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**TECHNOLOGY ACCEPTANCE OF DIGITAL  
HISTORICAL RECORD DATABASE SYSTEMS  
AMONG HISTORIANS**



JYVÄSKYLÄN YLIOPISTO  
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## TIIVISTELMÄ

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Informaatioteknologian kehitys on vaikuttanut monin tavoin akateemiseen historian tutkimukseen, sekä akateemiseen tutkimustyöhön ylipäänsä. Erityisesti alkuperäislähteistön saatavuus digitaalisessa muodossa on muuttanut historian tutkijoiden työtä merkittävästi: vanhoja, fyysisiä asiakirjoja digitoidaan ja uutta sähkösyntyistä syntyy jatkuvasti lisää. Erityisen merkittävä tämä muutos on ollut yleisessä historiassa, jossa on voitu ratkaista monia periferisyydestä johtuvia haasteita. Nämä digitaaliset asiakirjat ladataan erinäisiin tietojärjestelmiin muun muassa akateemisen yleisön saataville. Näitä digitaalisia primäärilähteitä ovat muun muassa arkisto-organisaatiot ja historian tutkijat tutkineet asiakirjojen digitointiprosessin näkökulmasta. Sen sijaan järjestelmäkehityksen näkökulmasta tätä aihetta ei juuri ole lähestytty. Historiantutkijoiden käyttökokemukset tällaisista järjestelmistä ovat kuitenkin usein negatiivisia, mikä luo tarpeen aihetta käsittelevälle tutkimukselle.

Tässä tutkielmassa aihetta tutkittiin teknologian hyväksymisen näkökulmasta käyttämällä Fred Davisin Technology Acceptance Model -mallia, TAMia, pääasiallisena taustateoriana. Tutkielman tutkimuskysymys muotoiltiin seuraavasti: ”Mitkä tekijät tekevät digitaalisesta, historiallisesta asiakirjatietokantajärjestelmästä hyödyllisen ja helppokäyttöisen historian tutkijoille?”. Aihetta lähestyttiin ensin kahden kirjallisuuskatsauksen avulla. Tämän jälkeen laadittiin haastatteluprotokolla, jota käytettiin haastateltaessa historian tutkijoita. Näiden kvalitatiivisten, puolistrukturoitujen haastatteluiden tavoite oli määrittää tutkimuskysymyksen mukaisesti, mitkä tekijät vaikuttavat historian tutkijoiden käsityksiin tällaisten järjestelmien helppokäyttöisyydestä ja hyödyllisyydestä. Haastatteluilla kerättyä dataa analysoimalla määriteltiin viisitoista eri tekijää, jotka vaikuttivat historian tutkijoiden käsityksiin tällaisten järjestelmien helppokäyttöisyydestä ja hyödyllisyydestä. Näiden tekijöiden pohjalta laadittiin tähän kontekstiin räätälöity versio TAMista, jota voidaan vastaisuudessa hyödyntää suunniteltaessa tällaisia vastaavia tietojärjestelmiä.

Asiasanat: Technology Acceptance Model, TAM, teknologian hyväksyminen, historian tutkija, tietojärjestelmä, tietokanta, historiallinen asiakirja, historian tutkimus, digitointi

## ABSTRACT

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As information technology (IT) becomes increasingly prevalent in our society, academic research, too, makes increasingly extensive use of it. IT has influenced the work of historians in various ways. Especially the digitization of old historical records and the inception of born-digital records have changed the research practices of historians considerably. These digital records are uploaded into various information systems for public use, by historians among other users. This development has been studied mainly from the point of view of the digitization of old historical records, and primarily by historians and archival organizations. On the other hand, this topic remains largely unstudied from the point of view of information systems. Given that historians generally report negative user experiences with these systems, the need for IS-focused research on this topic is evident. This study approached this topic from the point of view of technology acceptance, using Fred Davis' Technology Acceptance Model as the background theory. The research problem this study addressed was "What makes a digital historical record database system useful and easy to use for historians?" This problem was approached by first conducting two literature reviews. After this an interview protocol was created and used to interview historians. The goal of these qualitative, semi-structured interviews was to determine what factors influence historians' perceived ease of use (PEOU) and perceived usefulness (PU) of these systems. By analyzing the data collected through the interviews, fifteen factors influencing historians' PEOU and PU of these systems were determined. These factors were used to create a version of TAM tailored to specifically explain technology acceptance in this context. This study presents both theoretical and practical contributions with its qualitative TAM-based approach and system-focused view.

Keywords: Technology Acceptance Model, TAM, technology acceptance, historian, information systems, database, historical record, historical research, digitization

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# 1 INTRODUCTION

The digitization and digital archiving of existing physical records has been a relevant topic for decades. While a lot of the content produced by individuals and organizations in this day and age is digital from the get-go, the digitization of the old, physical records remains a topic of importance, with the amount of content being digitized continuously on the rise (Berry 2012, p. 2). At the same time, however, the overwhelming majority of historical records has yet to be digitized. For example, in some cases the politics of digitization may present an issue. The agenda of a government may prioritize certain types of records, or cuts to the budgets of archive organizations such as national archives may result in forgoing digitization projects.

Digitizing old records holds a number of benefits. Firstly, it makes them easier to access, for the most part resulting in the increase in their use, and in doing so, makes the records more valuable. This becomes increasingly important when large geographical distances are considered, such as in the case of using records from another country, as is typically the case in general or comparative European historical research. Secondly, it increases their longevity, both by shielding the original records from most use, reducing the rate of their deterioration, and by simply creating another version of the original record. Third, digitizing old records can bring about new ways to use them. For example, being able to word search old documents allows for quantitative research methods based on word searches. Along similar lines, big data offers various possibilities for historians studying long-term developments, as will be discussed in-depth later. (Guldi & Armitage 2014, Anderson & Maxwell 2004, p. 5)

From the point of view of user acceptance, digitization projects are carried out with varying success. There are examples of highly successful projects just as there are examples that have resulted in systems that leave much room for improvement. The digitization process itself is not the problem for the most part as the scanning of the documents is a very routine operation. Issues related to user experiences usually arise from the finished systems, or the information they provide in the form of digital historical records.

What makes an information system useful is a question that has been prevalent in information systems (IS) for decades. Whether or not a specific system is considered useful depends on a number of factors, including the software features of the system in question, the hypothetical user who may or may not find the system useful for him or her, as well as the definition of 'usefulness'. Over time, this question has been approached, directly or indirectly, in many ways. For example, usability has, over time, become a significant area of research in information system science, with usability being in many ways related to the concept of technology acceptance. While not mutually exclusive at all, both operate within the context of system use.

Similar to the question of what makes an information system useful, the simple question of how and why people use information systems has also been a subject of study for decades in information systems (Venkatesh, Morris, Davis & Davis 2003). To explain system use, researchers turned to explaining user satisfaction. It was only natural that before long, these researchers would then turn to psychology which has studied satisfaction on a more general level (Legris, Ingham & Colletette 2003).

As more and more of these digitization projects are undertaken, ensuring their success becomes increasingly important. This is the need this thesis aims to answer. Understanding the needs of this specific group of users, historical researchers, is in this digital age a much needed tool for anyone concerned with digitizing historical records, as well as anyone handling already digital historical records.

This study is a master's thesis of both information systems and general history. It was originally motivated by the hypothetical digitization of the old Finnish parliamentary records. Currently, the Finnish parliament has digitized but a small portion of its older records up until 1919. These records digitized so far do not include the proceedings of the plenary sessions, for example, much to the dismay of historians. The currently digitized records are mainly bills, and no plans currently exist for digitizing the proceedings of the plenary sessions and other types of records that have so far not been digitized. However, this matter will likely be revisited during the 2010s, making material that might aid in these future projects highly relevant. Seeing as extensive digitization projects of old parliamentary records have been carried out in numerous European countries including Norway, Germany, Belgium, France, Great Britain, Ireland, and the Netherlands, Finland is starting to lag behind. It is, however, in order to underline that the findings of this study are by no means limited to this one particular hypothetical future project as it takes on a much more general approach to the topic, as will be discussed next.

## **1.1 Research Problem, Research Methods, and Central Constructs**

This study approaches future technology acceptance through past system use. Simply put, technology acceptance research focuses on explaining what makes



individuals accept a technology. However, rather than focusing on technology acceptance on a general level, it is studied in a very specific context both in terms of the user group of focus and the systems of interest. System-wise I focus on digital historical record database systems, and user-wise I focus on historians. In this study, the construct *information system*, or system, is used to primarily refer to non-user related parts of the information systems. While information systems generally are seen as consisting of hardware, software, data and information, procedures or practices, and people, where “people” refers to both users and administrators and other system staff, in this study the users are referred to as a separate entity. Thus, here system features refer to software features, and system factors refer to those related to software and the data or information and how it is displayed.

System use, while seemingly a self-explanatory construct, is more problematic than it may seem at first glance, according to Burton-Jones and Straub (2006). The broad definition of system use in itself is not particularly problematic as it always includes the same three main factors: the user, the system and the reason for its use. For a more specific definition I quote Burton-Jones and Straub (2006) in defining information system use as “an individual user's employment of one or more features of a system to perform a task” for the purpose of this thesis. They present a typology for measures of system usage, where system usage is split into four elements: usage, system, user, and task. In this typology, lean measures focus on usage alone, while richer measures account for the other three elements as well to varying extent. In this particular study, system use is measured through both a very lean measure of simple use or nonuse, as well in a richer sense where the focus is on the system and its features, as well as how the users employ them to complete the tasks they set out to perform.

As this study focuses on a specific group of users, it is in order to accurately define this user group of focus. In this context, *historical researcher* and *historian* are synonymously used to refer to academic historians, ranging from professors to doctoral students of history. Doctoral students, having completed their masters’ theses and having undergone doctoral training, have a solid understanding of historical research, and as such are capable of critically evaluating the suitability of these systems for their research. The user group of focus is, thus, limited to academic users. I have chosen history scholars as my users of focus following the reasoning that they are, in the sense that they create new knowledge out of the records by using them to perform academic research, arguably the group of users that produces the most value out of these systems. While hobbyists do also conduct varying kinds of research, their research could be argued to generally produce less value to the general public. For example, hobbyists often study the family history of their own family, something that’s of interest to them, but not of much interest to the general public.

Another factor supporting their choice as the users of focus is the fact that they are, due to the needs stemming from their research, some of the more demanding users as well. For example, while the absence of properly OCR-processed (Optical Character Recognition) documents may not be a massive

obstacle for all users, it may make certain types of research much more work-intensive to perform in the absence proper word searches, to the point where it may result in less such research being undertaken. If the system is considered to be useful and easy to use by this user group, it should also be considered satisfactory by the less demanding users. No doubt many of the features considered important by the scholars are also considered important by the other potential users.

A situation where the needs of the history scholars make the system less desirable for other users is possible, however. Hypothetically speaking, it is possible that their needs, when taken into account in designing these systems, may in fact negatively affect the perceived ease of use of less advanced users that have different needs. This is, however, not a likely prospect, as historians seldom consider a more complex system more useful, much less easier to use, just because it is more complex.

The systems studied in this thesis are categorized as digital historical record database systems. The *raison d'être* of systems of this type is storing historical records and making them available to the users. Consequently, users practically exclusively use these systems to access these records. Secondly, through logical deduction drawing from the user motivations and the main purpose of these systems, we can argue that these systems are utilitarian information systems. Thirdly, these systems must be accessed over the Internet, using a digital device, and they must contain a web user interface. Though in practice a system can exist without a web user interface, such systems are excluded from this definition for the purpose of this study. Hypothetical such systems accessed via organizational intranets and other alternative means are also out of the scope of this study. We can, based on these factors, formulate the following definition for digital historical record database systems: a *digital historical record database system* is an online utilitarian information system created for storing and making historical records available to the public.

Finally, the construct *historical record* is defined in the context of this study by using the Finnish law. The Finnish law on archiving defines a record as follows: "In the context of this law, a record refers to a textual or pictorial presentation, or an electronically or otherwise produced presentation that is readable, listenable, or otherwise understandable using technical tools."<sup>1</sup> This definition for a historical record is used in this study because it effectively covers the wide variety of different types of historical records that are, or could be, used in historical research.

The aim of this thesis is to produce a version of the Technology Acceptance Model (TAM) that can be used to explain technology acceptance of digital historical record database systems among historians. The Technology Acceptance Model, which is discussed in-depth in the third chapter, holds that two central variables explain technology acceptance by eliciting salient beliefs

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<sup>1</sup> "Asiakirjalla tarkoitetaan tässä laissa kirjallista tai kuvallista esitystä taikka sellaista sähköisesti tai muulla vastaavalla tavalla aikaansaattua esitystä, joka on luettavissa, kuunneltavissa tai muutoin ymmärrettävissä teknisin apuvälinein." (L 23.9.1994/831).

resulting in attitudes towards using a system, which result in system use: 1) perceived usefulness (PU) and 2) perceived ease of use (PEOU) (Davis 1985). This study aims to determine what factors influence the perceived ease of use and perceived usefulness when historians use, or consider using, systems that fall under the category of historical record databases, in order to explain technology acceptance in this specific context. The research problem, as such, can be formulated as follows: “What makes a digital historical record database system useful and easy to use for historians?”. The research problem is approached primarily from the point of view of system-related factors, and more specifically system factors other than user-related factors, that influence historian PU and PEOU. Other factors, such as demographic or social factors, will be taken into account if observed in the data, but the approach this study takes is not geared towards determining the influence of these types of factors. After answering this question, the findings are applied into the TAM itself in order to fashion a new version of it fit for this particular context.

In order to answer the research problem, first, two literature reviews were conducted. The protocols for these literature reviews are discussed in the next subchapter of the introduction. Following the literature reviews, this study moves onto its empirical section. For the empirical part of this study, semi-structured qualitative interviews with historians were conducted. The aim of these interviews was to compile a list of factors that influence the subjects’ perceptions of ease of use and usefulness of digital historical record database systems. These interviews primarily focused on the relevant past system use experience of the subjects. The list of factors affecting PU and PEOU is subsequently inserted into the original TAM in order to create a new model that explains technology acceptance in this specific context. Further details on the structure of this thesis are found in the last subchapter of the introduction.

This research has both practical and theoretical motivational factors supporting its relevance. From the point of view of the IS discipline, TAM is often regarded as a paradigm. However, many scholars point out various potential shortcomings in TAM-based research, as is discussed in the third chapter. This study tackles many of these points of criticism. For one, TAM-based research is often criticized for its failure to address the central constructs, PEOU and PU, on an in-depth level. Instead of aiming to explain what PEOU and PU mean in various contexts, much of TAM-based research instead adds more variables to the model (Benbasat & Barki 2007, Bagozzi 2007). Admittedly, this study, too, mainly focuses on variables that affect PU and PEOU in this specific context, but in the process does also, through these variables, explain in part what exactly PEOU and PU mean for a specific user group in the context of specific systems. Due to the system-focused view this study takes on, it is possible to gain a practical understanding of PU and PEOU in this context, which can then be applied to systems development. Furthermore, TAM research is criticized for being almost exclusively quantitative. While TAM is at its core a quantitative model, it needs to be studied comprehensively for it to retain, or achieve, the status of a paradigm (Silva 2007). This thesis takes on a qualitative approach to

TAM, tackling this point of criticism in the process as well. Therefore, I argue, this study is relevant to the larger academic body of knowledge of IS, and TAM-based IS research more specifically.

The practical need for this research, on the other hand, stems more from the field of history. Given the large number of various digitization projects currently being undertaken, as well as the increasing importance of so-called born digital content, there exists a need for research into digital archive systems that are used to store these digital records in their digital form. Increasing amounts of historical records are either created digitally or later on digitized, which results in historical research becoming increasingly intertwined with digital technology. Consequently, the quality of these systems has, in the past two decades, become an issue of growing relevance as well. This study is relevant from the point of view of this development as its aim is to aid in designing systems that historians, an important group of users of these systems, perceive to be easy to use and useful. These systems, if considered to be of poor quality, will face the risk of seeing little use, just like any other type of system. Not only would this invalidate the effort put into the creation of these systems, but also negatively impact academic research in the field of history. These systems, when successful, help historians achieve higher levels of productivity in their work, resulting in, potentially, higher quality and volume of research. Thus, the findings of this study are aimed primarily at practitioners working on systems of this type.

TAM is mostly useful for early user acceptance testing (Davis 1993), and a modified version of TAM fitted into the specific context of historical record databases from the point of view of history scholars would be a very relevant tool for system development projects related to digitization projects, as well as systems development projects related to systems handling already digital historical records. This version of TAM would provide a useful starting point for developing systems that historians would find useful and easy to use, justifying, in at least one fashion, the resources spent on digitizing the records.

I have chosen to approach the question of technology acceptance in this context from a system-focused view because of the planned contributions of this research. I feel that this research holds the most value by helping practitioners in creating systems of this particular kind. These practitioners have little control over user-related factors, for example, the social factors affecting the users' technology acceptance, and as such I feel that the system-focus to be more relevant from the point of view of the potential contributions of this research. The constructs of perceived ease of use and perceived usefulness have been shown to be very important variables in explaining technology acceptance (Benbasat & Barki 2007), and as such provide a suitable theoretical framework for a study aiming to determine how to design digital historical record database systems historians consider to be of higher quality than many existing systems of the type.

## 1.2 Literature Review Protocols

For the purpose of this thesis, two systematic literature reviews were conducted.

The first literature review focused on literature related to digital humanities, and, more specifically, digital history. The goals assigned to the second literature review were to 1. Explain the construct of Digital Humanities and Digital History, 2. Explain how information technology has changed historical research both on a general level and in terms of different historical research approaches, 3. Identify benefits of digitizing historical records, and 4. Identify how historical records could be digitized to best benefit historians using them for academic research.

The second literature review focused on technology acceptance literature, mainly from the field of information systems. As this study builds on TAM, the focus was on literature related to TAM itself. The aim of the literature review focusing on technology acceptance was to 1. Find literature testing TAM in different contexts, 2. Find literature criticizing TAM, 3. Find literature otherwise discussing or focusing on TAM, and 4. Justify choosing TAM for this study over other technology acceptance related models.

Various other models that are either inherently related to technology acceptance, or that have since their inception been used to explain technology acceptance in information systems, exist. As such, choosing one of them over the others warrants a justification. In order to argue in favor of my choice to use TAM in this study, TAM2, the Theory of Planned Behavior (TPB) and the Theory of Acceptance and Use of Technology (UTAUT) were included in the literature review for comparison with TAM for use in this particular context.

These literature reviews were performed systematically and with scientific rigor, using guidelines and recommendations presented in existing information systems literature (Webster & Watson 2002; Levy & Ellis, 2006; Okoli & Schabram 2010). According to Okoli and Schabram (2010), scientific literature reviews in information systems can be classified into three categories: 1) theoretical background sections or chapters in journal articles, 2) literature reviews as chapters of graduate (or masters') theses and 3) stand-alone literature reviews, which refer to journal articles that are in and of themselves literature reviews. The article is primarily written to aid in carrying out literature reviews of the third kind; that is, the most rigorous kind, though the authors do state that it is very much applicable to the other two kinds of literature reviews as well. This study falls under the second category of literature reviews as it is a master's level thesis.

The literature review process proposed by Okoli and Schabram (2010) is divided into eight steps: 1) The purpose of the literature review, 2) Protocol and training, 3) Searching for the literature, 4) Practical screen, 5) Quality appraisal, 6) Data extraction, 7) Synthesis of studies and 8) Writing the review.

The purposes of both literature reviews, that is, the first step of the process, was already discussed above. The second step involves no training in this case

as there are no other researchers involved in this study. The protocol chosen for the literature reviews was that of Okoli and Schabram (2010) themselves, as they have in their paper built on the papers on literature reviews in IS by Webster and Watson (2002) and Levy and Ellis (2006).

Literature was searched by various means. The first literature review employed primarily Google scholar as its search engine of choice. The searches performed here were done using the following list of search terms: 1. Digital humanities, 2. Digital history, 3. Digital historical record, 4. Digitizing historical records, 5. Historical record database, 6. Historical record digitization. Additionally, the database of the local library of University of Jyväskylä was used to search for literature for this second literature review using variations of these same search terms combined with the search operator ‘\*’.

For the second literature review, literature was searched from six different top IS journals. These six journals were MIS Quarterly (MISQ), European Journal of Information Systems (EJIS), Journal for the Association of Information Systems (JAIS), Information Systems Research (ISR), Journal of Information Systems (JIS), and Journal of Management Information Systems (JMIS). These journals were searched using the search term “Technology Acceptance Model”. Additionally, Google Scholar was used to locate literature outside these six journals. The search terms used on Google scholar were: 1. “Technology Acceptance Model”, 2. “Technology Acceptance Model” Critique, 3. “Technology Acceptance Model” Application, 4. “Technology Acceptance Model” Test, 5. “Technology Acceptance Model” Empirical, 6. “Unified Theory of Acceptance and Use of Technology”, 7. “UTAUT”, 8. “TAM2”, 9. “Technology Acceptance Model 2”, 10. “Theory of Planned Behavior”, 11. “Theory of Reasoned Action”, and 12. “Technology Acceptance”. Quotation marks were used as search operators for all Google Scholar searches in the same way they were included in the preceding list of search terms.

The search results were filtered in multiple steps, with both of the literature reviews following the same screening process. First, the publication summary and the article title provided by the search engine were used to gauge the relevance of the publication. Secondly, if the publication passed this check, its abstract was analyzed. Thirdly, if the publication passed the second check as well, its introduction was analyzed. The fourth step involved the analysis of its conclusions. If, after these four steps, the publication was still considered relevant, it was chosen for the review. On Google scholar, only the first ten pages of results were scanned for relevant results for each search.

In addition to using search engines to locate literature, the listed sources of articles already chosen for the reviews were used to locate additional relevant literature. In this process, both the title of the publication listed in the source section of the study, and the context in which it was cited in the study, were used to gauge its relevancy. If it was deemed relevant based on its title and the context in which it was cited, the screening was continued using the screening process for search results described above, starting from the third step of the process.

In the quality appraisal phase, the articles chosen for the literature review were once more evaluated based on their quality in terms of scientific rigor. No articles chosen were excluded on the basis of quality appraisal, as none of the articles were deemed to be notably questionable in their use of methods or their results and the presentation of said results.

For extracting data from the articles chosen for the literature reviews, the goals determined for both literature reviews were used to direct the focus of the data extraction. In the case of each article, its relevancy for each goal was evaluated, and it was subsequently studied through the goals relevant to its contents. I.e. an article testing TAM would be mainly studied based on the way it tested TAM and whether its findings supported or went against TAM. Finally, the data extracted from the articles was combined into the literature review through synthesis. The syntheses were performed with the goals of each literature review in mind, with the information being codified to best fulfill said goals.

The literature reviews are found in chapters two and three respectively. The first literature review on digital history and phenomena related to it is found in the following chapter, while the literature review on technology acceptance literature is found in the third chapter of this thesis. The structure of this thesis in its entirety discussed next.

### **1.3 Thesis Structure**

In the upcoming second chapter of this thesis, the first literature review on digital humanities, digital history, and the digitization of historical records is performed. In short, the first literature review discusses how IT has changed academic research in the humanities, and, most importantly, academic historical research. For history, this is closely related to how many historical records are being digitized, as well as how increasing amounts of born digital content that can potentially be used as primary sources is born each day. Consequently, this chapter also focuses on what benefits can be gained from digitizing historical records, or from using born digital historical records, and how the digitization process should be carried out to ensure satisfactory results. At the end of the second chapter, digital historical record databases are discussed as a group of systems.

Following the first literature review, the technology acceptance literature review is carried out in the third chapter. This literature review discusses TAM as a theory through the studies in which it was formed, and reviews literature that has later on tested, built on, and criticized it. Furthermore, some other models that have been used for studying technology acceptance in IS, namely the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and the Unified Theory of Acceptance and Use of Technology, as well as a later version of TAM, TAM2, are evaluated in terms of their suitability for this par-

ticular study. I.e. the literature review also provides justification for choosing TAM over other alternatives for this study through a brief reflective comparison.

After the literature review chapters begins the empirical section of this study. In the empirical section, qualitative interviews with historians on system use of historical record databases are carried out and analyzed. Chapter four includes an overview of the qualitative interview as a method, as well as the interview protocol for this study. The interview data is coded and analyzed in the fifth chapter. Based on the data, various factors affecting historian PU and PEOU of digital historical record databases are determined, and subsequently used to create a version of TAM explaining technology acceptance of these systems among historians.

The findings of this study are discussed in the sixth chapter, the discussions section. There, the findings of this study are further evaluated critically, discussing the potential shortcomings of this research. Additionally, this study and its findings are discussed in relation to existing research, including their contributions to theory and practice. The discussion section also suggests directions for future, further research in this area. The seventh and final chapter concludes this study by briefly summarizing the entire research process and its findings.



## 2 HISTORY, DIGITAL HUMANITIES, AND DIGITIZATION OF HISTORICAL RECORDS

This chapter will discuss the larger context of this thesis by discussing issues relevant to its main research problem: what makes a digital historical record database system useful and easy to use for historians? The chapter is split into five subchapters. First, I discuss digital humanities, a concept that links all of these subchapters together under one theme. Digital humanities is a research area that focuses on the use of digital technology in the humanities and the way it has shaped the humanities in the past decades. Secondly, following this, the implications of digital technology for history are discussed in the second subchapter. There, the effects of digital historical records, as well as digital technology on a larger scale, on academic historical research and its methods and research approaches are discussed. In relation to history and digital technology, I also discuss the concept of digital history.

Thirdly, the benefits of digitizing historical documents are discussed in-depth, mainly from the point of view of academic historical research. Currently, most digital primary sources used by historians continue to be old documents that have later on been digitized, rather than content that was created digitally. While in the future the primary sources used by historians will no doubt include increasing amounts of so-called born-digital content that was, as the name of the construct implies, created in a digital environment, currently this is not the case as most historical research focuses on time periods preceding the spread of digital technology. Next, the digitization process of historical documents itself is discussed in the fourth part of this chapter, from the point of view of how it should be performed to best benefit academic historians.

Finally, the systems into which these records saved for use by the users of the systems are discussed as a category of information systems in the fifth and last subchapter of this chapter. There, digital historical record database systems, though already defined in the introduction, are approached through examples in order to better determine similarities between various systems falling into the category.

## 2.1 Digital Humanities

Today, information technology is all around us. We keep glancing at our smartphones to determine the time of the day, to keep in touch with the people around us, or to read the news. Computers are used to display when the next bus or train arrives at the station. Computers operate the traffic lights, and often use motion sensors to do so. Planes are mostly flown by computers rather than their pilots. Nearly every European uses a computer of some kind every single day to perform numerous activities both at work and at home. Information technology (IT) has not in a long time been just a tool for companies that offers administrative support, but a strategic asset that needs management and needs to be taken into account in business strategies (Henderson & Venkatraman 1993). There is no longer, or at least no longer should there be, separate departments for business and IT inside a company, as IT is a vital part of nearly any business. It is not at all surprising that information technology has also permanently pervaded universities, and, consequently, academic research.

It is now nearly impossible to find a scholar who does not use digital technologies in any shape or form to perform his daily work activities (Weller 2013, p. 74). One needs an email account to keep in touch with one's colleagues, and one needs a digital device to use it. Furthermore, most, if not all, universities now have user accounts in different systems for their staff members that they need in order to access their work email, set up courses for their students or to access academic publications. Many academic journals are also published online, with the physical versions but "empty skins sloughed off by a long-departed animal" (Hitchcock 2013). Even in the university libraries one is expected to use a computer to locate the physical documents. We use a computer to write our research, and we use computers to find and use the secondary, and sometimes primary, sources we need for it.

Indeed, digital technology has, over the past few decades, become a nearly inseparable part of the academic research process. While there is variety between disciplines and research areas in how information technology is used to perform and support academic research, it is hardly a question of whether or not it is used, but to what extent and how it is used. At the same time, however, information provenance is rarely taught in universities because this change has been so all-encompassing that we take digital technology for granted. (Weller 2013, pp. 2-3, Berry 2012, pp. 1-2)

No discipline or field has been left unaffected by the growth and spread of information technology. The concept of digital humanities focuses on this relatively recent development from the point of view of humanities specifically. It focuses on academic research in humanities, through both research methods and source material, and how digital technology has changed it, as well as how it might continue to change it in the future. It is not a discipline or a method, but a research approach encompassing all humanities. Research on the digital humanities studies the changes in the humanities research process brought on

by information technology, as well as how that research could be conducted even better using information technology. (Berry 2012, pp. 1-8)

The most visible change related to academic research that has taken place as a result of the spread of digital technology is the digitization of physical documents and the birth of born-digital documents. This change has affected all of humanities, and every other science as well, not just history. If in the past scarcity was an issue in the case of both primary and secondary sources, in some cases abundance is now the issue:

Several million books have been digitized by Google and the Open Content Alliance in the last two years, with millions more on the way shortly; the Library of Congress has scanned and made available online millions of images and documents from its collection; ProQuest has digitized millions of pages of newspapers, and nearly every day we are confronted with a new digital historical resource of almost unimaginable scale. (JAH 2008)

For many disciplines, the digitization of academic literature has been the most important change, as it has enabled disciplines to have a much larger canon than previously. Overall, this digitization of academic literature is perhaps an even larger change than the digitization of historical records, as academic historians have always travelled in order to reach the primary sources required to conduct their studies, if needed. Indeed, even now historians continue to travel to both foreign and local, remote archives to reach various historical records that remain undigitized. Though vast amounts of historical records have been digitized, an even larger amount still remains available in only their physical form. Historians continue to use both physical and digital records, sometimes in conjunction, with only some historians having a clear preference for one or the other. Especially secondary sources actively used by historians, such as anthologies and monographs, have not been extensively digitized.

The increased availability of academic literature, however, is not a result of just its digitization, but also a direct result of the endeavors of the Open Access movement. The Open Access movement was born in the 1990s (Open Access 2015a) from the desire of scholars to have free access to each other's research. At the time it had no official name, being referred to as 'Free Online Scholarship' and the like, before the term Open Access movement was coined in 2001 and subsequently went on to become the name of the movement (Hagemann 2012).

The movement has both an ideological background in wanting academic knowledge to be publicly available for free (Schnapp, Lunenfeld & Presner 2009, European Commission 2016a), as well as a practical side in wanting to lower the costs of academic publications and to allow scholars to access a wider range of digital scholarship. The dissatisfaction of scholars with the practices of academic journals, especially in terms of pricing, have since kept the movement growing (Noorden 2013).

The movement has made a large impact since its inception, especially for scholars, as fewer and fewer academic publications remain behind uncircum-

ventable paywalls. Some notable milestones of the movement include the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (Open Access 2015b). On a larger scale, governmental and intergovernmental organizations have also recently acted on the principle of Open Access. For example, the European Union actively advocates for Open Access, and specifically Open Science, e.g. through its own research funding (European Commission 2016b). Various other academic funds for funding Open Access research now exist as well. However, even though the movement has seen considerable success, observing the increase in the number of freely available studies, many publications remain only available for free when accessed through a university Internet connection, remaining behind a paywall for the general public, as well as many scholars working in universities that are not paying the fees required to access them (Noorden 2013). While Open Access has in most cases lowered the fees associated with publishing scientific articles (Noorden 2013), it may still remain costly at times.

Other discernible so-called open movements related to the Open Access movement and in some way to digitizing documents are, for example, the movements for open data and open data in governments. These are especially relevant for history, as, for example, political history is concerned with government documents.

Apart from there simply being more primary and secondary sources to use for scholars of the humanities, information technology also provides benefits in using and locating said sources. The most prominent change has been the ability to use text-based searches to find digital documents and to search through their contents. Using a digital search, one will effortlessly find a plethora of digital documents related to the query, as opposed to having to go to a library in search of academic research. Not only that, simply many more documents are available by using a web-wide search engine rather than limiting oneself to the selections of the local libraries. Search engines not only search for document titles and authors, but can also search them based on their contents so long as they are written in a format the computer software understand. Not only does this help in searching for documents, it also provides us more effective ways to use them.

Aside from old documents being digitized by various parties from private companies to government organizations, vast amounts of new, digital content is being created every single day. It is estimated that in 2013 there were 4,4 zettabytes, or 44 trillion gigabytes, of digital data in the world, though most of this data is transient: packets of data forming video streams that, when received by the recipient device, are quickly discarded after use, for example. Similarly, a large portion of this data could be considered useless even if properly tagged with metadata and analyzed. (EMC 2014) Nonetheless, even the remaining portion of this enormous amount of data remains just that; enormous.

These documents that are digital from their inception are called born-digital. Quantity-related advantages were the first point of focus in digital humanities as the amount of digital sources began to grow rapidly in the 1990s.

The first wave of digital humanities was about these quantitative advantages brought on by the use of information technology. Though the focus on quantity-related advantages has since lessened, Big Data is a curious proposition for history scholarship, taking the use of quantity-based methodologies to the next level. Big Data is a construct that refers to processing massive sets of data that normal data processing applications are unable to handle. It is not tied to any one methodology or research area as what big data can be used for is entirely related to what the data in question actually is. For example, in 2009 during the H1N1 outbreak in the United States, Google used big data from its users' search histories in almost real-time to create through mathematical models an algorithm that was capable of predicting the spread of the disease. As computers become more proficient in text analysis, the possibilities of using big data for historical research become more numerous as well (Hitchcock 2013). Projects such as the Dilipad project that uses computer-processing for analyzing parliamentary proceedings spanning two centuries (Blaney 2015) are pioneers that no doubt pave way for more similar studies.

While a digitized photo is still in essence the same object in terms of content as the original physical photo, with the addition of some metadata, many digital documents do not have a physical counterpart. Facebook and Twitter posts among other types of entirely new born-digital documents have provided humanities with new types of sources. For historical research, these types of records largely remain limited to research focusing on contemporary history as opposed to long-term history, as these records do not presently span lengthy periods of time. Contemporary history refers to historical research studying the time period after the Second World War, or more precisely, the time period from 1945 to the present day (Brivati 1996, p. xvi). The mere birth of these types of documents has necessitated some changes in the conventions of academic research, the most obvious change being the way they have necessitated changes in guidelines for citing digital sources in academic research. In time, these born-digital documents are no doubt going to become increasingly relevant to historians studying the twenty-first century. As politicians continue to make use of various digital technologies in their campaigns and in voicing their opinions and views, these types of documents cannot be ignored by political history, to name but an example of their future, as well as present, applications.

The quantitative advantages gained from digital technology were the focus of the so-called first wave of Digital Humanities. The first wave viewed digital technology, first and foremost, as a tool used in academic research, almost exclusively focusing on the power of digital search technology. The second wave, on the other hand, is argued to be qualitative in nature. In the second wave, IT becomes more than just a tool in that it "harnesses digital toolkits in service of the Humanities' core methodological strengths: attention to complexity, medium specificity, historical context, analytical depth, critique and interpretation". (Schnapp, Lunenfeld & Presner 2009) The third wave of digital humanities has been brought up as the next phase in this development. Though it is pure speculation, according to David Berry (2012, p. 5), the third wave would

supposedly have disciplines question their implicit beliefs such as whether or not close reading can make way for so-called distant reading, with the help of computers. This has, in fact, recently become a subject of debate in conferences of digital humanities.

## **2.2 The Implications of the Spread of Information Technology for Historical Research**

Historical research and, more precisely, the modern historical research as we know it today in universities, as a discipline relies heavily on primary sources in the form of historical records and documents of varying kinds (Haupt & Kocka 2004), taking on a more empirical approach as opposed to a theoretical one. To place sufficient emphasis on just how reliant historical research actually is on primary sources, one could say: no records, no history (Sreedharan 2000, p. 3). As already established, digital technology has especially changed the way humanities use sources. Indeed, it is no surprise that history has been greatly affected by digital technology given its reliance on primary sources, which are now becoming digital in increasing amounts.

Just as digital humanities has become a concept to describe the transformation digital technology brought about, digital history is a concept created in dialogues between historians. The American Historical Association (AHA) defines digital history as being “scholarship that is either produced using computational tools and methods or presented using digital technologies” (AHA 2015).

As the entire discipline revolves around the use of primary sources in the form of historical documents, the recent increase in the availability of digital primary sources has been a great boon to the discipline. The amount of easily available primary sources has grown explosively in the last few decades, making it “clear that historians will have to grapple with abundance, not scarcity” (JAH 2008). There is naturally huge variety inside the discipline based on research areas when it comes to the use of digital sources. Historians studying more modern history from the 18th century onwards, as well as those studying early modern history, have seen a large increase in the amount of digital primary sources available to them, while those studying the early Middle Ages or the ancient Mediterranean Europe are still forced to primarily use physical primary sources. The time period of focus in a study is also not the only factor in determining the availability of digital primary sources, as some countries have had more of their historical documents digitized than others. For example, historical documents from Great Britain have been digitized quite extensively (Hitchcock 2013), with collections such as the Eighteenth Century Collections Online or Early English Books Online housing a downright vast collection of old documents (Spedding 2011). While many of the British record collections, for example, have been digitized by private businesses, countries like France have seen

primarily state-funded projects leading the digitization efforts of their historical records.

In this light it cannot be said that every historian now works with digital primary sources. In fact, there were some historians interviewed for this study that had not used digital databases in their studies at all, not because of the lack technological proficiency or any other personal reason, but simply because none of the primary sources they needed were available in digital form. Meanwhile, some historians write their research based almost exclusively on online sources, an approach that is not always viewed with much respect within the discipline (Hitchcock 2013).

It should be noted that the availability of historical records is not only an issue related to digital historical records and the digitization of historical records, but a political issue on a larger scale related to the availability of physical historical records as well. Politics are never far from the work of historians as they deal with legislation related to archives and especially political historical records on a regular basis. By affecting the availability of historical records, politics shape the way historians and societies perceive the past. Furthermore, censorship resulting from politics can affect the contents of the records in various ways even where they are (permitted to be) available. (Rosenberg 2001) Even outside the issue of records being intentionally censored and made secret, simply not all records can be archived. Politicians and archivists make conscious decisions on what materials to preserve (Brown & Davis-Brown 1998), and, in relation to digital history, what materials to digitize. Historians have to acknowledge these potential gaps and work around them in an attempt to minimize their impact on our understanding of the past.

Politics generally tend to have a much larger impact on recent historical records. Sometimes archive personnel even act together with other state officials to intentionally conceal information or the entire existence of some documents from historians. In practice, according to Rosenberg (2011), this can sometimes simply be a result of a lack of motivation, as state officials find it rather convenient to keep the records secret instead of going through the effort to review whether or not they are “safe” for the public to see, especially in the former Soviet countries.

In a way, drawing an analogy from political censorship to digitization is not a ludicrous proposal: what records are digitized affects our perceptions of the past in a quite similar fashion. In the case of digitized records, however, one could speak of self-censorship in cases where historians let the availability of digital records affect the direction of their research without critically reflecting on it. Digital records, with how much easier they are to access on average, are often preferred by historians where available. In this sense, the fact that only a small portion of historical records are digitized calls for self-reflection from academic historians. These undigitized records remain available to historians in their physical forms, but may end up seeing proportionately much less use in academic research in the future. Do we, thus, limit our collective understanding of the past by letting the availability of digital records direct our research?

Though one may reason that their own research is but a drop in an ocean, and as such whether or not they choose to do so does not really matter such lines of thinking may yet cause tidal waves in that ocean, as they are quite common.

Nonetheless, the advantages of digital records stemming from the new ways they can be handled using digital technology has provided various benefits to historians from differing fields of history. Firstly, digital historical records lend themselves better to quantitative research approaches of any type. Economic historians are conventionally seen as being the historians most interested in quantitative research approaches. While this is not untrue, other types of historical research take on quantitative research approaches as well. In fact, digital historical records have given rise to a quantitative approach to the history of concepts, for example.

The history of concepts, or conceptual history, on a basic level refers to the historical study of semantics of concepts (Müller 2014). It places emphasis on concepts due to their perceived importance for contemporary cultural and linguistic understanding. This relates to the notion that language, too, changes over time. To truly understand what was said in the past, one has to understand the language used at the time and how it differs from the language we now use. According to Reinhart Koselleck (1998), for example, the "study of concepts and their linguistic history is as much a minimum requirement for the very recognition of history as the definition that it deals with human society".

The ability to perform full text searches on the textual body of historical records has made extensive conceptual historical research spanning centuries possible. By performing a series of searches, a historian is able to swiftly scan through thousands of records in search of occurrences of a single search term such as 'liberty' in order to study it over long periods of time. Of course, this is not something limited to the history of concepts. Any historian can quickly go through vast amounts of historical records in search of relevant ones by making use of full text search features of digital historical record database systems. Though textual records are the most used primary source type in history (Gregory 2014), metadata also makes it possible to search for images and other document types using text-based searches along with other types of searches relying on various types of document metadata, as will be discussed in-depth later on in this chapter in relation to the digitization process of historical records.

Aside from the way search features allow historians to quickly handle digital records, the very existence of digital historical records has greatly helped historians in general. With digital records eliminating the need for, at times, costly trips to archives, historians are more easily able to utilize a larger range of historical records for their studies. The ability to access foreign records online has especially been beneficial for comparative history. Comparative history, according to Haupt and Kocka (2004, 2009), studies similarities and differences between historical units such as regions, economies, cultures, and nations. Whereas comparative history consciously makes comparisons between historical units, including nations, transnational history aims to look past nations to an extent.



What is referred to as the “transnational turn” is seen as being the most important development of the past decade in the discipline of history (Ngai 2012). In the past, historical research largely treated the nation as the basic unit of historical analysis, meaning that history conformed to national borders. Transnational history, through the use of sources from different nations, studies history in a way that transcends man-made borders, from the point of view of people, ideas, and various other phenomena. (Halonen, Ihalainen & Saarinen 2014, Haupt & Kocka 2009, Ngai 2012). Even though they may conflict at a quick glance, transnational history and comparative history are not mutually exclusive by default (Sartori 2015).

Both of these types of historical research make extensive use of a vast amount of sources from various nations. Consequently, the digitization of historical records has been a considerable boon to such types of historical research. Being able to easily access historical records from different nations has made conducting both comparative and transnational historical research easier by saving historians both time and funds that would have been spent on traveling when using physical records.

Challenges for comparative historical research related to the digitization of historical records is the whether or not the digital records from different countries can directly be compared diachronically and synchronically (Ihalainen & Palonen 2009). Even when records of the same category are available from various countries, the national conventions of each country may differ to the point where their comparability becomes questionable in some cases. For example, parliamentary records are, according to Ihalainen and Palonen (2009), considered suitable for comparative conceptual research. Parliamentary records happen to also be among some of the most extensively digitized historical record especially in European countries. The digitization of historical records has, from the point of view of the increased availability of records following their digitization, also greatly benefited especially parliamentary historians, or more generally, political historians, seeing how parliamentary records have been rather extensively digitized.

While the increased availability of digital historical records, i.e. primary sources, has recently helped historians conduct comparative historical research more easily, secondary historical sources are not as easily found in digital form. The more cases compared in a comparative study, the more reliant the historians conducting it become on secondary sources, e.g. monographs, as it becomes less possible to closely work with primary sources (Haupt & Kocka 2004). At the same time, however, full text searches and other exclusively digital ways of handling historical records may help comparative and transnational historians alike handle larger amounts of primary sources, reducing their reliance on secondary sources when conducting studies with larger scopes. Moving on, it should be pointed out that these types of historical research discussed so far are not mutually exclusive by default. One can plausibly conduct comparative conceptual historical research, for example, and such studies have indeed been car-

ried out in the past (Ihalainen & Palonen 2009), just as one can conduct comparative economic historical studies.

As briefly touched upon in the preceding subchapter, the rise of big data has also affected the humanities and thus history. Though historians are largely interested in qualitative, text-analysis based big data, quantitative big data, too, has many uses in historical research. Big data provides various possibilities especially for *longue durée* history that looks past single events, focusing instead on long-term developments. Big data could be used in historical research to search for unforeseen correlations between multiple variables over time (Guldi & Armitage 2014). The emphasis, here, is on finding interactions between variables that may not seem related initially (Grossman 2012), as big data tools make it rather effort-free to look for such correlations inside sets of data. As more sets of data become available, the potential applications of big data in historical research increase as well. Economic historians, among others, use various quantitative measures, e.g. commodity prices like butter or salted herring (Heikkinen & Nummela 2015) to draw conclusions about long-term economic developments.

Economic historians, and other historians handling quantitative or table-based data, perhaps benefit the most from digital software in general, however. Tools such as Microsoft Excel have offered much to historians handling quantitative data as it has allowed for large sets of data to be created and handled with relative ease compared to physical ways of handling them. As computational capabilities increase and computational power becomes increasingly cheap, big data is also likely to become more commonplace in historical research in the future. Currently, handling big data is often still out of question with typical office computers. As such, historians wishing to handle large sets of data will typically need to conduct their data acquisition and analysis using specifically prepared equipment, resulting in some additional resource costs in terms of time and possibly funding.

As for the effects of information technology on academic historical research practices on a more general level, one cannot ignore the social side of academic research. In this regard, digital technology has also allowed for much closer co-operation between historians and other scholars alike, especially when collaborating internationally or otherwise over distance. Historians residing in different countries, or continents entirely, are able to collaborate in real time using various digital tools ranging from voice communication software the shared document viewing and editing software. This makes collaboration between scholars that is both independent of time and place possible, making conducting academic research collaboratively much easier and more effective, regardless of the methods or primary sources used. Consequently, this may result in a rise in co-authoring in historical research where co-authoring has conventionally been rarer than in many other fields.

While much emphasis is placed on how digital technology has made historical records, as well as academic research, more available to scholars through digitization, among other benefits already discussed, the potential drawbacks of

this development are sometimes forgotten. History as a discipline faces a number of problems associated with the rise of information technology and the increase of digital historical sources.

Though the average individual produces increasing amounts of data using various digital technologies, many of these born digital documents that may be of interest to future and present historians are highly transient. We may save digital pictures we take online in cloud storage spaces provided by large IT companies, but there is no guarantee that they will still be there in ten years, not least because these companies themselves may, for whatever reason, not be. Similarly, even if we have our files saved on our own hard drives, one day those hard drives may suddenly cease to function and we will come to realize that we never did get around to making those backups of our files like we were supposed to. Most of us can recall some old files we still miss that we once upon a time lost forever due to a hardware failure. On the contrary, we will still find those old physical photographs inside the dusty photo albums stored somewhere in our cellars should we end up wanting to take a look at them.

On the other hand, sometimes we do not even want to save some of our documents. Some primary source types considered valuable by historians such as letters are even becoming practically obsolete as emails, text messages and the like take over. Much to the dismay of historians, such documents containing various types of digital communication are often deleted without a second thought (Weller 2013, p. 11) by businesses and individuals alike. Especially business historians lament the fact that most large businesses routinely delete their old e-mails.

From the point of view of historical research, this transience associated with the majority of digital data is a notable issue. Though there is now more data than could ever be used for research purposes using current methods, this data is not only transient but scattered around the Internet with few organizations actively seeking to preserve and organize it. With no one to ensure that all these documents do not simply disappear as time goes on, these seemingly abundant masses of data may not really be so abundant after all. (Weller 2013, p. 4) The organizations that do collect this data ultimately determine what is history in the future will be by choosing what to preserve (Black 2011). Who, indeed, is supposed to be responsible for preserving the historical records in this digital age? What are the agendas of the organizations that choose to preserve it or are already doing so? What types of born digital documents should archival organizations seek to preserve, and how? These are questions any historian finds himself asking from time to time, but to which answers are scarce, with archivists and politicians looking for solutions to the same issues as well.

However, even when digital documents are saved and stored appropriately, it is not always done with enough expertise and foresight. This applies to both born digital documents and old, recently digitized documents. Apart from digital data completely disappearing as a result of a lack of measures taken to preserve it, the documents that do remain safely stored somewhere may nonetheless be lost. As advances are made in digital technology, hardware and soft-

ware change and so do the associated standards such as file types. We are already in a situation where an average home computer does not have a floppy drive, and is consequently unable to use the floppy disks that were used in place of CDs, DVDs, and Blu-ray disks in the 1990s. Evidently we have, since then, realized that this is a problem, and now most disk drives are capable of reading all three types of disks listed. There is even then no guarantee that everything we do will always be backwards compatible, however. As Terry Kuny (1997) memorably put it: "we are moving into an era where much of what we know today, much of what is coded and written electronically, will be lost forever. We are, to my mind, living in the midst of digital Dark Ages". Taking into account these factors, it is evident that digital technology has created new challenges for not only history as a discipline but anyone concerned with the preservation of our past.

Digital historical records created by digitizing physical records are also problematic in other ways. One inherent issue associated with digitized historical records is the fact that some details of the physical documents may not transfer over to their digital versions. If a text document is OCR-processed and scans of the original are not available, details such as handwriting that was added at a later date to the typewritten document may be omitted because the computer does not recognize or even pay attention to them. In one case, the lingering scent of vinegar in letters from centuries ago was used by a historian to study an outbreak of cholera, as vinegar was used to disinfect the letters to prevent the spread of the disease. Such details may be added into the metadata of the documents, but only if they are noticed and considered important enough to be included. The same can be said for digital documents, as we cannot be certain what will be considered important in the future, making it possible for us to unintentionally overlook important details when archiving more complex digital documents, e.g. websites (Cohen 2004, Weller 2013, pp. 4–8). For the time being, historical research has not seen these new born digital sources used to a notable extent, as most historians remain more concerned with time periods dating much further back into the past, but for future historians they will one day be the primary sources used to study the moment we now live in.

With the spread of digital technology, some historians have also expressed concerns regarding the possible decline of the historical research skills of future and current historians. By using digital technology in increasing amounts as a tool in historical research, we may, in some ways, end up dependent on it. As computers make it easier to perform various research tasks, such as data collection, this may even lead to a situation where traditional, physical historical records are considered cumbersome to use in comparison to their digital counterparts. Why spend weeks in an archive flipping through old records when you can use a piece of software to do it for you? In the current situation where vast amounts of historical records remain undigitized, and may well never be digitized, this is a troublesome proposition. As we become increasingly reliant on digital sources, our skills at locating physical ones inside libraries and archives may decline (Hitchcock 2013), along with our motivation to do so. There is no

doubt that the availability of digital records downright directs the research topics of some historians, as we will later observe based on the interview data of this study as well. This preferential choosing of primary sources may, in the future, result in gaps in academic historical research, if undigitized, physical records see increasingly less use by future generations of historians.

Past directing the choice of research areas and topics, the increasing use digital records are seeing may end up causing issues in the traditional historical research skills of academic historians in terms of source criticism as well. Digital historical record database systems contain issues in both software and the records stored in them, and taking into account the possible influence of these problems, e.g. incompleteness of search results or collections, or data being omitted from the digitized records due to OCR issues, is something that is a part of the basic source critical abilities of a historian (Hitchcock 2013, Spedding 2012). In using digital sources, documenting the search process according to academic standards is something that should be done to conform to the quality standards for academic historical research. However, we sometimes blindly rely on data that is not at all as certain as we think it is.

While using Google Scholar or Google, many tend to assume that it is infallible in that it will display everything that is out there (Hitchcock 2013), and this same phenomenon often occurs with digital historical record database systems. Only by acknowledging the limitations of these systems, and by employing the historical research skills expected from an academic historian, can these issues be addressed appropriately. Furthermore, when using primarily digital tools such as online searches to conduct academic research, the same standard of scientific rigor should be retained as when operating with the traditional tools and practices. E.g. when performing a literature review using digital tools such as word searches, the literature review section should be written in a manner that includes details about the search process, such as all the search words and search engines used (Hitchcock 2013, Okoli & Schabram 2010). This way the research process can be replicated as far as the literature reviews are considered as well, adhering to the principle of reproducibility for scientific information.

Continuing the discussion on a more general level, academic scholarship in history itself has also been a subject of discussion. In September 2015, The American Historical Association published guidelines for evaluating digital scholarship in history, with the focus being on recognizing new forms of scholarship digital technology has given rise to. According to the guidelines, scholarship in history should not only be limited to “work that can be seen as analogous to print scholarship that is reviewable by peers (i.e. journal articles and books), but also to address the myriad uses of digital technology for research, teaching, pedagogy, and even some that might be described as service.” (AHA 2015)

In practice, we seldom consciously make note of any kind of on-going technological revolution that is supposedly happening. We still write the same kind of journal articles and books we used to write decades ago, with the excep-

tion that they also end up online, and that we exclusively write them digitally. Perhaps, though, it should rather be said that they now end up online, and sometimes also in physical journals. When it comes to digitized collections, we are mostly happy to see one less reason to leave our own campus to work on primary sources. Slowly, some more profound changes are taking place out of our sight, as is evident from the AHA guidelines of 2015 for digital scholarship. As time marches on, we will inevitably find ourselves actually actively using born digital sources along with the digitized old record, whereas for the time being born digital primary sources have remained marginal in historical research. Through allowing new types of research approaches applying full text searches to perform vast conceptual historical research, or using big data to observe long-term developments, digital technology has already become more than just a tool used to perform old tasks more effectively.

## 2.3 The Benefits of Digitizing Historical Records

It is all too easy to say that all historical records, as well as any other types of documents, should be available in a digital form because digital information has been the trend of the past two decades, to the point where we call our society an information society, and this era the information era (Guldi & Armitage 2014). Furthermore, historical documents hold within them our cultural heritage and having it readily available for everyone to use on demand is something to strive for as a principle. Even more importantly, having historical records readily available for researchers who seek to study our past is a question of common good. Ideally, this would be the case.

In reality, digitizing documents costs money and the parties in control of the historical records often find themselves wondering whether or not the investment to digitize their records would be worth it. Digitizing a book or two written fifty years ago is a much simpler undertaking than digitizing fifty years' worth of proceedings of a parliament's plenary sessions, each spanning dozens of pages. The organization that owns, or is otherwise in control of, the records no doubt finds itself asking whether or not digitizing them would be worth it, and why. While potential monetary gain is perhaps the most obvious factor to consider, it is but one aspect of digitization, and is generally not highly relevant outside digitization projects carried out by some large Anglophone companies. When evaluating the need for digitization, one should, according to Anderson and Maxwell (2004, p. 9), take into account at least: 1) the uniqueness of the document, 2) the demand for its use and 3) the physical state of the original document. The uniqueness refers to the question of whether or not similar documents exist elsewhere, possibly already in digital form. This subchapter will expand on these three factors, providing more arguments supporting the digitization of historical documents through the various benefits that digitizing them can provide for the parties involved.

The benefits of digitizing historical documents are various and intertwined. The benefits, I argue, can be split into three categories depending on which party they benefit: user benefits, owner benefits and universal benefits. User benefits refer to the benefits the parties using the documents for their own ends gain from their digitization. Owner benefits, on the other hand, refer to the benefits gained by the party that owns the documents, or the rights to publish and distribute them. As such, in a case where an individual stores a collection of photographs into a local archive that then digitizes them in a later project, the archive is considered the owner of the documents. Additionally, some benefits were listed under the category of universal benefits, on the grounds that they are both large and vague, as well as hard to pin-point to any one person or organization that would directly benefit from them.

Though the reasons supporting the decision to digitize any given documents and the benefits gained from digitizing them vary case by case, some general factors applicable to most cases can be found. Additionally, the type of document in question is also an important factor in determining what can be gained by digitizing the materials. Videos, pictures, audio files, texts and other kinds of materials all have their own unique qualities that affect the way they can be used digitally. As already implied through the categorization discussed above, the benefits of digitization are different for those interested in the documents, the customers or users, and for those that own the documents, the party that either digitizes or tasks someone else with digitizing its materials.

The most obvious, and also the most important, benefit of digitization is the increase in accessibility (Anderson & Maxwell 2004, p. 5). A digital document can be accessed over the Internet at will, regardless of physical distance, whereas the distance can be a major obstacle in the case of physical documents. If a document is located in another country entirely, the user is likely to forgo using it unless the document is of high importance to the individual. While one will go to great lengths to access the primary sources most pivotal to the study in question, supporting primary sources may well be left unused should they prove unreasonably difficult to access, while not being at all vital for the success of the study. Drawing from this observation, one could argue that the more sources scholars are able to easily access and use, the more extensive their research can potentially become should they choose to use these sources.

Being able to access a nation's historical documents online is not only beneficial for foreign scholars, but also for the scholars of that nation who happen to be working abroad at any given time, or simply work far away from the archive despite being in the same nation. In the globalizing world it is increasingly common for historians to be interested in the historical records of other nations, and for historians to be working abroad. Comparative historical studies, for example, have been utilizing primary sources from multiple countries for decades (Haupt & Kocka 2004, 2009).

Furthermore, digitization improves the accessibility of the documents by offering the possibility of simultaneous use. Unless there are multiple copies of the same document in the same place, their use is restricted to one user or one

group of users at a time. In some cases, there may not even be any copies of the original document, making it accessible in only one location and only one user or group of users at a time, which serves to provide an even stronger argument for digitizing the documents (Anderson & Maxwell 2004, p. 2). Archives are also not open around the clock and consequently have to be accessed during office hours. Digital archives and websites in general, on the other hand, can be accessed even in the dead of night, providing much more leeway for their users. Furthermore, as the users do not need to travel to physical archives, they also end up not having to pay for the trip. On the other hand, the physical space of archives and libraries is also not experienced when using digital records.

Very closely related to increased accessibility are the benefits of findability, from the users' point of view, and increases in the amounts of use the materials of the owners see. As the materials become more accessible through digitization, they will also end up seeing more use as users who may have previously been interested in them, but not to the point where they were willing to travel to use them, can now access them. Similarly, many may have been unaware of the existence of a historical collection until an Internet search brings the digitized version of the collection to their attention. This is referred to as findability. It is, in this light, very important to realize that when deciding whether or not to digitize something, the amount of use and interest it has seen so far is at best a questionable number. Even if a collection of documents has seen little use in an archive so far, it does not at all mean that there is no interest in it. Findability is not an issue just for the general public but also historians. Many of the historians I interviewed generally became aware of new digital collections by either performing Internet searches on their own, or through word-of-mouth of their colleagues.

Publicity comes with the increased use of the documents and their better findability. The digital archive, or some of its contents, might be mentioned in newspapers, the news, magazines or academic journals. More importantly, as the documents become more used among scholars, the number of research either directly focusing on the contents of the archive or just using them as an additional source also grows. Consequently, the contents of the archive receive more attention from scholars, the general public and possibly the media as well.

Of course, publicity and an increase in use may be of much interest to the owner of the documents. For example, an old politician might welcome the publicity gained from digitizing his or her personal archives. Similarly, an organization selling access to its archive would no doubt welcome the new customers interested in its digital archive. In this case, financial benefit is an obvious benefit gained from digitization.

Financial benefit can be a factor of varying importance depending on the organizational or individual owner of the documents. Some organizations, such as some national archives, may either be completely non-profit or lean towards a non-profit orientation, while some organizations may start digitization projects purely for the potential revenue gained from selling access to the digital collection. For organizations looking for profit, the larger their collection be-



comes, the more customers they will likely be able to gain. Generally speaking, Anglophone historical records have seen more commercial digitization than historical records from continental Europe. Continental European parliamentary records, for example, have largely been digitized with public funding. On the other hand, it is not uncommon for the costs of digitization to be a major issue for non-profit organizations who want the access to their documents to remain free of charge. Digitizing their documents would be just another stream of costs weighing down their budget, and the larger the collection, the larger the costs of its digitization as well.

Some organizations have, to make up for the cost of digitization, begun selling access to their digital collection, while at the same time keeping their physical collection publicly available free of charge. This way the costs of digitization become less of an issue and the open data principle is not compromised as such: the documents are still available for free in their original form. Even though the user might end up having to pay for accessing the documents, in most cases paying for the archive will nonetheless be less costly than travelling hundreds of kilometers to another city, let alone to another country entirely, and spending multiple nights at a local hotel while working with the documents in question. Taking into account the additional costs associated with accessing physical archives, accessing them will cost the customer money in almost all cases, whether or not the collections themselves are free. In many cases the digital access will prove less costly, and it provides the user with long-term access to the archive, as opposed to a few days of intense research sessions inside the physical archive.

In relation to the benefit of accessibility of digital historical records, the transnational turn discussed earlier cannot be ignored. With the recent trend of transnational history challenging the conventional idea of the nation as the basic unit for historical analysis (Ngai 2012), historians are likely to utilize foreign digital records even more in the future. Consequently, national historical documents of any country may see surprising amounts of use from abroad once digitized. This is not to say, of course, that scholars would not travel abroad to access the physical archives of other countries, just as they have done in the past. However, upon their digitization, accessing the documents becomes a lot easier and less resource-intensive and digitization is hence highly likely to increase the amount of use they see in academic studies. Their increased availability makes it easier for transnational and comparative historical studies to have larger scopes. With the records easier to access and use allowing for academic research to be performed faster and more cost-efficiently, and by using new research approaches, the digitization of historical records will inevitably help us better understand history.

Another important benefit that is more relevant the older the documents in question are is the improved ability to preserve the original documents. Once a digital copy of the documents has been made, there should be little need for the public to access the original documents, eliminating, or at least lessening, the danger of deterioration caused by physical wear resulting from their use.

(Anderson & Maxwell 2004, p. 1) This way the materials remain accessible to the public in digital form while the physical documents remain in better condition for longer periods of time. On the other hand, this can limit access to the original documents in the event that they are stored away and become inaccessible from the physical archive as a result (Hupaniitty 2010, p. 38). To prevent such a situation, the archive simply has to offer its customers a chance to easily access those documents through a computer inside the archive. Alternatively, the archive could simply print physical copies of the digital documents after the digitization is finished. This way the documents will not become inaccessible from the physical archive itself, even if the original documents are subsequently stored away for preservation purposes.

Sometimes digitization projects can even be undertaken for the purpose of archiving old documents that would otherwise have been destroyed. For example, a private company may want to free up physical storage space by getting rid of old documents it is no longer legally required to store. However, at the same time, the company may consider digitizing those documents in order to save digital copies of them before the destruction of the original, physical documents, as, in this era, digital documents are much cheaper to store than physical documents. When in 1986 a Massively Parallel Processing system with one Terabyte of storage was the size of an entire truck (Willcox 2014), today having one Terabyte of hard drive space is a rather typical occurrence in home computers of the citizens of the wealthier western countries. Digital documents take up much less physical space with their storages, and digital storage space today is much cheaper than office space used to store stacks of documents. When in the early 1990s a Gigabyte of storage data cost over one thousand United States dollars, ten years later in early 2000s one hundred Gigabytes cost some two-hundred United States dollars (McCallum 2015). In 2015, three Terabytes cost approximately just one hundred United States dollars. With the costs of storing digital documents growing ever smaller as time passes, only the digitization process of the documents remains cases costly due to the amount of manual labour involved. From this example, we can derive the benefits of cost-saving, space-saving and archiving for the owner of the documents.

One could also argue that the current trend of open data, and open data in governments, may be a driving force behind digitization. This trend started with the Open Access movement in the 1990s as was discussed in the previous subchapter. Additionally, we have seen the democratization of knowledge in the past few decades, our academic knowledge no longer bound to just libraries and universities (Hall 2008, pp. 8-9). It is now respectable for documents and knowledge to be openly accessible, and their digitization goes a long way in making them more accessible to a larger section of the public. National parliaments and other national organizations may feel external pressure to digitize their documents if their counterparts in other nations decide to digitize theirs, not wanting to feel behind the times internationally. This, too, could be considered following a trend.

Digitization also offers more effective or entirely new ways to use existing documents. The most commonly cited benefits of digital materials when compared to physical ones are the quantity-related benefits. Going through vast amounts of materials is a lot more effective using a word search than by reading or browsing through physical materials one page at a time. Search engines offer the most in the case of text documents because often one can also perform a word search inside the text document, but they make any kind of digital content easier to find, as long as the materials have relevant metadata attached to them in order to make them searchable. Video and audio files are also much more easily usable in a digital environment as the media software allows the user to skip to different parts of the file much more easily than a physical video or audio player. Similarly, switching from one record to another is also much faster. Digital historical records have made it possible for historians to use a larger variety of sources in their studies. Using newspaper articles related to the phenomena being studied is as easy as searching the newspapers' digital archives for articles or newspapers from the related time period. Being able to use word searches on massive archives containing text documents has made way for new, quantity-based historical research on the use of concepts as discussed earlier in this chapter, to name but one way in which digital content has created new ways to use existing materials.

The benefits of digitization discussed within this subchapter are visually represented in a table below (see Table 1), sorted by what benefits each party, the user and the owner, gain from the digitization of historical documents.

TABLE 1 Categorized benefits of digitizing historical records

Gainer of benefits	Benefits
User	Accessibility Findability (e.g. discovering entirely new collections online) New and more effective ways to use documents Increased total amount of sources and information available
Owner	Preservation of documents Increase in use of documents Financial benefit Publicity Cost-saving Space-saving Following current trends
Universal	Preservation of cultural heritage Increase in academic research

While the benefits of digitizing historical records are numerous, finding direct drawbacks is more difficult. In many cases, the only drawback may well be the costs of digitization for the owner of the documents. If the digitized documents fail to, or were never meant to, generate revenue, the costs of digitizing the documents may be hard to overcome in the organization's budgeting, as most of the benefits discussed here as well are not financial. One needs to con-

sider whether wanting to keep access to the digital documents free in the name principle is worth forgoing their digitization for. Accessing the physical archive is rarely free, let alone cheap, for the user in the first place, even if the archive access itself is free.

The more indirect drawbacks of digitizing historical records were discussed more in-depth in the preceding subchapter. These drawbacks can be seen as being mostly associated with the academic historians employing these digital sources to conduct historical research. If historians fail to apply appropriate scientific rigour to using digital tools and digital records, this neglect may result in a decline in the quality of the research conducted using these digital records (Hitchcock 2013, Spedding 2012). Furthermore, the availability and apparent ease of use of digital historical records may direct the research areas of historians, potentially resulting in gaps in academic historical research if physical records are neglected as primary sources in the favour of digital records (Hitchcock 2013). This has already become the case with major Anglophone newspapers such as New York Times, which have seen almost disproportionately high volumes of use as both primary and secondary sources since their digitization.

## **2.4 The Digitization Process of Historical Records and How It Should Be Ideally Carried Out from the Point of View of Historians**

While this study does not study the digitization of historical documents but, rather, the way they are used once digitized, the digitization project itself is nevertheless very closely related to the way they are used afterwards, and is on these grounds discussed in this subchapter as a logical continuum to the previous subchapter discussing arguments in favor of digitizing historical documents. Once the initial decision to digitize a collection of documents has been made, there are some more important decisions to be made regarding the digitization process. A poorly executed digitization project can result in a digital archive researchers and the general public alike may not even want to use. Despite what was previously discussed about the benefit of accessibility, the digital archive itself can in fact make the documents very poorly accessible with bad metadata, poor OCR quality, lackluster document quality or an awful search engine (Spedding 2011).

The digitization process has two phases: first the digital copy of the document is created, often with a scanner or a camera, and subsequently metadata is added to this document to make it possible for computers, as well as their users, to find it. In the case of text documents the second phase involves creating a version of the text saved in the digital image by either manually typing it out or having a computer OCR-process it. (Gregory 2014, Anderson & Maxwell 2004, pp. 83–84)

Before starting the actual digitization process, however, one has to consider what documents are used to make the digital copies if there are copies of the original document in existence. Some digitization projects dealing with text documents use microfilms to create the digital documents. Oftentimes, this does not turn out well as the microfilms themselves tend to have myriads of problems associated with them, including "omitted pages, poor framing and focus, excessive contrast, poorly lit texts so tightly bound that they cannot be opened fully when filmed" and generally poor image quality resulting from scratches, stains, dirt and fingerprints (Spedding 2011). A better option would be, despite it requiring more resources, to use the original document wherever possible, be it a book or picture. Scanners and cameras today are capable of producing very high resolution images in color, which make for a much better use experience for the users of the digital documents. One commonly mentioned problem with digitized historical documents is their poor readability as a result of using microfilms to create them.

On a further note related to the documents chosen to be used for the digitization, digitization projects should be rather comprehensive in terms of collections. Historians often lament the partial digitization of collections, especially when it is immediately not apparent to the user. If parts of a collection are missing from the digital archive, it should be clearly announced somewhere so that the users know they are not browsing the entirety of the collection. This way the limitation can be properly acknowledged in their studies, making it much less of an issue.

Once in a digital form, the documents need to be made searchable by, for example, adding metadata that can be used to locate them inside the digital archive. For text documents, this often means using OCR-processing to make them fully text searchable by gluing onto them a computer-generated layer of digital text created by the OCR program. This process carries with it some inherent problems. To read the text in text documents they use in-built dictionaries and font data to recognize words on the scanned images of text documents. Computers sometimes make mistakes, and when handling old texts, computers make even more mistakes (Spedding 2011). An alternative would be to simply manually type the text, though in larger projects this is often far too time-consuming and costly to be a feasible option, resulting in OCR being the go-to method for creating the text that computers can read and search (Gregory 2014).

The OCR programs may not always be prepared to handle centuries old documents with their outdated ways of spelling certain words, words no longer in use, and complex fonts, or, even worse, old handwriting. While handling old, typewritten documents is not impossible for the program at all, it is bound to make a few errors. Handwritten documents on the other hand are highly challenging to OCR, but progress is being made on that field as well. For example, the Leiden University has been as of 2015 working on a project on digitizing handwritten historical documents related to the Indonesian Archipelago (Universiteit Leiden 2015). Handwritten documents can, indeed, already potentially be handled by OCR programs by helping the computers with some contextual

information on the topics of the documents, though this is still challenging to say the least.

Afterwards, a choice has to be made: either the records are simply left alone after the OCR-processing, accepting the errors the computer may have made, or human resources have to be spent on proof-reading them afterwards. Proof-reading and manually correcting records is especially costly, and though ideally it should always be done for quality assurance (Anderson & Maxwell, 2004 p. 86), often one has to ask whether or not the quality is bad enough to warrant proofreading. These costs can be offset to some extent by offshoring the proof-reading for cheaper labor, for instance. Sometimes the errors are simply accepted, and no proof-reading is done, and the historians will simply have to do their best to live with them, as was the case with e.g. the parliamentary records of Belgium.

While the OCR-processing makes text documents searchable, this should not be the only way to locate them. More importantly, pictures, videos and the like cannot be OCR-processed in the first place. Indeed, the digital documents require metadata. Upon scanning physical documents, not much metadata is automatically provided, calling for more manual labor. Born-digital documents, on the other hand, have a plethora of metadata such as the date of creation or location data added to them automatically, which can be used to help users search for them.

Attaching metadata to the documents is primarily based on manual labor even if the documents are born digital in nature. However, OCR-processing for text documents can be used to locate some metadata included in the contents of the documents, lessening the amount of manual labor involved. In many cases manually adding metadata such as tags, or keywords in another manner of speaking, would go a long way in helping the historians using digital archives find documents (Hitchcock 2013), though it is resource-intensive if carried out one document at a time. One alternative solution would be to tag clusters of documents that are somehow related to each other instead of tagging single documents. Standards for metadata, such as the Dublin Core Metadata Initiative (2013), can, and should, be used to make sure that the metadata of the documents is sufficient. Even if they are not fully adhered to, they can nonetheless provide guidelines for adding metadata to digital documents that are to be archived.

Important types of metadata, also included in the previously mentioned Dublin Core Metadata Initiative, include contributor, coverage, creator, date, description, format, identifier, language, relation, rights, source, subject, title and type. In addition to these metadata types, tags are a powerful tool in helping users find documents. For example, a picture featuring a dog could have the tag 'dog' associated with it. Of course, having this same information in the description would generally speaking produce the same effects, but tags have their benefits over descriptions. Tags are often standardized inside systems and have their own definitions and requirements that a document needs to fulfill to

be placed under a specific tag. Furthermore, tags can usually be used to search for documents directly using hyperlinks.

Some important metadata historians often use to search for documents are the author, date of creation and document type, as also later observed in the data collected in this study. The single most important way of searching the documents, in the case of text documents which are the most used type of historical primary source, is using a text search to search through the contents of the document. As such, the highest priority when digitizing historical text documents should be placed on providing the users of the database with the ability to use text searches on the contents of the documents.

While various kinds of metadata that can be added to documents, one has to weigh the options on a case-by-case basis depending on the documents in question. Ultimately, it is question of what the users want and need. The more metadata the better, but realistically speaking adding nearly everything possible to every document is not at all feasible. Text documents can be automatically processed reasonably well, but images, videos and other types of documents are lagging behind in this regard despite recent advances in image recognition technology by IT companies. Whatever metadata is chosen to be added to the documents, using the same logic for all documents of the same type, e.g. texts, is important for the archive to remain consistent. Just as important is making sure the metadata error-free and makes sense to the users, which is not always the case even with large, well-known collections such as Google Books (Hitchcock 2013).

Additionally, many archives seek to retain the physical archive's way of sorting the documents into collection, and this can be beneficial as the archive's catalogues can be used to locate the digital files as well if the folder structure of the digital archive represents that of physical archive. Simply by sorting the documents into collections in a logical way helps in browsing through them much like in a physical archive, which is especially beneficial for seasoned historians that are used to working with physical sources archives and museums. Though in this case the advantages of digital technology are hardly leveraged, it does still retain the benefit of accessibility.

Even though the digitization of the documents is in itself a virtue, it should not be done without planning and consideration just for the sake of digitizing a collection. Even the cheapest, least resource-intensive ways of digitizing documents have their costs, and if the resulting system ends up being of poor quality, it may end up seeing less use than it otherwise might have. Rather, when an investment is being made either way, investing a little more goes a long way in making sure it is all worth it in the end. If the digital archive is based around poor choices made in the digitization phase, improving its quality later on may prove a lot more costly. If the system does not support the addition of new types of metadata, modifying it to be capable of it will prove costly later on. On top of that, the digital documents may need to be modified as well, or at very least they will need to be gone through again, either by a computer or manually, in order to acquire the information required to fill in the new

metadata. At very least, the system should be flexible, allowing new types of metadata to be added into the search options or document information at a later point in time if needed. Although standards for metadata can, and should, be used to make sure that the metadata of the documents is sufficient, even these standards may prove to not include details future historians may find themselves concerned with one day (Cohen 2004). As such, systems should be created so that support for new types of metadata can be added on demand to answer the potentially changing needs of historians.

To conclude, various factors need to be accounted for when digitizing historical records. As much metadata as possible should be collected upon digitization. Though this may be costly, doing so makes it less likely for the records to need reprocessing in the future, which, in turn, would be costly as well. Metadata is essential in ensuring that the records are easily accessed by the users. A lack of metadata may result in users being unable to successfully locate records within the system, resulting in negative use experiences. Furthermore, the quality of the digitized records is crucial. The records must be scanned in a way that makes the images clear and easy to read for both the users and the OCR software. OCR-processing should always be carried out where possible, as being able to perform full text searches on the records is generally considered important among historians.

Once digitized, the records are typically saved into a digital historical record database system. The definition for what constitutes a digital historical record database system, past what was already determined in the introduction, is discussed in-depth in the following subchapter, along with the typical characteristics of systems of this type. Though these systems are similar enough to the extent that they can be grouped together under this construct, they do vary in some ways.

## 2.5 Digital Historical Record Database Systems

This subchapter will further discuss the systems of focus of this thesis, digital historical record database systems, as defined in the introduction. These utilitarian information systems created for storing and making historical records available share some general similarities but also vary greatly when it comes to smaller system details.

Returning to their classification as utilitarian information systems, one could argue that, based on use contexts, they may also be dual-purpose for some users – that is, both hedonic and utilitarian (Wu & Lu 2013). This study, however, focuses on historians, who primarily use these systems for their work, academic research. Thus, in this context these systems are evidently utilitarian. While it is possible to argue that they might in fact be dual-purpose, considering that hobbyist historians or simply average Internet users with no keen interest in history may be using them leisurely. However, both historians and other users of these systems most likely consider them exclusively utilitarian, as



users other than academic historians, too, are likely to use these systems to find information for a utilitarian goal. All the subjects interviewed for this thesis had used the systems exclusively for utilitarian reasons.

As the amount of digital historical records and digital historical record database systems is constantly growing, listing all, or even most, of these systems would already be a daunting task. As such, these systems are approached in this subchapter through various examples, observing some general features typically seen in these systems. Digital historical record database systems are created by various parties, including non-profit organizations, private companies seeking profit, as well as public organizations such as parliaments, and even individuals such as historians or politicians. The collections of digital records these systems house range from smaller, more focused collections of an individual or one governmental organization to vast collections spanning multiple organizations and individuals, such as ECCO, Eighteenth Century Collections Online. ECCO, quoting the description seen on its front-page, consists of “every significant English-language and foreign-language title printed in the United Kingdom during the 18th century, along with thousands of important works from the Americas”. Another enormous digital collection highly related to ECCO is the EEBO, Early English Books Online, that contains “virtually every” title printed in English from 1473 to 1700.

Some of the higher-profile such systems are created by public, government organizations. For example, some of the records of the parliaments of Great Britain, Belgium, The Netherlands, France, Germany, Hungary, Norway, and Ireland, among others, are available online, digitized and hosted by various parties; sometimes by the parliaments themselves, sometimes by third parties. Much like national parliaments, most national archives now have digital collections of varying sizes available on their websites. For example, the National Archives Service of Finland has digitized a fair amount of content in the recent decade, its homepage now hosting a digital collection, as well as allowing the users to see what physical documents are housed in the physical archive in Helsinki.

Some private organizations also host some large, high-profile collections of digital historical records online, such as the ECCO by Gale. More specific, but nonetheless rather widely used, private collections are created e.g. by various newspaper companies. Among others, New York Times, The Times, The Guardian, and Helsingin Sanomat, have had their old publications digitized to varying extents, with the NYT archive, for example, spanning hundreds of years of the newspaper's past publications.

Apart from organizational projects carried out to digitize historical records, some record collections are made available online by relying on what could be referred to as crowdsourcing in this context. Crowdsourcing, while lacking a widely accepted definition, is the act of outsourcing something to a large, undefined group of people through an open call (Estellés-Arolas & González-Ladrón-de-Guevara 2012). Though outsourcing and crowdsourcing are typically limited to digital contexts, with the work being done over the Internet, in this

case I argue that an analogy can be drawn. Many hobbyists and academic historians alike partake in digitizing records as a group effort by photographing or otherwise digitizing historical records and adding them into existing systems. In some cases these activities are more goal-oriented, with the target of digitizing certain collections in a certain fashion, while at times they are less defined in terms of goals. This type of crowdsourcing-based digitization has been commonly seen in relation to old church records in Finland, the digitization of which has been primarily done by unpaid volunteers, many of whom are affiliated with Finnish genealogical organizations.

These systems can be either free-to-use or require a license fee. Systems by public organizations tend to be free-to-use, while those created or operated by private companies sometimes require licenses. Typically, licenses are sold for one year at a time, with the price depending on the duration. These licenses are often targeted at organizations, mainly universities and other organizations conducting research, with the license allowing access to the system for all devices connected to the organization's network. The prices for such licenses have generally been steadily rising for the past two decades. Licenses targeted at individuals exist, but are somewhat less common. Pay-per-use models for single collections or documents do also exist, but have become rare as of late.

Many of these systems are primarily built around textual historical records. Indeed, texts remain by far the most used type of historical record in academic historical research. Consequently, the vast majority of the digitized and born digital historical records are also in text form, with many of the key system features of these systems revolving around handling textual records. Most of these systems offer a text search feature through which records can be found. The text search can target various types of metadata, ranging from record title or publisher to full body text search that can be used to search records based on their textual content itself. The lack of a text search feature is a very rare occurrence in these systems, as even systems focusing on e.g. pictorial records do often offer a text search that can be used to search the records based on tags or titles. Similarly, quantitative historical data tends to have important qualitative data associated with it (i.e. population records tend to have the names of individuals and cities etc. in them), making text search features relevant to any type of historical record.

Often the main text search feature is split into a basic search and an advanced search. The basic form of the text search offers minimal additional search options, while the advanced search offers various ways to refine the search. Though standards such as the Dublin Core Metadata Initiative should ideally be used to label records in these systems, in reality the searches operate on vastly varying types of metadata. Commonly, the records can be searched based on time of publication, record type, and record publisher or author, along with a possible full text search feature. Very rarely are resources spent on including all of the metadata types included in such standards.

The user manuals for these search features vary in quality and length. Sometimes the instructions remain minimal, with users often having to find out

themselves how the search works past the very basics. Though the search features do typically aim to conform to search norms (i.e. by using common operators such as '?' to denote a random symbol, or '\*' to denote a random String after the asterisk), they often come with some out-of-the-ordinary solutions that sometimes prove problematic to the users. This may either be due to intended differences, but it may also be a result of bugs.

Outside text search features, the records can sometimes be browsed through using hyperlinks. Much in line with what was discussed in relation to search options, the collections are organized e.g. by type, author, or date of publication, for browsing purposes. Most importantly, many systems choose to retain the structure of the original physical collections the digitized collection was based on, making it possible to browse the collection based on, for example, the original table of contents of a collection of physical records. The collections in the system are sometimes presented in a tree-structure in a sidebar.

The records in the systems can be accessed by viewing them through the system's built-in document reader, or by downloading them onto the user's device for viewing. Most systems include a document reader of their own, which is used to open the records the user wishes to access. Many systems give the user the option to download the records for future use as well.

These features discussed so far form the core of these types of systems. Other types of features exist, but are relatively rare. For example, few systems offer features related to user-accounts, such as favoriting or bookmarking records or creating account-specific collections from the records stored in the systems. Similarly, any community-related features are seldom seen. Users are generally not able to interact with each other or the records in any way while using the systems.

Having established the general context of this study in this chapter, we now move on to its research approach. The next chapter discusses technology acceptance and system use through which the use of the systems discussed here is approached in the empirical section of this study starting from the fourth chapter.

### 3 SYSTEM USE AND TECHNOLOGY ACCEPTANCE

This chapter, based on a literature review of academic IS literature, focuses on the various models that are used to explain use behavior and technology acceptance in IS. Though TAM is the most well-known model used to explain technology acceptance, a number of other models used for the same purpose exist. These other models offer, for example, various factors explaining technology acceptance that not included in TAM, and choosing TAM over these other alternatives warrants justification through logical argumentation. As such, this chapter is devoted to discussing TAM and TAM-based research, along with evaluating other technology acceptance related models in terms of suitability for this particular study. In the process, this chapter explains why TAM was used as the theoretical foundation of this study.

The basic underlying concept in all user acceptance models is similar: individual reactions to using IT result in intentions to use IT, which then result in actual use of IT (Venkatesh et al. 2003). What factors are used to explain this concept varies between models, however. There are many research approaches to technology acceptance, with some focusing on individual acceptance of technology, using intention or usage as a dependent variable, and with some focusing on organizational level implementation success and task-technology fit (Venkatesh et al. 2003). My research will focus on individual acceptance of technology, using system usage as a dependent variable.

The models discussed in this chapter were chosen for comparison due to their ability to include the perceived ease of use and perceived usefulness beliefs, either by readily allowing for their inclusion, or by already including them in their original form. This was used as a basis for selecting the models because these two core beliefs were used to approach the factors affecting technology acceptance in this context.

### 3.1 Technology Acceptance Model

Originally based on Fred Davis' research (1985), the Technology Acceptance Model (Figure 1) is one of the most used models for explaining human behavior in information systems, as well as one of the most renowned information systems theories overall, to the point where it has been considered either a paradigm (Bagozzi 2007) or the only well-recognized IS theory by some (Benbasat & Barki 2007). Davis based his theory on the attitude paradigm from psychology, more specifically from the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975). This paradigm "(1) specifies how to measure the behavior-relevant components of attitudes, (2) distinguishes between beliefs and attitudes and (3) specifies how external stimuli, such as the objective features of an attitude object, are causally linked to beliefs, attitudes and behavior.". The two attitude constructs involved in the model were the attitude toward a behavior and the attitude toward a specified object, which were combined into one variable. For the purpose of TAM, Davis (1985, 1993), used attitude toward using (the system) to include both of these attitude constructs of TRA. The attitude towards using Davis (1993) defines as follows: "the degree of evaluative affect that an individual associates with using the target system in his or her job.".

The original TAM proposes that external variables, in the form of system features, affect its two main constructs, perceived usefulness and perceived ease of use. The TRA has it that external stimuli affect attitude toward a behavior by influencing the underlying salient beliefs surrounding the behavior. Davis (1993) points out that system features are external stimuli in this sense. The model in its entirety is seen in the figure below (Figure 1).

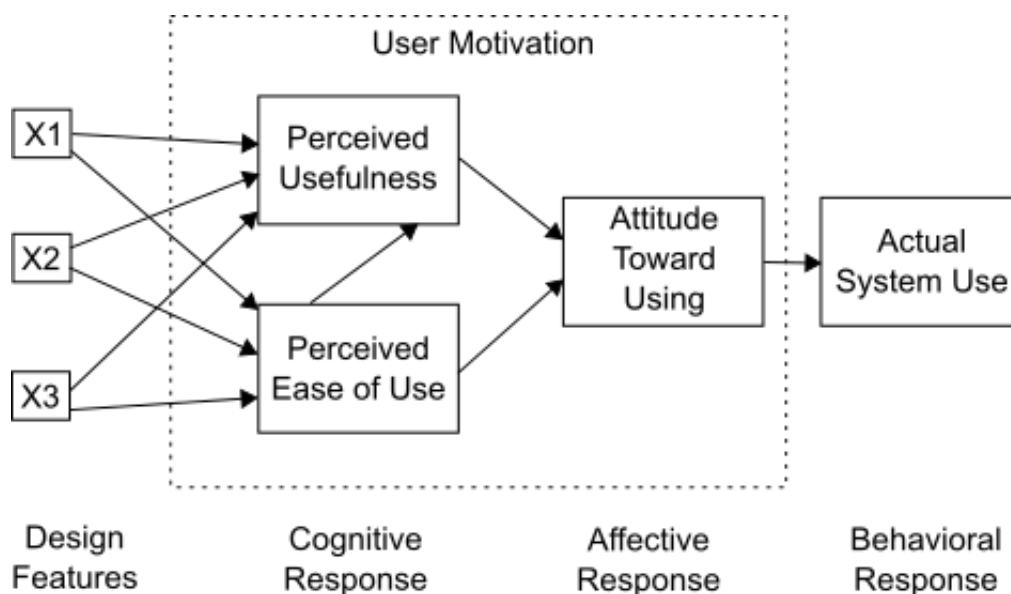


FIGURE 1 The Original Technology Acceptance Model, TAM

Perceived ease of use and perceived usefulness, then, together affect attitude towards using, which, if sufficiently positive, results in system use. Perceived ease of use directly affects perceived usefulness as well, apart from just affecting attitude toward using like perceived usefulness (Davis 1989). This, Davis argues, is because users tend to find systems that are easy to use consequently more useful as well. Curiously, tests have shown that the perceived usefulness can have an even larger, direct influence on actual system use than the attitude toward using, apart from influencing it indirectly through attitude toward using (Davis 1993).

The final version of TAM (Figure 2), is slightly different. The design features as external stimuli have been replaced by the external variables construct. The two main constructs, perceived usefulness and perceived ease of use, and their relations remain the same, though (Davis 1985, Chuttur 2009). The final version of TAM also replaces the attitude toward using with behavioral intention (Chuttur 2009).

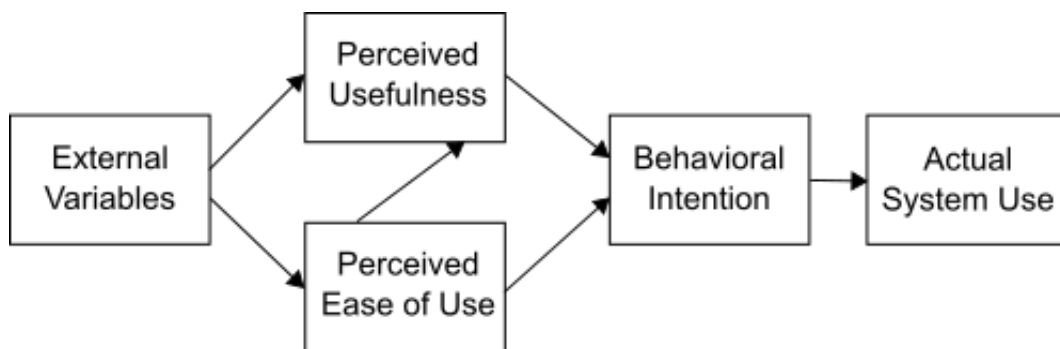


FIGURE 2 The Revised TAM

The two main constructs of TAM are perceived usefulness and perceived ease of use. These constructs are both used to elicit salient beliefs about the user's attitude toward a behavior, which in this case is system use. These underlying salient beliefs are what ultimately affect attitudes towards behaviors, and in determining them, the attitudes, as well as the decision to perform or not to perform the behavior, can be understood. Davis (1989) defines perceived usefulness as being "the degree to which a person believes that using a particular system would enhance his or her job performance". Perceived ease of use, then again, is according to him "the degree to which a person believes that using a particular system would be free of effort". Both of these definitions Davis (1989) based on the definitions of the words included in these constructs, that is, 'effort', 'ease' and 'useful'. These factors are quite intuitive: if a system is easy to use, users are likelier to adopt it, and if a system is perceived to be useful for them, users are likelier to adopt it.

According to Davis (1985, 228-232), TAM is best suited for describing user acceptance of computer-based information systems in an organizational context. TAM is a primarily system-focused model, more concerned with system

features rather than demographic or social factors that may or may not influence the individual's decision to adopt a system. This is evident in the implied system-focus of the external stimuli factors of TAM; as touched upon previously, in the original TAM, "external factors" were still referred to as "system variables". Generally speaking, TAM is a tool mostly useful for early user acceptance testing in information systems development (Davis 1993).

While the simplicity of TAM can be considered its strength in being a very general model with strong, context-independent predictive power, TAM has also been criticized for this simplicity (Bagozzi 2007). Bagozzi argues that TAM, given its simplicity, can't hope to explain a huge range of behavior and decisions spread across a multitude of technologies, adoption situations and differences between the adopters. Furthermore, why exactly TAM works, that is, the mechanism behind the model, is rarely touched upon in research testing TAM (Bagozzi 2007).

Notably, TAM has also been criticized for being too effective. Silva (2007) refers to Popper's principle of demarcation in underlining that in order for a theory to be scientific, it needs to be falsifiable. He points out that TAM's impressive explanatory powers, in fact, "render it virtually unfalsifiable". These explanatory powers, he argues, mainly stem from the concept of action. Actions consist of desires and beliefs, which give actions meaning, and actions cannot exist without meaning. Every action an individual takes has a reason, whatever it may be – irrational behavior as such cannot be an action, according to Silva (2007). This link is logical, he goes on to argue, making it an analytical truth. Silva (2007) argues that TAM studies tend to predict intended use based on desires and beliefs, and so "constitute only a re-description of the action they are thought to be predicting". In other words, "In the case of TAM, I cannot imagine a test in which a technology can be adopted without the user having any beliefs toward it. Thus, TRA and TAM are not falsifiable" (Silva 2007).

Moving onto more specific criticism directed at TAM, the main shortcomings of TAM, according to Bagozzi (2007), are "(1) two critical gaps in the framework, (2) the absence of a sound theory and method for identifying the determinants of PU and PEOU, as well as other bases for decision making, (3) the neglect of group, social and cultural aspects of decision making, (4) the reliance on naïve and over-simplified notions of affect or emotions, and finally (5) the over dependence on a purely deterministic framework without consideration of self-regulation processes".

One of the gaps in the framework according to Bagozzi (2007) is the linkage between intention and behavior, which has been poorly proven in TAM and the TRA of Fisbein and Ajzen (1975) that Davis partially based TAM on, as well as the TPB of Ajzen (1991). Bagozzi (2007) argues that the link between intention and behavior is not as simple as these models make it out to be, as there's a number of steps situated between the formation of intention and initiating the action. The second gap is that the linkage between reactions to using information and intention is also not straightforward. For example, even if a person recognizes the usefulness of a technology and he considers the

behavior positive, he may nonetheless simply choose not to use it for various reasons (Bagozzi 2007). In this context, a historian may hypothetically choose to use physical sources instead because more challenging primary sources remain implicitly more appreciated among historians. With the second shortcoming Bagozzi (2007) refers to his argument of the decision making process being more goal-oriented than TAM portrays it as being, with individuals being first and foremost focused on achieving personal goals in their behavior and intentions.

The fact that salient beliefs are elicited with two variables without a chance to easily add more has also been a point of criticism in TAM. The model it was based on, the Theory of Reasoned Action (Fishbein & Ajzen 1975), on the other hand, allowed for the inclusion of salient beliefs relevant to the context (Benbasat & Barki 2007). This makes TAM harder to adapt to the needs of any specific context or research, should a need to add such variables arise. However, as this study aims to determine factors influencing TAMs existing variables, this point of criticism, though perhaps valid, does not concern this thesis.

As touched upon previously, Davis (1985, pp. 228–232) did originally state that TAM is most suited for evaluating technology acceptance inside organizations. Consequently, it is also best suited for evaluating technology acceptance of utilitarian systems, and has been criticized for not being as well suited for hedonic systems (Wu & Lu 2013), as especially in the 1980s hedonic organizational systems hardly existed. Davis (1989, 1993) does, however, claim, based on his further research on TAM, that TAM is not at all limited to organizational contexts.

Apart from criticism directed at the model itself, TAM has also been criticized indirectly through research focusing on it. For example, TAM-based research has been criticized for exclusively focusing on use instead of other important user-related behaviors such as reinvention and learning, both of which are related to technology acceptance (Benbasat & Barki 2007). Indeed, TAM in itself does not explicitly include the learning process involved in the adoption of any new technology, which could be considered a shortcoming, as the learning process and the effort involved in it can, in some cases, be an important variable in adopting new technologies (Bagozzi, Davis, Warshaw 1992). Further criticism of TAM-based research has been directed at it failing to explain the variables of the original model, choosing instead to add more variables to explain PU and PEOU, in the end failing to explain what actually makes a system useful or easy to use (Benbasat & Barki 2007, Bagozzi 2007).

Despite the wide array of criticism directed TAM, its widespread use is not without reason. TAM has been tested and validated multiple times in various ways and various contexts (e.g. Lederer, Maupin, Sena & Zhuang 2000, Davis 1989, Davis 1993, Edmunds, Thorpe & Conole 2012, Straub, Keil & Brenner 1998). Not all of the tests performed on TAM, however, have produced validating results, and the tests themselves have faced some criticism too. First off, a lot of the early tests of TAM included students, whereas Davis (1985) himself describes TAM to best fit an organizational context. Additionally, on



the same note, the tests rarely included business process applications, instead focusing on office automation software or systems development applications. Finally, the tests have largely relied on self-reported use rather than observations, which can be problematic (Legris, Ingham, Colletette 2003). While this does not invalidate the earlier tests, it does bring up aspects that may have been overlooked in them. To this day, though, students continue to be largely used in testing TAM (e.g. Park, Nam & Cha 2012), just as the tests have continued to rely on self-reported use (e.g. Edmunds, Thorpe & Conole 2012). It should be noted, though, that many of the more recent tests performed on TAM have been focusing on education, and in the case of such research, using students as the user group of focus is well justified.

Nonetheless, despite the array of criticism directed at TAM, decades of research have proven that perceived usefulness is a very influential belief and that perceived ease of use is its antecedent and important on its own as well (Benbasat & Barki 2007), even if there may be some other important factors at work that as of yet remain unknown (Legris, Ingham & Colletette 2003).

Many have attempted to add to TAM since its inception. According to Bagozzi (2007), most of these efforts have simply broadened TAM by adding new predictors into the model rather than deepening it. By 'deepening' it, Bagozzi (2007) refers to explaining perceived usefulness and perceived ease of use, re-conceptualizing them, or introducing variables that explain these original variables. The attempts that have introduced moderators to qualify the effects of perceived usefulness and perceived ease of use on intentions, have focused on demographic variables in the form of, for example, gender and age, past use experience or classifying use contexts based on voluntariness (Bagozzi 2007). Other non-demographic variables added to the TAM in some cases include trust, perceived risk (Pavlou 2003), cognitive absorption (Saade & Bahli 2003) and perceived social presence (Gefen & Straub 1997).

At times, a line has been drawn between utilitarian and hedonic information systems in the context of technology acceptance. In the case of hedonic information systems, it has been argued that perceived enjoyment and perceived ease of use play a larger role than perceived usefulness, whereas the role of perceived usefulness grows larger with utilitarian information systems. A suggested extension of TAM stemming from these arguments includes a third variable in perceived enjoyment, adding onto the perceived ease of use and perceived usefulness (van der Heijden 2004).

Variables such as these have, according to Benbasat and Barki (2007), ultimately just served to provide another set of variables explaining perceived usefulness and perceived ease of use without truly increasing our understanding of what makes a system useful or easy to use. TAM2 and UTAUT, both of which will be discussed later in this chapter, include precisely variables like these. In fact, the large amount of TAM-related research has over the years resulted in a situation where multiple alternative and/or corrected versions of the model exist, leading to a "state of theoretical confusion and chaos" (Benbasat & Barki 2007).

### 3.2 The Theory of Reasoned Action and the Theory of Planned Behavior

Davis based the TAM on the Theory of Reasoned Action by Martin Fishbein and Icek Ajzen (Davis 1985, pp. 15–23). The Theory of Reasoned Action originates from social psychology rather than IS, being a model created to explain human behavior in general rather than one aimed at explaining system use (Vallerand & Pelletier 1992). It is one of the most influential theories of human behavior (Venkatesh et al. 2003), and it has consequently found its way to information systems as well.

As was briefly touched upon in the previous subchapter, the TRA is based on attitudes. In their research, Fishbein and Ajzen (1975) differentiate between beliefs and attitudes. Beliefs refer to a person's judgement of the likelihood that performing a behavior will lead to a specified outcome, while the attitude toward a behavior is an affective evaluation of the behavior (Davis 1993).

The influence of TRA in TAM can be seen in the variables of the models. TAM's main variables are perceived usefulness and perceived ease of use, which result in attitude towards using. In TRA, subjective norm and attitude toward the behavior or act result in behavioral intention, which then results in the behavior being performed. While the earlier versions of TAM did not include behavioral intention as a variable, the final TAM had it added as a precondition to actual system use, at the expense of attitude toward using. Similarly, TRA also proposes that behavioral intention is a pre-requirement to performing the behavior.

As an extension of the TRA, Ajzen later created the Theory of Planned Behavior (TPB)(Figure 3)(Ajzen 1991). Especially TPB has been used to explain human behavior in the context of information systems, IS has, over time, created its own models more specifically fit into the context of information systems and their use. Regardless, TPB continues to see use in the field of information systems. Other psychological models used to explain human behavior in IS include the The Hierarchical Model of Intrinsic and Extrinsic Motivation, often abbreviated as the Motivation Model, MM (Vallerand 1997, Venkatesh et al. 2003).

However, as the focus of this study is on system features and explaining the two main variables of TAM, perceived ease of use and perceived usefulness, I do not believe TPB, or the other general-purpose psychological models explaining human behavior, to be as well-suited for my research as TAM. Nevertheless, it is possible, as Benbasat and Barki (2007) suggest, for example to take TPB and modify it with one's own set of variables to elicit salient beliefs in order to tailor it to fit a specific context. Regardless, as my focus is on explaining what ease of use and usefulness mean for history scholars in the context of historical record databases, there is little benefit in doing so. Just as well, explaining the influence of these added variables is outside the scope of this particular research. Examples of TPB being modified to include variables to

explain its existing three variables include the Decomposed Theory of Planned Behavior, which adds two to three factors to explain attitude toward the behavior, subjective norm and perceived behavioral control (Taylor & Todd 1995). The constructs added included perceived usefulness and ease of use, along with other variables such as compatibility, self-efficacy and technology and resource facilitating conditions.

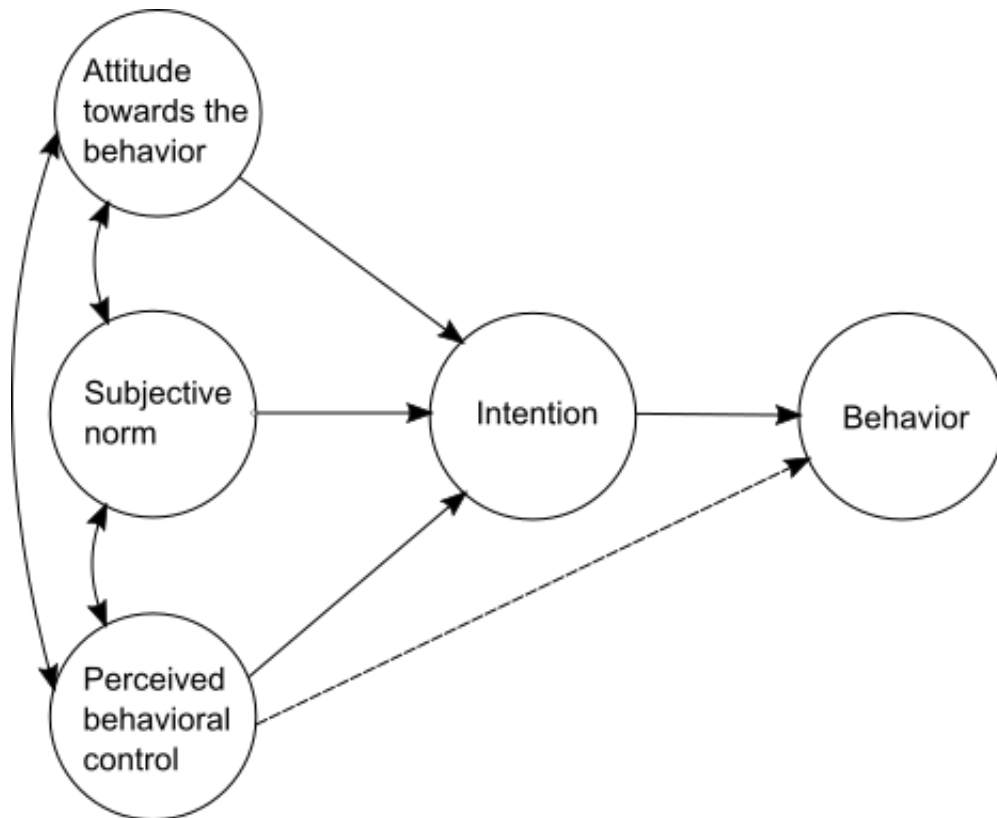


FIGURE 3 The Theory of Planned Behavior, TPB

TPB has been mainly criticized for the exclusion of emotions and habits as well as the lack of knowledge about the relations between its variables (Benbasat & Barki 2007). Tests that have tested TAM and TRA or TPB in a comparative manner have generally found TAM to outperform TRA or TPB in explaining variance (Davis 1989, Venkatesh et al. 2003), though some studies have had more mixed results, with the models performing relatively evenly (Taylor & Todd 1995).

### 3.3 Technology Acceptance Model 2

Apart from modified versions of TAM by other researchers (e.g. Kim & Park 2012, Lai, Larson, Rockoff & Bakken 2008, Phan & Daim 2010, Venkatesh 2000), another, expanded version of TAM by Fred Davis, fittingly named TAM2 (Figure 4), also exists. Created by Davis and Venkatesh (2000), the core of the TAM2 is still essentially the same as that of the original TAM. Perceived usefulness and perceived ease of use have retained their place as the central constructs of the model, both of which, in conjunction, lead to intention to use, which then leads to usage behavior. The difference in these factors is that attitude toward using has been replaced by intention to use as a factor leading to system use, much like in the final version of TAM.

Where TAM2 truly extends the original one is in including social influence and cognitive instrumental processes as factors influencing technology acceptance. In the original TAM and its revisions, external factors remained unspecified. TAM2 introduces 7 specified external factors that influence perceived ease of use and perceived usefulness: 1) Subjective norm, 2) Image, 3) Job relevance, 4) Output quality, 5) Result demonstrability, 6) Experience and 7) Voluntariness.

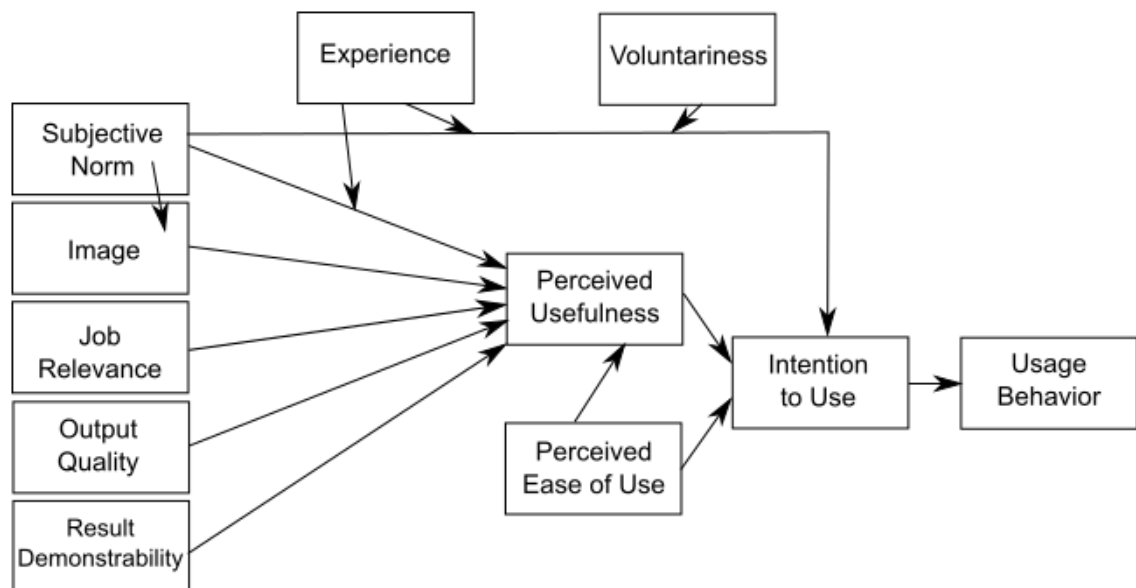


FIGURE 4 Technology Acceptance Model 2, TAM2

The subjective norm is the social factor in performing the behavior. How does the subject feel other people would perceive his choice to either perform or not to perform the behavior in question? (Ajzen 1991) Just as the original TAM drew on the TRA, subjective norm as a variable for TAM2 has been directly adopted from TPB. All of these factors fall under either social influence or cognitive instrumental processes, where cognitive instrumental processes refer to factors influencing perceived usefulness: job relevance, output quality, result

demonstrability and perceived ease of use. Individuals judge how useful they consider the system based on “what the system is capable of doing with what they need to get done in their job”. (Venkatesh & Davis 2000)

Compared to the original TAM, TAM2 has not seen as much use in information systems research, as is also largely the case with the modified versions of TAM presented by scholars other than Fred Davis.

### **3.4 The Unified Theory of Acceptance and Use of Technology**

Based on research by Venkatesh, Morris, Davis, and Davis (2003), the Unified Theory of Acceptance and Use of Technology (Figure 5), UTAUT, was created to provide a unified view of user acceptance, in response to a situation where researchers were forced to choose out of a number of models, sometimes by simply combining and using just the constructs they deemed relevant. UTAUT combines, through empirical similarities, TAM, TAM2, TRA, TPB, MM, the Model of PC Utilization (MPCU) and the combined TAM and TPB model (C-TAM-TPB), resulting, supposedly, in a single, unified view on user acceptance. With the large number of models used concurrently, the purpose of UTAUT was to bring the fragmented research area of user acceptance back together (Bagozzi 2007).

UTAUT includes the central variables of TAM, the perceived ease of use and the perceived usefulness, in the form of effort expectancy and performance expectancy, respectively. Apart from this, it includes the social side of TAM2 in the form of social influence, and a fourth variable in facilitating conditions. The facilitating conditions refer to “the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system”, reflecting the organizational context of the supposed system use. Apart from these variables, the UTAUT includes four key moderators related to the attributes of the user: gender, age, experience and voluntariness of use.

As opposed to TAM that has been criticized for its simplicity, UTAUT has been criticized for its complexity (Bagozzi 2007). With at least eight independent variables and 41 independent variables, Bagozzi (2007) goes so far as to call it a “patchwork of largely unintegrated and uncoordinated abridgements”. Ironically, though, UTAUT, while the culmination of over a decade of technology acceptance research, has essentially resulted in research coming back full circle to the roots of TAM. The social influence and facilitating conditions added to the model are quite similar to the subjective norm and perceived behavioral control of TPB (Benbasat & Barki 2007).

While UTAUT has not seen as much use as TAM or TPB, it has nonetheless been tested and validated as well, though not as extensively (Venkatesh et al. 2003, Wang & Shih 2013). The UTAUT has also seen alternative versions of it being created, with, for example, an updated version titled UTAUT2 having been proposed by Venkatesh, Thong, and Xu (2012).

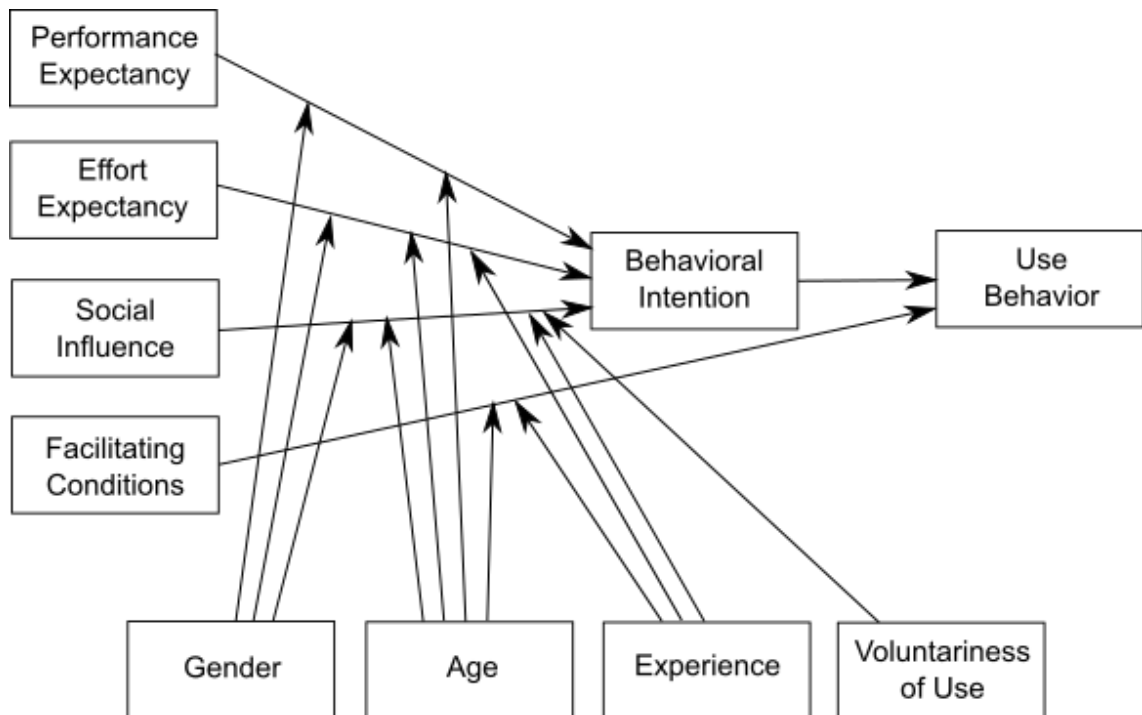


FIGURE 5 The Unified Theory of Acceptance and Use of Technology, UTAUT

### 3.5 Why TAM?

In general, no universally accepted model for technology acceptance exists (Benbasat & Barki 2007, Bagozzi 2007, Venkatesh et al. 2003), with all of the models presented in this chapter having competing alternative versions of their own as well. These differing versions have all been tested and validated to varying extent, with none of them clearly debunked by any means, even if some of the test results have, at times, been conflicting.

I retain that TAM fits this study the best out of the models included in this chapter. Due to being a very general model, fitting it into a specific context user-wise and technology-wise gives it more predictive power in that specific context. I argue that it's reasonable to largely disregard the critique aimed at the supposed simplicity of TAM in the case of this study. The aim of this study is to gain an understanding of the external factors affecting its relatively general main factors PU and PEOU, resulting in an in-depth understanding of technology acceptance in this specific context.

Curiously, some of the criticism directed at TAM has been concerned with it being too focused on in IS research. Benbasat and Barki (2007) go so far as to speak of "TAM++ research" that "adds little knowledge to TAM or its many different versions". While the contributions of my research will only be applicable to a very specific context, they will be of notable benefit in that single con-

text. I do not aim to broaden or deepen TAM in its original, general-purpose form, but to create a version of TAM for a particular context that is poorly applicable outside it. In fact, the approach I have chosen actually directly answers some of the criticism directed at TAM and research related to it. TAM-related research has been criticized for keeping perceived usefulness and perceived ease of use as black boxes, so to say, validating their importance, but failing to answer the question of what actually makes a system useful or easy to use precisely from the point of system-related factors. This research aims to answer both of these questions, given its system-feature focus, albeit in a specific context only. Furthermore, TAM research has been criticized for the almost exclusively quantitative approach it takes (Silva 2007). This study, on the contrary, is entirely qualitative, presenting a methodological contribution to TAM research as well.

The main argument for choosing TAM over the other models is the system-focus of this study that largely leaves the user out of the equation. Rather than focusing on explaining technology acceptance in a wider sense, I will focus on explaining technology acceptance from a mainly system point of view by explaining "ease of use" and "perceived usefulness" predominantly in terms of system features. The system features, in this context, also include factors related to the information provided by the system, such as the amount and type of records stored in the system. As I cannot, in this particular study, test and extensively validate the effects of additional, user-focused variables, such as demographic variables, I see no benefit in including them into this study. Their possible influence remains acknowledged, however, and is discussed in relation to future research suggestions at the end of this study.

Furthermore, while this study focuses on individuals, these individuals are all historians with coinciding work-related needs. Indeed, TAM is best suited for evaluating technology acceptance of utilitarian systems (Wu & Lu 2013), which are the focus of this study. Though TAM does excel at dealing with technology acceptance inside organizations (Davis 1985, pp. 228–232), the technology acceptance I am observing is just as well job-related. At the same time, however, it is not organization-wide or unit-wide in the way a typical top-down IT implementation project inside an organization would be, nor is it limited to any one organization. TAM has also been validated in non-organizational contexts by Davis (1989, 1993) himself, along with other researchers, justifying its use outside organizational contexts typically seen in IS literature.

The user group of focus in this study is, despite being a heterogenic group of people, nonetheless brought together by their profession. Their motivation to use digital historical record database systems, I hypothesize, will almost exclusively stem from their work-related needs, or, alternatively, their leisurely interest in history. Generally speaking, their goal in using of these systems will as such be the same for the most part: finding historical records that aid them in their work, or to satisfy their need for information regarding the contents of the records, or to find new perspectives and interpretations for old, formerly exclusively physical records. In this sense, it can be argued that demographic varia-

bles are unlikely to play a large role in this use context. This discourages the use of the more individual-focused UTAUT for this study. It is, on the other hand, plausible that senior researchers, such as professors, may be more willing to readier to try something out of the ordinary, while doctoral students may be more conventional in their approaches to using digital records, or vice versa, for example. Due to the shared motivation of system use, the demographic factors are likely to play a smaller role in this particular context than they might in other use contexts.

The additional variables presented in the alternative versions of TAM do not offer much from the point of view of my research due to my limited opportunities to test the additional variables even where they are considered relevant. For the most part, however, the variables are not relevant in this context. Some of the more well-known variables added to TAM, such as trust and perceived social presence, are simply not relevant in this context. Trust plays little part in the technology acceptance of historical record databases as the databases often do not include the purchase of an individual use-license, or even a registration process involving input of personal information. Where users need to purchase a license, the license is usually purchased by an organization, such as a university, rather than the individual users themselves, though this may, in fact, result in feelings of responsibility for using limited public funds. Some variables, such as perceived enjoyment, can have some relevance in this context. Perceived enjoyment in particular, however, is in the case of utilitarian systems such as historical record databases, likely to be highly related to perceived usefulness and perceived ease of use; the system use is most likely considered enjoyable when it is being seen as a useful behavior that is performed with ease.

Out of the models discussed, TAM2 was considered the most relevant alternative to TAM. Some of its additional variables are already indirectly studied in this thesis. For example, job relevance is, by default, a known factor, as it is the foremost motivation for the use of these systems in this case. For a slightly different approach to this topic, TAM2 might be a suitable alternative to the original TAM. The TAM2 variables remain out of the scope of this approach, however.

The use of TPB, then again, would require a modified version of TPB that includes the main TAM constructs that are my research focus. Much like is the case with TAM2, if the additional variables are not actively utilized in the study, they add little to the overall contribution of the study. If anything, including them and leaving them untested would reduce the validity of the findings. The main benefit of using TPB would be the addition of the social factors, which are also present in TAM2, making TAM2 the more relevant alternative out of these two models given the system-focus of this study.

The factors related to these systems can be split into three categories in this context: 1) software feature factors, 2) record-related factors, and 3) user-related factors. The third category of factors, user related factors, is not actively focused on. Most variance in technology acceptance inside this group of users, as far as historical record databases are concerned, is likely to stem from the



record-related factors rather than the software features. Ultimately, what records are stored within the systems is the single most important factor in explaining technology acceptance in this context. As touched upon previously, the primary motivations for system use among the users in this context stem from work-related motivations and general interest in history. In the case of both of these motivations, the records stored in the database play the most important role in the decision to use or not to use the system. E.g. if the user is interested in the history of Great Britain, they will be drawn to databases containing records dealing with the history of Great Britain.

Second in importance, though still central, are the software features of the system, such as its search functionalities. My past interactions with various history scholars have shown that history scholars will, at times, even use systems they considered nearly downright unusable in terms of software features as long as the historical records found in the system are relevant to their research. This is something that is supported by the data collected and analyzed later on in this study. Even if the historical records inside the system are the most important factor for predicting technology acceptance in this case, being able to effectively use these records is heavily dependent on the system features, along with the user's technological savviness. Even though in some cases even systems considered poor in terms of software features are used by historians, they are just as well sometimes outright discarded. This study focuses on both software feature factors and record-related factors, aiming at a comprehensive understanding of system-related factors explaining technology acceptance in this context.

In relation to TAM being criticized for ignoring the learning aspect of technology adoption (Benbasat & Barki 2007), I argue that the sharp increase in everyday IT usage in the past two decades has led to a situation where the learning process no longer plays a central role in technology adoption in this particular context. The vast majority of history scholars that are not retired have very likely used computers before. Similarly, they have also very likely used general-purpose search engines such as Google, as well as other search engines used for searching academic publications. Most of them have likely also used these types of historical record database systems before. As a result, most of the subjects will have had past experience with search engines, and are able to use these past experiences to guide them in the process of learning to use a historical record database system, the use of which generally revolves its search features, reducing the time and effort required for the learning process. Consequently, the importance of the learning process in technology acceptance in this context decreases, making my results have predictive power in most cases regardless of the near-exclusion of the learning process. This argument, however, relies entirely on the assumption that such future systems will also keep on resembling the past and current ones – and the future is difficult to predict.

While the other models used in the context of explaining technology acceptance provide more user-related variables than the original TAM does, they do not provide more system-related variables, making TAM the best the best

choice for this context given its system focus. The user-related variables would largely remain untested in this specified context, and as such would add little to its contributions. Thus, TAM is arguably the most suitable model for explaining technology acceptance in the context of this study.

Having now contextualized this thesis and discussed and justified the research approach used in it, we move onto the empirical section of the study. In the following chapter, the qualitative interview as a method, along with the interview protocol of the study is discussed.

## 4 DATA COLLECTION

This chapter covers the data collection phase of this dissertation. The data for this study was collected through qualitative interviews focusing on use experiences of historical record databases. The subjects for the interviews were all historians. The goal of these interviews was to elicit system-related factors that make the subjects perceive these systems to be easy to use or useful.

The protocol was reported using Kvale's (1996, p. 263; Alshenqeeti 2014) guidelines for reporting interviews as a framework. Following this introduction, the first subchapter discusses qualitative interviews as a method, its weaknesses and strengths, and why qualitative interviews were used as the data collection method for this thesis. The second subchapter presents the interview protocol used for this study and discusses the reasoning behind the choices made in the interview protocol.

### 4.1 The Qualitative Interview as a Method

The interview is an interactive data collection method, "a conversation, whose purpose is to gather descriptions of the [life-world] of the interviewee" (Kvale 1996, p. 174). Interviews are most commonly individual, face-to-face exchanges, but they can also be, among others, group interviews, mail interviews, or telephone interviews. Interviews can be quantitative or qualitative. They can be structured, unstructured, or semi-structured in nature, depending on whether they are carried out through strictly pre-determined questions, completely improvised, or something in-between. Interviews can be completed in a single, short session, or include multiple session over lengthened periods of time. Furthermore, the interview is not only a research method, but a tool used in politics, marketing, and for many other purposes as well. (Fontana & Frey 1994)

The data for the empirical part of this study was collected through qualitative interviews, the protocol of which will be discussed in the next subchapter. The qualitative interview is, according to Myers and Newman (2007), the most

common data collection method in qualitative research. It allows for the collection of more in-depth data (Alshenqeeti 2014), though is on the flipside not suited for collecting data from a large number of individuals in the way a questionnaire would. The interactive nature of the qualitative interview allows the researcher conducting the interview to ask case-specific questions, or to otherwise direct the interview into a new direction when needed (Alshenqeeti 2014), with the exception of strictly structured quantitative interviews. This gives the researcher a high level of control over the data that is being collected, making it possible to extract additional data from interviewees.

In historical research, the qualitative interview has largely been for what is referred to as oral history. Oral history refers the collection and subsequent studying of historical data using recorded interviews (Ritchie 2015, p. 1). Where academic historical research has largely taken on a political or administrative perspective especially in the past, oral history brings the focus to individuals and their experiences of past events. Though, sadly, we cannot “interview tombstones” (Thompson 2015, 5), oral history provides rich sources that can be shaped by the historian for studying, roughly, the past hundred years at any given time. Oral history does not refer to history based entirely on oral sources, but, rather, history that uses oral sources among others, and it can be used by political historians and social historians alike. (Thompson 2015, pp. 1–25, Ritchie 2015, pp. xi–xvi)

In addition to oral history, ethnographic research has made extensive use of the qualitative interview. The definition of ethnography has become diluted and fuzzy over time, but originally it was used to refer to descriptive accounts of cultures, and with its roots in colonialism, in practice it referred to studying non-Western cultures in, e.g. Africa or South America. Though lacking in a universally accepted and accurate definition, in essence, ethnography remains the study of cultures mainly through observation, but interviews can also be made use of while conducting such studies. (Gobo & Marciniak 2016, Atkinson & Hammersley 2007, pp. 1–2) As such, ethnography is often seen as a method or a research framework. It is used in various fields of research, including history and ethnology (Lange 2013, pp. 14–15).

The qualitative interview is a common data collection method in IS research as well. Interviews in IS research are used for studying, for example, systems development projects in relation to project management (e.g. Gregory, Beck & Keil 2013, Newman & Sabherwal 1996). Much like in oral history, interviews in IS, too, are used to approach past events and the thoughts of the subjects on said events. E.g. project managers may be asked to recall past projects they were involved in and reflect on why they think they failed or succeeded. Generally speaking, qualitative interviews in IS are often used to create dialogue between practitioners and scholars, as well as to better understand the users of information systems, as is the case in this study.

The qualitative interview was deemed the most suitable data collection method for this study for several reasons. Firstly, this study did not focus on any particular system(s), but an open-ended group of systems. Secondly, this

study specifically focused on past use experiences. Thirdly, the study focused on collecting in-depth and personal data from the users. Based on these three reasons, qualitative interview was judged to be the most suitable method for data collection.

While this study could have been conducted by, for example, using an open-ended survey, interviews were deemed a better method given their interactive nature that gives the researcher the ability to ask further questions or clarification. For the subjects, narrating their use experiences through speech also requires far less effort than writing them down in detail, making face-to-face interviews attractive for the subjects as well. It is also difficult to create a comprehensive survey without it becoming far too lengthy from the subjects' point of view. Upon creating a completely open-ended survey, one ought to consider whether simply interviewing the subjects instead would be a more suitable approach. As the research problem itself was open-ended in nature, qualitative interviews were a logical fit.

As for entirely different approaches, such as using use observation as a method, the fact there were no specific systems chosen to be focused on makes user observation difficult. Observing experienced users using a system does not yield data that could be used to evaluate the perceived ease of use of the system due to their pre-existing knowledge of the system. Though the users could narrate their use experience on the go, the results of the observation would be largely dependent on the observed instance of use rather than the subjects' history of use, which was deemed to be more fruitful in terms of gathering relevant data. Similarly, limiting the study to focus on one particular system chosen for the observation would likely direct the data being collected based on the system that was chosen for use observation. Observation is not well-suited for such a general approach.

Through qualitative interviews, the subjects are able to narrate their past use experiences and critically evaluate them as experts of history. Being already familiar with the ways the systems they have used in the past can be used, they can focus more on what makes them perceive them as being useful and easy to use, or, alternatively, what makes them perceive it as being less useful and less easy to use. In an interview situation, they can speak of past ease of use issues while still being, at present, experienced users of the same system they once struggled with. Furthermore, this study did not focus only on what factors have an effect on the perceived ease of use and perceived usefulness of these systems, but also why these factors have these effects.

The qualitative interview as a method is not unproblematic, however, even though IS scholars sometimes forget or ignore some inherent issues associated with it (Myers & Newman 2007). Interviews are inherently social situations where the social context can be ignored in neither writing the studies nor during the interviews. The interview is an artificial social situation where the researcher downright interrogates the subject, who is typically a complete stranger. This results in a lack of trust, which may potentially result in the subject not disclosing all relevant information to the researcher. In some cases this

may not have a notable effect on the truthfulness of the subject's answers, but the subjects may feel hesitant about revealing personal information they deem embarrassing, for example. (Qu & Dumay 2011, Myers & Newman 2007) How these trust issues may or may not interfere with the data collection depends on the context. Some subjects may, for example, wish to portray themselves in a better light, or to portray someone else in a worse light, by presenting disinformation in their narrations. A project manager may not tell the whole story when asked why a project they managed failed if they feel that they themselves were largely at fault for its failure.

Aside from disinformation, misinformation may also be an issue in interviews. The further into the past the qualitative interviews delve, and the more detailed information on the events they are concerned with, the higher the likelihood of receiving data including misinformation becomes. The human memory is not infallible; the subjects cannot always accurately remember events that happened decades ago, or may recall false memories (Loftus & Pickrell 1995). This is more of a problem for historical research that looks further into the past, whereas IS research generally focuses on more recent events.

Additionally, the interviewee or interviewer may be pressed for time, resulting in time pressure, which, again, may affect the data collected. If the subject does not have sufficient time to formulate their answers, the answers may not be reliable or complete. Even when there is no evident time pressure, the subject has to formulate their answers spontaneously, sometimes looking at a phenomenon from an entirely new point of view, or form an opinion on something they did not previously even have a well-defined opinion on. With only a short time to think, the answers may end up, in retrospect, poorly thought-out or pre-maturely presented.

Specifically in the context of IS research, interviews often involve representatives or members of various organizations. The level of entry can potentially become a problem, as a researcher may find it difficult to interview managers later on if they chose to start their interviews at a lower level of organizational hierarchy. On the other hand, neither should the interviews only focus on high status representatives of an organization, as this may result in what is called elite bias, where the opinions of high-ranking individuals outweigh those of lower-ranking individuals. (Myers & Newman 2007)

The language used may result in problems during the interviews. The interviewees may not fully understand the interview questions, and it may not always be apparent that they do not. This may be due to a difference in the way the interviewer and interviewee define the primary concepts used in the questions. Even when the researcher and subject seemingly speak the same language, cultural differences may still result in differences in how they understand the concepts used (Qu & Dumay 2011). The interviewer may also unintentionally insult or otherwise offend the interviewee, which can result in a further loss of trust or the interview being outright cut short. (Myers & Newman 2007)

Finally, interviews, along with other qualitative and interpretive data collection methods, in general are considered by some to be subjective and generally unreliable (Qu & Dumay 2011). However, the interview is seen as a method that can be used to gather data about events that are not always observable, such as historical events. Indeed, interviews can be said to even create sources on information that may otherwise not be studied due to the lack of written or other types of sources related to it. Interviews can also offer new perspectives on events () that complement other types of sources.

Myers and Newman (2007) suggest using a dramaturgical model for qualitative interviews. The dramaturgical model proposes that the interview be treated as a play: the interview the drama, the interview location the stage, the actors the interviewee and interviewer, the pre-planned questions the script, and so forth. For successfully carrying out qualitative interviews, they present seven guidelines, seen in the figure below (Figure 6).

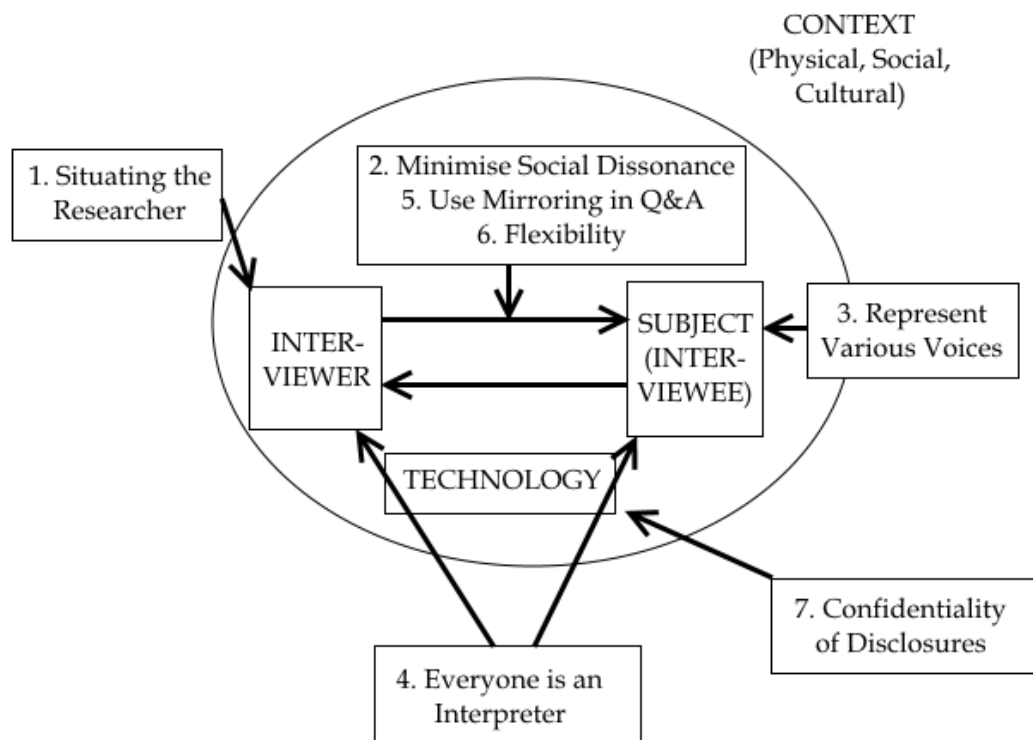


FIGURE 6 Guidelines for the qualitative interview

First, the researcher (or interviewer) should situate themselves as actor. This involves providing background for the interview as well as the subject (or interviewee) and interviewer. This step would include defining who each party is, which not only makes the social situation less unnatural, but also produces potentially relevant data. In this study, the background was established through the e-mail invitation sent to the subjects, and further built upon before

the start of the recorded interview by briefly explaining the study further to the subjects and answering any questions they may have had.

Secondly, the social dissonance should be minimized to what extent possible. This is achieved by using appropriate language and concepts, by acting appropriately and by simply dressing in a suitable way. The simple act of dressing up or down, if done inappropriately, can hamper the interview. While Myers and Newman (2007) mostly discuss the aspect of social hierarchy, they note that this also applies to such factors as gender, culture, and age, which are much harder issues to overcome. Attempts were made by the researcher to minimize social dissonance by presenting themselves as a fellow historian to the subjects, and explicating that the researcher, too, had used these systems in the past. Furthermore, I attempted to create a somewhat relaxed atmosphere for the interview where possible, though this was met with more success in the later interviews, as prior interview experience made it easier to feel relaxed.

Thirdly, the various "voices" in an organization should be represented. Through triangulation of subjects, a more complete set of data can be achieved. If the researcher only interviews one hierarchical echelon of an organization, they risk missing out on the different views individuals higher up or lower down in the hierarchy of the same organization may have had. The elite bias, discussed above, is a phenomenon that can be avoided through triangulation of subjects. (Myers & Newman 2007) This potential issue was addressed by interviewing historians of varying seniority, ranging from doctoral students to professors. In the case of this study, however, the elite bias is unlikely to have presented itself in the way Myers and Newman (2007) see it, as the focus of the study was on the experiences of the subjects as individuals rather than on any organization-wide project or other such phenomena more commonly studied in IS literature.

Fourthly, interviews are about interpretation. The subjects, as they narrate their internal world, are interpreters in their own right. The data collected through an interview has already been interpreted by the subjects before it even reaches the researcher. This interpretation, then, is subjected to another round of interpretation when the transcripts are analyzed by the researcher(s). (Myers & Newman 2007) Though this will always remain a problem with qualitative research interviews, the data analysis was carried out in as objective a fashion as possible. The interviews were first transcribed in their entirety, after which the transcripts were used for the analysis of the data. This was to ensure that the analysis did not rely on personal memory of the researcher, but the data as it was originally collected. What the subjects said in the interviews was clearly separated from the thoughts and arguments of the researcher in the analysis. While only direct quotations truly remain outside the interpretation of the researcher, even they are not outside researcher interpretation, as the choice of which quotations to include in the study is up to the researcher's interpretation of the data and what they consider relevant enough to directly quote. As such, it can only be said that the data was presented objectively to what extent possible.



Fifthly, one should use a model, such as mirroring, for questions and answers. Mirroring is achieved by using the same concepts and phrases the subjects use to formulate further questions or while commenting on their narration. This is done to avoid forcing the researcher's views onto the subjects, and to avoid loaded questions that may influence the answers of the subjects. (Myers & Newman 2007) In line with these guidelines of Myers and Newman (2007), mirroring was chosen as the model for carrying out the interviews. Outside the set of pre-determined questions prepared to direct the interview, as is discussed in detail in the following subchapter, mirroring was used in off-the-sheet questions posed to the subjects. The pre-planned questions, too, were kept as neutral as possible in terms of concepts to avoid reflecting views onto the subject or directing their answers.

Sixthly, flexibility is required if the interview is not structured or quantitative. Semi-structured and unstructured interviews require improvisation and flexibility, as the researcher needs to formulate new, case-specific questions during each interview. The researcher has to actively discover new directions the interview can be directed towards, asking relevant questions suited for each individual situation. Additionally, the researcher has to account for the subject's reactions and attitude, responding accordingly in order to make the interview successful. (Myers & Newman 2007) The interviews carried out in this study were semi-structured in nature, and as such the interview was directed with off-the-sheet questions formulated during each interview. These additional questions were formulated based on the use histories of the subjects and focused on e.g. specific systems they had used, whereas the pre-planned questions were general in nature and did not focus on any one system. Additionally, for example, in some interviews I took on a more active role in order to encourage the subjects to talk, while some subjects were more talkative and it was more natural for me to simply ask questions to direct their narrative into a new direction where needed.

Finally, the data collected, including the transcripts, notes, and recordings, should be kept confidential and secure. This becomes more important the more confidential the subjects consider the data to be, as the subjects may feel hesitant about revealing some information if they feel uncertain about the security of the data. The subjects should, consequently, be informed of the ways the data is handled following the interview. (Myers & Newman 2007) The data collected for this study was not considered highly confidential. Basic security precautions were taken by e.g. only handling the data on private office or home computers, and by creating the transcripts using headphones so that the interviews could not be heard by third parties during the transcribing process. The relatively non-confidential nature of the interviews was reflected in the fact that many subjects actually suggested for the interviews to be carried out in relatively public spaces inside the Department of History and Ethnology building of University of Jyväskylä. At the same time, some subjects did not wish for the full transcripts to be published, and as such the data collected was nonetheless kept confidential and presented anonymously.

These seven guidelines, as already briefly discussed here, were employed in planning and carrying out the interviews for this study. In discussing the interview protocol in the following subchapter, these guidelines are further discussed in the context of this study by also elaborating more on what was already discussed in this chapter in relation to the guidelines by Myers and Newman (2007).

## 4.2 Interview Protocol

The aim of the interviews was to elicit, primarily system-related, factors that influence the perceived ease of use and perceived usefulness of historians using digital historical record database systems. This was done by interviewing historians who have had past use experience with these databases. During the interviews, the subjects were asked questions to make them reflect on their past use experiences with systems falling under this category, recalling factors that influenced their use experiences positively or negatively, in order to achieve the goal set for the interviews.

All of the subjects were invited to participate in the interview with a personalized e-mail that explained the purpose of the interview as well as the researcher's background as far as it was considered relevant in the context of the interview and this study. Some of the subjects were already acquainted with the researcher due to sharing a department affiliation.

The interviews for this study were carried out in a semi-structured fashion to allow for flexibility. Some questions were prepared beforehand, but as this study focused on no specific system or group of systems, the interviews were influenced by the individual system use history of each subject. Through these questions past system use was approached, using the system use measuring typology of Burton-Jones and Straub (2006), from the point of view of both use and nonuse, as well as in a richer sense of system features and how they are used to accomplish the tasks the users set out to carry out. All of the subjects were to be asked the same set of questions over the course of each interview. However, in some cases, the subjects unintentionally answered planned future questions while answering another question. In these cases the subjects were informed of the existence of the questions they had already answered, but were not asked to repeat their answers. The questions asked in each interview can be found in the table below (Table 2).

TABLE 2 Interview instrument

Question	Purpose of the Question
"What is your research area of expertise?"	To provide context
"What kind of historical records do you generally use for your research?"	To provide context
"To what extent are these records available in digital form, and where?"	To provide context, to direct the interview towards past system use

"What, if any, database systems for historical records have you used? Why?"	To map use experience, to direct discussion towards past system use
"What kind of meta data is the most important for finding these records?"	To elicit factors that influence perceived usefulness or perceived ease of use
"What system features do you consider important ? (e.g. search features)"	To elicit factors that influence perceived usefulness or perceived ease of use
"Was the use experience positive or negative? Why?"	To elicit factors that influence perceived usefulness or perceived ease of use
"Was the system easy to use? If not, why?"	To elicit factors that influence perceived usefulness or perceived ease of use
"Was there something the system lacked? If yes, what?"	To elicit factors that influence perceived usefulness or perceived ease of use
"Disregarding all notion of what you consider currently possible, financially and technology-wise, what features would you like to see in these types of systems?"	To elicit factors that influence perceived usefulness or perceived ease of use

This instrument was not a rigid questioning protocol due to the semi-structured nature of the interviews. Rather, it was used as a guideline for the conversations and the questions were at times worded in a slightly different manner in the interview situations in order to retain a natural flow of conversation. Moreover, though these questions were intended to be asked in order, starting from the top of the table (Table 2), the order was adjusted to fit the flow of the conversation on a case-by-case basis. The interviews were to start with questions related to the academic research the subjects are conducting, moving on to the primary sources they commonly use to conduct their research. From there, the questions would start focusing on system use experiences and, most importantly, perceived usefulness and perceived ease of use.

Based on various pre-existing accounts by historians (e.g. Spedding 2011, Hitchcock 2013), it was determined that the perceived usefulness and perceived ease of use in this context are likely to coincide with the search functionalities of the systems, as well as the metadata associated with the records stored in them. As such, some of the interview questions were directly related to the metadata of the documents. Furthermore, many of the off-the-sheet questions asked in the interviews were related to the metadata of the documents and the search functionalities of the systems. By no means do the search functionalities and metadata alone constitute the perceived ease of use and perceived usefulness experienced by the subjects, however, leading to more general questions.

The pre-planned questions were not piloted through a pilot interview before conducting the interviews. The questions were, however, evaluated by two independent researchers one at a time, including one historian, and were deemed suitable for the intended purpose based on the feedback received.

Many of these questions focus on negative experiences, and, indeed, I argue that negative use experiences are a good source of data for eliciting needs. When the user has difficulties in achieving their goal by using the system, they can usually pinpoint the problem (e.g. "the search doesn't work well be-

cause..."). On the contrary, when everything works just as intended by the user, they might not stop to think about what exactly it was that made the use experience so smooth. In other words, it is, I argue, easier for users to readily evaluate why something didn't work for them as opposed to why something did work as intended, making problematic use experiences, where available, a good starting point for the interviews.

In addition to these pre-planned questions, the subjects were asked questions on a case-by-case basis based on their personal use experiences. E.g., if the subjects reported having used one specific historical record database a notable lot, they would be asked questions such as "How would you personally evaluate the search functions of [system name]?", or "Why did you find the document preview options of [system name] lacking?". These off-the-sheet questions were formulated using mirroring, that is, by using the same concepts the subjects used to build their stories, and by building on their narration by asking them to elaborate on it. Typically, these questions were more system-specific, as the interviewees were asked to further narrate their personal use experiences with specific systems in mind, given that the pre-planned questions were more general in nature. As most subjects had extensive use experiences with just one or two systems, this approach was judged to yield satisfactory results.

One shortcoming often underlined with the qualitative interview as a method is the potential untruthfulness of the subjects' narratives. The risk of falsified or biased accounts does vary between interviews. As an extreme example, asking Internet users questions about their illegal downloading habits is unlikely to yield truthful answers, as the subjects are highly likely to be hesitant to answer in the event that they do illegally download (i.e. 'pirate') software or other copyrighted content online in fear of potential repercussions resulting from their answers. On the other hand, questions such as "how old are you?" are unlikely to yield untruthful answers under normal circumstances.

In the case of this particular study, the questions were intended to be entirely work-related. No personal information was collected, nor were sensitive questions asked. Regardless, it is possible that the users may, for example, have felt embarrassed about their own perceived lack of IT proficiency, resulting in untruthfully positive accounts on the perceived ease of use and perceived usefulness of the systems they brought up. This hypothetical feeling of shame may have been further accentuated by the fact that the researcher, at the time, worked at the department of computer science and information systems of the same university, resulting in, perhaps, wanting to 'show off' with IT proficiency. It is also possible for the historians to have over-exaggerated the rigor of their research practices in terms of locating primary sources in order to portray themselves in a more positive light as academics, which may have led to omitting or making up some of the data regarding their use habits.

The interviews were limited to historians. In choosing the subjects, triangulation of subjects was carried out by selecting subjects from various levels of the vertical hierarchy of the academic world, as well as by selecting subjects with differing research areas of interests. In practice, this meant including histo-

rians ranging from doctoral students to professors in the sample. Furthermore, the potential subjects were selected with their research areas of expertise in mind, with the intention of avoiding some overlap in system use experiences, as the research areas of the subjects determined to some extent which systems they had used. Using the very general three-way-distinction the department of History and Ethnology of the University of Jyväskylä uses for classifying master's level students of history into students of general, Finnish and economic history, the subjects were also categorized in a rough fashion following this typology. Emphasis in this regard was mainly placed on interviewing subjects representing both Finnish and general history. Of course, in practice, subjects categorized as those researching primarily Finnish history often studied topics falling under general history as well, and vice versa. Nonetheless, this was to ensure that the data included a wide variety of use experiences. Additionally, some subjects were contacted based on recommendations by other subjects, and some subjects were contacted due to them being familiar with the researcher, which was considered to increase the likelihood of them being willing to participate in the study. Perhaps also worth explicitly stating is the fact that, expectedly, not all of those invited to the interviews responded to the e-mail or accepted the invitation despite responding.

Ultimately, the subjects ranged from doctoral students to professors with varying research areas of expertise. Two of the interviewees were professors, two were senior researchers, seven were post-doctoral level researchers and four were doctoral students. Out of the fifteen subjects, five were female and ten were male. This sample is analyzed further later on in this subchapter.

The average length of the interviews conducted was 27 minutes and 21 seconds. No time pressure existed for the interviews save for one occasion where the subject informed beforehand that they had to attend another scheduled meeting 45 minutes after the start of the interview. While this interview was not seemingly cut short, this may have influenced the subject's answers in the event that they were unable to fully focus on the interview due to feeling pressed for time. All other interviews concluded when all the pre-planned and improvised questions had been gone through and the interviewees felt like they had nothing more to add to their responses. Every interviewee was interviewed only once.

The time period during which the interviews took place was a six-month-period from October 2015 to April 2016. The majority of the interviews were carried out before December 2015, while two took place in April 2016. The interviews were all voice-recorded using the built-in microphone of a mobile device. All recordings were audio-only; no videos were recorded. As the interviews were performed one-on-one, face-to-face, with the researcher acting as the sole interviewer, no additional notes were taken. This was to ensure that the interviews were not disrupted or otherwise impaired by the process of note-taking, as it is important for the researcher to not only gather data, but to actively listen to the subject (Alshenqeeti 2014; Myers & Newman 2007). All of the

recordings were subsequently transcribed into digital text documents and the data was analyzed using these transcripts.

Interviews were conducted until a satisfactory saturation point was reached. That is, until the interviews started yielding answers very similar to one another. Additionally, interviews were conducted until the triangulation of the subjects was considered satisfactory. The reason for splitting the interviews into two distinct time periods was not related to the data, but rather, the schedules of the subjects and the researcher. The few interviews that were performed in April 2016 had been planned beforehand to be conducted on-demand on a short notice at a future point in time. Statistical data on the individual interviews in line with what has been discussed in this chapter so far can be found in the table below (Table 3).

As some subjects wished to remain anonymous, the interview data, both in this subchapter and especially in the analysis presented in the next subchapter, is largely presented in a fashion that makes the subjects unidentifiable. The subjects primarily wished to remain anonymous in terms of the complete transcripts not being published as an appendix, which also implied that they might not wish for some of their comments to be quoted in a way that makes them identifiable. As such, though the data is not completely anonymized (i.e. it is possible to deduce who some of the interviewees perhaps were based on e.g. Table 3), the quotations presented in the analysis of the data will not be associated with any one subject in any fashion, but simply referred to as being quoted from the interview data as a whole. Of course, this also means that the transcripts are not included as an appendix at the end of this thesis.

TABLE 3 Information on interview subjects

No. #	Job title	Research area (Finnish/ General/ Economic history)	Sex	Interview Length (mm:ss)
1	Professor	Economic	Male	38:02
2	Professor	Finnish	Male	26:46
3	Senior researcher	Finnish	Male	34:09
4	Senior researcher	General	Female	-
5	Post-doctoral researcher	Finnish	Female	40:02
6	Post-doctoral researcher	Finnish	Female	32:26
7	Post-doctoral researcher	Finnish	Female	16:59
8	Post-doctoral researcher	General	Male	18:54
9	Post-doctoral researcher	General	Male	35:12
10	Post-doctoral researcher	General	Male	24:48
11	Post-doctoral researcher	Finnish	Male	20:26
12	Doctoral student	General	Male	17:20
13	Doctoral student	General	Male	30:07
14	Doctoral student	Finnish	Male	-
15	Doctoral student	General	Female	20:28

In cases where the subject had not used any databases relevant to this study, no formal interview was conducted according to the protocol. Instead, in these cases, the subjects were asked to explain why they had not used such systems and their disuse was discussed in an informal interview situation. These cases are denoted with a dash, '-', in place of the interview duration in the above table. There were two such cases among the fifteen planned interviews, reducing the number of complete interviews conducted to thirteen.

The potential effect of social dissonance during these interviews was considered relatively low. One factor lessening the amount of social dissonance present in the interviews was the fact that both the researcher and the subjects were historians affiliated with the same university. While the fact that the researcher was a master's level student created a potential ground for social dissonance in some of the interviews, no social dissonance large enough to distort the data was detected through observing the behavior of the subjects. The way the interviewer and the subjects dressed and spoke did not differ to an extent where it would have become a disturbance.

While the subjects represented all stages of the vertical hierarchy of the academic world, some potential shortcomings exist in the sample. Most importantly, all of the subjects were either staff members or former students of University of Jyväskylä. It is possible for this fact to have affected the data. For example, there may be a degree of shared knowhow of the use of certain databases with a prevalent user base inside the Department of History and Ethnology. This is especially likely in research areas that are well-covered by the research staff of the department. It is not at all unlikely that the staff members are to some extent aware of who uses which databases for their research, and as such may turn to each other for help in using these systems. With the help of an experienced user, a database that might otherwise be difficult to use for the novice user may feel much easier to use, leading to a more positive evaluation of the perceived ease of use or perceived usefulness of some system features of that particular system. In fact, on some occasions, the staff members even suggested other interviewees based on which systems their co-workers had use experience of. This made it evident that the staff members are, to some extent, aware of the systems their co-workers employ for their research.

Furthermore, some demographic variables may have affected the data. Only 5 out of the 15 subjects were female, leading to an over-representation of the male sex. The majority of the interviewees were also under the age of 40, and no senior users over the age of 60 were interviewed. It is plausible that older users may have evaluated the perceived ease of use and perceived usefulness of the systems differently than the younger users. Age has been suggested to affect technology acceptance in various ways, e.g. Venkatesh et al. (2003) propose in UTAUT that age affects, among other things, performance expectancy and effort expectancy, along with social influence and facilitating conditions. Some older historians might also have felt that digital tools would have added little to their tried-and-true scholarly practices, as work routines

can be a source of user resistance in adopting new systems (Laumer, Maier, Eckhardt & Weitzel 2016). The effect of demographic variables in this context cannot be ascertained using qualitative methods, and, as such, what effect they may have remains a point of interest.

However, the aim of this thesis is to map what system factors, other than those related to the users, influence these perceptions. How the effect of these individual system factors on the perceived ease of use and perceived usefulness experienced by the users may differ between demographics is out of the scope of this study. It is possible that demographic variables may have an effect on the emphasis the users place on the system factors that influence their perceived usefulness and perceived ease of use. Some demographic groups may, for example, consider their perceived usefulness of the system to increase as the amount of search functions increases, while their perceived ease of use remains the same regardless of their amount. On the other hand, other demographic groups may consider the increase in their perceived usefulness to be negligible at best, while their perceived ease of use may notably decrease as a result of the new, perhaps confusing functions. However, the effect of demographic factors such as this would be best studied through quantitative methods, e.g. a survey, as lengthy qualitative interviews lend themselves poorly to such approaches. In fact, the results of this study could be used to formulate such a survey in further research on the subject.

A more important demographic factor than age would likely be the extent of past system use of the subjects. The database systems offering historical records online are very similar in nature, leading to an increase in the intuitiveness of the user interfaces with the use of other systems of the same category. The search interfaces of these systems are also seldom non-standard, leading to intuitiveness in generally experienced Internet users who are accustomed to various types of online search engines. However, the younger the user, the more likely they are to have extensively used the Internet simply due to the fact that many of the scholars, like their peers, born in the late 1980s or early 1990s grew up using the Internet, while older users only began using IT later on in their lives. Originally suggested by Mark Prensky (2001), these young IT users who grew up surrounded by IT have even been called the “digital natives”, drawing a line between these digital natives and the older users, the “digital immigrants”, who, so to say, moved in(to the world of IT) as adults.

However, it should be noted that all of the interviewees shared the same motivations of system use, i.e. their work or their studies. It is also in this light that demographic variables can be expected to have less influence than they otherwise might have. The subjects would, without exceptions, only use systems that held in them digitized records the subjects were interested in, and this was the first and foremost basis for selecting which systems to use. It could, thus, be argued that demographic factors played no role in why the users wanted to try using the systems they did. On the other hand, it is possible that older, less IT-savvy users may have given up on using some systems based on



poor PEOU that their younger counterparts evaluated to have much higher PEOU. Though the demographic variables cannot be overruled, their impact in this particular context is arguably much less meaningful than it would be in many other cases. Furthermore, due to the system-focused view, with emphasis on system features, the potential, unaccounted for influence of demographic and social variables is not an issue for the validity of the results of this study. If anything, the findings of more general technology acceptance studies that have accounted for demographic variables (e.g. Venkatesh et al. 2012) may likely be applied to this context as well. This, however, should be verified in future research, as is expanded upon in the discussion chapter of this study. With the discussion related to the interview protocol now concluding, the next chapter includes the analysis of the interview data that was collected using the protocol discussed in this subchapter.

## 5 ANALYSIS OF INTERVIEW DATA

In this chapter, the data gathered through the qualitative interviews is analyzed through the goal set for them; eliciting system-related factors that influence perceived ease of use and perceived usefulness for historians using digital historical record database systems. The data is analyzed and the findings reported using Kvale's (1996, p. 263) guidelines. The first subchapter focuses on the past system use experiences of the subjects: which systems they had used and how they had found these systems. Additionally, it discusses to what extent the subjects used digital records in relation to physical records. The second subchapter comprises the core of the analysis as the factors for PU and PEOU are discussed in-depth based on the data collected.

The analysis was performed by first transcribing the interview recordings into text documents. As rhetoric used was not a point of focus here, the interviews were not transcribed word-to-word. Instead, spoken language, slang and dialects were removed and replaced with grammatically correct, written language. However, on the contrary, any direct citations in this chapter are presented in their original form as they were spoken. I.e. in the case of direct quotations, the data is presented in its original form. It should be noted, though, that the interviews were carried out in Finnish, meaning that the quotations have nonetheless been subject to some personal interpretation in the translation process, despite my best efforts to retain the original meanings and choices of words. The quotations, as well as the interviews in general, were anonymized as many subjects expressed wanting to remain anonymous, especially when being quoted.

After the transcribing process, the interviews were codified into themes for analysis. There were two main themes: factors affecting PU and PEOU. Furthermore, these factors were split into two main categories: software feature related factors and factors related to the records and their metadata. In this process, the interview data was first scanned for factors explicitly stated by the subjects. Then, the interview data was scanned for factors implied to have affected PU and PEOU, but which were not explicitly stated to have done so by the subjects.

In the third and final subchapter, the findings of the study, as formulated during the analysis, are presented. The factors influencing PU and PEOU determined during the analysis are inserted into TAM to explain what, possibly among other factors, affects PU and PEOU of historians using digital historical record database systems.

## 5.1 Relevant System Use History of the Subjects

Most subjects reported having used multiple systems that fall under the definition of a digital historical record database. Only one subject reported having actively used just one such system, with most subjects narrating their use experiences with at least two systems through drawing comparison. All subjects, however, were aware of the existence of many other systems, for example due to having spent time searching for suitable record collections, going through such systems in the process, or from work-related chats with their colleagues. Consequently, they also tended to have varying degrees knowledge of relevant systems outside the ones they reported having actively used, ranging from isolate use cases to knowledge gained through word-of-mouth transmission.

The extent of past system use depended on multiple factors, however. There was no clear correlation between the years spent on academic research and the amount of databases used. Some senior researchers had used a wide variety of databases, as had some doctoral students, and inversely, some doctoral students and some senior researchers spoke of only a system or two.

Factors more important than the amount of research performed by the subjects were their research topics and research areas of choice. The two historians invited to the interviews who reported having actively used no such systems cited the lack of relevant digitized records as the sole reason behind their lack of use experience; otherwise they would have been more than happy to make use of such convenient systems. On the other hand, some subjects reported that they used digital primary sources practically exclusively. For the most part, however, subjects reported using both physical and digital sources in varying ratios, depending on their research topics. Some subjects primarily used digital sources, while others primarily used physical sources. All the subjects interviewed reported wanting to use digitized records first and foremost where available for convenience reasons. Visiting an archive in person is time-consuming, and, in most cases, costly, as one of the subjects jokingly, but with a hint of truth mixed in, expressed it: “the Finnish Digital Newspaper Archive just made it so that you didn’t have to go to the first floor of the [university] library [located next door] to read them. . .”.

In relation to research areas and topics and digitized records, some subjects chose their research topics regardless of whether or not there were digitized records available, while some subjects stated that it directly affected their research topics to some extent. One of the subjects, when asked if whether or not some records are digitized influenced his choice of primary sources, went

on to say that “Yes. Currently quite a lot, in fact. . . it’s in a sense one. . . one way in which I try to ‘sell’ my research topic. Like, with the records having been only recently digitized, they haven’t been systematically researched yet”. Many subjects also reported having studied digitized records in ways which physical records could practically not be studied in. This included the use of word searches to scan through massive collections of records for occasions on which a specific concept has been used. This, too, does imply that their choice of topic for some of their studies was directly dependent on whether or not the records used were digitized, and the subjects did all say that such an approach would not have been reasonable with physical records. On the other hand, all subjects reported having used physical records as primary sources for their research as well, with many of them mixing both physical and digital records on a regular basis. How many different systems the subjects had used largely depended on their research areas of interests.

Which systems the subjects had used also depended on their research areas of interest. For example, systems containing parliamentary records were rather commonly mentioned in the interviews. This was likely due to multiple reasons. Firstly, parliamentary records of European parliaments from the last few centuries have already been quite extensively digitized, making them an easily available primary source type, as well as allowing for comparative research approaches combining records of multiple European parliaments. Secondly, parliamentary history is one of the more represented research areas of the University of Jyväskylä, Finland, where the subjects all worked. Lastly, the systems containing these parliamentary records tend to be some of the more highly regarded ones, as made evident by the opinions of subjects during the interviews, further increasing their availability and accessibility. Typical parliamentary record systems used included the British Hansard 1803–2005 (Hansard 1803–2005, 2016) and the House of Commons Parliamentary Papers (2016) among others.

Outside parliamentary systems, newspaper record systems such as the New York Times archive (New York Times 2016) and the Finnish Newspaper Archive by the National Library of Finland (Kansalliskirjasto 2016) were commonly used, primarily as sources for supporting primary sources. For example, those historians working on parliamentary topics often used newspapers as supporting primary sources in their studies, alongside parliamentary records. Aside from these two record types, the subjects cited use experiences with general collections, such as ECCO, Eighteenth-Century Collections Online, or those of the Finnish National Archive, as well as Church records and so on. Notably, many subjects reported having occasionally used parts of historical record collections digitized by other historians, primarily by their colleagues, during their visits to various archives. This digitization was often done by simply photographing the records with a digital camera. However, these collections were not uploaded into any system, being instead passed around via e-mail or on USB memory sticks, and as such were outside the scope of this study.

Though making claims about the effect of any demographic variables based on such a small sample size, from the point of view of quantitative reasoning, is questionable, based on the data demographic variables nonetheless seemed to not have much effect on past system use. However, older historians made comparisons between using physical and digital records more frequently during the interviews. This was not surprising considering they had worked by using almost exclusively physical records in the past, as opposed to younger historians who have had access to digital records since they started their university education. Both younger and older historians made extensive use of digital records where available, and at times used system features to enhance their research practices, by i.e. using word searches to perform quantitative research that they might not have carried out using physical records. Notably, though, two younger historians reported practically exclusively using digital historical records as primary sources, and, furthermore, only used systems that supported full text searches to find these records. Both of these subjects underlined the importance of digital records in creating new approaches to historical research, stating that their own research approaches were almost entirely reliant on them.

The subjects located these systems in different ways. There were three main ways in which new digitized collections, and, consequently, new systems, were discovered by the subjects: 1) by using Internet search engines to locate entirely new collections the subjects had no prior knowledge of, 2) through information gained from fellow historians such as co-workers, and 3) searching online for a digitized version of a collection of records the subjects already knew existed in physical form. The subjects typically made use of at least two of these forms of discovery. The use of such systems was an occasional topic of conversation between the department research staff members. Additionally, one of the subjects mentioned having made use of the University of Jyväskylä Library to locate record collections, as can be observed from the quote below. Though the other subjects did not explicitly discuss the role of the local university library in helping them locate record collections, its influence may have nonetheless been felt through the information they gained from their colleagues, who may not have been interviewed for this thesis. This quote illustrates well how there is no one way these systems are found by the subjects, with most subjects having found systems through various different channels:

Often it comes in as like a tip, that someone knows of some [new] collection, and that way it starts unfolding. Or then there's some collection like Moody's or New York Times that everyone just knows exists in digital form. These are good, but . . . well, and then we have, on the side of economic history, some international websites that point out various collections. That's how you usually find information. And then we get a lot of tips from the [University of Jyväskylä] library. (Interview)

To summarize, all subjects had used at least one historical record database system extensively, with most of them citing extensive use experiences of two or more such systems. The subjects would, expectedly, select which systems to use primarily based on the collections of records the systems hosted. In some

cases the subjects would report downright abandoning a system based on poor perceived ease of use and perceived usefulness, but in many cases just the records being available in a digital form made them continue using the systems they otherwise considered to be lacking in various ways.

## **5.2 Factors Affecting Perceived Ease of Use and Perceived Usefulness by Historians Using Digital Historical Record Database Systems**

This subchapter constitutes the core of the data analysis of this study. As PU and PEOU and linked together as variables, with PEOU also directly affecting PU in TAM, they will be discussed in the same subchapter. It is impossible to completely separate PU and PEOU when analyzing which factors affect which antecedent. It would also not be correct as PEOU is shown to influence PU through a direct link within TAM itself. Therefore, the factors presented in this subchapter will generally be treated as affecting both PU and PEOU. To ascertain which factors influence which antecedent more, further research should be performed by creating a quantitative survey using the list of factors derived from this data. Some factors will be, based on logical reasoning, separated to affect either PU or PEOU almost exclusively to the point where it is reasonable to argue that it only affects only PU or PEOU. As PEOU affects PU in itself, this ultimately changes little.

It should be noted that, though the focus of the analysis is on system features other than those related to the users, some user-related factors were brought up in multiple interviews and as such their influence cannot be ignored. Most importantly, some factors are related to the records stored in the systems rather than the systems themselves, but these are considered closely intertwined as typically the system owners were also associated with digitizing the records, and the records can arguably be considered a part of the system. A generally accepted view holds that an information system consists of hardware, software, information and/ or data, individuals, and practices. Thus, the records fall under the categories of data and information following this definition, and as such are a part of the system. A differentiation is made in this chapter between software feature related factors and record related factors, which together comprise the system factors.

Starting the analysis with some general observations, all subjects expressed dissatisfaction with some of their past use experiences. The subjects would go on to describe multiple issues they had encountered with the systems they had used, as well as sometimes discuss some positive use experiences they had had with some other systems. Though all but one subject had gone through negative use experiences, for the most part they had kept on using the systems despite the issues they reported as the issues were not deemed to be grave enough to warrant discontinuation of use.

Before getting into any other factors, it should be noted that the most important factor of all in this context was which records were contained in which system, as touched upon in the preceding subchapter. Above all, the subjects chose to use systems that contained records relevant to them. Any other factors of PU and PEOU only mattered if the subjects found the records in the system interesting. This was to be expected as the motivation of the subjects to use these systems was to find records they would use in their work or were otherwise interested in. Thus, the single most important factor of PU in this use context is the relevance of the historical records for the users.

Only after the subjects became interested in the records stored in the systems did other factors start weighing on their PU and PEOU. Based on the data collected through the interviews, the second most important factor for the PU experienced by the subjects was the availability of a full text search. The majority of the subjects reported full text search as their primary way to locate records inside these systems. All subjects had used other means to search for records as well, but the preference for text searches, even when not available in the systems, was evident when searching for textual, qualitative records. While all subjects cited textual records as their main primary sources, some made use of more quantitative, though nonetheless primarily textual, records such as toll logs or traveler logs. One of the subjects summarized the importance of the full text search as follows:

In the case of textual records what's essential is that the full text search works as well as possible. And if it doesn't work, then the... the value generated by the digitization ends up being terribly small, and the interest towards using it becomes much lower. This is because often especially this kind of newspaper material, if not a primary source, is this kind of a complementary one. You look up some qualitative thing that supports something you have found in some other way. If you can't find it easily... well, it doesn't even matter after that. (Interview)

Though this particular quote primarily refers to the use of supplementary sources, many subjects had similar thoughts on the importance of full text searches despite using them to locate their primary sources. A few of the subjects working on conceptual history stated quite readily that without full text searches their research would not be plausible in its current scope, as it would be far too time-consuming to go through decades or centuries of parliamentary records manually in search of words, resulting in a far too slow rate of publication. "There's just too much content to be browsed through without a word search", a subject responded upon discussing alternative ways of finding relevant records inside systems, highlighting the importance of full text search capabilities for their research approaches. The importance of full text search functions capable of searching through the body of the records was indeed highlighted in most of the interviews. Multiple subjects downright stated that without it digitizing historical records was almost meaningless from their perspective, with the sole benefit of increased availability evidently not considered very important by these subjects. Two subjects reported exclusively using systems

with full text search features available due to their research interests, underlining the importance of full text search features in creating new research topics and creating new approaches for studying existing ones.

And you could say that... that the topics you could study . . . they have already been studied. . . . There's nothing [left to do]. They've all been exhausted. (Interview)

On the contrary, some subjects did not rely on full text searches at all, though these subjects, too, expressed interest in using full text searches should they become available in the future, or, where already available, should they start working at a satisfactory level. Thus, it would be an over-exaggeration to portray full text search functions as being essential for the systems to be adopted by historians. Nonetheless, the availability of a full text search did stand out as the second most important system factor affecting PU among the subjects.

The full text searches were, in practice, not end-all solutions that alone made the systems highly desirable for the subjects, however. None of the subjects were completely satisfied with the full text search functions of the systems they had used. The subjects all cited problems with the full text searches of various systems, with many separate systems sharing similar problems. Many of the problems discussed below apply to other search forms as well, though.

A common problem, as well as a very frustrating one according to the subjects, was the timing out of search results. Apparently, it was a common occurrence for the search result pages to time-out after a set amount of time had elapsed since the search was performed, resulting in the system either redirecting the user back to another view, or displaying a pop-out announcing the time-out which made the search results inaccessible and also removed the user from the search results view after being acknowledged. This was considered a notable hindrance as many of the subjects were interested in large masses of records, making the act of going through numerous records cumbersome as they risked the search results page timing out while they were browsing through specific records in separate web browser tabs.

Alone, this would not have been such an issue for the subjects. However, coupled with some of the other issues they faced with the systems, its effects cumulated. System stability issues, as well as other search-related issues, were the main reason the subjects considered search time-outs so frustrating:

It would sometimes reset your search results. It would jam; it was really heavy. It did not make good calls with word recognition. All the promising features . . . were still under development. It was terribly unstable. I went through some 10 000 newspapers clippings in a year and sometimes I felt like just slamming my head against my desk - repeatedly. (Interview)

Many subjects reported the searches themselves taking anything from a few seconds to a few minutes, or sometimes ending in an error message after running for minutes. When being able to get back the search results was not at all something the subjects could take for granted, the systems timing out their search results pages became a large source of frustration. It should be noted in



this context that some of the stability issues experienced by the users may have originated from the University of Jyväskylä network rather than the systems themselves, but client-side stability issues cannot be addressed through system design, and as such are not related to the systems. Multiple subjects also reported receiving differing search results using the exact same search terms but at a different point in time. In some cases the subjects knew this to be a result of the collection being updated, but this was not nearly always the case.

The subjects brought up various other issues with the full text searches. Problems with using search operators were typical: the users were accustomed to using standard search operators such as '+' and '\*'. Sometimes they did not work, or produced unexpected results. These types of problems were not at all uncommon. Many subjects who had regularly employed full text searches to find records reported facing problems with search operators and how the searches actually functioned below the surface despite being familiar with search engine standards.

In word searches . . . they advise you to use certain search operators such as '+' to better find records. What they forget to mention is that . . . take for example the search "Council of Europe". I'm currently researching the Council of Europe so I've used that to find data. "Council+of+Europe" returns nothing, but "Council+Europe" then again returns the intended results, which is a pretty weird fault. (Interview)

Problems closely associated with the full text search were OCR-quality problems. Computers, as discussed in the second chapter, are often used to "read" through the records upon their digitization in order to produce a plain text version of the record by matching symbols using optical character recognition software. Computers make errors, and very rarely these records are afterwards extensively checked using manual labor. Sometimes this produces decent results; sometimes it does not.

They had OCR-scanned text; digitized text . . . the default search protocol used was this OCR-based [full] text search. The [original, physical] text was printed with poor quality ink on poor quality paper. There were some really horrible recognition errors in there. You would run into just about anything while using it. You just had to find your records some other way. . .

But they have made progress. It feels like nowadays things are easier and easier to find. Still, the researcher's own judgement [source criticism] remains essential. (Interview)

Text searches were employed in finding records even when the search engine was unable to perform text body, i.e. full text, searches. When using text searches only searching through titles and other metadata, the subjects would use different search terms. In these cases, for example document types, in the sense of record collections, combined with e.g. the names of towns or administrative regions, were used to find the records. Often these searches were very rigid according to the subjects. If you did not happen to know the exact name of

the collection or document type you were looking for, you would not find anything. On the other hand, even this did not always prove successful:

It doesn't even necessarily find the records you want even if you search using the exact title of the records. It doesn't find the record based on its title but based on some completely different metadata which is really peculiar. (Interview)

This was not an uncommon issue. Some of the subjects considered it an annoyance that the search features tried to be too 'smart', which sometimes resulted in issues such as this one. The subjects recalled cases where they had really just wanted the system to find one particular record by searching for it using its exact title, only to have the system return completely different results based on its own judgement of their relevance to the search terms. The subjects generally wanted to see simpler search features that maybe did less overall, but worked as intended, unlike some of the more complex alternatives.

Drawing from the data analyzed thus far, we can argue that the availability of full text search heavily affects historians' PU and PEOU for these systems. Indeed, despite the various issues many subjects reported experiencing with the full text searches of the systems, some felt that they were given less credit than they deserved. One subject noted that, though computers make mistakes, historians themselves can just as well make mistakes:

You can't always be so meticulous. You just can't skim everything; it just won't work. In a way, I think it's unfair critique... they expect too much. (Interview)

The subject felt that historians were sometimes perhaps being too idealistic about historical research when criticizing especially the full text search features of the systems and the use of digital records over physical ones in general. Often, the subject thought, there was such a vast amount of records in the systems that the search failing to find some of them would not make a notable difference in the findings of the study; this argument that was also brought up by another subject. Moreover, having a historian go through the physical records manually would more than likely result in some errors as well when faced with such vast amounts of records.

Despite the weight placed on the importance of full text search by many of the subjects, others reported seldom using text searches at all, and all of the systems indeed offered alternative ways to locate records. For example, the front page of the Historical Hansard collection of British parliamentary records describes the site as follows:

There's the Hansard text itself by volume, Lords sittings, Commons sittings and Westminster Hall sittings as well as Written Answers, Written Statements, Lords reports and Grand Committee reports. This site also includes extracted lists of People who are recorded as having spoken, Constituencies, Offices, Acts, Bills and Divisions. (Historical Hansard 1803–2005)

Subjects who seldom used word searches reported primarily navigating the digitized collections by using the structure of the physical collections. This is often carried out using a tree-like structure for organizing the records. As it is very common for the digitized collections to try to retain the way the physical collection was organized, knowledge of the physical collections and archival practices in general can be used to aid in locating digitized records. This can be preferable if the text search is considered to be lacking, or does not exist altogether, or if the research methods of the user make it preferable. E.g. if the user is interested in all of the records of the same type from a specific time range, text search offers very little. On the other hand, if the user is interested in finding records based on their contents, regardless of record type, and over a long period of time, word search becomes an important tool. As many subjects reported using the structures of the physical collections, including the tables of contents of the records, to browse through the digitized versions as well, retaining this structure upon digitization can be considered a factor for both PU and PEOU.

On the same note, multiple subjects expressed dissatisfaction with only partially digitized physical collection. At times, parts of a collection had, for some reason, not been digitized with the rest of it. The subjects felt that most of the time they were not notified clearly enough about the absence of some parts of a collection, and even when they were, the incompleteness of the collections nevertheless negatively affected their PU. This would sometimes also result in problems with accessing these undigitized records in the physical archive, as the entire physical collection had sometimes been made unavailable to the public following its supposed digitization despite the fact that some parts of it had, in fact, not been digitized. A subject reported having travelled to a Finnish archive in order to access some undigitized parts of a collection, only to end up being told that the collection is now available online and is consequently off-limits from visitors of the physical archive. Only after convincing the staff that not all of the collection had, in fact, been digitized, were they allowed access to the physical collection.

In addition to pre-determined ways of organizing the collections in the systems, some subjects brought up that they would have liked to be able to bookmark or favourite records inside the systems, and to then use these favoured records to create collections of their own by organizing them in various ways. This, the some of the subjects thought, would have slightly improved their PU, as it would have made handling the records more effective.

Aside from text searches and using the collection structure to locate records, other ways to find records included record type, the author of the record (i.e. organization or individual), or time of publication. Software features, either search tools or browsing tools such as sidebars, supporting the use of such metadata for locating records were found in almost all systems. Often such metadata was also combined with word searches, as historians almost without exception study a specific time range. E.g. being able to only search for records

published between 1939 and 1945 was also considered important while performing, for example, a full text search.

Other types of metadata can, depending on the system, also be used to search for records, but none of the subjects reported using means other than: 1) full text search, 2) time, 3) location, 4) creator or owner of the original record, and 5) record type (e.g. plenary session proceeding) to find records in these systems. Nonetheless, the amount of various metadata that can be used for searching for records in the systems is evidently a factor influencing both PU and PEOU. In other words, the amount of metadata associated with the records affects PU and PEOU. Furthermore, building on the earlier analysis of full text search related input, the quality of the search features in general, rather than just full text search ones, affects PU and PEOU. E.g. for a text search engine of such a system to be considered easy to use and useful, it has to adhere to search engine standards with the way it employs search operators.

Continuing on theme of the search features, many subjects also discussed the way the systems displayed the search results and what options they were given for sorting them, or otherwise processing them further, and handling them. Many subjects hoped that they could have performed a search inside a search, so to say, by performing another search on just the results that had already been retrieved by their earlier search. To some extent, though, the same results could likely be achieved with planned use of search operators and additional search options. Nonetheless, the subjects typically wanted to be able to sort the search results in different ways. The two most commonly used bases for sorting were time-based sorting and relevance-based sorting.

As for displaying the search results, the subjects largely wanted to see information of the records brought up by the search. E.g. a full text search should show the context in which the search terms were found inside the record by displaying a part of the text for each result, along with the title of the record and other metadata. This was considered to considerably speed up the rate at which they were able to go through the records returned by each search.

Otherwise you have to open a 100-page-record, and are forced to check its relevance that way . . . it takes time, a toll on your nerves, and many other things. (Interview)

The more records the subjects usually handled at a time, the more important features related to displaying search results became for them. It can be thus argued based on the data that search result sorting and previewing options notably influenced PU and PEOU. They were considered especially important when used in conjunction with full text search, which typically resulted in large numbers of search results for each search, making their effective handling consequently more important as well.

Multiple subjects appraised one system that presented quantitative data on the results of each search, namely how many records were found in different time periods, shown as a bar chart, hoping to see such features more widespread in the future. Along similar lines, the subjects were interested in seeing more tools that could be used to help analyze both quantitative and qualitative

data, or to generate more data from the records using digital tools. Data analysis tools, such as this bar chart generation for search results, are arguably a system factor affecting PU.

System stability was already briefly touched upon in relation to search functions. However, system stability, as well as availability, in general was also a subject of discussion in the interviews. Outside slow or unresponsive searches, many subjects could also recall incidents where one of the systems had gone offline in its entirety for lengthened periods of time. Lengthy system maintenances presented a real issue for historians working with them. If such an incident happens at an unfortunate time, the subject may be forced to completely halt their research until the system is functional again, as the unavailability of the primary sources can, in many cases, prevent historical research from being conducted altogether.

I remember a few years ago Historical Hansard did go down for a while, but right at that moment I did not need it because I had already gotten everything I needed for my doctoral dissertation from there. So there was no dramatic frustration . . . but, but . . . the risk was there. I noticed it then, that it exists. And in a way, because of it I have aimed to pre-emptively prevent it from affecting me by downloading records related to my future research from HCPP [House of Commons Parliamentary Papers]. (Interview)

If the system is unusable due to being offline, it can consequently also not be useful. Similarly, if the searches take unreasonably long to finish, or only work occasionally, it negatively affects PU as it slows down the rate at which the subjects are able to perform their work tasks. Arguably, then, system stability is a factor influencing their PU.

Further along the lines of being able to access the systems, in some cases, the license fees of pay-to-use systems were considered problematic. Many systems feature licenses typically aimed at organizations, making the historians reliant on their organization of affiliation in accessing some record collections. This sometimes resulted in cases where the organizational license for a system was discontinued for various reasons, rendering the system unusable for the historians working in the organization. Some subjects felt that being able to buy individual licenses for these systems would have helped them considerably, as they did not have access to any organizational licenses to some collections they wished to use for their research. However, this is something related to the payment model of choice of some commercial systems and will not be treated as a system factor for the purposes of this study.

Continuing with the handling of digital records, being able to download the records on demand was considered an important feature. While many subjects preferred reading the records using the built-in reader of the system, many also wanted to download them for further use. Many of those who downloaded the records also preferred their own document readers to the ones provided by the systems. For example, one subject said they preferred the scrollable documents of their own document reader to having to press left and right arrows to

change pages while reading the records through the one provided by the system. The download option was, expectedly, considered beneficial also because it provided feelings of security: with the records saved on their own hard-drives, potential system stability issues were no longer as large a risk for the subjects.

Some preferred to simply save links to the records instead of downloading them in order to save hard-drive space. One of the subjects who preferred saving links to downloading files also wished to be able to generate links to specific parts of specific record for future use rather than just linking to the record as a whole. With the records at times hundreds of pages long each, being able to link to a specific page would be desirable. Even those who generally preferred links nonetheless wanted the download option to be there as they, too, liked downloading a particularly interesting record occasionally. Being able to download records on demand should as such be considered a PU factor, and the document reader of the system a PEOU one. Additionally, linking to parts of a complete record was also considered to increase PEOU.

As with system stability, the quality of the digital records is also an issue not only from the point of view of the full text search, but also from the point of view of the user trying to read them. Low-resolution documents created from smudged microfilms can greatly impair the reading experience, resulting in a slower rate of work. These quality problems, for the most part, stemmed from using microfilms and other secondary copies of the original paper records instead of scanning the original paper records to create the digital versions. Aside from obvious quality issues in terms of readability, this may also result in inadvertent omitting of data. Parts of the records may become downright unintelligible as a result of their low quality. Therefore, record quality is a factor for PU and PEOU.

Also in relation to the digital records, the subjects brought up factors relating to the way the documents can be viewed and handled in the systems. In the case of textual records, the systems would offer either a scanned (or photographed) version of the original document or a plain-text version of it – or sometimes both. If the documents had been OCR-processed, but no plain text version was available, the typically PDF-format documents had had the plain text version attached to them instead in order to make them searchable. The subjects generally all shared the sentiment that having both versions available to them is the best option.

If you had both a scan of the original and the plain text version] you could straight away confirm [the validity of the OCR]. And then of course in some documents you have hand-written commentaries in the marginal of the pages. These can simply not be put online [as plain text]. And these were just one person's inputs . . . two thousand photos later I was like, oh, this is the same document. Oh, some other person responded to this first person's comments which I saw a thousand pages ago. (Interview)

When talking about a database with tens of millions of items . . . if you're doing something quantitative then the curve is going to go upwards or downwards wheth-

er or not you have an error or two in there. It doesn't matter one bit. But if you're looking up some specific incident, it's always good to check the original scanned record. (Interview)

The ability to confirm the validity of the plain text documents through the scans was the most common argument among the subjects for having both versions available. Some users preferred the plain text documents for ease-of-use reasons. They considered them to be both easier to read and easier to handle in terms of copying, pasting or highlighting parts of the text. Others preferred to read the scans. All users, however, wanted to be able to search the documents, and to be able to copy and paste on demand. As such, the plain text should at least be present in the same document as the scan if there is no stand-alone plain text version. The availability of scanned or photographed digital versions of the original document was evidently considered a PU factor. On the other hand, the availability of plain text versions of the records was considered to increase both PEOU and PU.

As for the data in the systems itself, one of the subjects who primarily worked on quantitative data was concerned with the way large masses of data are built into tables in these systems. They reported having often had to restructure the data themselves in order to make it relevant for their research.

You would find like, yeah, here's a captain, but the title 'captain' may have been written in fifteen different ways in the collection. It took us a ton of time to systematize the data so that we could actually use it for comparative research. . . . So when you make these systems, I think it's important that the historians are involved from the beginning. . . . It takes me half an hour to tell them what to do (Interview)

They went on to note that building large sets of data is always a difficult task when working on historical data comprising of decades or centuries of records. For example, if one makes the mistake of making final decisions on how the data should be structured by observing records from just the start or end of the time range, the structure may later on prove problematic. They cited a case where they themselves had created a table of data based on data from the 18th century. They chose to use companies, which at that point in time consisted of one factory each, as the unit for the rows of the table. Hundred years into the data, they ran into problems when those companies started consisting of multiple factories each. To avoid these types of issues, careful consideration should be put into creating large sets of data for such systems.

The subject went on to note that these systems often do not support quantitative research approaches. Even data that would clearly have its uses in quantitative research is sometimes not handled in a way that allows for it. For example, in some cases data that is clearly separate rows of a larger table is only available through search functions, with no option available for downloading the entire table, or even parts of it. While issues such as this can be worked around, this does result in an increase in the workload of the user.

Many subjects lamented the lack of extensive user guides and manuals for these systems. Especially those who reported having struggled with the search functionalities of these systems wanted to see better instructions for using them. The subjects would generally have to learn to use the system entirely on their own, relying on their personal knowledge of search engines. What guides were available, the subjects felt, rarely told them anything they did not already know. Only one subject reported having found the user guides of the system useful:

And they publish their own printed search engine guides in a digital form. Like, if you do this and this type of research, then . . . then read these and these [instructions] that will help you with it. They have some very practical examples there. These have . . . that has been one of the most pleasant surprises I've encountered. . . (Interview)

As can be observed from this quotation, in-depth guides and manuals may change the use experience considerably. Even apart from word searches, the subjects wished for more guides and other helpful information to be available in the systems. As an example, multiple subjects stated that they would have considered guides on the collections of records found in the system useful. The main argument for this was that these guides would help historians expand their research area of interest by making it easier to understand different types of records and record collections.

The typical perception regarding IT is that the average user does not want to spend a long time reading through a manual before using a system. In fact, most users downright avoid using both paper and online help systems (Novick & Ward 2006). The subjects, on the contrary, said that they would have liked to see more comprehensive manuals for the systems. They found it frustrating that they had to learn to use most systems on their own. Though they were able to quickly begin using the systems intuitively based on earlier experiences with IT, gaining a deeper understanding of the way e.g. the text search worked took them long in each case. Comprehensive user manuals, especially for the search functionalities, were clearly a factor increasing the PEOU for these systems among the subjects. The subjects largely felt that the existing manuals were too basic to be useful.

Somewhat related to manuals and guides, it was suggested that having an English version of the system's user interface available would be helpful in cases where the language used was neither Finnish nor English. Many European historians study the history of nations other than their own, or simply use records written in foreign languages for other reasons. Though this naturally means that they must have a grasp of the foreign language in order to do so in the first place, a subject nonetheless felt that being able to use an English user interface would have made using some systems easier, despite the records remaining in their original language. Additionally, they would have liked to see English user manuals for these systems in order to better understand, again, mainly the search functionalities. This was a fair argument; an English translation of the system user interface could be considered to increase PEOU.



The user interfaces of the systems were not regularly brought up as a whole. The subjects mainly faced issues with the search interface, but some did discuss the interface from a wider perspective as well. One subject reported having wanted to use some of the systems on a mobile device, which quickly proved unfeasible. With the growth of the mobile technology sector, assuring system functionality on multiple computing platforms becomes increasingly important. It is not at all unthinkable for a historian to want to access historical records using a tablet device rather than a tabletop office computer or a work laptop. Simpler, lighter interfaces may also end up helping with system stability issues by reducing the traffic between the clients and the server.

I'm actually a bit old-fashioned in that the simpler the system is the better. It doesn't necessarily have to hold your hand much . . . I think it's a good starting point that you have a solid understanding [of the records], that you would be able to use the old physical records too, and search those. That way those systems can work well . . . you can build a rather simple system where the basic search features work, and work well at that. That way there's very little chance of anything going wrong. (Interview)

The subject concerned with using these systems on mobile devices suggested the use of plug-ins, for the lack of a better word. The system could be very bare-bones by default, simply offering the possibility of adding more features on demand through said plug-ins. This would simplify the graphical user interface, removing elements the user does not consider relevant, with the option of adding them back in if they do end up needing them.

As discussed earlier, some subjects reported using almost exclusively the structure and/or table of contents of the original physical collection to locate the digitized versions online. Most subjects discussed in some ways the effect these systems along with digital historical records have had on their research practices, and historical research practices in general. Generally, the subjects all seemed to share the sentiment that it is important to have what they referred to as the "basic research skills of an historian". This meant, in practice, being able to locate records without relying on text searches or other exclusively digital tools. The subjects felt that it made finding digital records easier regardless of how they were searched for. Though not a factor related to the system software or data, knowledge of historical research practices is evidently an impactful factor for PEOU. This is a noteworthy observation specifically because it is a user-related factor that the subjects themselves readily acknowledged affects their own PEOU. In highlighting its importance, however, the subjects would point out that it is important for other historians to also have as good a grasp of these skills.

At times, there are views according to which historians will no doubt use any system that has historical records in which they are interested. The subjects, however, did not seem to conform to this view. While most subjects who reported various issues with some systems nonetheless continued using them by doing their best to find ways to work around the shortcomings of the systems.

Some simply stopped using the systems, instead choosing to use the original, physical for their research.

At some point I just threw my hands up in the air, like, I don't want to do this anymore. I have other ways of finding this information. (Interview)

Such accounts go on to show that not even historians, who have often subjected themselves to various problematic systems, are willing to put up everything for the sake of using digital records instead of physical ones. If there are too many issues with the systems, using the physical records sometimes becomes preferable, even if it can also result in having to change one's research methods for a paper.

These negative use experiences, as well as the positive ones, may be shared inside work communities. Many subjects mentioned, in passing, having discussed these systems with their colleagues from various points of view. Most commonly the subjects mentioned finding new systems because a colleague had brought them up. One subject mentioned planning on asking a colleague for help with using a system they found difficult to use. It is possible that such sharing of technical knowledge occurs from time to time between historians. These types of human interaction between historians may in some cases influence the PU of historians using or planning on using these systems. This type of influence has been observed and studied in the context of technology acceptance before, with TAM2 referring to it as "subjective norm", borrowing from TPB (Venkatesh & Davis 2000), and with UTAUT calling it "social influence" (Venkatesh et al. 2003). Here, it is from now on referred to as the subjective norm, borrowing from TAM2. Simply put, the subjective norm refers to the subject's perception on whether the people who are important to them think they should or should not perform a behavior (Venkatesh & Davis 2000, Venkatesh et al. 2003).

Despite the various issues the subjects described having experienced, these systems were nonetheless considered important tools by the majority of the subjects and downright invaluable by some. Especially younger historians found themselves increasingly reliant, work-wise, on these systems, something that the concluding quote of this subchapter underlines:

In general . . . I probably wouldn't be here studying this topic – or at all – if those [digital] archives didn't exist. And I know that many others wouldn't be, either. Now we just need more of them.

### 5.3 Findings

Through the interviews, and analyzing the interview data, I have gathered 21 factors affecting PU and PEOU in the context of historians using historical record database systems. These factors were discussed more in-depth in the previ-

ous subchapter. In this subchapter, these 21 factors are analyzed further in order to narrow them down into a more concise, as well as the final, form of presentation. Following this, the final list of factors will be discussed from the point of view of its practical implications, providing suggestions for future development of such systems. This chapter, as such, presents the results of the empirical part of this study, and how they can aid practitioners in developing digital historical record database systems.

The subjects were asked various questions relating to their past use experiences of historical record database systems. Through the analysis of the interview transcriptions, the following 21 factors influencing their PU and PEOU of these systems were determined:

- Historical Record Relevance
- Historical Record Quality
- Historical Record Metadata
- Retaining Physical Record Collection Structure Upon Digitization
- Record Collection Comprehensiveness
- Ability to Create Custom Record Collections
- Availability of Original Document in Picture Form
- Availability of Plain Text Document
- Built-In Document Reader
- Ability to Download Records
- Full Text Search
- Search Function Quality
- Search Result Preview
- Search Result Sorting
- Data Analysis Tools
- System Stability
- User Manuals
- Historical Research Skills
- Cross-platform
- UI language
- Subjective Norm

Some of these factors evidently over-lap to such extent that they could, and should, in order to improve the clarity of the presentation, be combined under one, more comprehensive factor. Similarly some of them ought to be presented in a more general fashion to be more in line with the interview data as a whole. This is done below, leading up to the creation of the context-specific version of TAM.

Out of the 21 factors listed, many remain overtly specific while overlapping to some extent, which calls for some refining. The factors “retaining physical record collection structure upon digitization” and “record collection comprehensiveness”, for example, both are related to the way digital record collections are organized inside the systems. Multiple subjects stated that hav-

ing the digital collection navigable in the same fashion as the physical one, e.g. by using tables of contents of the originals, was important to them. However, the subjects spoke of the structure of the digital collection in general as well, including mentions of wanting to create their own customized collections using favourites or bookmarks, and as such it would be more fitting to formulate this factor as “Record Collection Structure” to account for other ways of structuring the collections considered useful. Furthermore, as many subjects expressed concern with how collections were sometimes digitized only partially while leaving the user uncertain of the extent of the digitization. Even though the users were often made aware of gaps in the digitization of entire collections, they considered this to negatively affect their PU. Thus, “Record Collections” as a single factor could be used to include all of these factors, as well as including the possibility of other ways of organizing digital collections that may affect user PU and PEOU.

In a similar fashion, “Availability of Original Document in Picture Form”, and “Availability of Plain Text Document” are closely related. These two factors can be replaced with “Record Format” that refers to format of presentation and file format, as well as includes other as of now unaccounted for forms of presentation that may influence PU and PEOU in some users. This way, the factors “Built-In Document Reader” and “Ability to Download Records” can also be combined under one factor, “Record Accessibility”. Not directly related to file format, this refers to the ways the documents can be accessed using the system; that is, whether the user has to download the records or is able to view them using a built-in document reader, or both.

Another group of closely related system features that are split into numerous different factors are the system features related to the search functionalities. Subjects actively brought up their experiences with the search functions of the systems, including the ways the systems handled the displaying of search results. Based on this data, the factors “Search Result Preview” and “Search Result Sorting” were formulated in the previous chapter. These two factors are both related to search results and how they are displayed in the system and how they can potentially be processed further. As such, they may be combined under a single factor, “Search Result Display”. Along similar lines, “Full Text Search”, due to its importance to the subjects, was originally separated from “Search Function Quality”. However, I argue that for the purpose of presenting the results, using a more comprehensive factor, “Search Features”, is a preferable approach. This is not meant to negate the influence of the availability of the full text search functions, as it is incorporated into the definition for this factor. One could also make an argument for refining these search-related factors further by simply removing “Search Result Display” and including it in the definition of “Search Features”. Here, however, I argue that a clear distinction is in order to not make the model too general. A clear line can also be drawn, from a perspective of system functions, between the search features that are used to perform the search and the actual displaying of the search results.

With these changes, the earlier list of 21 factors has been refined down to 15 different factors. This final list of factors influencing historians' PU and PEOU of digital historical record database systems, including a definition for each of them, is presented in the table below (Table 4).

TABLE 4 Factors Influencing historians' PU and PEOU of digital historical record database systems

No #	Factor	Definition
1	Record Relevance	How relevant the subjects consider the historical records in the system to their work or other possible motivations
2	Record Quality	The quality of the digital records, i.e. readability resulting from resolution, colours
3	Record Metadata	How much metadata is associated with the digital records in the system, and whether or not this metadata is usable in searches
4	Record Collections	How the records are used to create collections inside the system to aid users find them, and is the structure of the physical original collection retained. Whether or not users can bookmark, favourite, or otherwise handle and organized records for their own use inside the system. Additionally, whether or not all records belonging to a collection are digitized.
5	Record Format	What format the records are stored in and available to the users. I.e. file format, and whether or not there's a picture of the original document available in scanned or photographed form, or whether or not there's a plain text version of a text document.
6	Record Accessibility	How the records can be accessed; can they be downloaded, viewed in the system using a built-in document reader, or both? If hyperlinked to, can the link direct the user to a specific part of the record?
7	Search Features	What search options the system offers for searching for records; full text search, time range search, record type search, search by publisher of records etc., as well as how they can be used
8	Search Result Display	How the search results are displayed and what options the users are given for sorting them and otherwise processing them further. Resetting the search results after a certain time had elapsed was considered frustrating by the subjects.
9	System Stability	How stable the system is, i.e. how long the loading times are, and is there downtime.

10	Data Analysis Tools	The availability and quality of tools helping the users analyze search data and other data related to the records in the system.
11	User Manuals	The availability of user manuals and their extensiveness.
12	Cross-platform	Inter-operability on multiple computing platforms, i.e. on both Mac and PC, or on mobile platforms such as Android, and PC.
13	User Interface Language	The language of the system's user interface; whether or not a localized version exists.
14	Historical Research Skills	How well-versed the user is in historical research and its methods, e.g. locating physical historical records inside archives.
15	Subjective Norm	In this context: mainly how the colleagues of the user's technology acceptance in various ways. E.g. how the opinions of the colleagues of the user influence their opinion of the system, or how the technical support or guidance affects their use experience etc.

These 15 factors can be categorized into three distinct different categories: 1) software feature factors, 2) record-related factors, and 3) user-related factors. Following this categorization, the following factors can be considered software feature factors: record accessibility, search features, search result display, system stability, data analysis tools, user manuals, cross-platform, and user interface language. Record-related factors, on the other hand, are record relevance, record quality, record metadata, record collections, and record format. Finally, historical research skills of the user, as well as the subjective norm, fall under user-related factors. While the record-related factors are closely related to the software-related factors, e.g. record metadata needs supporting software features to exist in the first place, record-related factors are also such that they cannot exist, from the point of view of the users, without the records.

As touched upon in the previous subchapter, some of these factors were evidently more important than others based on how often the subjects brought them up in the interviews, and how much emphasis each subject placed on them. Every subject selected systems to use initially based on the relevance of the records in the system, and as such, record relevance was the single most important factor for technology acceptance in this context. If the systems did not contain records the subjects considered useful, they would not adopt the system regardless of how high their evaluations of PU and PEOU otherwise were, as made evident by the two subjects who reported having actively not used any such systems exactly for this reason. Arguably, then, such systems should include records considered useful by many historians. Of course, the research areas of historians are diverse, and no one system can realistically satisfy the needs of all historians. Instead, for example, when digitizing only a part

of a larger collection, the goal should be to prioritize the digitization of historical records most relevant to historical research.

The second most important factor was *search features*. The majority of the subjects reported relying greatly on full text search features capable of searching the body of textual records, and as this is incorporated the search features factor. As such, any such system should aim to offer a full text search capable of searching the textual body of the historical records. In other words, the records should always be OCR-processed, if at all possible. Aside from the full text search, the availability of time range searches based on time of publication or record creation is an important search option. Additionally, the ability to search for records based on record type (e.g. searching for pamphlets) is of interest to historians.

Search features as a factor is closely intertwined with *record metadata*, given that the record metadata directly influences the ways the records can be searched for in the system. Consequently, record metadata was an important factor in determining technology acceptance in this context. While rarely directly touched upon by the subjects, they nonetheless indirectly approached it from the point of view of search options, which the metadata makes possible. In practice, the more metadata is associated with the records, the more search features the system can offer based on the metadata, and the more search options the system offers, the better.

Notably, however, the subjects felt that the systems were at times trying to be 'too smart'. Despite searching for a specific record using its exact title, the systems would not always find that particular record, choosing to instead display other results of supposed relevance. Historians preferred simpler search functions that worked as intended as opposed to more diverse search functions that at times impaired with their objectives. Thus, the addition of more search features must be weighed against the potential loss of ease of use resulting from the increased amount of search options.

*Record collections* were also considered an important way of locating digital records in these systems. For the most part, historians wished to see digitized record collections being organized in the same way the physical originals were organized. This was because of the way it allows historians to handle the digital records in the same way they would handle the physical ones, employing their skills as historical researchers to find digital records inside online collections. In the event that full text searches were not possible, historians often used the structure of the digital collections to locate records instead. In most cases, this meant navigating a digitized collection based on the structure of the physical, original collection. Digitized historical record collections should, based on these findings, be organized so that the the structure of the physical collection is retained.

Just as the ways the records could be searched for was considered important by historians, historians also placed much weight on how the search results were displayed to them, i.e. *search result display*. The ability to determine the relevance of the records as well as possible without having to view each in-

dividual record as a whole was considered highly desirable among historians. In the case of full text search, for example, being able to see the context in which the words appeared in was considered especially helpful in determining the relevance of the results. Generally, any information that helped historians evaluate the contents of each record returned by the search without having to view them individually was considered to make the system easier to use. Not having to go through the records individually saved the subjects a lot of time. In addition to passively viewing the search results, historians often wanted to sort them in different ways (e.g. relevance, alphabetic order, date of publication etc.).

The subjects also underlined the importance of *record quality* from various perspectives during the interviews. Many subjects reported having had problems with grainy, low-resolution digital images produced from microfilms that themselves had been low-resolution and grainy, for example. These quality problems often cumulated when the OCR-processing of the low quality documents produced lackluster results or was forgone altogether because of technical difficulties resulting from the quality issues, which resulted in either there being no possibility to search through the text body of the text records, or the full text search working poorly. Record quality can be assured in practice by digitizing records using the original records rather than microfilms or any other copies made of them, and by using a high quality camera or scanner to do so. The digitized versions should also not be black-and-white, but include colors to make sure they remain easy to read for both users and OCR software.

As for possible ways *accessing the records*, historians expressed interest in both being able to download the records, as well as being able to view them directly in the system using a built-in document reader. Some subjects generally preferred one or the other, but liked to have both options nonetheless available to them. The ability to download records from the system was mainly considered important because of how it allowed the users to make sure they would always have access to the records even if the system stopped existing in the future. On the other hand, the ability to view the records inside the system was considered important because of how it allowed historians to quickly browse through the records without needing to first download them. Digital historical record database systems should therefore provide both options for accessing the records.

Similarly, when it came to textual records, the users generally preferred having a scanned version of the original record available, along with a plain text version that made it possible to search for strings of symbols inside the record. While the plain text versions were considered easier to read, historians presented various arguments for including scans of the original records. Firstly, having a scanned copy of the original allows the users to double-check that the plain text version is error free. Secondly, the plain text versions may end up omitting some information found in the original records, such as small, handwritten additions in the marginal of a page. Such things can be seen when viewing a scanned version of the original record, however. Practitioners should thus aim to provide both a plain text version of the textual records as well as a



scanned version of the original physical records, while prioritizing the scanned versions if they have to choose one or the other.

On multiple occasions, the subjects cited frustrating experiences with systems either not working at all or working too slowly for their liking. For example, a recent incident where the Historical Hansard system experienced a period of downtime lasting multiple months was often brought up in relation to system stability issues. *System stability* issues result in a loss of time waiting for the system to work, resulting in negative use experiences. Naturally, practitioners should try to ensure that the systems are stable and perform adequately to minimize user frustration resulting from stability issues. Any such issues should be fixed with utmost urgency upon their discovery.

Contrary to the general perception of *user manuals* in relation to information systems, the subjects hoped for more extensive manuals and guides for these types of systems. The need for these manuals stemmed mainly from the search features of the systems that were often considered unintuitive. Though this consequently raises the importance of the search features factor further in relation to PU and PEOU, it does nonetheless point to user manuals being an important factor of especially PEOU. This finding conflicted with existing IS literature, which generally holds the belief that users do not like reading manuals (Novick & Ward 2006). Based on my findings, it is possible that users of highly specific systems, such as digital historical record database systems, do in fact not only hold an interest in manuals, but wish to see more detailed manuals as well.

The remaining factors, i.e. cross-platform, user interface language, data analysis tools, as well as subjective norm, were considered relatively minor in importance by historians. *Cross-platform* functionality, while potentially helpful, was not often discussed by the subjects. As historians mostly work using office and home PCs, the availability of mobile versions of the systems was not often desired by the subjects. However, in the future the importance of mobile technology may also increase further in this context. Even at present, historians may sometimes wish to access historical records while, for example, travelling and using a tablet computer. Practitioners may thus wish to make their systems work on various mobile devices as well, taking future trends into account in the process.

As for *user interface language*, having either an English version or a localized version of the systems available may increase the PEOU of historians using the system. Naturally an historian would have to know the language the records are written in to be able to effectively use them, but even so being able to use the systems in English or their native language may serve to make the use experience better. Similarly, user manuals for the systems should also be provided in English. On the other hand, some historians would rather use the systems in their original language despite having a localized version available to them. As such, the systems should ideally include different language options the users may choose from.

*Data analysis tools* were something historians wished to see more of. Given that most systems the subjects had used did not offer any notable tools for analyzing the data, they were considered a welcome potential addition, but at the same time their absence was rarely lamented. Such tools would include automatically generated graphs portraying, for example, the amount of occurrences of a search term by year, or tools for handling quantitative data inside the system in various ways. In some cases, there may be data stored within the system in the form of large tables, and providing the users with tools for analyzing these types of data can considerably improve their use experience.

*Subjective norm*, then again, appeared to primarily have an effect on which systems the subjects were aware of, as knowledge of digitized collections was often shared between co-workers. Though at times historians no doubt share bad use experiences with their colleagues, the subjects did not consider subjective norm to have had a notable impact on which systems they eventually chose to use. Additionally, the subjects felt that their understanding of the academic historical research practices made these kinds of systems easier for them to use. Building on this, arguably involving historians or systems developers with an understanding of academic historical research is likely to be highly beneficial from the point of view of the technology acceptance of historians.

To what extent these factors influence PU, PEOU, or both, cannot be fully determined based on qualitative data alone. The aim of this thesis was to elicit such a list of factor through interviews. Refining it further by determining which factors affect PU and PEOU and to what extent is something I will address in future research through a quantitative survey. For now, it is nonetheless possible to create preliminary hypotheses of which factors affect PU, which factors affect PEOU, and which factors affect both, and to what extent. As an example, the relevance of the records is purely a factor for PU. If the records are not relevant for the historian, the system is largely perceived to not be useful. Expanding on this, content related factors, that is, record related factors in this context, primarily affect perceived usefulness. For the system to be useful, its information contents (i.e. the historical records) have to be considered useful. On the other hand, software feature related factors primarily affect perceived ease of use, as they determine how easy said content is to access. Thus, factors likely to affect PEOU are the software feature factors, factors 7 through 13. The factors likely to affect primarily PU are the record related factors, factors 1 to 6. Finally, the user related factors affect both PEOU and PU, with the subjective norm primarily affecting PU (Venkatesh & Davis 2000), and historical research skills affecting PEOU. However, these hypotheses must be confirmed through quantitative research in the future.

Nonetheless, for the presentation of the results of this thesis, the original layout of TAM is retained, with the factors added onto the unspecified “external variables” which Davis (1985) argued affects both PU and PEOU, rather than making a hypothetical distinction between factors influencing PU, factors influencing PEOU, and factors influencing both.

We now have 15 external factors affecting PU and PEOU in a specific context, sorted into three distinct categories. Below, these factors are inserted into TAM to create a version of it fitting of this one specific context (Figure 7). The findings are in line with the original version of the TAM, determining what exactly the external variables affecting user PU and PEOU in this context are.

Notably, this thesis observed the influence of the subjective norm on the PU by historians using, or considering the use of, digital historical record databases. While not present in the original TAM, subjective norm was adopted into TAM2 from TPB (Venkatesh & Davis 2000). In a similar fashion, subjective norm was incorporated into this model as an antecedent for PU, as was the case in TAM2 (Venkatesh & Davis 2000). Furthermore, historical research skills as a factor was determined to exclusively influence user PEOU based on the data analysis, as is reflected in the model below (Figure 7).

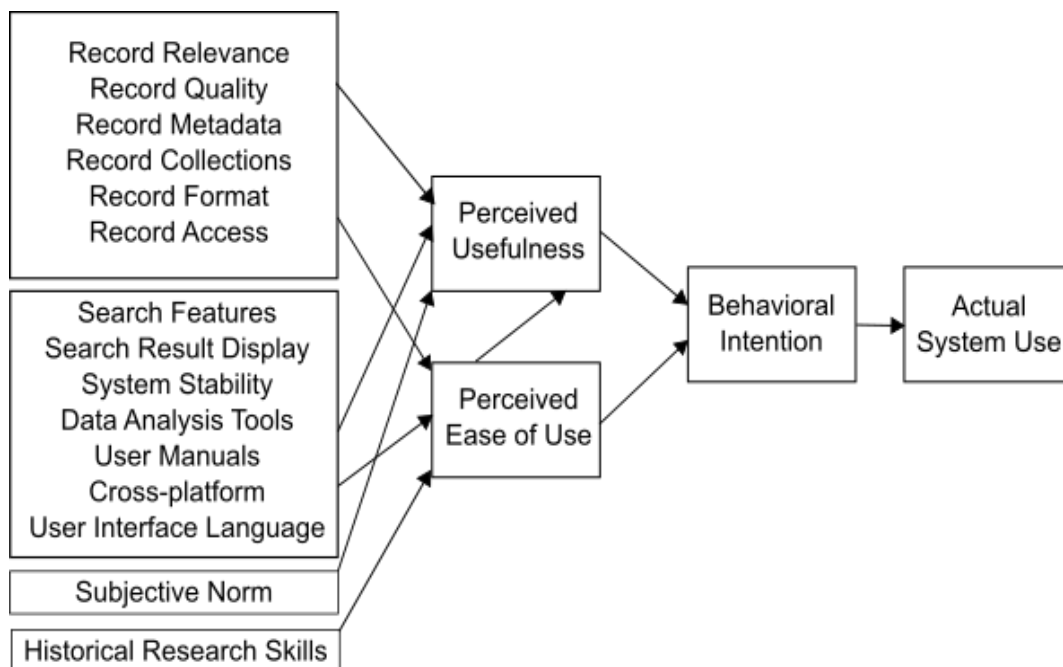


FIGURE 7 TAM with specified external variables explaining technology acceptance of historians considering the use of digital historical record database systems

This model was created using the revised version of TAM. The fashion in which the factors were included in the model was reminiscent of the design features 'X1', 'X2', and 'X3' of the original TAM (Davis 1985). As discussed, these factors affecting subject PU and PEOU were split into three categories based on their type: 1) software feature factors, 2) record-related factors, and 3) user factors, as denoted by the way they are split in the model (Figure 7). Additionally, the subjective norm was included into the model as an antecedent of PU, based on how it was included into TAM2 from TPB by Venkatesh and Davis (2000).

This version of TAM can be used to effectively explain technology acceptance of historians using, or considering the use of, digital historical record

database systems. It explains in detail what factors truly influence the perceived usefulness and perceived ease of use of historians in practice, whereas the original TAM does not go into detail as to what PU and PEOU really mean in practice. This model replaces the vague “external variables” of the revised TAM with an extensive list of factors affecting both PU and PEOU in this system use context. System developers may use this model in conjunction with an in-depth understanding of the system related factors included in it to improve their digital historical record database systems.

Out of the factors included in this TAM, the most crucial one in predicting technology acceptance in this context was record relevance. Historians would choose to not use systems mainly when the records were considered irrelevant. Other cases of users not adopting a system were mainly a result of dissatisfaction with the search features, or the way the search results were displayed. Some subjects reported not adopting a system simply because of the lack of a full text search possibility, while some reported a wider range of issues resulting in not adopting the systems. For example, one user reported not adopting a system due to a combination of lacking search features, system instability, and search result display issues.

Ultimately, however, the interview data can provide but an estimate of the relative importance of these factors for historians’ PU and PEOU of these systems. Due to the relatively small sample size, as is typical for the qualitative interview as a method, quantitative testing is in order to ascertain the relative importance of these factors. These results do nonetheless explain comprehensively what historians consider important in systems created for storing digital historical records in order to make them available to the public online. The results are comprehensive, as a saturation point was reached in the interview data after just ten interviews, after which five more were conducted. However, the findings do have their limitations, as will be discussed in the following chapter, the discussion section. The discussion will also reflect on them from the point of view of existing knowledge and their contribution to it.

## 6 DISCUSSION

This chapter is dedicated to discussing the findings of this study. The results of the data analysis from the preceding chapter are discussed in relation to the research problem of this paper, as well as from the point of view of existing research. Secondly, the findings are also discussed in relation to their contribution to IS and historical research, as well as their contributions to practice. Finally, the implications of this study are discussed from the point of view of potential future research directions.

This study was conducted to better our understanding of historians' needs as users of digital historical record database systems. Many historians find themselves at odds with these systems, and at the same time find themselves at a loss on how to make their views heard for those who develop these systems. Some have taken to writing about their experiences through various channels (e.g. Spedding 2012, Kuny 1997, Cohen 2004), while some have attempted to provide feedback to the system administrators, and some simply keep their use experiences to themselves or discuss them with their colleagues in private. Motivated by this very specific context of technology use, the research problem posed for this study was formulated as follows: "What makes a digital historical record database system useful and easy to use for historians?". As little prior academic IS research exists on the topic, the findings of this study offer valuable insight especially for practitioners working on such systems.

This study was conducted in an empirical fashion, using the qualitative interview as the data collection method. Historians were interviewed in a semi-structured fashion, with the interviews focusing on their past use experiences with such systems. Based on the interview data and its analysis, the research problem has been answered. Fifteen different factors, listed below, were determined to be of varying importance to the perceptions of usefulness and ease of use experienced by historians using systems of this type:

- Record Relevance
- Record Quality
- Record Metadata

- Record Collections
- Record Format
- Record Accessibility
- Search Features
- Search Result Display
- System Stability
- Data Analysis Tools
- User Manuals
- Cross-platform
- User Interface Language
- Historical Research Skills
- Subjective Norm

As prior academic research on digital historical record database systems is scarce, this thesis offers novel scientific knowledge on what makes historians, the single most important group of users for digital historical record database systems, consider these systems useful and easy to use. While new, these findings do not generally conflict with or contest earlier technology acceptance research. This is not unexpected, seeing as though other modified versions of TAM fitted into specific use contexts exist (e.g. Kim & Park 2012, Lai et al. 2008, Phan & Daim 2010), they cannot, at least fully, be utilized in this context, much like this model cannot be removed from this user and system context while retaining its predictive power. As such, these findings cannot be fully compared with other such modified versions of TAM created by scholars from varying disciplines. Furthermore, they also do not contest the original TAM. Instead, the findings of this study explain in detail what the antecedents for PU and PEOU, simply “external variables” in the revised original TAM (Davis 1985, Chuttur 2009), in this context are. As a result, the findings of this study serve to explain in-depth what really affects historian PU and PEOU of digital historical record database systems in practice, helping practitioners develop better such systems.

The interview questions of this thesis did not directly focus on PU and PEOU as constructs, but rather, took on a more general approach in focusing on past use experiences. The subjects narrated their use experiences with digital historical record databases and evaluated what they considered to have made those experiences positive or negative. For example, the subjects were asked if they had faced any problems in using such systems, and were asked to describe those problems in detail in case they had. This data was then analyzed from the point of view of their perceived usefulness and perceived ease of use, using these constructs as a framework for the data analysis.

This study presents a multi-faced contribution. In terms of its theoretical contributions, this study contributes towards the already quite extensive corpus of TAM-based research. Notably, it tackles two criticisms directed towards TAM: the lack of qualitative research on TAM, and the lack of research studying what PU and PEOU mean in practice (Silva 2007, Bagozzi 2007). The goal of this study was exactly to explain what PU and PEOU mean, albeit in a technol-

ogy-wise and user-wise rather specific context, and it did so in a qualitative manner. The more general theoretical impact of this study nevertheless remains relatively small due to its context-dependent approach to TAM. Its findings are not intended to be applied to other types of systems or groups of users. At the same time, it explores a new research direction in combining historical research and IS research.

The most important contribution of the findings of the study is their practical contribution. These findings offer a valuable insight on what makes digital historical record database systems useful and easy to use for historians, and, consequently, what makes historians use these systems. Though these findings may also be of interest to historians themselves, they are primarily aimed at practitioners that are working on these types of systems, or those that will be working on them in the future. Using these findings as guidelines for systems development of these types of systems, they can be made more useful and easier to use for historians, which in turn will help them perform historical research of various types. The guidelines for practitioners drawn from the findings of the thesis were discussed in-depth in the findings subchapter preceding this chapter.

Based on the findings of this thesis, it can well be argued that historians should be closely involved in designing digital historical record database systems. Historians as users have user needs that are not easily understood without an in-depth understanding of the practices of academic historical research. While user involvement in systems development may not always be beneficial at all or may be minimally beneficial at best in some cases (He & King 2008), the findings of this study suggest that involving historians in the development process may provide large benefits. Aside from simply involving historians in the development process, involving system developers with an in-depth understanding of academic historical research can provide even further benefits to eventual historian PU and PEOU of the system.

These findings, though comprehensive and novel, are not entirely conclusive. While a saturation point was reached through the interviews, some limitations for the findings remain. First, this study took on a very system feature-focused approach, leaving possible demographic and social factors largely out of its scope. Past research has shown that demographic factors such as age, IT proficiency, or gender may play a role in the users' perceptions of a system's ease of use (Venkatesh et al. 2003, Venkatesh et al. 2012, Venkatesh & Davis 2000). Unless specifically brought up by the subjects themselves, user-related factors, such as demographic and social factors, were not focused on in this study.

Some user related factors were in fact brought up by the subjects, many of whom reported that their historical research skills had influenced their ease of use of the systems; e.g. knowing archival practices made using digital archives easier as well. This was accounted for in the model. The subjects also mentioned that they had had various conversations with their colleagues about these systems, primarily from the point of view of new collections that have been digit-

ized, or new collections that may soon be available online. One subject explicitly stated that they may, in the future, ask a colleague for help in using one system they considered difficult to use. Such social influence was addressed through the inclusion of subjective norm, drawing from the TPB of Ajzen (1991), and the TAM2 by Venkatesh and Davis (2000), based on the data collected. Subjective norm in this context accounts for the interaction between colleagues that in some cases resulted in the subjects becoming aware of and ultimately adopting new technologies.

Similar to the way social influences were not directly studied, demographic variables were also not directly focused on in this study. Past research on the effect of demographic factors on technology acceptance has been quite general in nature (e.g. Venkatesh et al. 2003, Venkatesh & Davis 2000), making these past research findings also applicable to the context of this study. For example, age seemed to have relatively little effect on the extent of the system use of the subjects. Both younger and older historians reported primarily using both physical and digital sources, and both groups used digital records in similar ways. Two younger historians stood out by stating that they used digital historical records as their primary sources practically exclusively, and that they only used systems in which full text searches were possible. This may point to a shift in research practices between generations of historians, with some younger historians perhaps preferring different research methods that employ these systems differently. It should be noted, though, that the older subjects also made use of the full text search features of the systems to perform similar research at times, but their research topics were not as strongly influenced by its availability or lack thereof. This may simply be a result of different levels of professional attitude between the age groups, however, with younger historians on average being more inclined to choose the approaches they perhaps perceive as requiring less effort than their older, more experienced counterparts. Future research should nonetheless aim to study their influence in this particular context, comparing it to the existing literature and its findings.

The second limitation of the findings is, as of now, the lack of quantitative data. This study took on a qualitative approach to determine various factors that would make a digital historical record database system easy to use and useful for historians. However, the relative importance of these factors cannot be accurately determined by qualitative data alone. Data such as how many subjects brought up each factor, or how much emphasis the subjects placed on each factor when bringing them up, does give an estimate of the relative importance of each factor included in the list. While this data can be, and was, used to determine the most important factors on the list, i.e. record relevance and search features, the relative importance of all 15 factors cannot be accurately assessed. Using quantitative data the factors can be ranked based on relative importance in future research.

The third limitation of these findings stems from the sample. As discussed in the interview protocol section, the sample itself had some shortcomings associated with it. Demographically, the sample could have been more diverse:



most interviewees were under the age of 40, and no senior users above the age of 60 were included in the sample, and only 5 out of 15 interviewees were female. Diversifying the sample in terms of age and gender is unlikely to have changed the list of factors generated by this study, however. On the other hand, a perhaps more relevant factor to note about the sample is the fact that all of the subjects were historians working in the University of Jyväskylä Department of History and Ethnology. As a result, this sample cannot account for cultural factors, for example. The subjects all being co-workers may also have affected which systems they chose to use, which on the other hand may have affected the findings as they were primarily based on the past use experiences of the subjects. Following this logic, it is possible that by repeating this study in another country, some additional factors affecting PU or PEOU may be discovered, though I nonetheless argue that these factors are highly independent of culture and geographical location.

Acknowledging the limitations of these findings, future research on the topic should aim to address them. The shortcomings of the sample would be best addressed by repeating the same study with a different sample in order to validate it in the process. More importantly, however, these findings should be studied further by approaching them from a quantitative perspective. With a list of factors such as this available, this list could now be used to sort these factors by their relative importance, e.g. by asking historians to sort them based on their own perceptions as system users. Though how often the subjects spoke of these factors in the interviews is already an indicative of their relative importance, it cannot be used to make in-detail claims. Quantitative research approaches could also be used to study the effect of demographic and social variables in this context of technology acceptance by, for example, using the already tested demographic and social variables of TAM2 (Venkatesh & Davis 2000) or UTAUT (Venkatesh et al. 2003) as a framework. The next step for me is to build on these findings and refine them using quantitative methods.

To summarize, though this study has its limitations, it nonetheless presents both a theoretical contribution as well as a practical contribution. As for its theoretical merits, it addresses some of the criticism directed at TAM. Notably, it approaches TAM in a qualitative manner whereas TAM is generally studied quantitatively. Furthermore, it explores a new research direction with its interdisciplinary approach combining general historical research with IS research. Its primary contributions, however, are its contributions to practitioners. By making use of the findings of this study, practitioners are able to better develop digital historical record databases that meet the needs of historians. Having comprehensively elicited software feature and content related factors affecting historians' PU and PEOU of digital historical record database system, this study achieved its intended contributions.

## 7 CONCLUSIONS

As IT becomes ever more prevalent in our society, academic research, too, is affected in many ways. Historians use IT in various ways to conduct their research, with one of the most prevalent changes of the past few decades being the growing amount of digitized or born-digital primary sources historians use for their studies. This development is closely related to information system development as well, as these digital historical records are uploaded into various online databases for public use. Though numerous projects are continuously undertaken to digitize old records, historians often report poor use experiences with the digital historical record database systems these digitized records are eventually uploaded into after their digitization. These systems have remained largely unstudied despite the dissatisfaction often expressed by historians.

I approached these digital historical record database systems from the point of view of technology acceptance, aiming to explain what factors make these systems easy to use and useful for historians. In tackling this research problem, the focus of this study was primarily on factors related to system features, and as such TAM was used as the background theory through which the data was interpreted. As the contributions of this study were intended to be primarily practical in nature, aimed at helping practitioners design better such systems, software-related and factors related to the records, or information and data, were chosen as the main focus in terms of determining factors influencing the perceived ease of use and perceived usefulness, and consequently technology acceptance, among historians using these systems. Nevertheless, user-related factors, where observed, were also included into the findings and discussed.

This study was carried out using a qualitative, empirical approach to TAM. First, two literature reviews were conducted: one for literature on digital humanities, digital history, and digitization of historical records, and one for TAM-related and other technology acceptance related literature. The goal of the first literature review was to 1. Explain the construct of Digital Humanities and Digital History, 2. Explain how information technology has changed historical research, 3. Identify benefits of digitizing historical records, and 4. Identify how historical records could be digitized to best benefit historians using them for

academic research. The goal of the second literature review, on the other hand, was to 1. Find literature testing TAM in different contexts, 2. Find literature criticizing TAM, 3. Find literature otherwise discussing or focusing on TAM, and 4. To justify choosing TAM for this study over other technology acceptance related models.

Following the literature reviews, an interview protocol was created, and a set of semi-structured, qualitative interviews was planned and carried out with historians. The aim of the interviews was to elicit, primarily system feature related, factors that influence the perceived ease of use and perceived usefulness of historians using digital historical record database systems. Fifteen historians were interviewed for this study using a set of pre-planned questions as a guideline to direct the discussion.

The interview data was coded and analyzed in order to determine factors influencing historian PU and PEOU of these systems. The following fifteen different factors were determined to influence historian PU and PEOU.

- Record Relevance
- Record Quality
- Record Metadata
- Record Collections
- Record Format
- Record Accessibility
- Search Features
- Search Result Display
- System Stability
- Data Analysis Tools
- User Manuals
- Cross-platform
- User Interface Language
- Historical Research Skills
- Subjective Norm

Using the list of factors determined through the interview data analysis, the Technology Acceptance Model was modified to fit this particular context by including these fifteen factors into it as antecedents for PU and PEOU. Based on the findings, common issues with digital historical record database systems were identified, and detailed guidelines were given to practitioners developing these systems. The modified version of TAM may be used in the future by practitioners to create better digital historical record database systems. The findings of the study were considered comprehensive because the interviews reached a clear saturation point.

However, the results cannot be considered conclusive. Due to the focus placed on software feature and content related factors, the influence of possible demographic and social variables was not actively studied. The influence of factors other than ones related to software features or data and information,

primarily social factors, was observable based on the interview data as well and was addressed in the study where observed. It is thus possible for other such factors to have remained unobserved in this study. As far as software feature and content related factors are considered, though, the findings were highly comprehensive, if not conclusive. Based on the findings of the study and their limitations, I highlighted relevant future research directions in this research area.

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## LIST OF ABBREVIATIONS

AHA	The American Historical Association
ECCO	Eighteenth-Century Collections Online
EEBO	Early English Books Online
EJIS	European Journal of Information Systems
IT	Information Technology
IS	Information System(s)
ISR	Information Systems Journal
JAIS	Journal for the Association of Information Systems
JIS	Journal of Information Systems
JMIS	Journal of management Information Systems
MISQ	MIS Quarterly
MM	The Hierarchical Model of Intrinsic and Extrinsic Motivation (aka Motivational Model)
OCR	Optical Character Recognition
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology