditional values of libraries, to promote free access to knowledge and allow individuals the environments in which they can access these resources and interact in a fashion free from prejudice.

As mentioned previously, the user domain is one of the domains listed by the DELOS digital Library manifesto. In the manifesto, they detail the function that the user might play in correlation to the digital library. The user acts upon the policies and roles that the function domain of the library allows or offers (i.e. the user environments or resources provided) and is subject to many different aspects that can differ on a personal level (demography, location, age etc.) as well (Candela et al., 2006). But more concretely than identifying the actor as an entity in the user domain, the resources in which the actor can interact with are few and primarily more streamlined insipid functions as has been mentioned. The true Web 2.0 development (and in extension library 2.0) is the participatory factor of the web. Users are no longer only being fed information, but are invited to create their own information for others to take part of. Not only are they creators, they are operating out of their own personalized work spaces.

Brophy stated that it was becoming increasingly clear that the trend in the service sector skewed towards personalization where systems and interfaces are designed to allow actors to operate out of their own home (Brophy, 2007, p.166). User environments in Swedish academic libraries have unfortunately not embraced this development yet, the rudimentary functions available to users do not constitute a virtual home. I believe that this is the natural development to come, the next step if you will. The functionality of enabling resources and providing users with a wealth of information is there and has been streamlined in such a fashion that further expansive actions are few and far in between regarding the resource domain of the library. The user domain needs to become more of an important focus in forming the virtual environments. IFLA/UNESCOs manifesto for digital libraries does for example not even list the users experience as an integral part of their inception.

A digital library is an online collection of digital objects, of assured quality, that are created or collected and managed according to internationally accepted principles for collection
Creating a user-driven experience through interaction and customization isn’t a prioritized goal in IFLA and UNESCO’s mind, when defining a digital library. When stating the mission and goal of the digital library it is primarily with regard to resources and accessibility that they shape their definition of a good digital library. It is understandable to primarily concentrate on providing resources and promoting free information, but in extension, the design and implementation of said resources should become an important function to dwell upon. In fact, DELOS functionality domain is directly related to the resource domain (Candela et al., 2011b, p.12). The resource domain is strictly governed by the functionality domain, i.e. a resource has to in some way or fashion be presented in respect to its functionality for the end-user. In my mind, there is yet another step to discuss and that is the representation of the functionality and the way in which one presents the understanding of free knowledge that is the read/write web.

The question is then, what potential user dimensions are there that they have yet to tap into?

2.5.1 Goodreads and LibraryThing

We have previously mentioned private actors and their creations on the web (Goodreads and LibraryThing being two prime examples) which offer varying user-centric resources. LibraryThing defines itself as “a community brought together by the love of books” (LibraryThing, 2013). A quick glance at their primary menus of navigation read three different categories: books (cataloging your own books, browsing collections, and much more), community (discussions, groups, forums etc.) and other functions which are many and varying (appendix e and appendix f). Not just a form of social cataloging, these are interfaces or environments in which the users are invited to be a part of, discuss their favorite books, build a collection that they can show off to others, find recommendations and much more. Traditional aspects such as serendipity come into play here and are replicated in a concrete manner. Browsing, cataloging and categorizing provides a platform for which the user can find likeminded literature; but also for the serendipitous encounter in which the user can, much like the physical counterpart, stumble upon something far from what they had in mind in the first place. Constructing a functionality which allows for serendipity is of course quite paradoxical, but through a wealth of content being presented in a random fashion, it can be achieved as both Goodreads and LibraryThing have done.

If we take a look at the user interface as it is presented to the end-user, we can see that both websites allow customization in many regards. Account details, favorites, usernames, recommendations etc. that all define your unique avatar in
the community. Just like the physical representation of your presence in the library, where all your experiences and ideas shape and define you, these two actors allow you to define your own persona in the digital. You are no longer just a number in a database (a library patron database for example) consisting of loans and debts, but rather an entity which has the ability to interact with others and forge your own reality within the digital.

The end-user can here browse collections of literature, catalog their own databases of books, create lists, get suggestions etc. Such a feature could bring a whole other aspect to the digital academic library in terms of user appreciation and utilization. Adding literature to your own personal collection, finding related literature, creating lists, interacting with others are all dimensions that can further the academic library. Interaction is perhaps the biggest pillar in the community-creating cultural atmosphere which is a place in time and space accessible to anyone, regardless of location, age, sex, ethnicity etc. Accessible at Goodreads through the menu “community” is a whole range of possibilities for users to interact with each other, participate in quizzes, events, writing and even interacting with authors. Whilst the academic libraries are progressing in forms of interaction between patrons and librarians, interaction between patrons has not been developed yet. As is apparent by figure 7, less than 50 percent of academic libraries in Sweden actually have a direct communication channel (i.e. a chat/instant messaging function) other than social media or mail support.

Interaction between patron and librarians has in other words not reached its peak...
potential yet, and so it might be over-ambitious to expect even greater functionality in the forms discussed.

Technological development has allowed for culture and knowledge to be transmitted globally, accessible to anyone. The only requirement being an internet connection. In an age with what Girard dubs “new conditions of living” (Girard and Gentil, 1983) where the cultural has been scoffed aside to the sidewalk with the emergence of globalization on a larger scale than ever before, cultural free-havens on the web are priceless. Providing users with the space to roam in and manipulate into their own pseudo-creations is a practice quite common to web-developers. Earlier, we suggested that sense-making is employed everyday by individuals actively bridging a “gappy” existence. Information as a concept is critically dissected within sense-making, it should not be seen as something static and capable of being mouth-fed into individuals’ minds (Savolainen, 2006, p.1118). Information can take the form of interactions between users, perhaps on digital forums, which is the point to be made here. Such an information need cannot be bridged because the platform for which the information designers (in this case being the users themselves) can operate and construct the information. With a user-centered approach to information creation and need, it is no longer a static relationship between user and resource but rather a dynamic phenomenon. Present day academic libraries in Sweden are not dynamic in this sense. They consist of services and patrons acquiring these services without the dynamic exchange of knowledge existing as an option. Integrating it into Swedish academic libraries in some fashion must surely be the natural step.

2.6 Accessibility

We have discussed and brought to light a couple of the most central aspects of the digital library. This part of the analysis section concerns the accessibility and availability of said aspects and resources. When discussing accessibility it is important to make a certain distinction as to what the term really entails in this context. In the digital library context it primarily concerns two different factors: the connection between user and library, and the connection between library and resource. When we picture a physical library, it is quite clear in our minds what that entails and how this physicality operates. Empirical experience and rationalistic sense constructs the library in our mind as a phenomenon which we can picture even though a particular library is new to us. With the digital, it is not quite the same.

The connection between user and library is constantly developing as the web progresses. What was once perhaps a streamlined connection between a stationary computer and a web browser to the digital library has now been made severely more complex. Flexibility and choice is now the norm, no longer are users expected to
arrive through one type of instance. The biggest booming market as of late is undoubtedly the mobile market, it is now of the utmost importance that the digital library is adaptable to different screen sizes and layouts. Primarily smartphones and tablets require different aspect ratios and interaction methods, which require different coding and preparation of the digital resources. Normally, optimizing for the mobile market means limiting graphical content, keeping the text sizes to a smaller level and other such solutions (Fox, 2007, p.6). But not only does the mobile age come with concerns regarding accessibility, there are also possibilities regarding different services that adhere to devices on the go. One such service is SMS (Short Message Service) which can be utilized to many different outcomes. Fox discusses the extension of traditional reference services via SMS and gives an example of a web-based solution where patrons can send text-messages to the library which get translated to e-mails (Fox, 2007). The library can then respond via e-mail which then gets translated back into an SMS for the patron. This is just one example of how one can use the mobile functionality to seamlessly integrate it into your normal work routines whilst providing a digital service. Another form of accessibility is the task to take library services to the users, reaching out to patrons to deliver a sense of availability. Lawson proposes the use of Facebook to make your presence, and perhaps even more important your services known (Lawson, 2007). It is not enough to simply be present, but one must rather take a marketing standpoint and really try to express your services quite aggressively in order to stand out in the information bombardment of the information society.

The connection between library and resources has been touched upon earlier in this thesis in regards to design and frustration. To the user, this is the prime concern when navigating digital services. Dervin’s sense-making is a useful theory to implement when studying user behavior and their access to these environments. Conceptualizing information and realizing information design is one of the goals of sense-making and constructing order (Dervin, 1999a). To further this theory then is to considering metadesign whose goal it is to assist in manufacturing the sense-making in the design. There are many factors to consider in this particular instance. On one hand there is the problem of understanding, patrons cannot be expected to understand the limitations of a discovery interface system. All-in-one solutions presented to them are to librarians known to have weaknesses and limitations, whilst users might expect a search engine like the ones they are used to (Google, Yahoo, and so on) which not only search on the surface. Commonly used search engines are expected to find all the answers necessary, without advanced searching. Libraries function differently, perhaps with more possibilities but also with greater need of search techniques. This leads to libraries providing multiple solutions to access their collections, solutions that users don’t necessarily realize that they must use in order to access certain content (Breeding, 2010, p.6). The other concern is the branching nature of the collections that can lead to nothingness. When one clicks
on a link that is supposedly going to lead to a resource, a wave of frustration hits when the link is broken or you don’t have permission to access the resource. Due to immense collections and complex relations to third-party content providers, it is a difficult task to keep quality collections that operate to a maximum level.

Whilst we cannot in an orderly fashion delve into the connection between library and resource, we can view the connection between user and library through the perspective of GU and BTH. We will analyze this connection through the looking glass of mobile devices, a phenomenon that only keeps getting more and more mainstream. The first thing we’ll notice when browsing the digital library through mobile devices is that neither GU (figure 8) nor BTH (figure 9) adapts to the mobiles limited viewing. Quite interestingly, both of the institutions provide mobile adaption, but not the library. This means that navigating through their

Figure 8: GU library accessed via mobile device
collections and resources is instantly made much more difficult and inconvenient. When using the discovery interface though, the portal leads to an external solution which is optimized to smaller screens. Thus, navigating resources through this fashion isn’t as clunky as browsing the website. Browsing through their local resources does not come with mobile optimization however. If we switch back to the institutions web pages we are instead in for a smooth and welcoming design in contrast. The effect should not be underestimated, browsing the web without optimization is a hassle for mobile users.
Clark delves into the world of mobile applications through a library viewpoint in his study from 2012. His study shows that the world of mobile devices keeps growing and the user base is immense, which means that libraries have to show some sort of reaction to it. He believes that not only do libraries have to develop services that are adjusted for mobile devices but that we can learn from the simplicity of design required in this adjustment (Clark, 2012, p.3). The biggest challenge in adapting to the mobile requirements is the paradoxical issue of keeping it simple whilst still offering the same services as the “standard” web does. What we have presented to us through BTH and GU are two similar solutions; none of which opt to meet the demands users have on the mobile web. Reasons unbeknownst to us (resources, staffing etc.), we can only conclude that the experience and ease of use that their institutions “regular” web site, in contrast to the library, provides is much more attractive than the constant zooming and pinching needed to navigate the digital libraries. The Swedish academic libraries seem to be of the same opinion as most of the digital libraries do in fact optimize their web sites to the digital, as per figure 10.

A fair amount of libraries have not elected this solution though, which can be seen as quite odd. Navigating these environments and acquiring resources is frustrating and befuddling, leading to a poor experience overall. As pinpointed by the research executed by Findahl and Davidsson, the market keeps increasing

Figure 10: Web optimized for mobile devices

<table>
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<tr>
<th>Optimized</th>
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(albeit this increase has slowed down) with the exponential growth of mobile gadgets (Findahl and Davidsson, 2015, p.12). An estimated amount of 83 percent of Swedish citizens have access to a mobile device. From this, students are the most frequent users of the internet (Findahl and Davidsson, 2015, p.13). A conclusion to draw from their research is then that students using the internet on a mobile device is a highly likely user. Not developing optimized work spaces for such users must therefore be seen as an underutilized aspect of the digital library.

2.7 Information organization

This final part of the study concerns an aspect of the library that has always been present, whether it is digital or physical. Libraries are knowledge- and information based institutions that are ultimately required to organize all of it through classification, metadata and so on. Naturally it is therefore quite well researched and employed. What we are interested in however, is still in its inception, namely information organization in a digital fashion.

It is no secret that the digital collections keep growing, but since they are in cyberspace and not locally hosted – one does not notice their existence to the same extent as the physical collection. In the National Library of Sweden’s study on interlibrary loans and e-books from 2013, it is stated that e-book collections are expected to grow by 80 percent in the next five years (Kungliga Biblioteket, 2013). It becomes apparent in their study that academic libraries prefer electronic resources above their physical counterparts. There is usually a point of order where one first eliminates the option of buying the requested resource to the e-collection before considering the physical option. In other words, the digital collections will only increase in size and ultimately in resource-allocation. The epistemic truth of the printed medium and its downsizing should unbearably have had an effect on the ontic image of the library. If our resources are clearly edging towards the digital, it makes sense then to construct environments for these resources to thrive in within the digital.

There is an interesting battle or conversion period in progress where we are to a degree abandoning the traditional controlled vocabularies (a list of keywords and terms which define the information resource and dictate the users acquisition of it, ranging from subject headings to taxonomies etc.) (Bawden and Robinson, 2012) and opting for full-text solutions, where results are not controlled from a set list of terms. In contemporary web construction, controlled vocabularies are fading. In library collections however, they still persevere. There is in other words a huge challenge awaiting discovery interfaces where they are expected to navigate traditionalistic information organization and newer solutions to provide search results of quality and relevance (Breeding, 2010). Since these are concerns for external actors though, we shall not be contemplating that particular matter.
anymore. What this chapter is interested in is the local information organization in forms of metadata, cataloging, resource description etc.

Before analyzing the solutions employed by GU and BTH, it might be in its place to discuss what information organization on a local level might hope to achieve. In a general and sweeping sense it can be summarized as follows:

- Location: a description of where the resource can be found, whether it is digital or physical
- Resource: title, author, year, subject, type etc.
- Accessibility: how the user can obtain it
- Similar resources: in regards to metadata, similar artifacts

There is an immense amount of actors who have all developed their own set of rules and requirements for bibliographical data and information organization, all in hope to create universal cataloging rules and interchangeable data (see AACR2, RDA and so on). What they hope to achieve in different forms and circumstances are primarily the finding, identifying, managing and using of information resources that are deemed relevant to the search term (Bawden and Robinson, 2012, p.108). These tidbits of information that are now generally viewed as metadata (data about data) in the digital world, organize and manage your collections.

As we touched upon earlier, BTH doesn’t employ their own solution for browsing their collections which means that they do not compile their own metadata for local resources. Acting through external solutions, the metadata that defines their collections are already attached to the records without their impact. Hjørland regarded this development in 2012 and suggested that we view libraries in different senses due to it; “libraries functioning as tools for finding documents, as document delivery services, and as reference (or other) services” (Hjørland, 2012). He also states that the user does not really care where the classification has taken place, so long as the user can get the resource in question. The true quest in information organization is to allow the users to find what they are looking for and similar resources with accuracy. If I search for a particular term and come up with 0 results, but with the same term attempt to search another database (with the same contents) and come up with 100 results, then either the first database has a bad blend between the controlled vocabulary and full-text capabilities or the second one has. It all depends on what I find, of course, but the summary is that one of these solutions is probably underdeveloped.

In the advent of Google searching, where no classification is carried out, libraries have been forced to challenge their beliefs in the tradition of classification. By not having their own classifications or local resource descriptions, BTH are trusting the metadata of external actors to help users find what they are looking for.
GU employs GUNDA as we have touched upon earlier as well, their own search engine for local resources. This allows them to locally index their resources particularly aimed towards their own students and their subjects. They can in other words create hierarchs, taxonomies, vocabularies and so on that particularly focus on their own institution and its subjects. By taking control of this particular aspect of information organization, the library can help its users by analyzing search patterns, information retrieval, keywords and so on to further adjust their metadata schemes. They cannot be expected to extensively search for the desired resource using loads of synonyms and Boolean combinations to find what they are looking for, and so the systems must be constructed for this purpose (Breeding, 2010, p.15). If subject librarians get well versed within their patrons’ universes and their information needs, they can manipulate the metadata to their advantage. To a large extent, metadata manifestation and information retrieval operates in the same fashion as it has done for a long time. A search for “digital library” through GUNDA presents us with 7281 results. One of the results can be seen in appendix G where we can notice the “contents” section listing all the chapters in the book, and “subjects” column listing a couple of related terms of subject headings. The metadata standards are still developing, new standards keep emerging. It is still not particularly complex however, we are still complementing MARC-standards (Machine-Readable Cataloging) with automatically generated metadata (the content section with the chapters) and quite static subject headings (Koehler, 2004, p.404). Koehler anticipated an immense development in 2004, this development could perhaps be the full-text possibilities, but they are still quite under-developed in truth. Information retrieval algorithms and systems have improved, I’m not so certain metadata standards have. The question that Hjørland stated is of course hanging like a dark cloud over the whole discussion, are the extra expenses required to perform the local metadata incorporations worth it?
3. Discussion

In the study and analysis part, I’ve brought to light some of the key components that construe the digital library and the virtual environments within it. In this finalizing chapter of the thesis, I shall trace back to the initial goals and questions to see how they can be answered and perhaps developed in the future. I posited the following questions:

- What is the current state of the digital in Swedish academic libraries?
- How do the virtual environments function in relation to presentation, attraction and function?
- Is the digital a central point in academic libraries?

Whilst there is of course no apparent answer to any of these questions as they can merely be speculative, I can offer my view and thoughts on them in relation to the quantitative data of the study and analysis part as well as the qualitative viewing of GU and BTH.

Before we get into the separate topics however, I’d like to mention two domains of the DELOS digital library manifesto which I haven’t discussed that much in the analysis part: policy and quality. Because of their nature, I felt that their place is more suited to discussion rather than as an analysis tool. The policy domain is perhaps the more interesting one since there are definitive guidelines and restrictions put upon employees of different institutions when it comes to the digital. Particularly communication and social media policies appear to be common, a reaction to the increasingly simple way to communicate in a sense that would seem to be the view of the whole institution and not the individual. Having a set of guidelines and goals can be seen as a way to receive feedback on communication behavior, but it can just as easily backfire. Constantly referring and relating to the policies can seem restrictive and deterring. If we have a look at BTH’s communication policy they have split it into three parts: aim, vision, demand and responsibility (Blekinge Tekniska Högskola, 2015). Within these three parts there is always the legality and graphical profile to adhere to as well. Communicating as a response to inspiration, goodwill or desire to express yourself is then subject to demands from the institution. Within each post, on say Facebook, you as an employee at BTH have to regard: open, trustworthy, distinct and visible communication that attempts to empower the BTH profile in regards to innovation, sustainability, brand personality and so on. These are posited as goals and visions rather than rules or legislations, but in my experience I have found attempts to guide or restrict communication to be deterring not only to the communication itself but to the employees and their work morale.
The other domain which we didn’t really delve into is the quality domain, which I believe to be quite difficult to measure. The concept of quality is hotly contested and subjective to such a degree that I can’t see its relevance as a digital library analysis methodology. It is of course always in the back of every content creator’s mind, the concept of quality permeating everything we output to users.

3.1 The state of digital libraries in Sweden

It is ill-advised to draw big conclusions from studies such as these as they are fleeting in their nature and stem from my own beliefs mixed with relevant research. This portrays a study and analysis that carries with it certain axiomatic assumptions and prejudices. With that clarification in mind, I do still believe that by combining quantitative data with critical studies of a select few can give us a pointer in which direction digital libraries and virtual environments in Swedish academies are heading, or at least where they are at the moment.

From our study, we can draw a couple of general conclusions instantly:

- The digital is here to stay; there is no longer any question regarding the actuality of the digital, even though it might not be ontically accepted within all visions of the library and its future (technophobia, technostress, traditionalism etc. can all be detriments and counteract this development to a certain extent).
- The web is still underutilized and poorly presented. Considering the amount of resources libraries put into their digital solutions, their web is lacking in certain aspects.
- User environments have reached a certain degree of comfort but have halted their progress, particularly when comparing to other actors.
- Social media is considered a vital part in communications and not many institutions are inactive within these realms.

One could be so crude as to state that we have reached a point in space and time where libraries have caught up with the technological development and properly integrated them into their concept and visions, but without any radical solutions or high-end ideas. There were in my quantitative data two columns that each and every digital library fulfilled; account creation (for reservations and extensions of loans) and individual access to databases (not only being able to access them through discovery interfaces but also individually). There was also a majority of libraries that offered discovery interfaces and reference management. A shape and form has developed in which we expect and envision the digital library to adhere to. Peterson dubbed this an academic web site design template, a shared vision and design that can fit any resources (Peterson, 2006). Whilst I wouldn’t necessarily be of the
opinion that Swedish academic libraries are all streamlined in relation to a certain template, I think one can’t ignore that they do indeed adhere to the same guidelines when it comes to resource and resource-enabling. There are the familiar components (databases, periodicals, account, reference management, news, contact) within each web solution and most of them employ the same enabling tool (external discovery interface) to access the bulk of the resources. Due to the nature of the academic library, it is no surprise that these are the functions which are in focus.

Vision and conviction remain the same for the profession as a librarian, the conversion to the digital has not erased the ancient and traditional views of the library as an intermediate and a necessity for free, open access to knowledge and culture. With the digital, all of these goals have been furthered and albeit in different forms, made larger in scope. Information in different shapes and forms in the digital are not hampered by spatial issues such as lack of space, or materialistic issues such as misplaced or misused literature, too few copies etc. In the digital universe, we can see an information structure that is implemented to control the uncontrollable collections. Different institutions elect different ways to relate to what Brophy dubs the “information universe” (Brophy, 2007) which is the sum total of all information sources existing where one can find different structures. Through GU and BTH, we analyzed two similar but inherently different approaches to information structure. By not providing access to their own collections through a search/browsing engine designed to do just that, exploring the digital resources of BTH feels more distanced than it does when browsing through GU collections. This means relying on external sources to provide a user experience that can replicate that of the physical. When we construct our physical libraries and organize our collections, one of the defining factors is patrons and their commodity when moving through these spaces in time. Having a filter between the user and the spaces would most likely not provide a commendable environment for the user. Even though the comparison might be a tad lackluster since the digital cannot be directly compared to the physical, there is an important question to tackle here. Digital environments of Swedish academic libraries are stale and uninviting. User focus is barren and too much focus has been put upon the resources without providing the ample environments to find, use and discuss these resources.

3.2 Virtual environments

The digital age is not a small development in the history of mankind but rather a whole new age of possibility and connectivity previously unprecedented, as such it is good to have some perspective on the magnitude of the discussion taking place. In this new age, virtual environments have found their way into our lives and can
either replace or complement physical environments. Virtual environments should then aspire to, much like physical ones, be presentable, functional and open to everyone. This means that the users are allowed more freedom than they might have gotten if it wasn’t in the digital realm, as IFLA stressed in their conference regarding digital libraries (Carnaby, 2010, p.117). The dynamics that occur in the digital world between users and libraries have the potential to add another dimension to the aesthetic of the library. Russo and Watkins find a new dimension in the convergence between community and institution.

By drawing communities into the consumption and creation of digital content, cultural institutions can take a proactive role in developing new literacy by enabling direct experience of content production and creating environments for community engagement. (Russo and Watkins, 2007)

In their terms, this is known as “community cocreation”. Inherently it is a feature of the read/write web which has been central to this thesis. What Russo and Watkins are suggesting are virtual environments which enable users to be part of the consumption as well as the creation of content. This is the true form of Web 2.0 in my mind, the next step of the digital era if you will. It is also a step that academic digital libraries in Sweden have so far failed to take. There are a few examples of solutions that edge towards a feeling of community, Dalarna University and University of Gävle provide meeting points through their websites for students to use in their studies. My general idea of the ICTs employed is that they are solutions rather than possibilities. Most content is provided as a means towards an end regarding a certain issue that has to be fulfilled. Some might be pondering the question of reference and wonder how they can “remove the issue” and thus provide a guide on the web. Rarely do I think that they act proactively to provide their users with better and more attractive, technologically advanced solutions. There are multiple reasons as to why this might be the case: resource allocation, competence, devaluation, scope, tradition, regulations and perhaps many more. We’ve touched on a couple of these subjects but not all of them due to lack of space and time, but in the end all of these factors play their part in shying away from creating virtual environments which are on par with other web services.

How can we move forward and take the next step then? Other authors have provided stepping stones and walkthroughs in order for libraries to implement or incorporate these ideas into their own (Wilson, 2004, Witten and Bainbridge, 2003, Clark, 2012). These “guides” or ideas are necessary and can provide a safe ground to fall back against. I believe that studies such as this thesis that provide a hands-on evaluation and critical analysis of different digital services are a necessary platform for future digital libraries.

The big transition from primarily physical resources to complementing or overtaking by digital resources has all but been completed. Technology, access, legislation etc. have all come to be fleshed out at the advent of the 21st century. In
other words, the first phase of the digital revolution has come to an end and factors such as the fear of technology are slowly coming to a halt. This should lead to the natural development of refocusing on creating environments that make the most use out of said resources. ICTs have become commonplace to such a degree that digital humanities projects have become more prominent and frequent. Abroad, we can see projects and other interesting research cases focused solely on the digital (see for example Zhang et al., 2015, Sprague and Lechich 2007). Unfortunately, such projects are hard to find in Swedish academic environments.

This thesis primarily analyzed the virtual environments of GU and BTH in depth, by virtue of experiencing them as an ordinary user might. What we found were immense databases and resources presented in different fashions but with the same goal in mind: access to artifacts whether digital or physical. Through discovery interfaces and search engines such as GUNDA, the user browses through their collections. DELOS digital library manifesto primarily concerns this type of resource when presenting their resource domain, which I find to be lacking. Albeit in an abstract fashion their resource domain can in fact be comprised of resources stemming from anywhere and potentially constructing anything, it is not fully realized. The manifestos are ambitious in the construction of potential digital structures in that they portray classes and divisions relative to each other, but in my mind they fall short in a number of areas. The interplay of domains is overshadowed by the sheer number of constituents that are all dependent on other domains, there are interesting ideas that convey the message of complexity of the digital but rather than simplify and provide a clear methodology and overview the manifestos create a hornet’s nest. This might have shown during the study and analysis as the thesis tried to implement the manifestos ideas in analyzing different aspects of the digital but ultimately shied away from it at times due to the sheer inexplicit nature of them.

In the analysis, I provided two examples of knowledge-intense solutions to user environments in the shape of LibraryThing and Goodreads. Albeit the circumstances (focus, resources, shape, target audience, legislation etc.) are different and a library obviously has other commitments, I believe that these ways of presenting users to collections and resources are the next step for the digital era of academic libraries, in some shape or form. Obviously, trying to read what the future will bring is no easy practice but judging by trends in the digital overall - this would be the natural development. There is still what Wilson calls an “uneasy existence” between two spaces or realms for libraries in present day, that of the physical and that of the digital (Wilson, 2007). I believe that the most important driving factor for the digital is the understanding of it, of the idea that it is not going to replace the physical but rather create its own environments that will become a new chapter in the library universe. To do that, creating proper environments for users to exist in is highly necessary.
3.3 Valuing the digital

What effort is being put on actually developing the digital, how much does the library push its potential and what say have the librarians over its development? Perhaps an abstract outlining but in my mind a question which isn’t nearly discussed enough. For each aspect to be fully developed and realized separate studies are required, what we have looked at in this thesis merely scratched the surface by viewing the shape of the web as it is presented to users. Conclusions could be drawn by aspects such as BTH not choosing to implement their own search engine for local resources or the fact that less than 50 percent have a chat service. But to understand the position and the role that the digital plays in each institution, one must implement a critical analysis of the policy domain as suggested by DELOS digital library manifesto (Candela et al., 2011b, p.12).

This thesis looked at one central aspect that conveys a statement as to how the digital library fares in the grand scheme of things in relation to the institution it is tied to. That is the focus of the pathway or portal that connects the user to the digital library. Quite a ubiquitous resource but all the same a common denominator when it comes to placing value on what lies on the other side of the portal. Early in the thesis, I posited quite abstractly my train of thought regarding the library underselling its resources. With more and more resources being allocated online, practically every institution places an incredulous amount of their resources on the digital library and expects ever growing databases and periodicals to offer their students. Valuing the digital is an abstract proposition, but ultimately a necessary one. In 2014 the National Library of Sweden concluded four facts when publishing their research, one of these facts was that print material has largely been replaced by electronic equivalents (Wallén, 2014). What this should mean is that the physical environments stature in relation to the institute is also reflected in the digital. The library has traditionally been a meeting point, a knowledge-intense building that institutions make it a certain point to introduce. I have not found this to be reflected in the digital, despite the overwhelming transition in regards to collections and services. Figuring out why this is would be an interesting study to carry out, in this thesis we scratched the surface by examining how it is portrayed outwards through the portal to the library itself.

This thesis has utilized Brenda Dervin’s sense-making theory in approaching the digital environments, the pathway to the library is perhaps the first hindrance or “gap” that needs to be bridged by the user. Making sense of an information need takes its start in the locating of tools which will then be utilized in order to “make sense”. As such, if we continue on this train of logic, the outwards valuation of the digital environments builds its first stepping stone in its face towards the public. Conveying a message of prominence and ease of use to the users begins with a portal to its own domain. In the study, we could see that fewer than 50 percent of academic libraries had its portal in focus. Further analysis and studies are required
to pinpoint the cause and effect regarding this phenomenon, be it in relation to information design, communication power, rhetoric, policies or other aspects is hard to say. But I think it’s safe to say that it is not an aspect that should be neglected, it is after all the digital door that leads into the library.
4. Summary

Defining digital space is difficult, constructing and metatheoretically progressing within the digital era perhaps even more difficult. Librarians have a tradition venturing back centuries, where visions and ideas have progressed but never radically been altered. The digital era has provided the biggest change to the profession since its inception and it only promises more change to come. Reflection over the digital is a necessary building block in order to keep progressing. Throughout this thesis, there was a definitive core of comparison to the digital outside of the library world. Even though there weren’t many explicit comparisons, the implicit message that was conveyed conceded that digital libraries were underdeveloped in comparison. Two examples were used to further analyze this happenstance, Goodreads and LibraryThing, both equally impressive in their user environments and immersion. User environments made available through the digital libraries faded in comparison.

This thesis has critically analyzed virtual environments in academic libraries from a Swedish context, both looking at two libraries in depth but also against a backdrop of a large number of others. By electing two libraries that provided different solutions to the digital and collecting quantitative data, the thesis has hopefully limited itself to a scope that was sufficiently narrow but also put into a context of a broader nature. Throughout the analysis we’ve found a dualistic presentation of digital environments, on the one hand the large number of resources accumulated and presented to users is immense and shows a progress in the era of digitalization. On the other hand the presentation and accessibility to said resources is lacking and fails to provide environments that are inviting and close to the forefront of technological development. Quantitative data showed a conformity in many aspects between libraries, though they could look different on the surface. There are components which are commonly present through all digital libraries, without much variation. These components are the bulk of the library but were widely presented in a shallow manner. By comparing the digital environments to DELOS and IFLA/UNESCOs respective digital library manifesto, it was put in a larger scope and a frame of reference was interesting to have. Obviously each institution bears its own policies and communication standards, but these manifests provide a general overview of what a digital library is expected to contain and aim towards.

Whilst my critical analysis primarily concerned two libraries and as such cannot be explicitly representative of Swedish academic libraries as a whole, there were worrying signs in the lack of development presented by these two as well as the quantitative data encompassing all academies. Aspects such as information design, user environments and digital services weren’t a factor to be seen for the
most part. Other forms of digital progress such as social media has been embraced quite well, in my mind. The gathered information showed that practically every library had a presence in social media and provided some sort of contact solution for users, albeit less than 50 percent actually provided users with a chat function. Something that has become quite standardized and thoroughly developed in the digital era. Social media development points to the fact that libraries are attempting to embrace different communication channels. This presence shows a forward-thinking and accessibility that paints the picture of a library which embraces new technology.

Students, scholars, researchers and other similar forms of users have always been the main recipients and target audience of academic libraries. Physical environments for their leisure and comfort are designed with the utmost care to acknowledge needs, requirements and so on. Librarians track their information searching habits, behavior and needs and endeavor to help them in these senses. In the transition to the digital, these qualities and aims become different in shape and form, some are even lost. But in the development of the digital environments, there needs to be an understanding of their complexity and their requirements that are quite different from the physical. Librarians aren’t necessarily developers or designers, but the digital library undoubtedly needs their abilities in convergence with those who shape it. What we have at present is a complete focus on resource-attainment, and less on users and design or shape of the enabling of these resources. Digital libraries are only going to grow larger, hopefully they will also grow better.
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Attachments

Appendix A: List of academic libraries that are part of this thesis

Blekinge Institute of Technology
Chalmers University of Technology
Dalarna University
Ersta Sköndal University
Halmstad University
Jönköping University
Karlstad University
Karolinska Institutet
Kristianstad University
KTH Royal Institute of Technology
Linköping University
Linnaeus University
Luleå University of Technology
Lund University
Malmö University
Mid Sweden University
Mälardalen University
Royal College of Music in Stockholm
Sophiahemmet University
Stockholm School of Economics
Stockholm School of Theology
Stockholm University
Swedish Defence University
Swedish University of Agricultural Sciences
Södertörn University
The Red Cross University College
The Swedish School of Sport and Health Sciences
Umeå University
University College of Arts; Crafts and Design
University of Borås
University of Gothenburg
University of Gävle
University of Skövde
University West
Uppsala University
Örebro University
Appendix B: GU homepage

UNIVERSITY OF GOTHENBURG

Research and education for a sustainable society

NEWS

Infections increase the risk of developing CP
[7 Mar 2016] Infections, either in the pregnant mother or the baby increases the risk that the baby will develop cerebral pares, CP. A new doctoral thesis at Sahlgrenska Academy, University of Gothenburg also studied other risk factors behind CP.

Unique partnership paves the way for socioeconomic growth in Uganda
[29 Feb 2016] Unique partnership paves the way for socioeconomic growth in Uganda. Two universities in Uganda are launching a unique partnership with the University of Gothenburg and Chalmers University of Technology. The intention is to enhance the ICT capacity in Uganda and enable socioeconomic development. Particular areas of interest include e-health, e-teaching and entrepreneurship. One of the main objectives is to educate ten doctoral students and facilitate exchange of students, researchers, and teachers between the countries.

More news
Appendix C: BTH homepage
Appendix D: GU search for “information science”

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<td>New York, 1996-2011</td>
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<tr>
<td>4</td>
<td>Journal of education for library and information science</td>
<td>State College, Pa., 1984-2014</td>
</tr>
<tr>
<td>5</td>
<td>Annual review of information science and technology (Online)</td>
<td>Online - Tidningen for Göteborgs universitet / Online access for the University of Gothenburg Wiley Online Library/Full Text</td>
</tr>
<tr>
<td>6</td>
<td>Geo-spatial information science (Online)</td>
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Appendix E: Goodreads home menu
Appendix F: LibraryThing home menu
Appendix G: Resource from GUNDA