MASTER THESIS

Building a Future for the Past

The Sustainability of Digital Archiving Processes
in Audio-Visual Cultural Heritage Organizations

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Abstract

This thesis aims to explore both theoretical and practical implications of sustainable digital archiving processes in organizational contexts. First, the theoretical discourse on digital archiving and digital sustainability is examined. In the scope of this theoretical assessment, the transforming role of archives in digital culture is discussed. Furthermore, four major factors that affect digital sustainability are identified: technical, social and economic factors, as well as the incorporation of user considerations. To incorporate a practical outlook, the theoretical framework is complemented by an ethnographic single-case study. Applying participant observation and document analysis as data collection methods, a practical digital archiving project of an audio-visual cultural heritage organization is investigated. To analyze the evidence that was collected for this investigation, a qualitative content analysis based on Mayring (2000) serves as the method for data analysis. The research approaches the complex interrelations and interdependencies within digital archiving processes to find out, how digital sustainability is manifested within a practical project. All in all, sustainable digital archiving requires both an appropriate technological infrastructure and an ongoing, systematic management of digital records as well as a secured, sufficient plan for funding. Furthermore, a thorough knowledge management system, which includes instructions for all workflows of the digital archiving process, can support a sustainable organizational infrastructure, while considerations of diverse user expectations and requirements become more and more relevant as well.

Keywords: digital media, digital archiving, digital sustainability, audio-visual heritage, cultural heritage organizations, ethnographic single-case study, participant observation.

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1 Introduction

"Today, the will to archive is a powerful impulse in contemporary culture" (Featherstone, 2006, p. 595). With this statement, the British sociologist Mike Featherstone refers to the increasing importance of archiving practices in both professional and personal contexts. Art historian Charles Merewether articulates a similar observation: "One of the defining characteristics of the modern era has been the increasing significance given to the archive as the means by which historical knowledge and forms of remembrance are accumulated, stored and recovered" (2006, p. 10). To preserve, archive and present cultural heritage and knowledge has always been a major objective and challenge in human history. However, with the development of advanced new media technologies, the traditional notion of an archive as a secret place with centralized structures and gatekeepers has changed (Featherstone, 2006, p. 591). New types of digital archives arose within dynamic web interfaces, based on decentralized structures and dealing with digital devices of various types (Featherstone, 2006, p. 595). Digital archives play an important role in diverse contexts. Libraries, cultural organizations and institutions are facing the challenge to create and adjust digital archives in order to respond to transforming archiving processes and meet the demands of their audiences. Hence digital archiving is an interdisciplinary concept, involving research traditions within archivistics, sociology, informatics and media studies.

Considering the rapid technological development of electronic storage media, new challenges for archivists emerge. With a vast multitude of different storage formats, the long-term preservation of electronic records becomes even more difficult, as "technology changes and compatibility becomes an issue" (Beer, 2013, p. 48). Featherstone describes the rapid technological progress as a major challenge in archival context, as he states that "the will to archive runs up against the speed and flexibility of the technologies" (2006, p. 595). In this context, the concept of sustainability is emerging to become an integral part of archival discussions. Generating a plan for the sustainable, long-term preservation of electronic archival records is getting increasingly complex, especially for cultural heritage organizations, which mostly do not have adequate resources to meet the demands for sustaining their archival material.[1] Which data formats are most sustainable to preserve digital content? How

[1] In the present thesis I will focus on audio-visual cultural heritage organizations, however, to some degree the analysis is transferable to libraries, museums and other institutions that are dealing with similar issues.

has the role of an archivist changed? And how can financial obstacles be overcome? These are just a few issues that are linked to digital archiving processes, entailing technical, social and economic implications that are all closely intertwined with the concept of sustainability.

In his paper "Defining Digital Sustainability", Kevin Bradley (2007), a world expert of digital preservation, approaches the concept of *digital sustainability*. In a broad sense, he defines digital sustainability as a concept that encompasses "the wide range of issues and concerns that contribute to the longevity of digital information" (Bradley, 2007, p. 151). According to Bradley, the process of digital preservation and archiving is based on the aspiration to sustain digital content for future generations, which is why it involves considerations regarding "the overall life cycle, technical, and socio-technical issues associated with the creation and management of the digital item" (Bradley, 2007, p. 151). Hence not only the cultural value of digital archiving is a relevant research subject, but also the more practical question of how to plan, organize and implement digital archives in a sustainable way. Digital sustainability connects a broad range of research approaches and practical issues, however, there is one point of intersection: the question of how to assure continuity when preserving and archiving digital content. This question lies at the core of digital archiving theory and refers to the high complexity of digital archiving processes, as they involve the merging of three dimensions: what has been, what is now and what will be. Past and present cultural heritage needs to be preserved and archived for contemporary culture as well as for future generations. It is this temporal dimension that makes the concept of sustainability highly relevant for both digital archive practitioners and researchers and thus constitutes the basic research interest of this thesis. Milad Doueihi, who holds the Chair of Research on Digital Cultures at Laval University in Quebec, emphasizes the importance of incorporating the temporal dimension of sustainable digital archiving in a balanced way: "Digital archiving is not only about converting the record of the past into digital form, not only about preserving the digital present: it is also about the future: a future of access, of relevance, and of freedom" (Doueihi, 2011, p. 142). Based on this temporal dimension, the present research acknowledges the fact that digital archiving is not limited to isolated features such as technical or economic aspects, but that it is crucial to embed it within a broader framework by incorporating the temporal dimension of future accessibility.

1.1 Problem Statement

As the previous section has shown, the long-term preservation of electronic archival records is a critical issue in the context of digital archiving. Yet besides Bradley's work on digital

sustainability, there is a lack of research that incorporates the concept of sustainability into archival theory. Furthermore, existing research mostly focused on the sustainability of digital preservation strategies, neglecting other essential components of digital archiving processes that could be optimized in terms of sustainability. In order to fully comprehend digital archiving processes, more balanced research approaches are required, investigating both external and internal factors that affect digital sustainability. Besides, most research about digital archiving is limited to theoretical examinations and descriptions, yet delivering practical results is particularly important for archival research, as Ross and Hedstrom argue (2005, p. 322). This thesis responds to this problem, by incorporating a practical case within the theoretical investigation in order to provide a more practical outlook.

Since the term *sustainability* is nowadays used as a buzzword in diverse contexts like marketing and politics, analyzing it in academic contexts entails the challenge to expose its essential meaning. This is especially problematic, since it entails multiple implications. On the one hand, sustainability in the context of digital archiving can have a practical emphasis, including questions about the durability of data carriers. How long does a data carrier survive? How established is a data format nowadays and how valuable might it be in the future? On the other hand, on a rather theoretical level, sustainability can describe a desire, a utopian approach to preserve cultural heritage for eternity. But this desire often involves ambiguity, as there is no clear knowledge about how to achieve this goal. As a result, it might just stay a theoretical desire, while being neglected within the actual, practical process of creating digital archives. Hence the question arises of how archivists deal with the notion of sustainability. And how relevant are sustainability considerations actually within a practical project of digital archiving?

To approach these questions, a broader research perspective is required; a perspective that incorporates the overall process of digital archiving instead of focusing on specific, detached subareas. It appears, however, that such a holistic approach has been neglected so far. Hence investigating digital archiving from a process-oriented perspective is highly relevant and could be valuable for both researchers and practitioners in order to understand the complex layers of dependencies and interdependencies within a digital archiving project. Especially cultural organizations could benefit from this research approach, as most research about digital archiving processes is focused on libraries and museums (e.g. Joint, 2006; Srinivasan, Boast, Furner & Becvar, 2009; Steenbakkers, 2005). A reason for this lack of research can be found in their different task orientation: Archiving is usually not the main objective within cultural organizations, but rather a sub-project that has to be coordinated by

employees that might not have a professional archivist education. Besides, most organizations do not have adequate financial means to commit to a digital archiving project. Nevertheless, cultural organizations are also an important part of contemporary culture and as they face the challenge to digitally preserve and archive their information and content for future generations, it is crucial for them to obtain recommendations and guidelines about how to organize a digital archiving project in a sustainable way.

1.2 Research objective and methodology

Based on the overall problem statement, the main objective of the present thesis is to establish a theoretical discourse on the sustainability of digital archiving processes within cultural organizations. Hence, I will explore the following research questions:

1.) Which factors affect the sustainability of digital archiving processes?
2.) How do audio-visual cultural heritage organizations negotiate sustainability considerations within a digital archiving project?

The first question aims to establish a theoretical framework, embedding the concept of sustainability within the context of digital archiving processes. To answer the first question, I will define essential concepts and factors, reviewing relevant literature and providing an overview of the current state of the art. How are digital archiving processes constituted? And to what extent can the concept of sustainability be incorporated into these processes? These are the fundamental subquestions that will guide the argumentative structure in the first two theoretical chapters.

The second question has a rather practical outlook and thus requires an empirical methodological approach. It aims to investigate, whether cultural organizations are aware of sustainability issues when planning a digital archive. How do they include sustainability considerations within a practical project? To what extent is there a gap between theory and practice, between aspirations and reality? Or is digital sustainability just a theoretical concept that has not found its way into real-life digital archiving processes yet? To answer these subquestions, I will conduct a case study research of the audio-visual digital archiving project *the Impakt Channel* to explore the organizational workflows within a practical digital archiving project and the role of sustainability within these processes.[2] Impakt is an

[2] Remark: The case study is the result of a research internship at Impakt that I completed in the scope of the Masters program *New Media and Digital Culture* at Utrecht University. More information about this internship can be found in appendix A.

organization based in Utrecht, the Netherlands, which deals with contemporary video art and is currently in the process of transforming their physical archive into a digital archive.

Yin describes the basic methodological characteristics of a case study as follows: "A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (2009, p. 18). Hence a case study suits the explorative character of the present thesis, as it allows for an open, broad investigation of a research topic, which has not gained much attention in previous research. Kromrey describes exploration as an in-depth, deductive investigation of a research problem (2000, p. 67). To collect data for this explorative approach, participant observation was chosen as the main qualitative data collection method to gain insights into internal processes and developments within the Impakt Channel project. Participant observation is an ethnographical method, which is defined as an open-ended, flexible research process, in which "researchers go into the field to gain knowledge about activities, beliefs, values, relationships and interests so that they may learn more about how others make sense of their everyday lives" (Brennen, 2013, p. 163). It is thus an efficient method to identify and analyze the complex workflows within cultural organizations that work on building digital archives, while considering the concept of sustainability. As a research intern, I was able to participate in the daily routines and practices of the Impakt Channel team and thus to observe to what extent the notion of sustainability was manifested within the individual stages of the project. To increase the validity of my research, the data collection process was complemented by a document analysis, in which I analyzed relevant, official documents I obtained from Impakt. This type of validity is also referred to as data triangulation, which implies the use of two or more sources of evidence (Yin, 2009, pp. 116-117).

The overall research design and the specifications of the chosen data collection and analysis methods will be explained thoroughly in chapter four. I chose a qualitative research approach, as it indicates a high degree of openness towards the research field and also includes subjective experiences (Reinders & Ditton, 2010, p. 50). This is essential to understand the interwoven, complex decision-making processes within digital archiving projects.

1.3 Academic and socio-cultural contributions

Based on the research interest and methodological approach, the present thesis offers both academic and socio-cultural contributions. The academic contribution lies within the socio-

technical, process-oriented approach to investigate digital archiving processes in terms of sustainability. So far, most of the research has been focused on isolated, specific aspects, for example technical, social or financial aspects, failing to embed it into a broader perspective. As a process-oriented approach has been neglected so far, it could provide a new understanding of interdependencies within digital archiving processes and, on a broader scale, digital culture in general. David Beer argues that a better understanding of archival processes can provide valuable insights into control and power structures of contemporary digital culture:

> The concept of archives can be used to explore the ordering of data in digital culture and to ask who controls them, what is stored, how it is accessed, how it is managed and so on. Using the concepts of archives allows us to see these processes more clearly and reveals the stages that allow data to be held or directed in different directions. (2013, p. 41)

As digital information circulates online with no direct analogue source, the question arises of how this information is selected, organized and structured.[3] This question is increasingly relevant as culture does not exclusively depend on physical storages anymore (libraries, museums, etc.), but also incorporates virtual archives, which move away from a physical place to store records towards a virtual space facilitating immediate data transfer (Featherstone, 2006, p. 595). Hence a better understanding of digital archives can lead to a better understanding of culture in general, as Beer argues: ". . . in order to explore the significance of cultural data flows, we need first to understand how these flows are organised" (2013, p. 60). With its practical outlook, this thesis aims to contribute to a better understanding of archival processes within digital culture. Besides, sustainability still remains to be an abstract, theoretical concept, which is hard to grasp and implement in practical projects. Thus a more practical approach, aiming to identify concrete factors and issues, constitutes an essential step towards the optimization of digital archiving processes. As digital archives are important tools for researchers, their optimization can have positive effects on research and science in general, as archival information is not only easier accessible, but also sustained for future research. Furthermore, there is also a socio-cultural contribution, as there are many cultural organizations comparable to Impakt that are facing similar challenges in the

[3] Within archival practice and theory, the term *analogue* is widely used, mainly to describe the opposite of *being digital*. Lorna Hughes states that analogue records are "tied to a physical medium, . . . [and] bound to a sequential representation that is pre-determined by the author", which is why they degrade when being copied (Hughes, 2004, pp. 3-4).

context of digital archiving projects. Not only can an academic exploration of this issue increase the awareness of sustainability concerns within digital archiving projects. But the knowledge about how specific decisions can positively influence the longevity of digital archives can also help cultural organizations to optimize their digital archiving processes right from the start, by incorporating sustainability concerns within their plans. This is especially important, since most cultural organizations have limited financial and personnel resources for their digital archiving projects. Thus they cannot afford to experiment with different solutions and ideas, until they have found an appropriate, sustainable way for digital archiving. Such a "learning-by-doing" approach could be particularly problematic, as it very likely entails numerous mistakes that can be made along the way, costing both valuable working time and money that cultural organizations do not have. Hence, it could be beneficial to get some recommendations and orientation on how other cultural organizations have dealt with digital archiving projects. This could enable cultural organizations that are planning to start a digital archiving project to base their plans upon approved practical experiences.

1.4 Outline

The explorative character of the thesis is reflected in its argumentative structure, as it starts with a broad research perspective, which is getting more and more distinct as the argumentation progresses (Lamnek, 2005, p. 25). By looking at the concrete composition of this thesis, this argumentative structure becomes evident: The second chapter presents a broad theoretical fundament for understanding digital archiving processes, including the analysis of essential concepts and the depiction of recent developments. The third chapter already entails a stronger focus. It deals with more specific aspects and factors, as it explicitly focuses on sustainability aspects and considerations in archival contexts. Both chapters add up to a broad theoretical framework, which is complemented by the detailed investigation of the Impakt Channel case study, dealing in-depth with one specific, practical case.

2 Archiving in a digital environment

"So many years will be spent searching, studying, classifying, before my life is secured, carefully arranged and labelled in a safe place – secure against theft, fire and nuclear war – from whence it will be possible to take it out and assemble it at any point. Then, being thus assured of never dying, I may finally rest."

(Boltanski, 1969)

During his whole life, the French artist Christian Boltanski was fascinated by the ephemeral nature of memory. Born in 1944, Boltanski dealt with the loss of memory caused by the German Nazi regime and was especially intrigued by the idea to reconstruct the past of himself and other people (Assmann, 2010, pp. 375-376). His approach was rather materialistic, as he collected and archived personal belongings of people to experiment with the concept of memory. However, the question of how to retain access to memory and history was not just explored within arts, but can be seen as an essential, reoccurring issue – a red thread that is closely entwined with human history and culture. The American sociologist David Beer acknowledges this fact, stating that "the history of cultural production and consumption can be seen as a history of archiving" (2013, p. 41). For a very long time it was mainly physical, material objects like printed documents or archaeological artifacts that constituted archives. However, as contemporary digital culture and virtual spaces evolved, new issues and research approaches emerged, which challenged the original concept of the archive. As a result, the notion of a *digital archive* became increasingly important.

In this chapter, I will investigate this development and theoretically approach the concept of digital archiving. The following three sections will provide analyses that form the theoretical framework on digital archives, which is an essential part of the overall research approach of the present thesis. First of all, I will provide an overview of the theoretical discourse related to digital archiving and examine how the advance of digital media has affected archiving theory and practice. Based on this theoretical elucidation, I will explain the significance of a holistic, socio-technical research approach, which frames the present research. In the final section, the theoretical examination will be incorporated within a more practical outlook, investigating the actual elements that constitute a digital archiving process.

2.1 The role of archives within digital culture

The archive is a concept that can trigger strong visual imagination. Depending on subjective perceptions, people might have a more traditional vision of the archive as a dark, obsolete place with gatekeepers and a complex system to search and find items. Images based on a rather modern, technology-oriented outlook might involve open virtual spaces with online catalogues and search interfaces. The German archivist Angelika Menne-Haritz, Vice President of the German Federal Archives (Bundesarchiv), describes a similar observation regarding the common perception of archives: "Archives are seen either as secret, dusty and chaotic or as open, transparent and clear" (2001, p. 59). As the idea of an archive can vary considerably from person to person, it is indispensable to define the basic terminology in the scope of the present research, which explicitly deals with the concept of *digital archiving*. But is there just one, original notion of the archive? And why and how has it changed with the rise of digital culture? Some implications of these questions might seem obvious, however, it is essential to address them as an essential part of the theoretical framework about digital archiving. The art historian Charles Merewether describes the archive as follows:

> Created as much by state organizations and institutions as by individuals and groups, the archive, as distinct from a collection or library, constitutes a repository or ordered system of documents and records, both verbal and visual, that is the foundation from which history is written. (2006, p. 10)

Even though Merewether has a background in the field of arts, his definition suits the research approach of this thesis, which is based on a socio-technical perspective (see section 2.2). Merewether's approach entails social factors, as he includes a central agency within the process of archiving: The people, who create, organize and maintain archives. Consequently, during the whole archiving process, their decisions and actions are highly influential and powerful considering the formation of the archive. Merewether's definition also acknowledges the broader cultural value of archives and their meaning for both the history and future of humanity.

From a media theoretical point of view, Merewether's socio-cultural perspective on archives is highly relevant, as it unfolds the interlinked relation to broad, cultural developments that can tremendously influence archiving methods and concepts. Nowadays digital media are a central part of contemporary culture. Consequently, they affect practical and theoretical archiving issues in diverse ways. First of all, more and more content is solely available in digital formats. For example, with the rise of digital filmmaking tools, more and

more films are being shot digitally (Willis, 2005, p. 4) Besides, an increasing amount of newspapers and magazines are transforming their printed products into digital versions that can be accessed online (e.g. Spiegel Online, the New York Times, the Wall Street Journal).

This shift entails technical and organizational obstacles and issues concerning authenticity and copyrights. Questions about the validity of the original source and the legal distribution of online material play an important role. Besides, there are even more profound organizational issues. As the life expectancy of analogue data carriers like VHS or MiniDVs is limited, a vast amount of analogue archives have to be transformed into digital archives, so that they can be preserved for the future. Thus the data that is stored on these analogue carriers has to be migrated to more current, digital storage media.[4] This transformation involves the labor-intensive task to digitize the original, analogue content in order to make it accessible for future generations. For Doueihi, the change from paper-based records to digital records presents an essential characteristic of digital culture: "Gateways, interfaces, and access privileges are being transformed from a print-culture-organized world into a world governed by digital literacy and its evolving environment" (2011, p. 139). Digital material does not include a physical representation of the original content and structure, but can be easily manipulated. Thus on a broader scale, digital culture entails a loss of physicality (McKemmish, 1994, p. 200). This development had an enormous impact on archival science and practice. First of all, both theory and methods of archiving have transformed in terms of the organizational structure. Digital archives turned into open, distributed systems, as Jussi Parikka describes: "Modes of accessing and storing data have changed from centrally governed and walled spaces to distributed and software-based" (2012, p. 114). Thus digital archives are transforming into collaborative, distributed networks, which affects the agencies and power structures within these networks. Furthermore, archival practices have become an integral part of the daily lives of not only archival professionals, but also a broad range of people who want to store and categorize their digitized memories like personal photos, music and movies – a new form of consuming digital archives in the everyday life has emerged (Robertson, 2011, p. 5). Additionally, digital archives have changed in terms of accessibility.

[4] Certainly digital storage media like hard drives have a limited life expectancy as well, thus digital material also has to be migrated to new storage media at some point. Furthermore, it is important to keep in mind that digital material can get damaged as well, like Barbara Sierman (Digital Preservation Manager at the National Library of the Netherlands) shows in her project "The Atlas of Digital Damages". Sierman provides an interesting overview of visual evidence about what can go wrong with digital material (more information on her website www.atlasofdigitaldamages.info). However, in the scope of this thesis I will specifically focus on the *transformation from analogue to digital* archival material, which is currently a very important topic for contemporary archival theory and practice.

The creators of archives have easier, cheaper and more elaborate possibilities to provide meaningful access to their material, as digital archives can be made accessible online within dynamic web interfaces (Barwick, 2004, p. 254).

All these practical implications of transforming digital environments affect archival theory and research as well. It appears that the effect of digital culture on archiving is reflected in a paradigm shift, which emerged over the past years. It was the scientific philosopher Thomas Kuhn, who coined the idea of a paradigm shift. He described paradigms as "the source of the methods, problem-field, and standard of solution accepted by any mature scientific community at any given time" (Kuhn, 1962, p. 103). When one paradigm shifts to another, some established problems might be no longer relevant, whereas new problems and approaches become increasingly significant. In the specific context of archives, Anne Gilliland-Swetland, specialist in archives and preservation management, describes the archival paradigm as "a set of assumptions, principles, and practices that are common to the archival community and are a model for its activities and outlook" (2000, p. 7). Therefore, the archival paradigm cannot only be influenced by related scientific disciplines, but also by social and cultural developments. Considering that digital media have strongly affected contemporary culture, the question rises of how digital culture has affected the archival paradigm during the past years. Related literature reveals that the rise of digital culture has turned the balance of archival research approaches within three major layers (cf. Figure 2.1): from product to process (Ketelaar, 2007), from storage to access (Menne-Haritz, 2001) and from closed to participatory archives (Huvila, 2008).

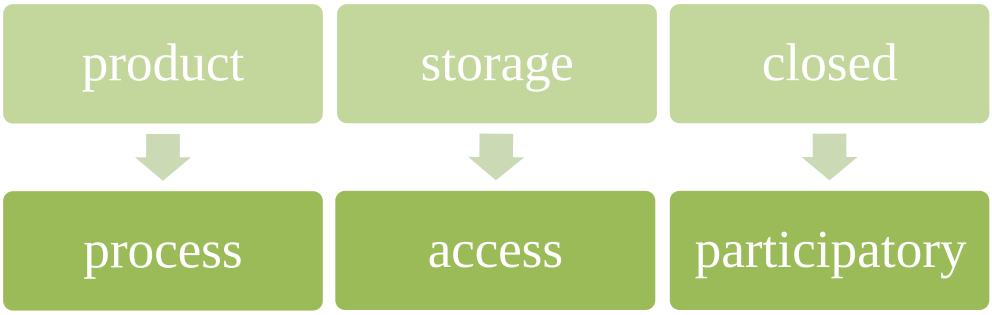


Figure 2.1: Basic paradigm shifts in digital archiving research (source: own illustration).

These layers reflect the socio-technical implications of archives within digital culture and will be elucidated in the following passage.

In his article "Archives in the Digital Age: New Uses for an Old Science", the Dutch archival scientist Eric Ketelaar (2007) investigates how digital media has shifted the notion of the archive from *product* to *process*. He describes theoretical and practical consequences that

result from this paradigm shift, as both scientists and practitioners have to develop new concepts, theories and methods in order to respond to the changing requirements (Ketelaar, 2007, p. 191). Ketelaar's reasoning is based on a socio-cultural approach towards archiving, as this is how he perceives digital culture: "The digital age implies not only technological opportunities and challenges, but is foremost a social and cultural phenomenon" (2007, p. 170). One implication of this phenomenon is that records and materials are no longer apparent as physical, fixed documents or files that can be organized, described and preserved like it was the case with paper-based records. As the notion of the original is slowly disappearing, Ketelaar observes a shift of the archival paradigm: "The object of archivistics theory, methodology and practice in the digital age is not the archive-product but the archive-process" (2007, p. 180). It is no longer the established concept of the archive as a product that demands the attention of researchers, but the whole, complex process of (digital) archiving. This process-oriented research approach is highly significant from a media theoretical point of view, since the concept of archiving is an essential part of contemporary digital culture. Hence the analysis of archiving processes and the interdependencies within these processes can be beneficial for developing a more elaborate understanding of digital culture (Beer, 2013, p. 41).

On a second layer, the advance of digital media has shifted the archival paradigm from storage to access (Menne-Haritz, 2001, p. 59). As the public awareness for archival practices has increased and more and more digital archives are accessible online, the role of the archivist has transformed as well. The main task of archivists is no longer to solely manage the storage of records, but also to provide meaningful access to it within online environments. Menne-Haritz states that access as a paradigm is reflected in both form and attitude (2001, p. 61). On the one hand, archivists provide the formal infrastructure that is required to handle the material and to make it available to everyone who is interested in accessing, reading and interpreting the records. On the other hand, access represents an attitude, as archivists facilitate access to specific material, however, still "accept the competence of the users regarding their own research area" (Menne-Haritz, 2001, p. 61). Thus the user of an archive maintains his autonomy in researching and interpreting the content he needs. As a result from the changing paradigm, Menne-Haritz observes that archives have to be opened up to the audience in order to respond to changing user requirements. Thus a new set of instruments and concepts needs to be developed, so that archivists can meet the changing demands of their audience (Menne-Haritz, 2001, p. 61).

Since Menne-Haritz wrote her article about the archival paradigm of access, more than ten years have passed and the technological changes that occurred in the meantime are immense. Interactivity, collaboration, usability and participation – these are just a few key characteristics that are currently discussed in the context of digital culture. Furthermore there has been an increasing interest in visual aspects of digital media (e.g. Block, 2008; Darley, 2000; Howells & Negreiros 2012). Making archives accessible within an online environment is not only a pragmatic matter anymore, but also a field of interest that is closely intertwined with contemporary visual digital culture. Hence it entails numerous choices that are linked to the design of interfaces, which have to be searchable and easy to use, while meeting aesthetical standards as well. This aspect brings the archival paradigm of access to another level and makes it even more complex.

The ongoing progress of opening up archives led to a third layer of an archival paradigm shift that Isto Huvila (2008) describes in his article about participatory archives. Coming from the field of information and knowledge management, Huvila observes the important role of user participation in contemporary digital culture: "In the post-modern sense, the notion of participation is built into any human interaction with information, which makes it and its implications also essential in the archival and records management contexts" (2008, p. 18). As a result, he traces the formation of archives back to a reciprocal relationship between archivists, archival records and the users. Hence both practitioners and researchers have to develop new concepts on how to plan and organize an archive in a way that allows the integration of and interaction with actual and potential users (Huvila, 2008, p. 32). Considering this development, archivists have to align their plans and actions in accordance with a new set of top priorities: the usability and findability of archival resources (Huvila, 2008, p. 25). Next to Huvila, the influential German media theorist Wolfgang Ernst also observes an interrelation between the archival paradigm and digital participatory culture. He argues that the progressing digitization of archives is transforming physical, static records into dynamic code, "entailing a shift from read-only paradigms to a generative, participative form of archival reading" (2013, p. 81-82).

The previous examination has shown that the concepts of *archives* and *digital culture* are intertwined in diverse layers. On the one hand, the notion of archiving plays an essential role in understanding contemporary digital culture – in both professional and personal contexts - as it constitutes a significant research approach to explore broader contexts of digital culture. On the other hand, the advance of digital media has strongly affected archival practice and research, which is reflected in an archival paradigm shift that is composed of

diverse layers. The exploration of these layers has revealed that technology is an important factor within this development – it can be seen as the catalyst that enables the transformation of archives into digital archives. However, these technical developments entail a large set of social and cultural implications as well, which are particularly relevant from a new media theoretical point of view and thus need be explored as well. Consequently, this thesis is based on a socio-technical approach, which will be explained in the following section.

2.2 A socio-technical approach

The previous section has introduced the fundament for the theoretical framework about digital archiving. However, it has also revealed an essential challenge that is involved in the investigation of digital archives: As related phenomena are rather complex, there is a multitude of different research trajectories in the field of digital archiving. Consequently, it is indispensable that I distinctly define the scope of my research approach. Hence the purpose of this section is to elucidate the socio-technical approach that the theoretical framework of this thesis is based on, which allows for placing it within a broader context.[5]

In the introduction, I have already touched upon the problem that the majority of research, which specifically deals with the sustainability of digital archives, is focused on technical aspects. In this context, the research topics range from archiving software, questions concerning the decision for sustainable data formats, technical problems related to digital preservation and systems to deal with metadata (e.g. Beaudoin, 2012; Groenewald & Breytenbach, 2011; Madalli, Barve, & Amin, 2012; Morrissey, 2013). All these problems are certainly important and need to be addressed, as the question of how to sustain digital archives has strong technical implications. However, digital archives cannot be reduced to the technology that is used to store and manage data. They are rather constituted by the interaction of people and technology that is needed to bring and keep digital archives alive, as "meaning does not reside in the technology, and data streams cannot sustain themselves" (Bradley, 2007, p. 151). There is a much deeper meaning to it, also involving organizational structures, financial conditions, user expectations, and – on a very basic level –the question of how people deal with digital records. An analysis that is based on a socio-technical approach acknowledges this broader perspective; it acknowledges that repositories that deal with digital

[5] There is also a postmodern, philosophical perspective on archives, which deals with wide-ranging societal issues and the formation of archives in a broader sense (see Foucault, 1972). In the scope of my thesis, however, I will focus on the transformation of digital archives and underlying, organizational processes that are linked to the concept of digital sustainability, which is why I will not further elaborate on the philosophical perspective.

items are "composed of people, activity, artifact, and technology", which results in a dynamic, balanced interplay between social and technical phenomena (Bishop, Van House, & Buttenfield, 2003, p. 2). Also Bradley emphasizes that "the ability to preserve and provide access to digital information is linked to more than technical issues, and that economic, social, and other such factors will play a part in determining the useful life of any information encoded in digital form" (2007, p. 156). Therefore neither the technical, nor the social factors should be neglected or favored, but there should be a balanced state of research approaches.

The German author Kathrin Passig, who focuses her work on the ongoing transformation from analogue to digital media, deals with the imbalance of technical and socio-cultural research approaches in her article "Facebook, Froschlaich, Folianten" (2013). She argues that limiting the discussion about digital archiving to technical aspects reflects an attempt to directly solve related issues. Discussing the technical problems of digital archiving is simply more prominent, as these problems are more practical and entail concrete solutions, compared to more abstract social and organizational issues (Passig, 2013, p. 131). Passig certainly has a point, however, the technical progress takes place at such a rapid pace that finding solutions for the technical issues to store and preserve digital material is extremely pressing. Thus it makes sense that related research obtains top priority – if we would not have the technical means, digital archiving would be impossible, which means that digital culture could not be preserved for future generations. Yet despite this fact, a broader assessment of related phenomena is also required in order to fully comprehend these technical issues of digital archives, as Ross and Hedstrom describe: "The problem is not just technological. If it were, the problems associated with long-term use would be – and would have been – more readily solvable. Organisational, legal, cultural, social, and financial obstacles also need to be addressed" (2005, p. 381). However, most research is still too narrow – as I mentioned in the introduction, most research does not include a process-oriented research approach, which would be necessary to include both technical and social factors.

Furthermore, recent developments of digital media (for example the rise of social media or the increasing use of mobile devices) have shown that technological changes often entail a transformation of social phenomena and relations, resulting in modified forms of communication and altered social dynamics. Hence when it comes to digital archiving, technical aspects cannot be separated from social phenomena. As the archival paradigm has shifted over the past years, the relationship of archivists, archival records and users has transformed (see section 2.1). More precisely, social components of digital archiving processes have changed, including the role of the archivist, user expectations and the nature of

archival records. In this context, Huvila states that the notion of a participatory archive entails a "reconfiguration of responsibilities between curators, users and the general public" (2008, p. 33).

From a broader perspective, it is in the nature of the concept of memory that digital archiving has deep social implications. Digital archiving is profoundly linked to the storage and creation of memory. In this context, Menne-Haritz acknowledges that memory is a social, not a technical phenomenon (2001, p. 58). In her article about the future of digital archiving, Diane Leenheer Zimmerman highlights the social significance of archiving processes: "And yet, our understanding of who and what we are as social beings and societies is largely informed by the continuity of our access to the books, correspondence, records, and other ephemera that capture the essence of earlier times and places" (2007, p. 989). With digital media being an essential part of contemporary culture, social and technical factors are closely intertwined. Hence to fully comprehend digital archiving processes, the social dimension should not be subordinated to technical phenomena.

Regarding the archival paradigm of access (Menne-Haritz, 2001), the academic value of a socio-technical perspective becomes evident. Focusing related research solely on technical aspects would include research about digital archiving software, user interfaces, sustainable digital formats, metadata and other technical issues. Approaching the same research field from a socio-technical point of view can open up new, valuable layers of research, for example the temporal dimension of the shifting archival paradigm. As the focus is shifting from storage to access, a new dimension appears; it is not just about preserving the past for the future, but it places the emphasis on the present: "Archives that see their main task in preserving the past for the future become invisible in the present, when support for creating an own memory is needed" (Menne-Haritz, 2001, p. 60). To consider these social implications can improve the overall understanding of digital archiving and is a main objective of the present thesis. Furthermore, a socio-technical approach acknowledges the human agency within digital archiving processes: It is not just about digital archival records, but also about how people deal with these digital items. In their book "Digital Library Use", Nancy Van House, Ann Peterson Bishop and Barbara P. Buttenfield investigate digital libraries as socio-technical systems, which are "networks of technology, information, documents, people, and practices" (2003, p. 1).[6] Thus in the scope of a socio-technical research approach, it is crucial to not only consider the nature of archival material and the technical issues, but also to reflect

[6] Even though I investigate digital archives, not digital libraries, both concepts are comparable when regarded from this broad, structural perspective.

the human agency within digital archiving processes. To embrace this reflection, this thesis has a practical outlook and includes the investigation of a real-world case.

The previous argumentation revealed the significance of a socio-technical approach when researching digital archiving processes from a new media theoretical point of view. Thus it constitutes an essential part of the theoretical framework of the present thesis. As digital archiving does not only entail theoretical discussions and issues, but is also composed of practical processes and workflows, the next section deals with the organizational elements that are involved within digital archiving processes.

2.3 The process of digital archiving

In the previous sections, I described two major developments within archiving theory and practices: first, its changing role within digital culture that entails some major archival paradigm shifts; second, the increasing relevance of socio-technical and socio-cultural approaches towards digital archiving. As an important implication of these developments, I identified a shift within archiving theory from a product-oriented towards a process-oriented perspective (see section 2.1). Hence in this section, I will incorporate the organizational workflow of digital archiving within the theoretical framework and explicate related practical processes. This is particularly important, since it allows for a more elaborate understanding of the underlying dynamics of power within digital archiving processes. Such dynamics affect the constitution of digital culture, since people are making decisions about the value of digital material by including or excluding certain material in their archives and thus affecting the way memory is shaped (Beer, 2013, p. 47).

On a broader scale, digital archiving processes are constituted of two essential components. First, there are *internal efforts* including digital preservation and the planning and building of the archive. Second, considerations about the *external impact* emerge, dealing with the question of how to open up the archive to the audience, in order to enhance accessibility and maybe even enable user participation. This second component of digital archiving processes did not receive much attention yet, as it evolved more recently. Doueihi summarizes the interrelated components of digital archiving processes as follows:

> The first step toward . . . digital archives consists in the identification of what has been termed ‘most historically significant’ cultural materials, irrelevant of medium and format. Then follows the collection, digitization, and organization of the digitized objects in order to make them eventually accessible to the public. (2011, pp. 135-136)

This quote reflects the complexity of digital archiving processes. Hence, to investigate these processes, I will structure the following analysis according to the two major components I previously identified: digital preservation practices and efforts to open up the archive.[7]

Digital Preservation

The first stage of a digital archiving project is constituted of two major, interwoven issues. First, it involves decisions on which items will be included into the archive and which will be excluded. The overall selection should be as wide-ranging as possible, instead of only representing a specific point of view or historical period, since a viable and solid selection prevents the digital representation of a radically modified cultural landscape (Doueihi, 2011, p. 136). Secondly, the question arises of how to digitally preserve the significant records in a sustainable way. In this context, it is crucial to differentiate between so-called "digitally-born" records and material, which needs to be digitized first (e.g. VHS tapes). Digital archives include both, whereas each group of records has its own specificities and entails different challenges and infrastructures (Doueihi, 2011, p. 135). When records need to be digitized, the process of digital archiving becomes even more complex, as digitization is a cost- and labor-intensive endeavor (Ernst, 2013, p. 81).

The term digitization describes the "process of transforming analog material into binary electronic (digital) form, especially for storage and use in a computer" (Pearce-Moses, 2005). It is exactly this process that constitutes the distinction between a traditional and a digital archive, as the involvement of binary code makes the words, images and sounds of records archivally encodable (Ernst, 2013, pp. 82-83). During the process of digitization, a whole set of issues emerge. On the one hand, fundamental technical decisions have to be made, including the selection of an appropriate digital format, which provides a good quality of the audio-visual material, while only requiring little storage space. On the other hand, there is a range of issues on an organizational level. How many people should work on the digitization, which material needs to be digitized first, and how can cultural organizations provide an infrastructure to store all these digital items in the long-term. Furthermore, the digitization phase already determines the future accessibility of digital archives, as the organization of metadata emerges. Metadata can be described as "data about data" and is used to organize information systems and resources, as Anne Gilliland-Swetland explains (2008, p. 1). Metadata has always been an important part of archiving practices, however, its considerate

[7] Since the present thesis is focused on digital archiving within audio-visual cultural heritage institutions, the detailed explanation will explicitly deal with how digital archiving processes occur within these organizations. However, the key components of the process can be transferred to other institutions and situations as well.

management is even more relevant and complex when it comes to *digital* information. This is substantiated by the loss of physicality. Digital information has no physical representation, thus metadata is required to preserve essential context information. For example, if a digital video file is preserved without thorough metadata, information about its author or the year of production might get lost. Besides, it will be difficult to access the video in the future, as metadata increases the findability of archival material. In the specific context of archiving processes, the term metadata is used to describe value-added information about the content, context and structure of digital items, which people create to "arrange, describe, track, and otherwise enhance access to information objects and the physical collections related to those objects" (Gilliland-Swetland, 2008, p. 2). In the case of audio-visual art this includes, amongst others, information about the art piece (e.g. title, year, language), the artist (e.g. name, nationality, contact information) and the technical constitution of the records (e.g. format, audio features, original data carrier). Even if an item is digitally born and does not need to be digitized, it has to undergo the same metadata procedure when being stored, since consistency is essential to make all digital items of an archive accessible in equal measure.

When an archive contains digitized reproductions of archival records, the issue of digital preservation becomes even more complex, as the discussion about authenticity becomes increasingly relevant. David Giaretta, Director of the APA[8], identifies authenticity as a critical factor that reveals the success of a digital archiving project:

> Authenticity is a key concept in digital preservation, and some would argue that it is the pre-eminent concept, in that unless one can show that the data object is, in some provable sense, what was originally deposited, then one cannot prove that digital preservation has been successful. (2011, p. 204)

Hence a successful process of digital preservation is linked to the fundamental objective to obtain the authenticity of an archival record.[9]

The process of digital preservation includes the major steps to plan a digital archive and to fill it with content. However, this is only one major component within the overall process

[8] The European "Alliance for Permanent Access" is a foundation based in the Netherlands that aims to guarantee a permanent information structure in Europe to access the digital records of science across all disciplines. For more information see: www.alliancepermanentaccess.org.

[9] There is an elaborate academic debate about the authenticity of digital archival records, especially in the field of video art. However, illustrating this discussion lies beyond the scope of this thesis. For further reading see Herzogenrath, 1995 and Reck, 1995.

of digital archiving. The second part involves the efforts to open up the archive to the audience.

Opening up the archive

Besides the issue of digital preservation, another central concept in this stage of the archival process is *access*. The term *access* is extensively used in the discourse about digital archiving, but what exactly does it mean? Bradley defines access as follows:

> It is not only about the ability to find and retrieve an item, but also the ability to use, view, listen to, interact with, display, or run the digital item in such a way that users can be assured that what they are viewing satisfies their needs. This may, for example, be a requirement to see exactly what the creator originally intended, the identical look and feel, or it may be the ability to find and interrogate the same data, or simply to be able to read the same text. (2007, pp. 154-155)

Hence making an archive accessible entails a high degree of user orientation and transparency. In terms of technical requirements this involves the creation of user-friendly interfaces, the selection of an appropriate platform to present the archive to the audience and the optimization of the findability of digital records, for example by tagging each record with keywords. Additionally, the concept of access also entails deeper, social implications. Basic structures that determine the degree of access have to be arranged, revolving around the question, if an archive is designed to be open or closed. Ranging from a digital archive with no user participation at all to a medium degree of participation through comments and the possibility to add metadata towards an archive where users can even add content themselves – when it comes to the degree of user participation, there is a variety of possibilities to consider and decisions to make. However, these considerations are not only linked to personal preferences of the cultural organizations creating the archive, but they are also dependent on organizational restraints. Is it financially possible, to include the design of interactive elements within an online environment? And which legal restrictions exist in terms of copyright? Indeed, the objective to make archival records available online often collides with copyright restrictions (Besek, 2003, p. 1). Lorna Hughes, Professor of Digital Collections at the National Library of Wales, stresses the high significance of copyright issues in digital archiving processes: “The management of intellectual property is potentially the greatest challenge to the development of digital collections” (2004, p. 286). Especially in the field of video art this is an extremely sensitive topic. Some artists use the World Wide Web strategically to present themselves and their artwork to a broad audience. Other artists,

however, have concerns to present their work online due to uncertain copyright conditions. Furthermore, many artists earn money by exclusively screening their videos at museums, festivals or other events. Making it accessible in the context of an online archive could result in a decreased income, as the notion of exclusiveness is lost. In the context of streaming video art online, cultural scientist Thomas Thiel describes an interesting observation. Thiel, who worked as a curator for the ZKM (Center for Art and Media) in Germany for many years, states that nowadays "videos are often treated like oil paintings, although - just like music - their original purpose was none other than distribution" (2008, p. 181). This quote reflects that when it comes to the online presentation and distribution of video art, there is insecurity about the appropriate degree of distribution and accessibility. Hence opening up an archive within an online environment is a controversial topic, entailing the opportunity to reach a broad audience while also triggering concerns about authenticity, exclusiveness and copyright issues.

As more and more organizations and institutions are making their archives accessible online, the concerns and insecurity about a broad range of technical, social, legal and financial issues accumulate. In contrast to these negative connotations, Ernst acknowledges the online accessibility of digital archives as a major benefit: "The strength of digitized archivalia lies not in their (highly vulnerable) migrability into the technological future but in their substantially potentized present online accessibility" (2013, p. 88). This approach reflects the temporal dimension of the notion of accessibility, as Ernst recognizes the importance of the *present*. Digital archival material cannot only be preserved for the future, but also people can make it easily accessible online for present research. This matches the temporal specification of the archival paradigm shift from storage to access that Menne-Haritz talked about (2001, p. 60). According to her, digital archiving is not just about preserving the past for the future, but also about providing access to archival material for the *present* formation of contemporary culture (see section 2.1).

The key components I described in this section might seem to add up to a structured process, however, it is crucial to keep in mind that digital archiving is a dynamic, open-ended process, in which the single stages and issues are interrelated in manifold ways (Ketelaar, 2007, p. 184). This is why a research approach, which includes a process-oriented, socio-technical perspective, is highly relevant, as it enables a better understanding of the complex interrelations and interdependencies within digital archiving processes.

In the previous sections (2.1, 2.2, 2.3), I explored the theoretical discourse on digital archiving, which revealed a reciprocal relationship between the concepts of archiving and

digital culture. The advance of digital media has tremendously influenced archiving theory and practice on diverse levels. In turn, the investigation of these archiving processes can provide valuable insights for a better understanding of digital culture. Next to the interrelatedness of digital culture and archiving processes, the significance of a socio-technical approach for holistically exploring related phenomena became evident. To give consideration to the process-oriented research approach of this thesis, I explicated the process of digital archiving in the third section. However, *building* a digital archive is only the first step along the way of preserving cultural heritage. After that, cultural organizations have to work on *sustaining* these digital information resources for the future, which brings up a whole new set of issues. To find out more about these issues, the next chapter will specifically deal with the concept of sustainability in archiving contexts.

3 Digital sustainability – realistic objective or utopian aspiration?

"[The] archive is a pledge to the future, it is not an issue of the past; it is a question of the future, the question of the future itself, the question of a response, of a promise, and of a responsibility for tomorrow."

(Derrida, 1998, p. 36)

In his book "Archive Fever" (1998), the French philosopher Jacques Derrida touches upon the temporal dimension of archiving practices by emphasizing the importance of sustaining archives for the future, since it is the future that attaches meaning to archives. In theory, it might seem obvious that archives should be designed with the main objective to assure continuity of archival records. However, in practical contexts, digital archiving projects are extremely cost and labor intensive. This leaves the people, who deal with digital archiving projects, with only little resources to consider possible future developments within their present plans. Already the individual steps of building a digital archive are time-consuming, for example digitizing all material, organizing the digital items and providing meaningful context for the archival environment. Keeping track of these fundamental processes, while also planning for future developments, can be a daunting task for cultural organizations, especially if they are inexperienced in the field of digital archiving. Thus the question rises, to what extent cultural organizations can actually provide the inclusion of sustainability considerations within their planning.

Even though an essential goal of archives has always been to preserve cultural heritage and other documents for the future, the concept of sustainability has just recently emerged in the discussion about digital archiving. In the following three sections I will investigate the notion of digital sustainability to find out, how the concept of sustainability can be incorporated into digital archiving research. What is digital sustainability? And which aspects and factors constitute this concept within both theory and practice? By dealing with these questions, this chapter forms the second part of the theoretical framework of the present thesis, aiming to answer the first research question I formulated in the introduction: Which factors affect the sustainability of digital archiving processes? As a theoretical fundament, I

already analyzed the notion of digital archiving and explicated related processes in the previous chapter. By incorporating the results of this analysis within the following investigation about digital sustainability, an answer to my first research question will be presented.

3.1 Sustainability and digital media

Recently, the term sustainability appeared in diverse contexts – from agriculture and energy science over economics to education and literacy. It seems like there is no part of contemporary culture that could not be optimized in terms of sustainability. Bradley makes a similar observation, as he states that it "is difficult to read a paper, view a blog, or listen to a news broadcast without finding a new use of the word *sustainable* or a new context for its application" (2007, p. 156). However, the notion of sustainability was not always linked to the meaning that seems to be so familiar within contemporary culture; as Bradley points out, it was only in the second half of the twentieth century that the term *sustainability* was used in an economic and temporal sense (2007, p. 156). That this meaning emerged at all can be traced back to the movement of environmental groups, who aimed to express an ideological position that combines environmental, economic, organizational and social issues (Bradley, 2007, pp. 156-157).

Within both academia and the professional sphere, different approaches to define sustainability have been fiercely discussed, which lead to a vast expansion of related terminology, definitions and concepts. As a basic, renowned definition, which has been used frequently in academic contexts, I want to refer to the Brundtland Report of the United Nation's World Commission on Environment and Development (WCED) (1987). In their elucidation on the issue of sustainable development, the WCED defines sustainability as the pursuit to meet "the needs of the present without compromising the ability of future generations to meet their own needs."[10] Besides this broad explanation, which clearly includes temporal implications about linking present actions with future outlooks, there are numerous other, more specific definitions. However, I want to base my theoretical approach towards the concept of sustainability on this basic definition, as it is not constrained to a specific field of interest, but expresses a broad perspective, while also highlighting its temporal dimension.

[10] The full report can be viewed here: www.un-documents.net/wced-ocf.htm.

Thus it can be easily transferred to digital archiving contexts and also matches the socio-technical research approach of the present thesis.[11]

I previously described that the notion of sustainability was originally composed of environmental issues. As the term got more popular, it became increasingly relevant for other parts of contemporary culture as well. Nowadays, it is not anymore limited to environmental contexts. But how exactly is the concept of sustainability linked to digital media? When reviewing relevant literature, two dimensions become apparent. On the one hand, the rise of digital media brought up a new set of environmental issues; thus it is interlinked with the basic ecological notion of sustainability. Digital media affect the environment both directly and indirectly. Direct impact is caused by the pollution due to the production of technological devices and infrastructures and the disposal of electronic waste, whereas indirect factors involve altered structural and behavioral effects and the ongoing dematerialization related to digital media (Berkhout & Hertin, 2004, p. 903). Besides the environmental approach, both concepts are interrelated on a more substantial level, as the sustainability of digital media in a *temporal sense* became increasingly important. To sustain digital content – despite rapidly changing software, hardware and storage formats – became an essential concern of scholars and practitioners. Giaretta states that today's "digital data storage media can typically be kept at most a few decades before the probability of irreversible loss of data becomes too high to ignore" (2011, p. 197). It is this temporal dimension that the present thesis is based on and that makes sustainability considerations highly relevant in the context of digital archiving. Bradley incorporated these considerations and issues within the concept of "digital sustainability", which includes a "wide range of issues and concerns that contribute to the longevity of digital information" (2007, p. 151).

As I explained in the previous chapter (see section 2.3), the process of digital archiving is constituted of various complex, interrelated actions and decisions, all working towards two major objectives: first, digital preservation and second, to open up the archive and provide meaningful access. So far, most research about the sustainability of digital archives focuses on the phase of digital preservation. An example for such an approach is the study of Evens and Hauttekeete (2011) that specifically deals with audio-visual collections of cultural heritage organizations. They identify four major issues related to the sustainability of digital

[11] Note: I am aware that this first, basic definition does not come from a new media theoretical background. However, as the term sustainability is used frequently nowadays, I find it important to first approach the overall concept of sustainability from a more neutral perspective, in order to understand its basic meaning. As this section continues, I will examine its relation to digital media by focusing on the specific concept of *digital sustainability*.

preservation: digitization, metadata organization, intellectual property rights management and business models (Evens & Hauttekeete, 2011, p. 157). All of these aspects can affect the sustainability of a digital archive in positive or negative ways. Based on a case study approach, Evens and Hauttekeete draw the conclusion that most organizations have underdeveloped digital preservation policies and that archives suffer from deterioration. Hence more research on sustaining digital archives of cultural organizations is urgently required.

Bradley also identifies digital preservation as a major component of digital sustainability (2007, p. 151). Furthermore, he describes an ongoing transformation in the specific field of digital preservation, as the way people approach the preservation of archival records (both analogue and digital ones) has drastically changed in the course of time. At first, the main objection originated in the utopian approach to find a permanent carrier that stored data forever. A lot of research was based on this pursuit, but the focus shifted as digital preservationists recognized that no data carrier would ever guarantee a permanent access to stored information.

> The goal of a permanent media has been wrecked on the rocks of relentless progress. Even if any media could be claimed and trusted, as permanent, the quandary is that within a short period of time the storage system would be technically superseded by storage media exhibiting superior performance specifications, and manufacturers would no longer support the old technology. Eventually there would be no functioning replay equipment to access the supposedly permanent media, and, even if there was, the technically slow performance of the old technology would make the transfer to a newer and faster storage media attractive. (Bradley, 2007, p. 153)

Based on this insight, the digital preservation community shifted their focus towards other solutions. As they expanded their perspective, another issue surfaced: It was not just data carriers that had a limited lifetime, but the same problems also applied to file formats and access software. This led to the development of new digital preservation strategies, which were based on the idea to sustain electronic records through *migration* and *emulation* (Bradley, 2007, p. 153). According to Water and Garrett, migration can be defined as "a set of organized tasks designed to achieve the periodic transfer of digital materials from one hardware/software configuration to another, or from one generation of computer technology to a subsequent generation" (1996, p. 5). Hence the main objective of this strategy is to keep the integrity of a digital object unchanged, while making it accessible in a new technological

environment. The main focus of emulation on the contrary is not on the digital object itself, but rather on the hard- and software environment, in which an object is integrated, aiming to (re)create "the environment in which the digital object was originally created" (van der Hoeven, Lohman, & Verdegem, 2007, p. 124). This means that the technological environment is preserved, whereas part of the environment – such as the operating system – is replicated or imitated to be the original one in order to make a digital object usable in the future. While archivists spent many years with discussing which strategy is the best one, it is nowadays acknowledged that both migration and emulation strategies are equally sustainable and efficient, when implemented in the right way (Bradley, 2007, p. 154).[12]

Regarding relevant literature, there is a wide spectrum of research about digital preservation strategies and the interrelated sustainability concerns. It appears, however, that the second major component that constitutes digital archiving processes – the effort to open up a digital archive and make it accessible to a broad audience – has been neglected so far. Thus the question arises of what is the role of sustainability within this major component? Are sustainability considerations only relevant for digital preservation strategies? Or can the degree of accessibility and openness affect the sustainability of a digital archiving project as well? So far, there is barely any literature that deals with this specific question. Even though the accessibility of archival content is a major point of discussion since the archival paradigm shifted from storage to access (see section 2.1), there is only little research that actually combines this perspective with the notion of sustainability. Even though good storage and preservation forms the fundament for access, it also includes other aspects, which can contribute to the sustainability of a digital archive, for example "creating metadata for preservation, search, and retrieval; maintaining hardware and software that can read the digital file; and providing reference help, among other things" (Smith, 2003, p. 12). The idea of access is closely linked to the agency of the user. Taking the role of the user into account can provide new, valuable insights into the sustainability of digital archives, thus I will investigate this phenomenon in section 3.3 as well as in my case study research.

This section has revealed relevant intersections between the concept of sustainability and digital archiving theory and practice. However, it became evident that sustainability is mostly considered within the scope of digital preservation. As digital archiving projects nowadays involve a broad set of additional challenges (for example making an archive

[12] For further reading I recommend Bradley's examination of the history of digital preservation strategies (2007, pp. 151-156).

accessible online to a broad, heterogeneous audience), the following section will examine specific factors, which can affect the sustainability of a digital archiving project.

3.2 Factors of digital sustainability

To clarify the concept of digital sustainability, I previously described the discourse about sustainability and digital media. Furthermore, I also examined digital sustainability from a broader temporal perspective, emphasizing the relevance of a three-layered research approach that incorporates the past, the present and the future. In this section, I want to combine this theoretical framework with its practical implications and explore the concrete factors that are linked to digital sustainability.[13] Based on the socio-technical research approach of the present thesis, there are three major factors that affect digital sustainability: technical, social and economic factors (cf. Figure 3.1).

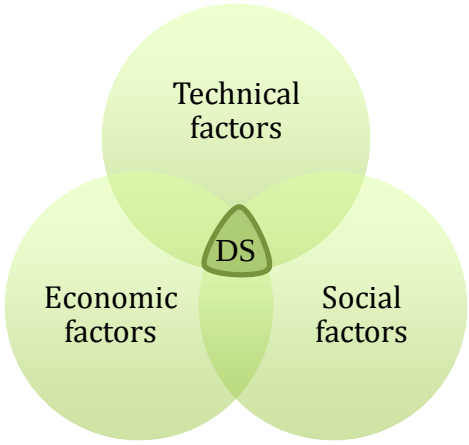


Figure 3.1: Three major factors that affect digital sustainability (DS) (source: own illustration).

All of these factors are interrelated in complex ways, which is why this section provides a detailed examination of the individual features.

Technical factors

Regarding previous research, the most obvious and distinct factor that affects digital sustainability lies within the technical considerations. As I already demonstrated in the previous chapter, a large part of the academic and professional discussion about digital

[13] Since my research is focused on audio-visual cultural heritage organizations, I will specifically elaborate on the factors these organizations have to deal with when building a sustainable digital archive. Hence some factors may only apply in the context of such organizations, while other aspects are also relevant for other institutions like libraries and museums.

archiving evolves around technical aspects (see section 2.2). But to what extent can technical factors affect the sustainability of a digital archiving project?

Firstly, a big part of this question is related to the digital preservation strategy that cultural organizations choose, since this is the most basic requirement to sustain records in the age of digital media. Cultural organizations have to evaluate different strategies to preserve digital records and choose a method, which suits their technical and financial prerequisites. Since technology is constantly progressing, once an archival record is digitized and archived, the process is not finished. It is rather a life-long procedure: Organizations have to keep track of the status of each digital record and be aware that at some point, these records have to be saved on newer storage media and software needs to be updated. In theory, this fact might seem obvious, but in practice there is a common, simplistic belief in the permanence of machines and digital media, contrasting the ephemerality of humans, as Wendy Chun demonstrates in her elucidation on memory and archives (2011, p. 80). Based on a software theoretical research approach, she argues that many people blindly rely on the endurance of digital media; however, they neglect the fact that "what is not constantly upgraded or 'migrated' or both becomes unreadable" (Chun, 2011, p. 133). Even though data loss happens on a daily basis, people still assume that if they store their data on DVDs, hard drives or USB sticks, it will always be there, whereas the failures of these digital storage systems are mostly considered as accidents rather than eventualities (Chun, 2011, p. 137). Hence people working on digital archiving projects have to become more aware of the notion of technical failure and how to prevent it. Once people start to be more realistic about the possible technical failure of electronic storage systems, they can actually take actions to prevent such archival loss. For example videotapes would have to be regularly reformatted and stored in a climate-controlled environment, in order to increase their life expectancy. Such methods do not require a lot of time or financial resources, while they are very likely extending the life expectancy of data carriers. Within the transformation towards digital archives, elaborate preservation actions have become more urgent and immediate, as Brian Lavoie (researcher at OCLC Research) describes:

> . . . digital materials generally do not afford the luxury of procrastination. The fragility of digital storage media, combined with a high degree of technology dependence, considerably shortens the 'grace period' during which preservation decisions can be deferred. Issues of long-term persistence can arise as soon as the time digital materials are created. (2004)

Hence technical aspects that affect digital sustainability are based on a transforming, more realistic mindset towards digital preservation. Furthermore, on a more pragmatic level, technical considerations include decisions on which software and hardware to use, which standard conversion formats to choose and how to manage metadata of digital records. All in all, there is not "the one and best" solution that can be applied for every cultural organization in order to build a technical sustainable digital archive. As this thesis has a rather practical, socio-cultural approach, I will not elaborate more detailed on concrete technical components of digital archiving processes, like the characteristics of specific file formats and organizational models to create and manage metadata. It is rather important to acknowledge the overall technological mindset towards digital records that I previously described, which can have an impact on the sustainability of digital archiving processes.

Social and organizational factors

While the technical dimension is highly relevant within the concept of digital sustainability, it cannot be analyzed separately from social and organizational factors. Technology represents the fundament for sustaining digital archives, however, digital records do not sustain themselves. It is the people, who plan, organize, build and maintain digital archives, and all of their decisions strongly affect how sustainable a digital archive is. When exploring the human agency in the concept of digital sustainability, it is essential to differentiate between two dimensions: the individual dimension and the overall organizational structure. The individual dimension includes issues on a personal level; it is about the individuals that work on a digital archiving project. Do they have a background in archivistics? Are they working for the cultural organization for a longer period of time and can thus continue to work on sustaining the digital archiving that they created? What are their decisions based on? Do they select relevant archival material according to their own interests or do they also take user preferences into account? All of these questions reflect the impact that individuals can have on the sustainability of a digital archive. Cultural organizations mostly cannot mobilize a lot of people to work on the archive, since their resources are limited – thus the few people working on it even have a stronger influence.

Even though it is individuals, who make the daily decisions while creating and building the actual digital archive, it is the organization that has to provide the infrastructure for it. Bradley states that the "sustainability of the organization, its funding and its business plan are critical to certifying a digital repository as trusted, at least equally with its technical infrastructure" (2007, p. 160). Hence the ongoing existence of the cultural organization that

builds the archive is an essential factor for digital sustainability. The organizational infrastructure is affected by factors like personnel fluctuation, fixed organizational workflows, the significance a digital archiving project has for an organization and the overall project management. Another essential organizational factor can be found within legal and regulatory frameworks related to copyright issues. To preserve digital information and make it available online entails a broad set of legal issues, which "could have an impact on what digital entities can be preserved, how they can be preserved, and what kinds of access can be provided to them" (Ross & Hedstrom, 2005, p. 22). As I already argued in the previous chapter, copyright is a highly sensitive topic, especially within the field of video art (see section 2.3). Hence within a digital archiving project there have to be clear guidelines and standards concerning copyright and authenticity considerations.

Economic factors

Besides organizational, social and technical factors, digital archiving initiatives can only be sustainable, if a constant, sufficient financial support is secured. Especially in the context of cultural heritage organizations, which are nowadays chronically underfunded, it is crucial to include financial considerations within a digital archiving project (Smith, 2003, p. 24). From an economic perspective, the process of *digital preservation* constitutes the most cost-intensive component of a digital archiving project. In this context, previous researchers investigated diverse cost models and business plans (e.g. Bote, Fernandez-Feijoo, & Ruiz, 2012; Chapman, 2004; Walters & Skinner, 2010).[14]

Even though there is a broad diversity in related research approaches, the discourse about the economic sustainability of digital information centers on two essential questions: What will it cost and who will pay for it (Walters & Skinner, 2010, p. 260)? The question about the costs differs from organization to organization, since it depends on various factors like the overall extent of the repository, the amount of records that need to be digitized and the existing technical and organizational infrastructure. In this context, many cultural organizations fail to calculate for an economically sustainable digital archive, as they "have traditionally focused more on the creation than the maintenance of content" (Smith, 2003, p.

[14] For a detailed analysis of diverse cost models and economically viable recommendations for digital preservation, see the report of the Blue Ribbon Task Force: Blue Ribbon Task Force (2008). *Sustaining the Digital Investment: Issues and Challenges of Economically Sustainable Digital Preservation*. Interim Report of the Blue Ribbon Task Force on Sustainable Digital Preservation And Access. Retrieved March 10, 2014, from http://brtf.sdsc.edu/biblio/BRTF_Interim_Report.pdf.

24). Hence they neglect the fact that they will not only need money to build a digital archive, but also to maintain it. Since cultural organizations have limited financial resources, the question of who pays for a digital archiving project is highly critical. In her study, Diane M. Zorich (2003) investigates the sustainability concerns of digital cultural heritage initiatives. Zorich, who is an experienced information management consultant for cultural organizations, states that cultural organizations receive financial support from several sources (2003, p. 14). These sources include foundations, public grants, membership fees, corporate support, donations and the actual own income of organizations (Zorich, 2003, pp. 14-19). Zorich identifies funding through foundations as the main financial source for cultural organizations, however, she also acknowledges that these funds usually do not take the concept of sustainability into account: Many foundations "are very willing to give seed money for projects but unwilling to provide general operating support to sustain those projects once they are up and running" (Zorich, 2003, p. 23). The large timespan that normally passes between submitting a proposal and receiving a grant makes it even harder to deal with digital projects and react to the rapid pace of technological development. However, a holistic, economic approach towards digital sustainability should not only include thoughts about the cost of digital archiving. As the Dutch digital preservation specialist Barbara Sierman (2013) argues in her blog post "The Cost of Doing Nothing", considering digital sustainability also means to consider what it would cost society and cultural developments if we did not preserve things. Thus the economic factors of digital sustainability are closely entwined with broader socio-cultural issues.

This section has examined the main factors that affect the sustainability of a digital archiving project. It became evident that the preservation of digital information is dependent on an overall sustainable infrastructure, including economic, social, organizational and technical considerations. However, it is striking that most literature solely focuses on *internal structures* within cultural organizations. Thus in the next section, I will investigate if *external factors* can affect the sustainability of a digital archive as well. As the notion of open, participatory archives is getting increasing relevant, I will focus on the role of the user to investigate to what extent these external influences are interrelated to sustainability concern.

3.3 The user – an underestimated component of digital sustainability?

Cultural organizations often struggle with providing sustainable infrastructures for digital archives. Consequently, both researchers and practitioners have to react to this issue by taking on a broader perspective and elaborating on new possibilities to expand the resources they

already have. Regarding the notion of participatory archives, the question rises of how users might affect the sustainability of digital archives.

Nowadays, user participation has become a central concept within contemporary digital culture. In this context, the influential media scholar Henry Jenkins coined the notion of *participatory culture*, which he defines as a culture "in which fans and other consumers are invited to actively participate in the creation and circulation of new content" (2006, p. 290). Thus Jenkins describes the shifting power relations between the media industry and their consumers, which is reflected in concepts like user-generated content, online collaboration and information sharing. New media scholar Mirko Tobias Schäfer (2011) presents a more distinct perspective on these phenomena, as he differentiates between *explicit* and *implicit* participation. He argues that explicit participation is driven by motivation, which occurs on an intrinsic or an extrinsic level, whereas implicit participation is channeled by the design of easy-to-use interfaces (Schäfer, 2011, p. 51). In the context of digital archiving practices, Schäfer acknowledges that "user participation has become a crucial aspect in creating data collections, filing, maintaining, and processing information" (2011, p. 115). Considering Schäfer's approach, a digital archive that can be accessed online within a dynamic web interface enables both explicit and implicit user participation. Explicit participation includes actions like creating content, uploading archival material and thus expanding the archive as well as commenting on other archival material. On the other hand, implicit participation is based on viewing and rating archival records as well as the creation of tags and other metadata. Thus implicit participation "draws on user habits, such as sharing information and sending each other copies of films and music files" (Schäfer, 2011, p. 52). Many cultural organizations work towards their archives being accessible online, which means they have to adjust the image of their audience. Huvila describes the transforming characteristics of archival users as follows:

> For a long time, an implicit assumption in archival science seems to have been that the people who come to an archive know what they want, are knowledgeable enough to be able to express their needs in archival terms, and, even better, are able to help themselves as much as possible both in practical matters and in analysing and interpreting the records. (2008, p. 16)

Since the 1990s, this assumption gradually changed, as archival research began to investigate the audience of archives in order to better understand their needs and requirements (Huvila, 2008, p. 16). Even though the awareness of the audience is increasing, the constant

transformation of technological development and related user behavior makes it difficult for cultural organizations to incorporate user requirements effectively within their planning. As more and more archives are accessible within the World Wide Web, the audience of digital archives is a heterogeneous user group, composed by researchers, professionals and non-professionals. To acknowledge these changes and to respond to them will be a key challenge for the future.

All in all, the previous argumentation has shown that a heterogeneous audience constitutes an essential component of digital archives, whereas the actual extent of user participation differs from archive to archive. But what does this mean for the sustainability of digital archives? Bradley argues that within digital archives, the role of the user is central to the degree of sustainability: "A collection of digital information is not sustainable if it has too few contributors or insufficient users to justify its existence" (2007, p. 160). Therefore cultural organizations should not neglect their audience, but directly include it into their considerations and maybe even utilize it to support the continuity of an archive. This is a major shift in archivistics, since the traditional gatekeeper mentality of archivists (see section 2.1) has transformed through the increasing awareness of the audience. Approaching the sustainability of digital archives from this point of view entails a whole new set of possibilities and challenges.

Considering the positive effects on digital sustainability, the user can be seen as an extended resource for cultural organizations. Since cultural organizations are lacking resources to create and maintain digital archives, they could benefit from a meaningful contribution of their audience. On the one hand, this could happen on an explicit level, with encouraging users to upload archival content and thus generate content for the archive. On the other hand, users could participate implicitly by supporting a sustainable information management, as Schäfer describes: "design channels user actions in a way that encourages their participation in expanding a system-wide database, adding meta-data, and thereby structuring stored information semantically" (2011, p. 49). Additionally, a distributed digital archive with an open, user-oriented environment could even affect the sustainability of the archival material itself. As the nature of archival records has altered from paper-based, printed records towards electronic records, basic characteristics have changed as well. Printed records might not be very robust towards external influences, for example water, sunlight or daily usage. However, it is both easy and cheap to reproduce printed material, which results in a higher print run and thus balances their vulnerability (Passig, 2013, p. 129). To emphasize this effect, Passig draws an interesting comparison to the way how frogs distribute their spawn:

"Auf dieselbe Strategie setzt der Frosch, wenn er große Mengen Laich unbeaufsichtigt in die Landschaft entlässt – der Laich ist weder robust noch gut bewacht, aber ein paar Fröschlein werden am Ende schon durchkommen" (2013, p. 129). Passig thus implies that it is not only the robustness, which determines the longevity of an archival record, but also the degree of distribution. This is a crucial point when investigating the sustainability of digital archives, since the degree of openness can be seen as another factor that impacts digital sustainability. To clarify this idea, I want to describe the example of *video art*. If there is only one, original copy of a video, chances will be that at some point the data carrier will break and if there is no one who takes care of digitally preserving the video, it is lost forever. However, the more people have a copy of the video, the less likely is the complete loss of the artwork. Considering the ephemerality of *digital* information, the notion of robustness and distribution is even more critical. As I already described in section 2.3, open virtual spaces have transformed the way we perceive archival records, as video art was originally designed for distribution, whereas nowadays it is often treated like oil paintings that are exclusively displayed at one specific space (Thiel, 2008, p. 181). Opening up digital archives online to a broad audience, supporting user participation and the controlled distribution of archival records could – in some cases – even enhance the sustainability of cultural heritage. Even if some artists might worry about their videos being distributed without their knowledge, once they agree to present it in an online archival platform – from a digital sustainability perspective, a higher degree of distribution can even be beneficial for the longevity of their work. Thus empowering the user to participate in a digital archive can have unexpected positive outcomes.

However, all of these possibilities to enhance digital sustainability through empowering the user also entail new challenges. Opening up archives, empowering users to actively contribute to it and maybe even distributing archival material online clearly conflicts with copyright issues, especially in the field of video art. As I already mentioned in section 3.2, complex copyright issues make it hard – sometimes even impossible – to enable user participation within a digital archive. Sonja de Leeuw, Professor at the Department of Media and Culture Studies at Utrecht University, stresses the relevance of related issues:

> The technological possibilities of the Internet and social media enable users to exploit and reuse audiovisual content creatively (ranging from professionals and students to fans and subcultural niches). Consequently rights issues have become radically more

> complex. Audiovisual archives and institutions cannot easily support open cultural productions that take place outside of carefully controlled circumstances. (2012, p.9)

Thus cultural organizations have to carefully consider the scope of copyright and authenticity problems, when opening up an online archive to their audience, and make sure they obtain clarity about the copyright regulations of each archival record. When archival material is presented or distributed online, related authenticity issues play an important role as well. In the context of video art, this entails issues about the audio-visual quality of distributed works and the authentic presentation of context information, which is necessary to embed the video within a broader artistic context. As an example, it might be very important for a specific video that the sound quality is very good and that the bass is turned up. Or maybe another video art piece was originally designed for screening at museums or exhibitions, in a dark room with no distraction where people had to wear headphones to be fully immersed in the video. These are just some examples of considerations that comprise the original, authentic virtue of an audio-visual art piece. Hence cultural organizations, dealing with digitally archiving video art, have to give consideration to authenticity issues on a larger scale – especially if they build an open online archive that allows for user participation. I want to clarify this important aspect with an example: If users can participate by creating metadata for videos (e.g. adding keywords), it entails the risk that some users might misunderstand the meaning of a video art work or maybe even intentionally add insincere keywords. Consequently, the online presentation that frames the video might not coincide with its original, authentic meaning anymore, since inappropriate keywords convey inaccurate context information. Yet it is crucial that digital archives present audio-visual material in a reliably contextualized way, as de Leeuw emphasizes: "Users might be able to retrieve items, yet without context and a framework for interpretation, the cultural and material understanding of selected content remains limited. In the end this hampers the realization of the full potential of audiovisual content" (2012, p. 9). Therefore the virtual spaces, which cultural organizations build for their audio-visual archival material, have to be carefully controlled environments, which raise awareness for these issues.

Besides copyright and authenticity issues, considering the role of the user entails even more practical challenges. As I already examined previously, the design of user interfaces can have an essential impact on user behavior (especially on implicit participation). Therefore, designing high quality user interfaces plays an important role for enabling meaningful user participation. However, many cultural organizations simply cannot afford to invest in the

development of elaborate user interfaces. Another challenge lies within the ambition to present high quality archival content. As the audience of an online archive is constituted of a heterogeneous user group – with professionals and non-professionals, researchers and people who browse the archive randomly – cultural organizations have to find ways to enable user participation and still ensure that the archive is filled with high-quality content.

In the previous sections (3.1, 3.2, 3.3), I examined the relevance of including sustainability considerations within digital archiving processes. In my analysis, I identified three major factors, which affect the degree of sustainability of digital archiving projects, and which frame the prevalent academic discourse: technical, social and economic factors. To respond to current developments in archivistics, I investigated the role of the user and to what extent this aspect can be included in the discourse as a fourth, relevant factor. My analysis has shown that considerations about users of digital archives are increasingly relevant, as more and more archives are presented in an online environment. Hence a large and broad audience can be reached. On the one hand, empowering the user to participate in an online archive could help cultural organizations to sustain their digital archives. Not only do users justify the existence of a digital archive, but they could also aid to fill it with content, for example by adding videos or metadata. On the other hand, this approach conflicts with important issues like ownership, authenticity and the assurance of a high-quality contextualization of the videos. Despite these challenges, it became evident that the integration of user considerations has recently emerged as a fourth factor that affects digital sustainability. Thus the figure that I presented in section 3.2 (cf. Figure 3.1) can be complemented as follows (cf. Figure 3.2):

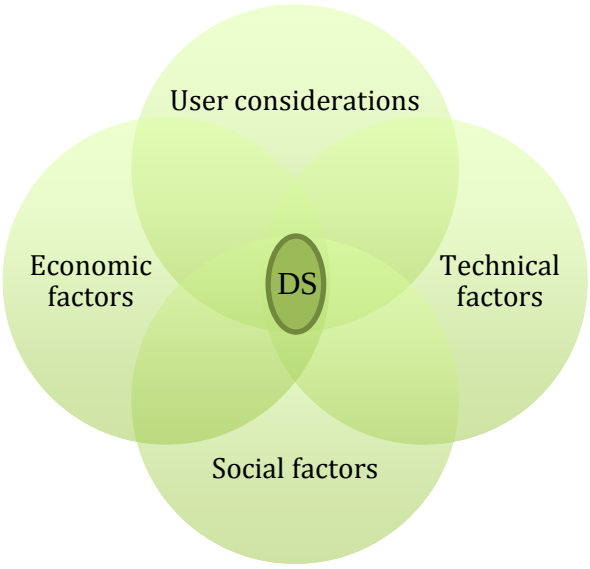


Figure 3.2: Four major factors that affect digital sustainability (DS) (source: own illustration).

The factors in their entirety represent the answer to my first research question. Being interwoven in complex ways, they constitute the notion of digital sustainability. Consequently, digital sustainability is neither a goal that can be achieved, nor a linear process, but it is rather a mindset, a new way to handle problems, as Voss and Kemp conclude:

> Sustainability cannot be translated into a blueprint or a defined end state from which criteria can be derived and unambiguous decisions taken to get there. Instead, it should be understood as a specific kind of problem framing that emphasises the interconnectedness of different problems and scales, as well as the long-term and indirect effects of actions that result from it. (2006, p. 4)

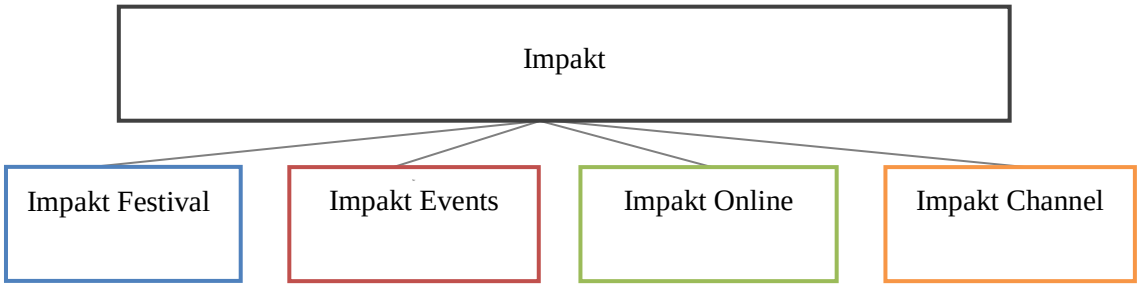
Thus the risk is given that digital sustainability just stays a theoretical construct; a utopian aspiration, which would be nice to achieve, if the people working on digital archives would not fail to start taking actions that are motivated by a *sustainable mindset*. Once this mindset is internalized, its actual, practical implications become evident. Then the concrete factors, which can affect digital sustainability, can be identified and approached, raising awareness within daily archiving practices and decision-making processes. However, the actual extent of this awareness can only be investigated by looking at a real-life digital archiving project. Therefore the next chapter will present a case study research, which complements my research in several ways. First of all, it aims to investigate the relevance of digital sustainability not only in the theoretical discourse, but also in practical contexts. Second, looking at a practical case complies with the holistic, process-oriented research approach of this thesis. Furthermore, the objective of the case study is to analyze actual decision-making processes within a digital archiving project. Hence it provides the methodological frame to investigate my second research question and find out, to what extent cultural organizations include sustainability considerations within a practical archiving project.

4 Case study: digital archiving at Impakt

Over 25 years ago, in 1988, *Impakt* was founded as an organization that engages critically with contemporary culture through media art. Over the years, especially in the scope of their annual Impakt Festival and numerous other events, Impakt screened a large quantity of video art works. So far, these audio-visual art pieces were preserved in their analogue form within a physical archive at the Impakt office, stored on VHS, Betacam tape or other carriers. In order to preserve the videos and to make them accessible to a broader audience, Impakt currently faces the challenge to digitally preserve their audio-visual material and to create an online environment for it, providing access for researchers, artists, curators and other users. This project is called the *Impakt Channel*. Within the scope of a research internship (see appendix A), I had the opportunity to investigate digital archiving processes at Impakt as a participant observer. These observations are embedded within a case study research. Before I thoroughly describe the basic methodological components of this research, I will first introduce the case of the Impakt Channel project by providing a basic project description.

4.1 Project description: the Impakt Channel

Impakt is an organization that deals with contemporary culture through media art. As their agenda is composed by numerous projects, the following illustration provides an overview of their main projects:



The Impakt Festival is an annual video art festival, which always takes place in autumn for five days in Utrecht, the Netherlands. Every year's festival has a different main theme and artists can submit videos that are somehow related to this theme. Art professionals will preview and discuss the submissions at the Impakt headquarters. In the end, the videos that are deemed most interesting for the festival will be screened at the festival. If artists give their

permission, every video that has been submitted for the festival will be archived, no matter if it will be screened at the festival or not, which is why the Impakt archive grows immensely every year.

Besides the festival, which is the most important project for Impakt, there are numerous other events that are hosted by Impakt. Mostly these events are related to the festival topic and take place one to three times a month during summer and autumn. The Impakt Online section involves all online activities of Impakt, which includes social media activities, the Impakt blog, the Impakt website and Impakt's net-art section, which specifically presents Internet art projects.

As a fourth project, the Impakt Channel is the most recent addition to Impakt's overall agenda and the main object of my research. The Impakt Channel project is composed of two major elements. First, it involves the digitization and preservation of the entire physical archive of Impakt. Second, after the digital preservation process is completed, its content will be made accessible online on the Impakt website under the section "Impakt Channel". The physical archive of Impakt consists of audio-visual material that they acquired since the founding of Impakt in 1988. According to an official stocktaking of Impakt, their whole archive consists of around 13800 titles that are stored on 6350 data carriers (see appendix C, document no. 4).[15] Some of these titles – especially the more recent ones – are already in a digital format. However, the majority of titles is stored on analogue data carriers and thus has to be digitized at some point so they can be preserved for the future. Besides, only digital archival material can be presented online within the Impakt Channel. This indicates the large extent of Impakt's digital archiving project. As the establishment of the physical archive started already in 1988, Impakt not only has to deal with an immense amount of titles, but also with a vast diversity of data carriers. The range of different data carriers includes VHS tapes, DVDs, Betacam tapes, U-Matic tapes and CD-Roms. Consequently, the digitization efforts are even more complex, since Impakt has to adjust their technical settings to different data carriers. The core team that worked on building the Impakt Channel during the period of my case study research was composed of a project leader and three interns (including me doing a research internship). Besides the core team, which was fully committed to the digital archiving project, both the director and curator of Impakt were also part of the project. However, they were only involved in the major decision-making processes of the project, but

[15] Due to ethical/professional reasons concerning my internship position, some parts of the appendix are not included in the uploaded version of this thesis, as they contain confidential information about a project that is currently still evolving.

did not participate in the daily workflows, since they were working on other projects and tasks.

The essential goal of the Impakt Channel project is to create an online environment, which enables a broad audience to access Impakt's digital archive. The following excerpt is a quote from the Impakt Wiki (Impakt's virtual knowledge management system), which provides an official description of Impakt's digital archiving project:

> In order to make sure that works and information from our archive remain accessible for us and for others in the future, it is very important to save files precisely and to describe their content well. Analogue works that have been collected during Impakt's long history need to be digitized. . . . We open up our video archive on the Impakt Channel, where we also present more current video programs. Impakt Channel is the platform on Impakt's website that presents and promotes media art by publishing curated video programs . . . We show the curated video programs under the titles of: *Expert's Choice*, *Artist in Focus* and *Flash form the Past*. . . . In times that almost all viewing is done online, we find it important to present media art in an online environment, next to our offline activities. With the Impakt Channel we provide an easily accessible online platform for people who are interested in video art, accompanied by good, engaging information and relations between works: Content with Context . . . To open up the archive, we publish thematic selections, artist in focus programs, and historical selections on our Impakt Channel online. (Impakt Wiki)

Thus the Impakt Channel project consists of two major challenges: first, to digitally preserve a large physical archive that is composed of diverse data carriers and formats; second, to open up this archive within a dynamic online environment, which provides a high-quality contextual framework that helps to comprehend the broader context of the video. This overall project structure establishes Impakt as a relevant case, since it combines both offline and online digital archiving activities and challenges.

4.2 Methodology

The present thesis is based on a qualitative research approach, which is constituted by a dynamic research process that aims to explore the "novelty" of a research field rather than validating established theories or hypotheses (Flick, 2009, p. 25). Furthermore, Cassell and Symon acknowledge that qualitative research methods are particularly appropriate for research questions that focus on organizational processes (1994, p. 1), as it is the case in the present thesis.

The research approach of this thesis combines deductive and inductive approaches. In this context, deduction describes the assessment of specific concepts and theories, whereas an inductive approach aims to derive general theories or rules from a specific case (Reinders & Ditton, 2010, pp. 47-48). The combination of both approaches is reflected in the structure of this thesis. On the one hand, the field of research was explored by means of analyzing theoretical concepts and developments (see chapter 2 and 3). On the other hand, this theoretical framework affects the empirical research design, as it helps to understand how digital sustainability becomes manifest in practical projects. However, the investigation is still an open, dynamic process, in which the researcher acknowledges and incorporates new aspects that might not have been considered previously. The basic methodological framework for this investigation is constituted by a case study. Figure 4.1 illustrates the individual layers of the research process that form the methodological fundament of the present research.

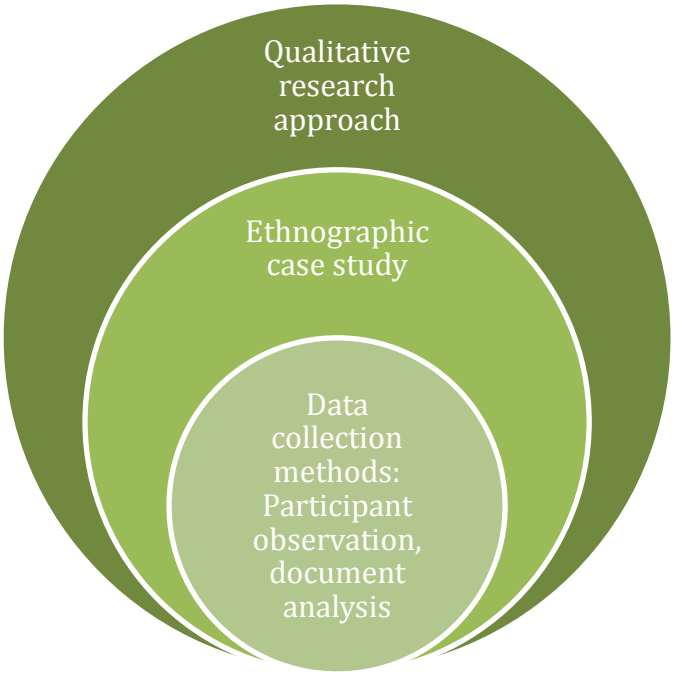


Figure 4.1: Overview of the different layers that constitute the methodology (source: own illustration).

A qualitative research approach frames the investigation of a practical digital archiving project; due to its openness, it allows for mapping socio-technical aspects and also helps to understand broad complex, interrelated processes. Based on this qualitative research paradigm, an ethnographic single-case study constitutes the methodology of this investigation. In order to collect evidence for this case study, two data collection methods were chosen,

which arose in the context of my research internship: participant observation and document analysis. The following sections will explain this research process more detailed.

4.2.1 Case study design

The case study that was performed to explore the second research question of this thesis is designed as a *single-case study*. Even if multiple-case studies might appear to be more appropriate for generalizing research results, there are several rationales that justify a single-case study (Yin, 2009, p. 47). One of these rationales applies to the case I presented in the previous section (see section 4.1), as it represents a *typical* case, which aims to "capture the circumstances and conditions of an everyday or commonplace situation" (Yin, 2009, p. 48). Hence Impakt can be seen as a representative audio-visual cultural heritage organization, which has to face the challenge to build and maintain a digital archive – just like many other, similar organizations – in order to preserve its content and make it accessible to a broader audience. A single-case study design that is constituted by the rationale of a typical, representative case is based on the assumption that the "lessons learned from these cases are . . . informative about the experiences of the average person or institution" (Yin, 2009, p. 48). To some extent, it is thus possible to generalize from a single-case study, given that it is done in an analytical, considerate way. However, as there is a lack of relevant empirical research focusing on the problem statement I explicated in the introduction (see chapter 1), my primary research objective is to gain first empirical findings rather than generating representative results. Another benefit of single-case studies is that they enable the researcher to conduct an in-depth investigation of relevant phenomena. Digital archiving projects are highly time-consuming, as they can last for several months or even years, especially within cultural organizations that do not have enough resources to expedite the process. Thus within the scope of the present thesis, it is more effective to investigate a single case instead of multiple cases, as only a long-term, in-depth observation and investigation of a digital archiving project allows for understanding the complex, interrelated steps and factors that constitute sustainable digital archiving.

In the course of the theoretical framework (see chapter 2 and 3) I already investigated the first research question that I stated in the introduction: Which factors affect the sustainability of digital archiving processes? I argued that the concept of sustainability provides a relevant framework for analyzing digital archiving processes within four dimensions: technical, social and economic factors as well as user considerations. The case

study now provides a methodological framework for answering the second research question: How do audio-visual cultural heritage organizations negotiate sustainability considerations within a digital archiving project? With this question, I want to find out if digital sustainability is just relevant on a theoretical level or if cultural organizations actually consider it within their practical, daily workflows on building a digital archive. Is there a gap between theory and practice, between aspirations and reality? And which specific workflows constitute a sustainable digital archiving project? In order to perform a valid, effective case study, which provides reliable information to answer these questions, it is crucial to clearly define the *unit of analysis* (Yin, 2009, p. 29). In organizational contexts, the unit of analysis can be an organization itself or networks, departments and sections within organizations (Bryman, 1989, p. 23). For the present case study research, the unit of analysis was chosen to be *digital archiving projects at audio-visual cultural heritage organizations*. I chose this specific unit of analysis, because audio-visual cultural heritage organizations have a wide range of activities and projects, including festivals, exhibitions, screenings and other events. In most cases, digital archiving is just a temporary sub-project, however, I want to investigate this specific segment, since it is highly relevant for broader cultural contexts, as I demonstrated in the theoretical framework (see chapter 2 and 3). Formulating this specific unit of analysis and embedding it within the context of sustainability allows for a mutual investigation of two components: *digital sustainability* and *digital archiving projects at audio-visual cultural heritage organizations*.

In the previous passage, I reasoned single-case study research as my basic methodological approach and clarified my research objective. As a next step, it is crucial to further describe my research design in order to assure inter-subjective traceability of my research process. Yin describes a research design as a logical plan that is constituted by the major steps to get from *here* to *there*, "where *here* may be defined as the initial set of questions to be answered, and *there* is some set of conclusions (answers) about these questions" (Yin, 2009, p. 26, emphasis in original). Thus a detailed description of the data collection approach follows.

4.2.2 Data collection

The process of data collection is based on a qualitative, ethnographic research approach. It appears that there is some confusion surrounding the term *ethnography*, as Brennen argues: "These days, even the term ethnography has become somewhat contentious: it has been called a synonym for all qualitative research, or described as a philosophical orientation, a

methodology or a research tool" (2013, p. 160). Additionally, the relation of the two concepts *participant observation* and *ethnography* appears to be unclear. Hence it is critical to situate my ethnographical research within this discussion: Within my methodological framework, *participant observation* (and document analysis) is the data collection method, while *ethnography* is the outcome of this process. This approach is based on Brennen's elucidation, who defines ethnography in the field of media studies as "the qualitative method of observing, talking to and interacting with people in their natural environments; that is, where they live, play and/or work" (2013, p. 160). Consequently, observation is a key element for understanding this method. But why is an ethnographic research beneficial in the context of the present thesis? There is much theoretical writing about digital archiving, however, its complex workflows and interrelations can only be entirely understood in the context of a practical project. In section 2.2, my theoretical investigation lead to a question, which is essential to understand the role of digital sustainability in archival contexts, namely how the people working for cultural organization actually deal with digital archival records. This is a crucial notion of digital archiving, as it acknowledges human agency within digital archiving processes. Hence an ethnographic research approach suits my socio-technical research objective, as ethnographic methods are essential to understand "how people actually engage with media" (Brennen, 2013, p. 162). To further describe my research design, I will describe my data collection methods more detailed in the following passage.

There are various data collection methods for qualitative research. Based on my research internship, I used *participant observation* and *document analysis* as techniques for collecting data to investigate the case. Bryman defines participant observation as a data collection technique, "which involves the researcher spending a period of time making observations in a particular organizational context. The degree of participation varies from study to study" (1989, p. 23). In organizational contexts, Bryman describes two major positions of the researcher, who can either perform a *covert* or a *full* participation. A covert observation occurs when the researcher assumes a work role within an organization, while keeping his role as a researcher a secret. Hence people are not aware of being observed. Also the full participant observer works at the organization, but he is actually known to be a researcher (Bryman, 1989, p. 119). In the case of my research, I was hired as a research intern to support the Impakt Channel team in their daily, practical work and additionally, conduct my research. Thus it can be characterized as a full participation. This can be problematic, as people know that they are being observed and therefore might behave differently. However, Impakt already had numerous research interns in the past, which conducted research next to

their practical duties. Thus it was not a completely new situation for the staff and I was quickly integrated within the small Impakt team. In the course of a participant observation, it is crucial that the observations are being documented in a thorough, consistent way, so that they can be analyzed and interpreted after the observation took place (Brennen, 2013, p. 167). Therefore I documented my observations in the form of fieldnotes.[16] Academic fieldnotes include "information regarding the locations of their observations, the dates and times that the observations take place and a description of the physical space where the observations are held" (Brennen, 2013, p. 168). As the Impakt office was generally a busy place, I usually jotted down my observations immediately in key words and short phrases, which I complemented after the situation was over by crafting more detailed descriptions.

The participant observation at Impakt took place from 17 June 2013 until 20 September 2013. During this time, I was present at the Impakt headquarters in Utrecht from 10:00 a.m. until 06:00 p.m. three days a week as a research intern. The weekdays I was at the office changed weekly, depending on when the digital archiving project leader was at the office, since she was only there three days a week. During my research internship, I was part of the Impakt Channel team, which dealt with building a digital archive for Impakt (see section 4.1) and was thus able to observe daily workflows and gather evidence on routines, practices and decision-making processes within a digital archiving project. In this context, I participated in meetings, talked with the employees about their digital archiving project and fulfilled practical tasks like digitizing and organizing archival records.[17]

In order to conduct a case study that meets academic research standards, Yin stresses the importance to use not only one source of evidence, but to complement it with another data collection method (2009, p. 114). In this context, I practiced document analysis as an additional technique to collect evidence. For this purpose, I collected relevant documents that I received from Impakt in a case study database and analyzed them with the same system that I used to analyze my fieldnotes (the data analysis process will be described thoroughly in the next section). Most commonly, participant observation is applied in combination with conducting interviews, however, I deliberately chose not to conduct interviews with the staff. This decision is based on my research interest: My investigation does not focus on conscious, personal attitudes towards digital sustainability, but is designed to find out if and how digital sustainability is manifested in the daily routines, workflows and decision-making processes within an organizational context. I want to observe, if the people working on digital archiving

[16] All fieldnotes have been collected in a chronological order and can be found in appendix B.
[17] For an overview of my practical tasks, see my internship description in appendix A.

projects show a direct or indirect awareness of digital sustainability in their daily routines and decision-making. Formally interviewing them about digital sustainability might have led to a biased research result, as it could have raised their awareness for sustainability considerations and thus might have affected their behavior. Yet during my observations, I still asked my colleagues casual questions to find out more about the project and then noted the answers in my fieldnotes. To summarize the basic characteristics of the data collection methods that were used in my research, the following table (cf. Table 4.1) provides an overview of the methodological strength and weaknesses.

Source of evidence	Strengths	Weaknesses
Documentation	• Stable – can be reviewed repeatedly • Unobtrusive – not created as a result of the case study • Exact – contains exact names, references, and details of an event • Broad coverage – long span of time, many events, and many setting	• Retrievability – can be difficult to find • Biased selectivity, if collection is incomplete • Reporting bias – reflects (unknown) bias of author • Access – may be deliberately withheld
Participant observation	• Reality – covers event in real time • Contextual – covers context of "case" • Insightful into interpersonal behavior and motives	• Time consuming • Selectivity – broad coverage difficult without a team of observers • Reflexivity – event may proceed differently because it is being observed • Cost – hours needed by human observers • Bias due to participant-observer's manipulation of event

Table 4.1: Overview of data collection methods and their strengths and weaknesses (source: Yin, 2009, p. 102).

Through my role as a research intern, most weaknesses were attenuated, like the retrievability of documents and the vast time and cost expenses of participant observation – since I was working for Impakt, I was able to retrieve relevant documents and was present at the Impakt office anyways. Also the selectivity of observed situations was not a big problem, as the Impakt Channel team was only constituted by three other people, who were all working right next and opposite to me. Thus I was able to provide a broad coverage of observed situations.

However, the issue of a biased researcher has to be taken into account, since being aware of this problem can increase the quality of the data collection process.

In the beginning of the participant observation, I barely confined the situations I observed, so that I was able to gain thorough information about a broad range of processes and practices. This way I gave considerations to the explorative nature of my research objective. Towards the end of the observation phase, I was able to develop a stronger focus for my observations. After the data collection process was over, I examined the data for the role of sustainability considerations within the development of the Impakt Channel. To elucidate the strategic data analysis process of the present research will be the main objective of the next section.

4.2.3 Data analysis

In the course of qualitative ethnographic research, the data collection process usually results in a vast amount of unstructured text. To meet academic standards, it is highly important to analyze textual material in a strategic, analytical way. In this context, Brennen stresses the importance to understand the actual concept of a "text", which involves "cultural artifacts, material documentary evidence that is used to make sense of our lives . . . In other words, texts are things that we use to make meaning from" (2013, p. 193). The data I collected for investigating my case study is composed by fieldnotes and organizational documents. The analysis of these texts is the next step in the research process.

Analyzing data requires the researcher to recognize patterns and themes that are related to the research question within the collected material. Thus "data analysis means a search for patterns in data" (Neuman, 1997, p. 426). After experiencing the research field as a participant observer, an ethnographer has to restore emotional distance and approach his/her fieldnotes "as if they had been written by a stranger" (Emerson, Fretz & Shaw, 1995, p. 145). This is important, since it helps the researcher to avoid a biased data analysis approach. In order to provide a distanced, strategic investigation of the data I collected, the analysis of both my fieldnotes and the documents is based on a *qualitative content analysis*, following the methodological principles of the renowned German scholar Philipp Mayring (2007). Qualitative content analysis can be used to analyze any kind of textual material, i.e. transcripts of interviews, protocols of observations and other written documents (Kohlbacher, 2006, [52]). Furthermore, it is recognized as the prevalent method to qualitatively analyze textual material and strategically search through material for underlying themes and patterns (Bryman, 2004, p. 392).

Since I was working for Impakt as a research intern, I was involved in the Impakt Channel project not only as a researcher, but also as a fully integrated team member. Therefore I had many practical tasks, supporting the Impakt Channel team in their daily workflows. Due to this high degree of immersion into the project, I found it especially important to use a data analysis method that allows for a qualitative analysis of textual material, while following refined techniques and incorporating an appropriate degree of formality. Consequently, qualitative content analysis provides an appropriate methodological frame to suit the specifics of my research. Mayring defines qualitative content analysis as "an approach of empirical, methodological [sic] controlled analysis of texts within their context of communication, following content analytical rules and step by step models, without rash quantification" (2000, [5]). Thus it allows for not only analyzing manifest content, but also for interpreting so-called latent content, which indicates the underlying, implied meaning of a text (Gläser-Zikuda, 2010, pp. 112–113).

Mayring describes three distinct analytical procedures within qualitative content analysis: summary, explication and structuring (Mayring, 2002, p. 115). In the scope of the present research, I chose a summarizing content analysis, as it is based on the overall goal to reduce the vast amount of textual material by summarizing central patterns and themes, as Mayring states: "Ziel der Analyse ist es, das Material so zu reduzieren, dass die wesentlichen Inhalte erhalten bleiben, durch Abstraktion einen überschaubaren Corpus zu schaffen, der immer noch Abbild des Grundmaterials ist" (2007, p. 58). Hence it entails an appropriate analytical framework to respond to the voluminous, unstructured nature of fieldnotes, as all of the text will be systematically summarized in a way that enables an inductive development of categories. These categories are the basis for strategically analyzing and interpreting the original material. Figure 4.2 illustrates the inductive process of categorization:

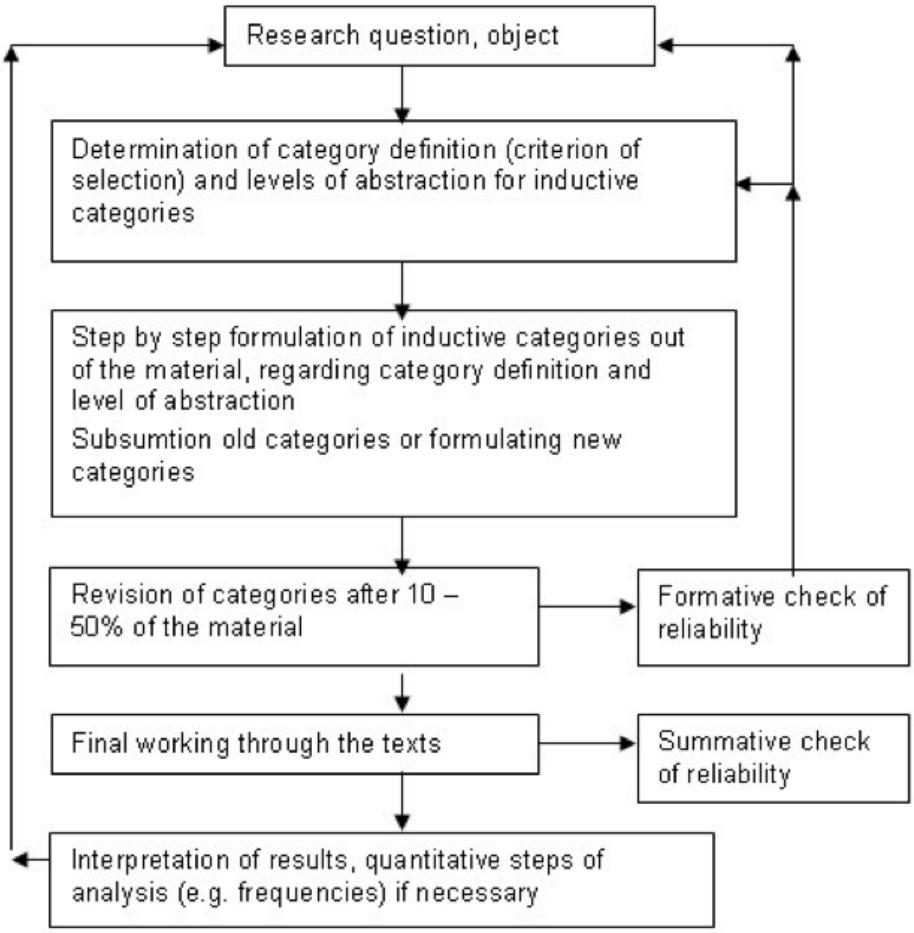


Figure 4.2: Process of inductive category development (source: Mayring, 2000, [11]).

Mayring's illustration visualizes the dynamic process of inductively developing categories to structure and summarize textual evidence. In this process, the research question (see section 4.2.1) constitutes the essential criteria for selecting, which content is going to be summarized and which content is irrelevant for the analysis. Before the actual analysis can start, the *analytical units* of the analysis process have to be clearly defined in advance. In this context, Mayring defines the *coding unit* as the smallest component of the material that may be analyzed, while the *context unit* determines the largest component (2007, p. 53). Within the content analysis of this specific research, the coding unit is defined as a proposition, which encompasses any profound textual information that is relevant for the research objective. A passage functions as a context unit and both the fieldnotes and documents I collected represent the sampling unit.

Following the basic structure of a summarizing qualitative content analysis, the textual material I collected is analyzed line per line.[18] Whenever a text passage is somehow related to the research question, an associated category will be developed. This category can be phrased either as a single term or as a full sentence, as long as it represents the essential content of the original text in a simplified, generalized way. After the first category has been developed, the textual content analysis continues. If the next relevant text passage suits an already existing category, it will be attributed to it. However, if a relevant text passage does not correspond with a category that already exists, a new category will be developed inductively from the new material. This procedure, which is based on a description of Mayring (2002, pp. 116-117), will be iterated for every line of the whole textual material. The previous illustration (see Figure 4.2) visualizes this process by also depicting the feedback loops, which bring the researcher back to the research question multiple times within the analysis to secure a reliable, specific and regulated data analysis process.

So far, I described *qualitative content analysis* (based on Mayring) as the methodological approach I chose to analyze my data. Furthermore, I explained my distinct analytical approach of a *summarizing* analysis, which is based on a dynamic process of inductively developing categories that reflect the original textual material. To assure intersubjective comprehensibility of my data analysis process, it is crucial that the development of the categories follows a systematic, transparent procedure, which will be explicated in the following passage.

First, if I find any relevant information in my fieldnotes (and documents), I will *paraphrase* it. This means that all components of the text that are irrelevant for its specific connotation (as they do not comprise meaning) will be eliminated. For example, the sentence from my fieldnotes "In this context, A. told me that especially the digitization is a time-intensive task, as there are thousands of titles in the archive" is paraphrased as "especially digitization is a time-intensive task, as there are thousands of titles". Thus the information will be transformed into its short form. Afterwards, this paraphrase will be *generalized* so that it reaches an appropriate level of abstraction. In a third step, the *first reduction* takes place, which means that all paraphrases that express the same content will be eliminated. Consequently, after the first reduction, I have developed categories for every relevant

[18] Even if my case study research is composed by two different data collection techniques (participant observation and document analysis), the data analysis will not be performed separately, but it will rather incorporate both kinds of texts – my fieldnotes and the documents – in one all-embracing analysis.

information of the textual material (Mayring, 2007, p. 62). To clarify this procedure, an excerpt of my data analysis table (cf. Table 4.2) illustrates the steps of paraphrase, generalization and reduction:[19]

Fieldnote no.	**Pro-position no.**	**Paraphrase**	**Generalization**	**Reduction**
1806	12	especially digitization is a time-intensive task, as there are thousands of titles	Digitization is a time-consuming process	C3 Challenges of a digital archiving project within a cultural organization • Lack of personnel resources • Time consuming processes • Poor quality of old data carriers
1806	13	Impakt doesn't have enough resources to have an employee working on manually digitizing videos full-time	Lack of personnel resources	
1806	14	Some VHS are so old that the videos cannot be digitized anymore, because their quality is too poor	Some data carriers are too old and thus have a poor quality	
1806	15	While the video is being digitized, there is nothing we could do, as we just had to sit there and wait until the video is over.	Digitization is a time-consuming process	
1806	16	Some videos are very short and only last a few minutes. However, some videos have a longer duration up to 45 minutes, but we still had to sit there and watch the whole video while it was being digitized, in order told make sure that there are no disruptions and the video is fully digitized.	Digitization is a time-consuming process	

Table 4.2: Excerpt of the data analysis table of the fieldnotes (source: own illustration).

The last stage within the process of developing a category system is constituted by another step of summarizing and reducing the content to its elementary meaning. For this purpose, all of the categories that were derived from the fieldnotes and the documents have to undergo a *second reduction*.[20] In this process, similar content of categories is being summarized and combined, resulting in the final category system that presents the essential, relevant content of the original textual material in a concentrated, compact way. By following this procedure, I developed six major categories that present relevant information about how cultural organizations negotiate digital sustainability within their daily practices and routines of a digital archiving project:

[19] The full analysis table can be found in appendix E.
[20] The analysis table for the second reduction can be found in appendix F.

- C1 Knowledge management through Wiki
- C2 Digitization and preservation
- C3 Challenges of a digital archiving project within cultural organizations
- C4 Value proposition
- C5 Considering the audience
- C6 Funding and financial issues

The final category system is attached in appendix D and provides a more elaborate description of the categories and their content. In the following section, I will discuss the results of my research by describing and interpreting the full category system with regard to my research question and the theoretical framework I developed previously (Mayring, 2002, p. 117).

4.3 Presentation and Discussion of Results

The data collection and analysis process revealed that there are two main dimensions, which comprise how cultural organizations negotiate digital sustainability within a digital archiving project. Firstly, cultural organizations are taking *preventative actions* to work towards a sustainable digital archive, which are manifested in the individual stages of the overall project workflow. Most of these actions are not directly labeled to pursue digital sustainability; however, they indirectly correspond to the theoretical framework of digital sustainability (see chapter 3). In other words: the Impakt Channel team has incorporated digital sustainability considerations right from the start, without consciously picking sustainability as a central theme or goal. Secondly, in the course of the project, diverse problems arose that were challenging the Impakt Channel project in terms of sustainability. For example it turned out that some of the older data carriers were already broken, which is why the videos that were stored on them could not be digitized anymore (appendix B, fieldnote 1806). Furthermore, an unexpected lack of financial resources disrupted the project plan (appendix B, fieldnote 0209). Hence the Impakt Channel team was forced to *respond* to these evolving issues, by adjusting their practices and schedules, and come up with new solutions, for example by contacting artists to get new copies of the videos that were lost. All in all, it is not only the considerate planning at the beginning of a project that is linked to digital sustainability, but also the way that people respond to sudden changes of plan, which also has to involve thoughts on sustainability. This dimension is illustrated in Figure 4.3:

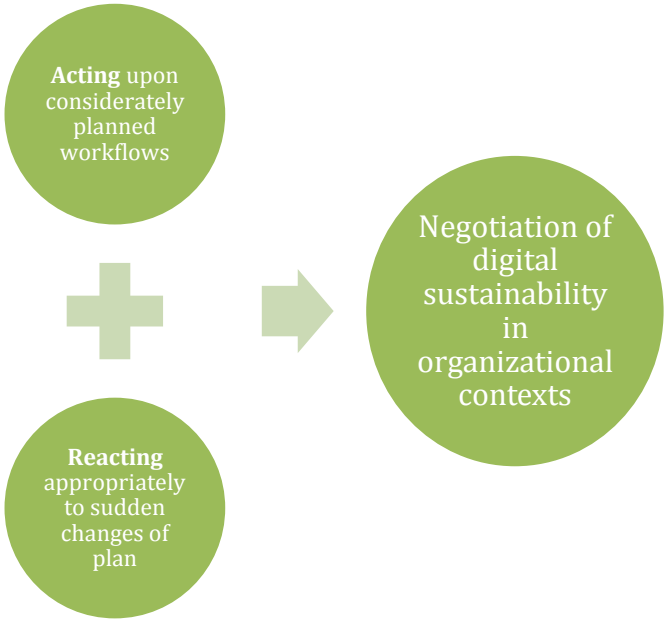


Figure 4.3: Overall components of digital sustainability in organizational contexts (source: own illustration).

In section 3.2 and 3.3, I examined four major components of digital sustainability: user considerations and technical, social and economic factors. All of these factors were reflected within the digital archiving project of Impakt, however, I will not cluster the presentation of my results based on these four dimensions. I rather want to be more specific and thus present practical situations and efforts – themes that emerged within the overall workflow – that were related to digital sustainability. Hence the structure of the following presentation of results is based on the categories that I developed through the data analysis and that I presented in the previous section (see section 4.2.3) – each category and its related findings will be explained in a passage. This way I can focus on the practical implications to demonstrate how the concept of sustainability is manifested within a real-world project.

Value proposition

My research revealed that it is important to start a digital archiving project with a concrete *value proposition*. Before the whole range of digital archiving efforts begin, cultural organizations have to get some clarity about the goals and the main value of the project:

> They knew that creating a digital archive and opening it up on the Internet was a massive project. Thus they wanted to make sure to get some orientation first so that they won't waste time and money by experimenting with different solutions and

> possibilities. Also they wanted to avoid working on such a big project without clearly defining their goals and value. (appendix B, fieldnote 1906)

In the case of Impakt, a brainstorming session and a best practice analysis helped the team to get some orientation to clearly define the scope of the project. For the brainstorming session, they invited experts (that have worked on digital archiving projects before) and people that represent their target audience (for example artists and art students). During the session, they asked the participants about aspects on which they still needed some clarity. Furthermore, the project leader A. did a best practice analysis of audio-visual digital archives in the field of media art.[21] These steps lead to the development of a "wishlist" that defines the overall structure of the Impakt Channel (see appendix C, document no. 5). This wishlist was an important document during the project, as it was an essential point of reference within decision-making processes. Based on the content of the wishlist, Impakt had a well-defined idea of the value that the Impakt Channel would provide for their audience. The overall goal of the project is to digitally preserve the archival material of Impakt and to make it accessible within an online environment. This online environment (the Impakt Channel) will present videos with high quality context information and thus provide "content with context" to facilitate education and research:

> Many audio-visual digital archives are just filled with thumbnails of videos, without any organization and meaningful context. C. and D. want to try something different by linking their digital archival material to other videos and curated programs. They also want to provide detailed context information, e.g. a biography of the author as well as the relation to contemporary culture. (appendix B, fieldnote 0608)

This way, Impakt makes sure to preserve valuable context information of the digitized audio-visual art pieces. Furthermore, the search for both online and offline archival material will be merged within the digital archive to increase the accessibility of archival records. However, offline material, which is not part of the online archive yet, can only be viewed at the Impakt headquarters. It is interesting that Impakt included the goal to embed their digital archive within an online environment right from the start. In section 2.3 I quoted Ernst, who argued that the major strength of digital archival material lies within its potential online accessibility (Ernst, 2013, p. 88). Even though Impakt has limited financial resources, they recognized the relevance of online accessibility and thus adjusted their planning to achieve this goal. By

[21] Due to privacy considerations, all persons mentioned in the research remain anonymous.

formulating a clear value proposition, the Impakt Channel team was able to distribute their resources reasonably as well as to include distinct considerations about their audience and what exactly makes their digital archive valuable for. Such an approach can be beneficial for building a sustainable digital archive, as it helps cultural organizations to ensure an efficient and sustainable allocation of their available resources.

Digital preservation

Getting clarity about the value proposition is the first basic step in developing a sustainable digital archive. Afterwards, the process of *digital preservation* begins. In section 3.1, I found out that most research about digital sustainability is limited to the phase of digital preservation. Evens & Hauttekeete (2011) described four major issues that are related to the sustainability of digital preservation: digitization, metadata organization, intellectual property rights management and business models (p. 157). Also Bradley argued that digital preservation is a major component of digital sustainability (2007, p. 151).

Investigating the case of Impakt has shown that digital sustainability is only partially manifested in the digital preservation efforts. In this context, one important point is the considerate management of metadata. Impakt used the database FilemakerPro to organize all relevant context information of archival records. People at Impakt were aware that the way they deal with metadata *now* would affect how the archival material will be accessible in the *future*, as it is reflected in an official instruction of the Impakt Wiki: "Apart from the basic information in Filemaker . . . it's also very important that you add a *Description* and *Keywords* in the *Title* section of each work in Filemaker, since this is what will make the work accessible in the future" (appendix C, document no. 2). Besides, the consistency of metadata played an important role, which is why there were detailed descriptions and discussions about how and where digitized videos have to be saved and described:

> A. asked us to meet so that we can discuss the consistency of metadata. A. stressed that it is a big problem that the way we archive the digitized videos is inconsistent . . . This will lead to problems later when we want to make the archive accessible online, because it might be harder to find the videos . . . To spare us from these problems, we elaborated on standards (e.g. each description text starts with a short catch phrase; then some information about the artist follows, etc.), which we noted in the Impakt Wiki, so that everybody can view this instruction. (appendix B, fieldnote 0207)

Therefore, setting standards for organizing metadata in a systematic, consistent way is crucial for facilitating long-term accessibility of archival records and thus directly affects digital sustainability. Within the overall Impakt Channel project, digital preservation was the task that involved the most technical issues. Which digital format is the most appropriate one and which program can be used for digitizing analogue data carriers? These are just some questions that are linked to digital preservation processes. The Impakt team was aware that it is important to deal with these questions; however, they also did not have the financial resources to hire a full-time IT-specialist to take care of it. Thus they outsourced this issue, by working with a freelance IT-professional, who set up the whole technical apparatus and explained the digitization process to the Impakt Channel team in the beginning:

> A. told us that they outsourced most of the technical tasks to their freelance IT-specialist. He also advised them in terms of digital preservation and set up their digitization station at the second floor of the office. By partially outsourcing the technical issues, they can focus on organizational tasks and economic issues. (appendix B, fieldnote 2506)

All videos were consistently digitized in mp4 format with an h.264 codec. This setting was chosen, as the h.264 codec provides the advantage of a high compression rate, which makes it possible to store more information on the same hard disk. Yet even if the file size is smaller, the audio-visual quality of the video is still better and more fluent than with other codecs (appendix B, fieldnote 1806). Furthermore, its features are suitable for streaming videos online. After the major technical issues were discussed and their IT-assistant set up the digitization station, the Impakt team was able to take care of the further digitization process on their own, because all the technical settings were adjusted and needed no further maintenance. If there were any problems, they could always contact their external IT-assistant so that he could solve the issue. This shows that cultural organizations can align the tasks within a digital archiving project with the little budget they have and thus still include considerations about digital sustainability, for example by outsourcing one-time tasks to external staff.

However, in the context of digital preservation, it is not only the technical aspects that are relevant, but also the management of intellectual property rights that affect the sustainability of a digital archive (see section 3.2). During the participant observation, it became evident that Impakt attaches great importance to copyright considerations. They contacted every single artist and asked for permission to digitize and publish his/her work online within the

Impakt Channel (appendix B, fieldnote 1107). This is an extremely time-consuming process, however, handling copyright matters in an appropriate, professional way was crucial for Impakt as it prevents future copyright issues and thus contributes to the future accessibility of digital archival material. All in all, the notion of sustainability was clearly manifested in the complex practical workflows that were linked to digital preservation efforts. By engaging an external IT-specialist to set up the digitization process, while still considering the size and quality of different digital storage formats, the optimized future accessibility of Impakt's digital archival material was the main focus. However, my case study research indicates that digital preservation is just one of many processes, in which the notion of digital sustainability became evident. In this context, another important theme emerged, which did not gain attention in previous research so far: the relevance of good *knowledge management*.

Knowledge management

Particularly cultural organizations often have to deal with high personnel fluctuation, since they have only little financial resources and thus work a lot with volunteers, interns and temporary employees. In Impakt's case, their temporary personnel often only work there for a few weeks or months; however, building Impakt's digital archive is a long-term project that will probably take several years until it is completed. Consequently, sustaining Impakt's digital archiving project does not only mean to digitally preserve archival material and provide its accessibility, but also to sustain organizational structures and workflows. For this purpose, Impakt collects detailed descriptions of all workflows that are related to their digital archiving project in a Wiki, which can be easily edited and complemented:

> A. told me about the importance to describe every step of the digital archiving project in the Impakt Wiki. This way we can structure and preserve the knowledge we have for future volunteers, interns and employees. Only a good knowledge management can assure that the working process on the Impakt Channel can continue . . . As Impakt doesn't have enough financial resources to keep a long-term employee to take care of the Impakt Channel, they depend on interns and volunteers to work on digitization and extending the content of the Channel. Hence future Impakt Channel team members have to have a source to retrieve the information about all the workflows. (appendix B, fieldnote 0509)

In the context of the Impakt Wiki, consistency was a reoccurring theme within the project planning, as poor communication often led to the inconsistent execution of tasks. For

example, if there are no clear instructions of how to create and manage metadata, everyone might do it in a different way, which makes it difficult to search through the digital archive in the future. Using a Wiki to communicate clear standards for all practices and routines helped to improve the consistency of workflows as well as to prevent knowledge drain, and can thus positively affect the long-term accessibility of digital archival material.

The role of the user

Another topic, which was frequently discussed within the daily workflows, was *the role of the user*. By acknowledging the user's perspective, the Impakt Channel team gave consideration to future purposes and usages of the digital archive. On a fundamental level, they considered the user as an essential element for digital sustainability, as this quote demonstrates: "A. stressed the relevance of user demands several times – if there is no one who uses Impakt's digital archive, there is no sense in maintaining it" (appendix B, fieldnote 2606). Thus their efforts to build a sustainable digital archive were essentially manifested in giving consideration to their audience. Within the daily practical workflows, this included a thorough analysis of their target audience (appendix C, document no. 3), the considerate planning of a user-friendly user interface (appendix B, fieldnote 2506) and the general incorporation of diverse user needs and expectations within the major decision-making processes.

In this context, one central point of discussion was the degree of user participation that should be enabled within the Impakt Channel. At the beginning of the project, people were insecure about how much user participations would be appropriate: "However, there is much insecurity, as they don't have any experience with user research. A. mentioned some concrete questions, for example, if they should include participatory features like commenting, rating, tagging, sharing videos etc." (appendix B, fieldnote 2506). Should users be able to comment or rate a video, create tags or even upload videos themselves? Or should there be no participatory features at all? I observed that the Impakt team expressed much concern about how enabling user participation might affect the quality of their digital archive in a negative way:

> D. remarked that the main goal of their digital archive is to facilitate education and research – thus the presentation of high quality content has top priority for Impakt. D. expressed concerns that if users could generate any kind of content for the Impakt Channel, Impakt might not be able to fulfill their high quality standards. Due to the lack of personnel resources, nobody could take on the additional task to supervise user

> activities on a daily basis to prevent the display of spam and low-quality content. Consequently, everyone agreed that it would be nice to have some participatory features like comments, tagging, suggesting playlists and videos etc. However, enabling meaningful user participation within a digital archive means even more work and even more complex workflows. Impakt simply does not have the means to carry out the additional work that is needed to incorporate a broad, meaningful user participation. (appendix B, fieldnote no. 1707)

Even if Impakt had a positive attitude toward the inclusion of participatory features – at the moment, their financial and personnel situation makes it impossible to approach it. However, in the end they decided for a compromise, as they now include a low, supervised degree of user participation. Selected people, who have some expertise or interest in media art, can participate by curating programs that are composed by videos of the Impakt archive. This program will then be featured online within the Impakt Channel. This also helps Impakt to fill the digital archive with content in the future, since they might not always have enough staff to regularly work on generating content. By giving other people the possibility to curate programs and take care of contacting the artists, Impakt facilitates limited, supervised user participation and thus still has control over the quality of their digital archive.

These empirical findings support my theoretical assessment of the relevance of user considerations for digital sustainability (see section 3.3). In this context, I identified the user as a factor that can affect digital sustainability in diverse ways. By investigating the case of Impakt, the practical implications of user participation became evident, complementing the theoretical analysis of section 3.3. Thus in the scope of the Impakt Channel project, the notion of digital sustainability was clearly manifested within a distinct awareness of the importance to consider diverse user needs and demands within the major decision-making processes.

Funding issues

Besides the central themes I described previously, there is one last aspect, which is closely interrelated with all other workflows and themes and thus represents the most profound manifestation of digital sustainability: the *funding* of a digital archiving project. During my participant observation, I noticed a general insecurity related to the funding of the Impakt Channel. Even if we were already in the middle of the process of building the digital archive, most applications for funding were still open and the financing was not secured yet:

> So far, the whole funding is not secured yet, because the application process takes very long. There are different applications that have to be done. Afterwards Impakt has to wait until they receive an answer. (appendix B, fieldnote 1070)

As the application process for funding takes very long, Impakt decided to start the project already, as they knew that it was a time-consuming, long-term project anyways. Towards the end of my participant observation, Impakt received the news that they were not getting the funds they had planned with:

> Impakt did not receive the funding they have assumed to receive. As all of the money has to be used for Impakt's main project (the Impakt festival), the launch of the Channel (which was planned to happen before the festival in October 2013) has to be postponed to 2014. However, the digitization and preservation activities will continue, so that the content will be gradually increased. Once the Channel launches next year, an even more elaborate, bigger basis of content will exist. (appendix B, fieldnote 0209)

This demonstrates the importance of a secured funding for a sustainable digital archiving project. If there is no money, there will be no digital archive. Especially for cultural organizations the negotiation of this factor is extremely difficult, since they often make no profit by themselves and depend on getting funding for their projects. However, these external factors can hardly be influenced by them, thus they have to adjust to the circumstances and be prepared for sudden changes of plans. Therefore the funding is the most obvious theme, in which the sustainability of a digital archive is manifested.

Next to funding problems, the Impakt team also experienced tax issues. They originally wanted to offer their archival content online for free, yet it was not clear if they are legally allowed to do so, as they might have to pay taxes for the videos (appendix B, fieldnote 2706). If they have to pay taxes, they will have to include some sort of paywall within the Impakt Channel. Yet nowadays most videos can be streamed online for free, hence it might be difficult to convince people to pay for watching videos at the Impakt Channel. Impakt was aware of this issue and thus decided not to include a paywall for the videos, as long as they do not have the definite, official obligation to do so. Regarding the overall funding issues, the problematic tax situation was another example for how external factors and restrictions can affect the sustainability of a digital archive. This aspect seems to be paradox. The government of a country should be aware of the importance to sustain its cultural heritage in times of rapid technological changes. However, in the case of Impakt, external policies were disrupting the

digital archiving project, as new administrative challenges made it even harder for Impakt to work towards a sustainable digital archive.

Major challenges of the project

So far, I thoroughly explained how Impakt as a cultural organization negotiates digital sustainability step per step within their daily practices and routines. However, within my research it also became evident that Impakt is facing some major challenges that make it difficult for them to work towards a sustainable digital archive.

First of all, the complex nature of digital archiving workflows entails problems. The whole process of digital archiving is extremely labor-intensive and time-consuming. The fact that cultural organizations often have to deal with a lack of financial and personnel resources intensifies these issues. Hence, if the basic organizational infrastructure is not sustainable, a digital archiving project will have sustainability issues as well. In terms of the longevity of archival records, it appeared that some data carriers were already too old for being digitized. Especially the VHS tapes were poorly preserved. Even if they were technically still working, the quality of the videos that were stored on them was so poor, that their digitized version would not provide an authentic representation of the original artwork anymore. Thus the Impakt Channel team had to spend a lot of time to find better copies of the videos, by contacting artists, galleries and distributors. The distributors, however, often ask for money in order to provide the videos – money that Impakt does not have.

Furthermore, Impakt has a large agenda, including the annual festival, other screening events, hosting artists for unique projects, working on the online presentation of Impakt and collaborating with schools for educational projects. In relation to the other main projects of Impakt, building a digital archive is only a sub-project that has no definite deadline, but is rather constituted as a long-term project that can be continued whenever there are enough financial and personnel resources to cover it. Thus it is difficult for cultural organizations to negotiate a complex and time-consuming digital archiving project next to their other daily obligations. Figure 4.4 provides a visual summary of the results that I previously discussed:

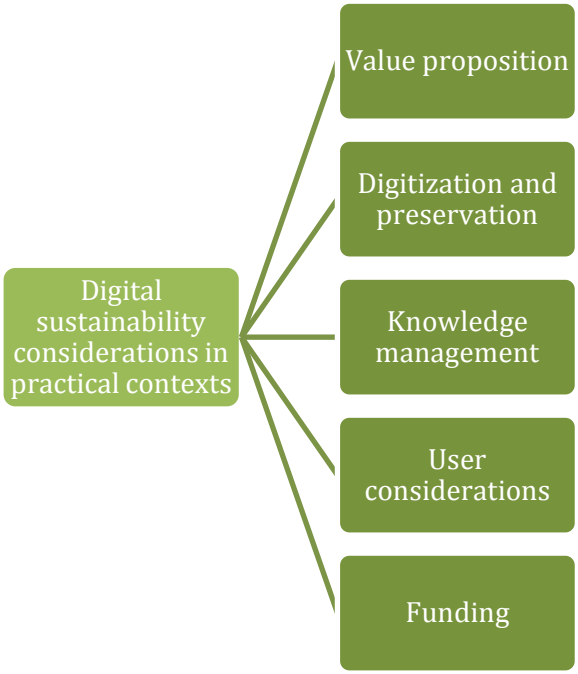


Figure 4.4: Main areas of a digital archiving project that are linked to digital sustainability (source: own illustration).

By considering all of these elements within their digital archiving project, Impakt incorporated digital sustainability considerations within their practical workflows. However, it is crucial to keep in mind that all of these components cannot be regarded separately – digital archiving is rather a dynamic process, which is based on workflows that are interrelated in manifold ways (see section 2.3). All in all, my research uncovered some of these interdependencies and framed them within a broader context. Within all workflows, the Impakt team discussed the *future accessibility* of archival records. It became evident that the way people dealt with digital archival records reflected a notion of sustainability, as they linked past, present and future dimensions within their planning: digitally preserving the past, incorporating it within contemporary culture and making it accessible for present and future users. However, my research also showed that digital sustainability was not a concretely articulated theme or goal, but it was rather a *mindset* that was intuitively incorporated within decision-making processes. In summary, sustainable digital archiving includes both an appropriate technological infrastructure and an ongoing, systematic management of digital records as well as a secured, sufficient funding plan. As a fourth dimension, considerations of the user perspective become more and more relevant.

5 Conclusion

"Audiovisual heritage is cultural memory, a vital component of historical knowledge and an equally important social and cultural component of European cultural heritage. Moving images are the most prominent tools for cultural expression and transmission of information. Europe's audiovisual heritage contains both a record and a representation of the past and, as such, it demonstrates the different levels of development of the 'audiovisual culture' we inhabit today."

(de Leeuw, 2012, p. 4)

In her quote, de Leeuw stresses the importance of audio-visual cultural heritage for contemporary culture and society. However, sustaining audio-visual material is not just important for understanding *contemporary culture*, but also for *future developments*. Giving consideration to the critical issue of providing long-term accessibility to digital archival material, the present thesis has shown that the notion of sustainability is relevant in the context of digital archiving theory and practice. After a first, introductory chapter, which presented the problem statement and the main research objective of this thesis, the second chapter investigated the changing roles of archives within contemporary digital culture. The following, third chapter explicitly dealt with the concept of digital sustainability. In this context, I elucidate the increasing importance of sustainability considerations in archival contexts.

All in all, chapter 2 and 3 constituted the theoretical framework of this thesis, by analyzing the discourse on digital archiving and digital sustainability and thus providing an answer to the first research question: Which factors affect the sustainability of digital archiving processes? Within a theoretical assessment, I examined four major factors that can affect digital sustainability: technical, social and economic factors, as well as the incorporation of user considerations.

To bridge the gap between theory and practice and to provide a more complete understanding of digital sustainability, an empirical investigation of a practical digital archiving project followed. The methodological approach was constituted by an ethnographic case study of the Impakt Channel project, which was performed in the scope of a research internship. Through participant observation and document analysis, I collected evidence to

find out how the notion of sustainability is manifested within the daily practices and routines of a practical digital archiving project.

Using qualitative content analysis as a data analysis method, I examined my second research question: How do audio-visual cultural heritage organizations negotiate sustainability considerations within a digital archiving project? My case study research revealed that the notion of digital sustainability was manifested in a practical digital archiving project in manifold ways. Daily routines, practices and decision-making processes of the Impakt Channel team were based on considerations, which reflect the temporal dimension of digital sustainability: digitally preserving audio-visual material of the *past*, embedding them in a *present*, contemporary context as well as sustaining them for *future* generations. As the main organizational contexts, which were linked to the concept of digital sustainability, I identified the importance to establish a clear value proposition for a digital archive, to have a secured funding and to implement a sustainable digital preservation procedure. Furthermore, the case study also revealed some new aspects that are particularly relevant for cultural organizations, like the importance of a solid, consistent knowledge management to provide a sustainable organizational infrastructure and respond to the problem of high personnel fluctuation. Additionally, the distinct incorporation of user expectations and requirements was a central part of how Impakt negotiated digital sustainability within their project. However, it also became evident that digital sustainability was not a central, articulated project goal, but rather appeared to be an underlying *mindset* that guided daily decision-making processes directly or indirectly.

To place this thesis within a broader, academic context, it is crucial to reflect on the major limitations of my research as well. First of all, in the scope of this thesis it was impossible to fully investigate all interrelations and interdependencies within a digital archiving project. As I described previously, digital archiving processes are highly complex and can last for several months or even years. Within the three-month phase of participant observation, I was only able to observe a segment of the whole process. Thus the results I obtained might only reflect some aspects of how cultural organizations negotiate sustainability within a digital archiving project – there is no claim for completeness. Furthermore, the data collection method of participant observation entails some features that have to be assessed critically. Brennen argues that the mere presence of a researcher can affect group dynamics and thus impact the way people will behave (2013, p. 167). Even if I was working for Impakt as an intern and people accepted me as part of the team, my presence might have impacted the way people reacted. As part of the Impakt team, I was able to access

almost all information within the Impakt Channel project. However, I still have to consider the possibility that some access might have been deliberately withheld due to social acceptability or privacy reasons. In this context, I recognized that I did not obtain any specific information about the financial situation of Impakt, including concrete numbers or estimations of Impakt's financing. Besides, Yin highlights another major problem of participant observation, since "the participant role may simply require too much attention relative to the observer role. Thus, the participant-observer may not have sufficient time to take notes or raise questions about events from different perspectives, as a good observer might" (2009, p. 113). In the context of my research, this was a problematic aspect, since digital archiving projects entail an immense workload. Mostly, cultural organizations like Impakt do not have sufficient personnel resources to meet these demands, so they need as much help as they can get for their projects. Hence, if a researcher works there as an intern and wants to perform a participant observation next to his/her practical duties, this can be a challenging endeavor. Indeed, I was busy with practical tasks like digitizing videos and contacting artists, which sometimes made it difficult to fulfill both roles as a *participant* and an *observer* in a balanced way.

As the overall research was not designed to obtain representative results, but to generate first empirical results by conducting an in-depth single-case study, the results I obtained cannot be generalized. However, since the case of Impakt can be seen as a typical case of an audio-visual cultural heritage organization, the research could be used as a starting point for further investigations. Hence future research could use my results to develop a more focused research approach. In this context, a multiple case study could aim to differentiate between organization-specific characteristics and overlapping, inter-organizational features. With this approach, heterogeneous and incompatible workflows could be made more homogeneous, by developing a more general recommendation for how cultural organizations can include sustainability considerations within their digital archiving projects. This recommendation could be designed as a "sustainability plan", which includes concrete steps for working towards a sustainable digital archive.

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Appendix A: Internship description

Internship Duration: 17. July 2013 – 20. September 2013
Internship placement: Stichting Impakt, Utrecht

In the course of my research internship at Impakt, I also completed the following practical tasks:

- Digitization of audio-visual material
- Organization of archived material in the database FilemakerPro
- Upload of digitized videos to vimeo.com
- Writing textual descriptions and keywords for archival material
- Adding metadata to FilemakerPro
- Creation of stills of archived videos
- Participation in the development of the user interface of the Impakt Channel
- Research of different payment models for streaming videos online
- Best practice analysis of audio-visual digital archives that are accessible online
- Assistance at expanding Impakt's knowledge management system (the Impakt Wiki)
- Contacting artists and distributors to get permission to digitize and archive their works
- Support the Blog team by setting up a tumblr blog and posting content on the blog
- Assistance at Impakt events

As this list shows, I was mainly working with and for the Impakt Channel team. Besides my role as a participant observer, my colleagues frequently asked me to do some informal research for them as well, such as researching different payment models or conducting some informal user research. In this context, I collaborated with an intern for interactive design, who developed a draft of how the Impakt Channel could look like, once it is launched. In the scope of my user research, I met with several artists and curators and showed them the printed sketches of the Impakt Channel, in order to find out how they liked it and if some sections or structures were still unclear. As a new media student, this was particularly interesting for me, as I was first involved in the practical development of a user interface, while afterwards I was able to see how possible future users directly respond to it. Bridging the gap between internal processes and planning and external requirements and expectations was a valuable learning

experience for me. I did not include this research in the present thesis, since the user research I conducted was rather informal, providing some first insights for the Channel team and the interactive design intern on what is perceived positively and negatively by users. Hence I presented my most important results to the Impakt Channel team right away, so that they could directly incorporate them within their further planning. For example, my user research showed that some sections of the Impakt Channel were unclear to the users. Thus we discussed some other names and agreed on a clearer heading for these sections (e.g. the section "Impakt History" implied that its content was directly related to Impakt and its organizational development, which was not the case. Thus the project leader and the director decided to turn it into "Flash from the Past"). All in all, the combination of research and practical tasks allowed me to gain in-depth, practical knowledge about new media art, cultural organizations and digital archiving processes. Additionally, I was able to apply my theoretical knowledge and serve as a "new media expert", for example within the research I did or when discussing usability issues of the design proposals of the Impakt Channel user interface.

Besides the Impakt Channel project, I also had the chance to gain insights into other areas of Impakt, for example by assisting at screening events or by supporting the PR team, where I had the task to work on the Impakt Blog. Compared to the time I spent working on the Impakt Channel, these were only minor tasks, yet they still provided me with a broader understanding for the workflows at a cultural organization like Impakt that deals with media art. The fieldnotes that follow in the next section (appendix B), present a more detailed description and reflection of the progress of my internship.

Appendix B: Fieldnotes of participant observation

Remark of author: Due to ethical/professional reasons concerning my internship position, this part of the appendix is not included in the uploaded version of this thesis, as it contains confidential information about a project that is currently still evolving.

Appendix C: Collected documents

This section of the appendix contains all relevant, official documents that I obtained from Impakt, which were part of the data analysis process of the case study research. Every official document is placed within a frame to provide a clear overview of the individual, separated documents.

Remark of author: Due to ethical/professional reasons concerning my internship position, this part of the appendix is not included in the uploaded version of this thesis, as it contains confidential information about a project that is currently still evolving.

Appendix D: Final category system

C1 Knowledge management through Wiki

- Tool to maintain acquired knowledge and train new personnel
- Contains detailed description of projects and workflows
- Necessary to assure that digital archiving project can continue in spite of high personnel fluctuation

C2 Digitization and preservation

- Use of a database to organize metadata and assure accessibility of archival records
- Outsourcing the technical issues to an external IT-specialist
- Preventing future copyright issues by getting permission of every artist to digitally archive his/her work
- Setting fixed standards for all practices and routines that are linked with digitization and preservation, in order to assure consistency

C3 Challenges of a digital archiving project within cultural organizations

- Complex workflows that are labor-intensive and time-consuming
- Lack of financial and personnel resources
- Old data carriers already suffered a loss of quality
- Plans are not fixed but might change during the process
- Uncertainty about financial situation, but secured financing is a critical factor for success
- Strong dependency on external factor
- Funding of a sub-project is difficult
- Concerns about who will continue digital archiving, since personnel changes occur frequently

C4 Value proposition

- Efforts to get clarity about values and goals of the project: best practice analysis and brainstorming session with experts and representatives of the target audience and

- Deployment of a “wishlist” that contains main goals and value
- Clearly defined goal of the project
    - To digitally preserve archival material
    - To make this material accessible within a high quality online environment that facilitates education and research
    - To merge the search for both “online” and “offline” archival material

C5 Considering the audience

- Analysis of the target audience
- Incorporation of diverse user needs and expectations within decision-making processes
- At first insecurity about how much user participation is appropriate, then decision for limited participatory features
- Thoughtful planning of a user-friendly interface of the digital archive
- Development of a promotion plan to gain more users

C6 Funding and financial issues

- Evaluation of diverse appropriate payment models
- Ongoing application for funding, however, no definite clarity about financial prospects

Appendix E: Analysis table of first reduction

Remark of author: Due to ethical/professional reasons concerning my internship position, this part of the appendix is not included in the uploaded version of this thesis, as it contains confidential information about a project that is currently still evolving.

Appendix F: Analysis table of second reduction

Remark of author: Due to ethical/professional reasons concerning my internship position, this part of the appendix is not included in the uploaded version of this thesis, as it contains confidential information about a project that is currently still evolving.