The Digital "Memory of the World"

An Exploration of Documentary Practices in the Age of Digital Technology

A thesis approved by the Faculty of Mechanical, Electrical and Industrial Engineering at the Brandenburg University of Technology in Cottbus in partial fulfilment of the requirement for the award of the academic degree of Doctor of Philosophy (Ph.D.) in Heritage Studies.

by

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05 February 2014

To my family

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Abstract

This research is a study of the UNESCO “Memory of the World” Programme established with the purpose to increase awareness of the existence and relevance of documentary heritage, and to achieve its universal and permanent accessibility. In this context, digital technology is increasingly used to provide access to documentary heritage but this activity also leads to a series of changes in how documents are understood and handled. Starting from the observation that the conceptual and practical changes triggered by digital technology in the “Memory of the World” do not seem to accurately reflect its stated philosophy, this research pursues the aim to critically analyze the possibilities and limits it offers. This analysis is facilitated by a conceptual framework anchored in the medium theory of Harold Innis and his concepts of medium, bias, space and time, and balance, which serve as analytical lenses to closely study selected aspects of digital technology and their influence. Despite popular beliefs that digital technology is most suitable for universal access, the findings of this present research lead to the observation that this cannot really be the case, and it reveals that an over-emphasis on the technical possibilities of digital access is not supportive of the overall purpose of the “Memory of the World”, leading to the narrowing down of its potential relevance. At first glance, this may suggest not recommending at all the use of digital technology. However, acknowledging that each medium has both limits and possibilities, instead of rejecting digital technology the study searches for solutions that may assist with integrating it in the “Memory of the World” in accordance with its overall purpose and philosophy. To this end, three recommendations are elaborated, the same conceptual framework that revealed the limits of digital technology being applied to construct on their possibilities. In order to motivate why following these recommendations would be necessary the study concludes by shifting attention from the relevance of digital technology in the “Memory of the World” Programme to the relevance of the Programme in a world changed by digital technology.

Acknowledgments

If I were asked how this present dissertation has come to fruition, I would perhaps say that it required discipline, but I'd also add that flexibility and creativity have been similarly important; alternatively, I would tell about long hours spent in reflection and sleepless nights in search for an idea; or I'd tell how much I wrote until its final form had been written; yet, regardless of what I would tell I, would certainly not forget to acknowledge the people whose support have made this three-year research possible.

I would certainly like to start by acknowledging the scientific and moral support of Prof. Dr. Marie-Theres Albert, who has not only guided me as my main scientific coordinator through this present dissertation but through my academic path for the last six years. She had been there when I needed help to discovered heritage or understand the academic world, and the entire process would not have been as engaging without her. I would also like to acknowledge the support of my second scientific coordinator, Prof. Dr.-Ing. Uwe Meinberg, for his advice and patience to answer the technical questions of a cultural scientist and for making me see that it is not so difficult to communicate across the disciplines. I am also indebted to Dr. Roland Bernecker for always having taken his time to listen to my queries and helping me to observe the weaknesses of my own arguments. The knowledge I have gained during that process has accompanied me throughout this research, and I would certainly like to also acknowledge his contribution, which can be likened to that of a scientific coordinator. No scientific research can be written without methods and methodology, and thus I would also like to thank to Prof. Dr. Magdalena Droste, Prof. Dr. Verena Aebischer and Dr. Muhammad Al-Zekri for their advice in this regard. Financial and physical resources for this research have been provided by the International Graduate School Heritage Studies at Cottbus University, for which I am very thankful. I have also been fortunate to participate in two UNESCO conferences on the Memory of the World Programme during this time, on both occasions having the opportunity to meet and talk to those people about whose work I wrote, and once having the occasion to present part of this research. These events have been a valuable source of knowledge that have highly enhanced my understanding of the Memory of the World, and I would therefore like to thank to all those who have facilitated my participation in these events. I also thank my colleagues, each of them contributing in their way through comments, jokes, encouragement or simply through their presence, which made all of the difficult moments easier to bear.

At all times, I have been fortunate to have Dejan, a true brainstorming partner and friend, to whom I am not only grateful for accepting my absence but also for doing pretty much everything. I thank him for being there all these days and for those that will come, for I am sure that he would have supported me, if I had embarked again on a three-year journey. The encouragement and support that Maria and Peter have given me during the last years have been valuable and I am very thankful for everything they have done. Mr. Chiliake similarly deserves my thanks for being the only one convincing enough to force me out of my dissertation world and, whether I wanted or not, to remind me to also enjoy nature. Last but not least I wholeheartedly thank to my family, who has instilled in me the strength to embrace the obstacles of life instead of running away. Without this my dissertation could surely not have come to fruition and for this reason, I am not only grateful but I also dedicate this work to my family.

List of Illustrations

Abbreviations and Acronyms

AI	— Artificial Intelligence
ARPA	— Advanced Research Projects Agency
ARPANET	— Advanced Research Projects Agency Network
BIOS	— Basic Input Output System
CD-ROM	— Compact Disc Read Only Memory
CCSDS	— Consultative Committee for Space Data Systems
COMEST	— World Commission on the Ethics of Scientific Knowledge and Technology
CPU	— Central Processing Unit
DISA	— Digital Innovation South Africa
DNS	— Domain Name System
ENIAC	— Electronic Numerical Integrator and Computer
FAQ	— Frequently Asked Questions
GIS	— Geographic Information System
GUI	— Graphical User Interface
IAC	— International Advisory Committee
ICA	— International Council of Archives
ICH	— Intangible Cultural Heritage
ICT	— Information and Communication Technologies
IFAP	— Information for All Programme
IFLA	— International Federation of Library Associations and Institutions
IP	— Internet Protocol
LAC	— Libraries and Archives Canada
LIS	— Library and Information Sciences
LOCKSS	— Lots of Copies Keep Stuff Safe
MoW	— Memory of the World
MIT	— Massachusetts Institute of Technology
MSC	— Marketing Sub-Committee
NGO	— Non-Governmental Organisation
NWICO	— New World Information and Communication Order
OAIS	— Open Archival Information System
PDF	— Portable Document Format
RAM	— Random Access Memory
ROM	— Read Only Memory
RSC	— Register Sub-Committee
SCoT	— Sub-Committee on Technology
UN	— United Nations
UNESCO	— United Nations Educational, Scientific and Cultural Organization
URL	— Universal Resource Locator
TCP	— Transmission Control Protocol
VDU	— Video Display Unit
VR	— Virtual Reality
WDL	— World Digital Library
WHC	— World Heritage Convention
WSIS	— World Summit on the Information Society

1. Introduction

The Memory of the World Programme (MoW)[1] is an international initiative established by UNESCO in 1992 and dedicated to the preservation of documentary heritage. While the main guardians of valuable documents have been libraries and archives, realising that many documents around the world would disappear forever if additional measures were not taken, the international community reacted by establishing MoW to complement the efforts of heritage institutions. The risks of the disappearance of documents are manifold, ranging from natural causes to man-made risks. The former relates to documents usually being composed of natural or synthetic materials that decay over time; while natural disasters involves floods or earthquakes affecting the buildings in which documents are housed.[2] Accordingly, it is only possible to take preventative measures against natural disasters, although documents also disappear due to man-made causes. On the one hand, people neglect documents because they are unaware of the relevance they hold as sources for memory and identity; however, documents have accompanied human societies since the invention of the first writing systems and are one current main source of knowledge about the past. On the other hand, documents are sometimes destroyed intentionally specifically due to people being very aware of the relevance that they hold as sources for memory and identity, with the historical phenomenon of book burning or the destruction of documents during communist regimes and the two World Wars representing cases in point.[3]

In order to positively change global consciousness regarding the relevance of documents and their preservation needs, MoW promotes a comprehensive and global perspective on documentary heritage as part of the common cultural heritage of humanity. From this perspective, MoW is considered complementary to two other major initiatives for heritage established by UNESCO, namely the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage (WHC),[4] and the 2003 Convention for the Safeguarding

[1] "MOW" with three capital letters was an accepted acronym and it was used in parallel with MoW but recently it has been decided to use only "MoW" as the official acronym, this being also the version employed in this present dissertation; UNESCO, *Final Report of the Tenth Meeting of the International Advisory Committee of the "Memory of the World" Programme, Manchester, United Kingdom, 22-25 May 2011*, Paris, 2011.

[2] That such risks are real is demonstrated by existing inventories. See for example Hans van der Hoeven and Joan van Albada, *Memory of the World: Lost Memory – Libraries and Archives Destroyed in the Twentieth Century* (Paris: UNESCO, 1996). See also George Boston, *Survey of Endangered Audiovisual Carriers* (Paris: UNESCO, 2003).

[3] See Rebecca Knuth, *Libricide: The Regime-Sponsored Destruction of Books and Libraries in the Twentieth Century* (Westport, Connecticut, London: Praeger, 2003).

[4] UNESCO, *Convention for the Protection and Promotion of the World Cultural and Natural Heritage*, 1972.

of the Intangible Cultural Heritage (ICH).[5] Despite the three heritage initiatives being considered complementary, the Memory of the World Programme and its core concept of documentary heritage are not well-known among heritage professionals and have not received much attention from research in the field of Heritage Studies.[6] Accordingly, the present dissertation addresses this gap and intends to provide a basis for future research on MoW, with this choice informed also by the assumption that the Memory of the World Programme has a special relevance today when digital technology fundamentally changes the understanding of documents, as well as the way in which they are accessed and preserved.

In order to carry out activities, heritage institutions responsible for documents are increasingly making recourse to the use of digital technology, which in this dissertation is used as generic term to refer to computer and Internet technology. Digital technology has found many applications in libraries and archives, prominently including their use for providing access to documents. An old document that has become fragile can be digitised and rendered accessible in digital form, which assists providing access to its content. Moreover, it may also assist with preserving the original document by relieving pressure from use. However, ironically the process of technological obsolescence, which causes the rapid development of ever-newer technologies incapable of handling documents produced with older technologies, render the digital copy inaccessible in just a few years. This is also the case for documents originally created with digital technology known as born-digital documents, which exist only in this form. Consequently, this has added a new layer of risks to the documentary heritage of humanity. Whereas it falls within the competence of MoW to raise awareness of this matter, the Programme seems to have been profoundly affected by digital technology, which apart from assisting access also triggers a series of conceptual and practical changes. However, in

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[5] UNESCO, *Convention for the Safeguarding of the Intangible Cultural Heritage*, 2003. It would be possible to add further standard-setting instruments, for example the UNESCO, *Convention for the Protection of the Underwater Cultural Heritage*, 2001. However, usually only WHC, ICH and MoW are considered complementary.

[6] Complementing the three heritage initiatives is a recommendation from a MoW Conference from 2008. See UNESCO, *Draft Proclamation from the Third International Memory of the World Conference, 19-22 February 2008, Canberra, Australia.* 2008. A methodology to promote the three heritage initiatives together has been developed by the UNESCO Bangkok Office. See UNESCO Bangkok Office, *A Common Heritage Methodology proposed by UNESCO Bangkok Office: Promotion of Programme and follow-up to Canberra Recommendations, 23 May 2008*. Paris: UNESCO, 2009. For further information see also Richard Engelhardt and Susanne Omager. "Progress report on the development of a methodology for complementing the three UNESCO programmes – intangible, tangible and documentary heritage." *Paper presented at the Third International Memory of the World Conference, 19-22 February 2008, Canberra, Australia.* 2008; For some remarks on the complementarities of the three heritage initiatives see Alissandra Cummins, "To Be or Not To Be Remembered? The greatest challenges for the Memory of the World," *Third Memory of the World Conference, Canberra, Australia, on 19-22 February 2008* (Paris: UNESCO, 2008).

the context of MoW, the changes triggered by digital technology do not seem to be entirely compatible with its stated philosophy.

A document used to be defined as a unity between an informational content and the physical carrier or medium on which information resided, with both considered equally significant as potential sources of memory.[7] A document's value was not confined to its content but could also be attached to the physical carrier owing to its aesthetic, historic, scientific, associative or other types of value. However, this conceptualisation has changed in the case of digital documents - and retrospectively in the case of all machine-readable documents - with attention largely paid to the content.[8] As explained in one of the key documents for the implementation of MoW, in the case of digital documents "the carrier, although necessary to physically hold the information, is of lesser, and often of no importance in the context of Memory of the World."[9] As further explained in the same document, the reason for this is the process of technological obsolescence, meaning that software and hardware rapidly fall into disuse as new ones develop, which renders transferring the content from one carrier to another necessary in order for the content to be preserved.[10] Indeed, in the case of traditional or non-machine readable documents such as a printed book, the preservation of the carrier, i.e. paper, was necessary because the information was recorded on it, with access to the book implying physical access to the carrier. Furthermore, this also meant that access and preservation were closely interrelated, with the need to find a balance between the two, given that too much emphasis on one could jeopardise the other; too strict preservation measures hindered access and too much access endangered preservation. In the case of machine-readable documents such as a digital book recorded on a CD-ROM, this situation has changed. Despite the preservation of the carrier, i.e. CD-ROM, being necessary, having access to it does not guarantee access to the digital book. The machine that "reads" the CD-ROM, i.e. computer, is also necessary. Given that the machines change very often, it is assumed that the carriers also have to change in order to maintain the digital book readable by machines. Consequently, this

[7] Some examples are: written text on paper, a drawing on plastic material, sound on magnetic tape, still and moving images on film tape or optical discs, letters carved into stone, wood, or any other material. For further examples see Ray Edmondson, *Memory of the World: General Guidelines to Safeguard Documentary Heritage*, Doc. No: CII-95/WS-11rev, (Paris: UNESCO, 2002).
[8] UNESCO, "Memory of the World Register Companion". *Official Website of the Memory of the World Programme*, 2011, http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/mow/Register%20Companion.pdf (accessed 23 October 2011).
[9] Ibid.
[10] Ibid.

results in ignoring the carrier's relevance as heritage and emphasising its instrumental value in making content accessible.

Whereas this might not represent a problem from the technical perspective of preservation, denying the potential heritage value of the digital carrier on the basis that it cannot be preserved is not really grounded in the context of MoW. In line with its core concept of documentary heritage, the value of a carrier in MoW has never been something inherent in the possibility to preserve it but rather arising from the assessment of a document against a set of criteria for determining its significance.[11] If the digital carrier could be proved as having heritage value, it would be equally significant as all other carriers; however, this would require assessing it first. Ignoring this matter would mean departing from the very principles advanced by MoW, namely that both content and carrier can be of great variety, including digital, and leads to two further problems. The first problem refers to the emergence of a new philosophy in the context of MoW somewhat contradictory to the initial one, which are supposed to coexist despite one holding that both carrier and content have potential heritage value while the other that the content does. The second problem refers to an over-emphasis of the digitisation of content, leading to MoW being centred on the concepts of access and preservation rather than the overall objective to positively change mindsets about documentary heritage and its relevance. However, this dissertation follows the argument that this overall objective is the essence of MoW, given that preservation and access are also objectives of libraries and archives, not to mention other heritage institutions and NGOs. Being singular in approaching documentary heritage as heritage of humanity, MoW stands apart only through its aim of promoting a comprehensive and global perspective on documentary heritage that would enable changes in thinking about it, which is believed to also consequently facilitate access and preservation.

In light of the above-described changes and implications, not all of which can be deemed as beneficial, the central hypothesis in this dissertation advances that the integration of digital technology in the context of MoW has to take place in accordance with its overall philosophy rather than specific objectives such as access. Deriving from this hypothesis is the main aim

[11] In the context of MoW these criteria refer to a document first being authentic; then being unique and irreplaceable; then being of world significance, which is assessed based on six further criteria, a document having to meet at least one of them, namely the relation of a document to time, place, people, subject and theme, form and style, and social/spiritual/community significance; and then considering four more criteria providing contextual information, namely rarity, integrity, threat and management plan. See Edmondson, *Memory of the World: General Guidelines*, 21-23.

of this dissertation— to provide a critical analysis of the relevance of digital technology in the Memory of the World Programme —as well as the three specific objectives deployed to address this main aim. The first objective is to study what capabilities digital technology has afforded for information transmission, leading to its broad adoption. The interest related to this objective is to emphasise the contribution of contextual factors rather than only technical criteria that have led to the rise and rapid development of digital technology. The second objective is to study how documentary practices have changed under the influence of digital technology, with documentary practices loosely defined as practices with documents, from their creation to access. In terms of this objective, the interest lies in understanding what practices digital technology has extended, and which new ones it has enabled. The third objective is to study how digital technology has changed conceptions related to practices with digital documents, aiming to understand the relevance people attach to digital technology, its surrounding activities and products. The findings of the analysis carried out under these three objectives offer a basis for reconsidering digital technology in the context of MoW from a critical perspective. This addresses the main aim of this dissertation and returns to the initial hypothesis enforcing it, given that the analysis leads to observing that digital technology should indeed be assessed in accordance with the overall philosophy of MoW, so as not to alter it and to enable MoW to fulfil the purpose for which it has been established. Consequently, this present dissertation results in an ethical and methodological framework for conceptualising MoW and its implementation, based on an informed understanding of the potential and limits of digital technology in its context.

This analysis has been guided by the theory and concepts of Harold Innis, whose theory represents a communication theory, and more precisely a medium theory, with its main feature placing the medium of communication at the centre of the analysis, studying its characteristics and their conceptual and practical implications. In the context of this dissertation, such a perspective offers the strength of bringing attention back to the carrier rather than content, which is necessary in order to properly understand the capabilities of digital technology. The choice of using medium theory, rather than theories from the fields of library and archival sciences, is informed by the observation that these research areas are those that inform MoW, with libraries and archives being the main institutions whose expertise and knowledge have contributed to establishing and developing the Programme. For this reason, they not only pass through the same conceptual changes as those observed in MoW, but given their instrumental view of digital technology as a tool for preservation and

access, they do not enable critical entry points into its study too far beyond these two objectives. By contrast, medium theory adopts a critical stance to the implications of a medium, arguing that it conditions and shapes outcomes rather than simply facilitating them. Given that changes in the conceptualisation of documents and practices of preservation as those pointed out above seem to be conditioned by digital technology, the choice of medium theory was deemed more appropriate in the context of this present dissertation. This choice is more properly grounded later in the dissertation where medium theory is set not only in relation to theories from library and archival sciences, but also with others from the broad field of communication sciences, to which it is said to belong. This has triggered the need to also explain why medium theory rather than other communication theory, and why the medium theory of Harold Innis and not of another medium theorist, have been chosen.

Five concepts and their theoretical underpinnings have been borrowed from Harold Innis and constitute a conceptual framework for conducting the analysis under the afore-mentioned objectives. “Medium” represents a first concept used in this dissertation to replace the instrumental view on digital technology with a constitutive view, emphasizing its role in shaping concepts and practices and also the content of documents. “Bias” represents a second concept that broadly speaking refers to the characteristics of a medium; however, it serves as a research device that encourages critical reflection regarding a medium’s limits and possibilities. Therefore, it is used as an analytical lens to study the characteristics of digital technology and their conceptual and practical implications. “Space and time” represent two further concepts, related to each other and referring to opposed yet complementary tendencies triggered by a medium, one oriented towards spatial expansion and the other towards temporal continuity. Attached to the notion of bias, they are used to study the capabilities of digital technology to facilitate universal and permanent access to documentary heritage. “Balance” represents a fifth concept, referring to the equitable or proportional relationship between space and time, which implies a reconciliation of biases. Balance represents an ethical level of analysis and gives purpose to the study of bias. The meaning of these concepts and how they facilitate the analysis can best be understood against the theoretical background of Harold Innis, and for this reason the five concepts are more carefully explained later in this dissertation when detailing the conceptual framework. Further concepts that are central in the present dissertation, such as documentary heritage or preservation, have been defined in the context of the subchapters with analysis dedicated to them accordingly.

Representing an analytical theory, medium theory has also been chosen by considering its compatibility with the critical-analytical approach followed by this dissertation and its methodology, which has been based on a literature review and combined different types of analytical methods, depending on what was being analysed. A literature review was considered the most appropriate technique given that it allows in-depth treatment of the topic and enables the exploration and comparison of different theoretical and methodological alternatives that facilitate gaining new insights into the subject matter. Since these directly support the main aim and specific objectives of the present research, a literature review has been considered most appropriate. The literature covered can be divided into five main bodies. A first group refers to documents related to MoW, which include the key documents for the Programme's implementation, reports resulting from the meetings of the leading bodies, surveys and guides commissioned on behalf of MoW, a small number of scientific articles written about it to date, and some philosophy of law. A second group refers to literature related to documents and documentary practices, comprising scientific literature written in the context of library and archival sciences and literature drawn from the practical experience of libraries and archives as institutions.[12] A third group refers to medium theory and comprises the publications of Harold Innis, including reviews and interpretations of his theories. A fourth body refers to digital technology, this comprising technical descriptions of digital technology borrowed from computer sciences, but also texts from the field of philosophy of technology. A fifth body refers to the interaction of technology and culture and includes literature lying at the intersection of the two, such as Anthropology of Computing, Software Studies and Ethno-Computing, which have served to support the arguments raised in this present dissertation. In terms of the methods applied for studying the data, they largely involved analysis and synthesis. Recourse to qualitative content analysis has been predominant, with this method applied to different bodies of literature. Gaining better insights into the scientific requirements of this method has been assisted by explanations of Klaus Krippendorff regarding content analysis, which he defines as "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use."[13] Agreeing with this definition, and also with Krippendorff's remark that the application of content analysis depends on how content is defined, it is necessary to clarify that in this present dissertation the meaning of a text is not taken to be inherent in the text.

[12] Libraries and archives also refer to collections of documents not only to the institutions collecting documents. In this present dissertation the references is mainly to the institutions rather than the collections, if not stated otherwise.

[13] Klaus Krippendorff, *Content Analysis: An Introduction to its Methodology, 2nd edition* (Thousand Oaks/ London/ New Delhi: Sage Publications. 2004), 18.

Rather, it is believed to be created with the help of the text by a reader in a specific situation, driven by certain intentions, implying that the application of content analysis has to consider that the intentions underlining the research as well as its author might influence the meanings derived. Therefore, in this present dissertation particular attention has been paid to supporting the arguments raised by constantly providing alternative perspectives and additional theories supporting the findings arising from analysis. Additionally, by following the medium theory of Harold Innis two further analytical requirements arise, namely a brief historical analysis of the medium, and an analysis of a medium's characteristics, with the methodology underlining these two methods more properly described when applying them within this dissertation.[14]

This present research is an interdisciplinary study combining insights from cultural and social sciences with those from technical sciences, yet has been written in the context of Heritage Studies, being mainly intended for a non-technical public. For this reason, the simplicity with which discussions of digital technology have been undertaken may be frustrating for those with a technical background, or for those who might expect technical solutions to problems of preservation and access in archives and libraries, which lie outside the interest of this present dissertation. As stated above, digital technology is used as a generic term referring to computer and Internet technology, but these refer to a combination of various other technologies; therefore, a complex discussion would have required detailed technical description of all components involved. Consequently, this would have expanded the analysis beyond the scope of this present dissertation, whose interest lies in bringing attention back to the medium by providing entry points into its functions and applications, rather than being comprehensive about these. Moreover, a complex discussion in the context of this present dissertation would not have been entirely feasible, given that technological obsolescence is not only a problem for preservation but also for scientific research. Conducting a complex analysis would have required focusing on an example of digital technology, for example social media, rather than a general presentation of its specificities as opposed to non-digital media. This would entail the risk of examples chosen for analysis already becoming obsolete during the research. As a result, the breadth and depth of analysis regarding digital technology has been conditioned by the scope and feasibility requirements of the research. Furthermore, this present dissertation has also largely excluded in-depth analysis of other theories besides those existing in libraries and archives and, naturally, the medium theory of Harold Innis. While several theories have been mentioned in support of the arguments raised through Innis'

[14] The reference is mainly to chapters 5 and 6 in this dissertation.

theory, given that digital technology has received substantial attention in recent years, the number of present theories, concepts and approaches are overwhelming. Whereas their relevance cannot be discarded, with some being mentioned in this dissertation, the decision not to provide in-depth analysis of these other theories was conditioned by the methodological implications of this research, which contrasts instrumental perspectives on digital technology with constitutive views. In support of this, contrasting the medium theory of Innis with the few theories discussed has been deemed sufficient to illustrate the difference.[15]

Apart from this present Introduction, which has aimed to introduce the basics of this research, and a Conclusion chapter, outlining the main findings and an outlook for further research, the main body of the present dissertation has been structured into four parts as follows. The first part represents the Literature Review, which comprises chapters two and three. The Memory of the World Programme is introduced in chapter two, commencing with an explanation of its objectives and basic characteristics, before moving to contextualise MoW in UNESCO as part of its heritage-related initiatives. In this regard, the notion of the heritage of humanity is introduced as a principle of law and human right, with its implications discussed in terms of the need to ensure the equitable use of heritage between present and future generations. Despite MoW not being a legal instrument but rather a programme, the same implications this concept triggers in standard-setting instruments also arise in MoW through its approach to documentary heritage as heritage of humanity, as can be seen from the key documents for its implementation. Subsequently, the concept of documentary heritage is discussed from three perspectives existing in MoW: the first relates documentary heritage to the concept of collective memory; the second moves to defining the concept of document, upon which that of documentary heritage is based; while the third clarifies the notions of content and carrier. The chapter concludes with a separate discussion on the emergence of a digital heritage, which highlights gradual changes in conceptualisations and motivates a more in-depth analysis of the implications of digital technology for MoW. Assuming that the changes observed in MoW reflect those taking place in libraries and archives, literature from library and archival sciences has been discussed in chapter three, with the focus placed on literature that engages with theorising of the concept of document, as well as changes that have emerged with the spread of digital technology. This chapter starts with a clarification of what

[15] Overall, the research has also been influenced by the author's academic background, which lies in Anthropology, Philosophy and Heritage Studies, with some acquaintance regarding digital technology. Acquaintance with the technical aspects of this present dissertation has been gained during a course on media technology, offered by the Chair in Media Technology at BTU Cottbus, and through intensive reading, long-term (amateur) practice, as well as informal discussions with professors and students from technical sciences.

digital technology is and how it functions from a technical perspective, emphasising that its understanding in libraries and archives is similar to that in computer sciences. This reflects an instrumental perspective implying certain neutrality of digital technology, which transfers content, yet impacts neither the content nor its transmission or reception. After clarifying how the technology works, the analysis shifts to discussing its conceptual and practical changes triggered in libraries and archives. Regarding conceptual changes, the accent has been placed on the gradual replacement of the notion of document with that of information, with the consequences reflected in the emergence of the notion of documentary practices, meant to counter the reduction of document to its content at the expense of its social dimensions. In terms of practical changes, emphasis has been placed on changes of preservation, discussing several methods of digital preservation that incorporate migration of content yet also extends far beyond to other methods concerned with the preservation of the digital carrier, and a discussion of preservation as sustainable access. This is followed by presenting changes in selection methods preceding preservation. The chapter concludes by underlining that the changes observed have been triggered by digital technology; however, given the predominance of an instrumental perspective on digital technology, the analysis prompts the need to refocus attention on the medium from a non-instrumental perspective.

The second part represents the Conceptual Framework, comprising chapter four. This commences with a brief introduction to medium theory, explaining its key characteristics through a comparison with other communication theories. Despite sharing a common focus on the medium of communication rather than its content, medium theorists have different focuses ranging from the micro level analysis of individual situations to macro level analysis of changes at the broad social level, which renders it necessary to explain which medium theory is followed, with the analysis consequently shifting to an explanation of the medium theory of Harold Innis. After presenting his theoretical position and methodology, attention has been paid to the five concepts that have been borrowed, clarifying how they are used in this present dissertation as building blocks of a conceptual framework meant to guide the analysis of digital technology and its implications. This chapter concludes with an explanation of why Innis' medium theory offers advantages over those considered in libraries and archives and communication sciences, also underlining its relevance as document theory in the context of the present dissertation.

The third part represents the Data Analysis, comprising chapters five, six and seven. Addressing the first specific objective of this dissertation, chapter five represents an extension of the conceptual framework to digital technology, which was not in use at the time that Innis wrote. Therefore, it was not covered in his analysis, which comprised several media ranging from clay tablets to the radio. The chapter commences by providing insights into the history of digital technology, which is approached through the definition of medium borrowed from Innis, and thus presents the development of digital technology as a succession of technical changes yet set in relation to several contextual factors and different social groups. Subsequently, the notion of bias is applied as a lens to offer insights into key characteristics of digital technology, illustrating that the influence of the factors and social groups previously discussed are currently reflected in its design, further conditioning the uses it enables. The chapter closes with the notions of space and time, which are brought in to study the tendencies of digital technology towards spatial expansion or temporal continuity, with this analysis conducive to the observation that digital technology triggers tendencies towards space rather than time. The concept of balance is based on the relationship between space and time, and thus has been included in the analysis surrounding these two concepts. The analysis within this chapter serves as a basis for what follows in chapter six, where the bias of digital technology and its implications are studied in depth in the context of documentary practices. However, given that this concept is broad and could potentially include any kind of practice with documents, only a selection was chosen based on their relevance to the second specific objective of this dissertation, which is addressed in chapter six. Accordingly, the selection includes four practices that are discussed either as extensions of older practices or as new practices enabled by digital technology, and refer to new writing practices and the resulting documents; ways of structuring information in digital documents; types of document classifications enabled with digital technology; and new patterns of access to documents. Chapter seven, which addresses the third specific objective of this dissertation, discusses the conceptual implications resulting from the bias of digital technology and its practices enabled. The analysis comprises four concepts, and starts with discussing utopian views regarding the capabilities of digital technology, and underlining further changes in conceptualisation, to three of which closer attention is paid. Accordingly, these are the concept of access, which reflects an ideology focused on the present rather than the long-term future; the notion of information, which tends to be seen as commodity on the one hand, and its digital form as the equivalent of reality on the other; and the concept of humanity, which under the influence of digital technology tends to be reinterpreted as society enabled by technology and information.

The fourth part represents the Data Interpretation and consists in chapter eight, where the results derived from analysing the data are connected with the Memory of the World to return to the dissertation's main aim and present the findings. The chapter starts with presenting the implications of the medium bias in MoW, clarifying both the possibilities and limitations of digital technology, which highlight that its current application to MoW is not entirely supportive of its overall philosophy. Consequently, the analysis moves towards finding solutions to redress this situation. In this respect, three suggestions are provided that comprise an assessment of the digital carrier's potential heritage value; the replacement of the technical understanding of access with the notion of cultural access; and an approach to preservation understood as participation. The chapter concludes by shifting from studying the relevance of digital technology in MoW to discussing the relevance of MoW in a world changed by digital technology. To this end, MoW is presented as a potential reflection of balance, returning to the initial argument that has motivated this present dissertation to fill research gaps regarding MoW and explain why it currently plays a special role, with digital technology having changed concepts and practices related to documentary heritage.

2. The UNESCO "Memory of the World" Programme

The purpose of this chapter is to introduce the Memory of the World Programme by focusing on its key objectives and the concept of documentary heritage. As remarked in an external evaluation of MoW, its objectives have been stated differently across time.[16] This is confirmed by comparing some key documents of MoW. An older version of the General Guidelines, which is the key instrument for the implementation of MoW, lists the following four objectives: "to facilitate preservation by the most appropriate techniques of the world' documentary heritage; to assist access to it, without discrimination against any users; to increase the awareness worldwide of its existence and significance; and to promote the Programme and its products to the widest possible public."[17] In the revised version of the Guidelines used today, the fourth objective is no longer listed yet appears to have been incorporated under the second objective of access, which has been expanded to also explain how access should be achieved: "this will include encouragement to make digitized copies and catalogues available on the Internet, as well as the publication and distribution of books,

[16] Guy Petherbridge, Christopher Kitching and Clemens de Wolf, "*Memory of the World" Programme Evaluation* (Paris: UNESCO 1998), 14.
[17] Stephen Foster et al., *Memory of the World Programme: General Guidelines to Safeguard Documentary Heritage* (Paris: UNESCO, 1995), 1.

CDs, DVDs and other products, as widely and equitably as possible."[18] Moreover, other documents, including the very first draft Guidelines,[19] or some meeting protocols of the MoW Committees,[20] list only the aims of preservation and access. Therefore, considering the existence of these different statements, it is important to commence by clarifying what MoW is all about.

In a similar manner to the World Heritage List, featuring cultural and natural sites of outstanding universal value, there is also a Memory of the World Register featuring documents of world significance. In the context of MoW, this Register is considered a tool for raising awareness and making an abstract ideal accessible and concrete, with the hope that it will eventually help MoW to achieve the popularity and support enjoyed by the WH Convention.[21] It is worth noting that unlike the WH Convention, MoW also has regional and national registers. With a three-tier structure operating at international, regional and national levels, MoW is led by an International Advisory Committee (IAC), which is the peak body and supported by its subsidiary bodies, namely the Bureau and three sub-committees: the Sub-Committee on Technology (SCoT), the Marketing Sub-Committee (MSC), and the Register Sub-Committee (RSC).[22] However, in addition to these committees responsible for the implementation of MoW at the international level, there are also regional and national committees responsible for implementing the Programme at those respective levels.[23] Therefore, besides the International Memory of the World Register – known as the MoW Register – there are further Registers at regional and national levels,[24] which only differ in their extent of geographical influence of the documentary heritage inscribed.[25]

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[18] Edmondson, *Memory of the World: General Guidelines*, 3.

[19] Jean-Marie Arnoult, *Memory of the World Programme: Suggested Guidelines for the Protection of Endangered Manuscripts and Archives* (Paris: UNESCO, 1993), 13.

[20] See UNESCO, *Report of the Tenth Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Egypt, 20-21 November, 2008*, Paris, 2008; In this present dissertation "MoW Committees" is used as a generic term to refer collectively to the main bodies responsible for the implementation of the MoW Programme.

[21] UNESCO, "Memory of the World Register Companion,"5.; See also Edmondson, *Memory of the World: General Guidelines*.

[22] In addition IAC is also supported by the Secretariat, which is provided by the Knowledge Societies Division, the Communication and Information Sector of UNESCO; See also UNESCO. *Statutes of the International Advisory Committee of the "Memory of the World" Programme*, 1996.

[23] In this present dissertation attention has been given to the implementation of MoW at an international level.

[24] E.g. Memory of the World Register for Latin America and the Caribbean; E.g. Australian Memory of the World Register

[25] In this present dissertation "Registers" in the plural is used to refer collectively to the registers existing at international, regional and national levels. When "Register" in the singular is used the reference is to the International MoW Register, which is also the subject of the discussions carried out in this present dissertation; For explanations regarding the difference between the Registers see Edmondson, *Memory of the World: General Guidelines*, 20-21.

The MoW Register is currently considered the most visible aspect of MoW, with existing literature largely focusing on this aspect of the Programme.[26] For example, some authors have analysed how the MoW Register is promoted through the website of UNESCO,[27] while other authors refer to the Register as an educational tool.[28] Moreover, some further authors consider the global relevance and representativity of the MoW Register.[29] Considering the focus of these authors, we can infer that the MoW Register helps to accomplish the purpose of attracting visibility and interest. However, according to statements recorded in the protocol of the tenth meeting of SCoT, the attention received by the Register is surprisingly not entirely welcome, given that it draws attention away from preservation and access, which as listed by the protocol are central objectives of MoW:

> "Preservation and access were rather dwarfed by the Memory of the World Registers. The SCoT was the only part of the Programme that concentrated on the core reasons for the Programme […] the primary role of the Memory of the World Programme was to improve preservation of and access to the documentary heritage of the world."[30]

On the one hand, it is possible to acknowledge the relevance of the objectives of preservation and access in the context of MoW, yet on the other hand, it is not possible to ignore the Registers. In order to avoid confusion, it should also be emphasized that MoW not only concerns the Registers; it also carries out projects, organises training activities, conferences and exhibitions, produces and distributes products based on the documentary heritage inscribed, lists lost and missing documentary heritage, and gives prize awards, to name a few activities. Nevertheless, the Registers represent an important aspect of MoW and serve specific purposes, as explained by Lyall, providing a brief account of how MoW has developed in Australia:

> "There is a general view that too much emphasis has been placed to date on establishing registers to the detriment of preservation and access. However, MOW is still young. It has been necessary for it to achieve status and credibility. The registers have been a means of achieving that goal. Many are now quite substantial and by

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[26] The Register being the most visible aspect of MoW has been stated in Edmondson, *Memory of the World: General Guidelines*. See also UNESCO, "Memory of the World Register Companion".
[27] Caroline Robertson von Trotha and Robert Hauser, "UNESCO and Digitalized Heritage: New Heritage – New Challenges," in *World Heritage and Cultural Diversity Challenges for University Education*, ed. Dieter Offenhäußer et al. (Bonn: German Commission for UNESCO, 2010), 74.
[28] Helen Bond, "Digitizing our Common Memory," in *Handbook of Research on Culturally-Aware Information Technology: Perspectives and Models*, ed. Emmanuel Blanchard and Daniele Allard, 520-42, (Quebec: Sherbrooke University, 2010); See also Robertson von Trotha and Hauser, "UNESCO and Digitalized Heritage".
[29] Hilary Charlesworth, "Human right and the UNESCO Memory of the World Programme," In *Cultural Diversity, Heritage and Human Rights: Intersections in Theory and Practice*, ed. William Logan, et al. (London: Routledge, 2010), 21-30; See also Annemaree Lloyd, "Guarding against collective amnesia? Making significance problematic: an exploration of issues," *Library Trends* 56, no. 1 (2007): 53–65; See also Ross Harvey, "UNESCO's Memory of the World Programme," *Library Trends* 56, no. 1 (2007): 259-74.
[30] UNESCO, *Report of the Tenth Meeting of the Sub-Committee on Technology*, 2008.

> promoting the registers and identifying their value in recording the memory of the world it will be possible to emphasise the need to preserve them and to enable access to them."[31]

Accordingly, rather than simply awareness-raising, the Registers also seem to be a tool encouraging preservation and access. Furthermore, referring back to the above-quoted meeting protocol of SCoT, it is debatable whether the focus on the Register indeed "dwarfs" the aims of preservation and access. Despite the General Guidelines including provisions for establishing monitoring mechanisms of inscribed documentary heritage, they do not seem to be active.[32] Therefore, in the context of MoW there are no instruments that could easily provide the necessary information to prove that the focus on the Register has a negative impact on its other aims. While some evaluation reports and surveys have been commissioned over the course of time, they do not support such a statement.[33] Rather, some of them even contradict this notion by stating that there is a diminished focus on preservation, owing to an increased focus on digital access:

> "Although preservation continues to be stressed as the prerequisite for access, much of the project work associated with the Programme, and much of the discussion of the IAC and its two Sub-Committees, has been devoted to the promotion of access through new technologies, particularly through digitisation of analogue holdings, and their conversion to mass digital media such as CD-ROMs or the Internet."[34]

The discussion above is not intended to deny the relevance of the objectives of preservation and access, given that they are indeed key aspects of MoW. They are sometimes referred to as twin objectives in the context of MoW, on grounds that "preservation of the documentary heritage and increased access to it complement one another. Access incites protection and preservation ensures access."[35] Furthermore, their very close link is also evident in how preservation is defined: "in the context of Memory of the World, preservation is the sum total of the steps necessary to ensure the permanent accessibility – forever - of documentary heritage. It includes conservation, which is defined as those actions, involving minimal

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[31] Jan Lyall, 2012. "Role of Memory of the World in improving preservation of and access to documentary heritage at a national level," *paper presented at Memory of the World Experts' Meeting, Warsaw, Poland, May 9, 2012.*

[32] UNESCO, *Report of the Fourth Meeting of the Register Sub-Committee of the International Advisory Committee of the "Memory of the World" Programme, Paris, 4-6 December 2006*, Paris, 2006.

[33] Petherbridge, Kitching and de Wolf, "*Memory of the World" Programme External Evaluation*; See also George Boston, Ray Edmondson and Dietrich Schüller, *Memory of the World Programme A Debate about its Futur*e, (Paris, UNESCO, 2005); See also Luciana Duranti,. *Survey on Global Familiarity with the Memory of the World Programme*, (Paris, UNESCO, 2009); UNESCO, "Evaluation of the Memory of the World Programme (res. 36C/COM CI/DR.2) Survey Results," UNESCO, Paris, 2012,

[34] Petherbridge, Kitching and de Wolf, "*Memory of the World" Programme External Evaluation*, 14; the quotation makes reference only to two Sub-Committees because the third Sub-Committee (the RSC) was established only in 2001.

[35] Abdelaziz Abid, "Memory of the World – Preserving our Documentary Heritage, Progress Report. In *Final Report of the Fourth Meeting of the International Advisory Committee of the "Memory of the World" Programme, Vienna, 10-12 June 1999* (Paris: UNESCO, 1999), 19.

technical intervention, required to prevent further deterioration to original materials."[36] However, regardless of how relevant preservation and access are, it is not possible to reduce MoW to these two objectives, and it is important to explain why.

A brochure prepared by SCoT states that:

> "archival and library services have two essential goals: The first is to facilitate access to the documents in their care, thus ensuring that cultural heritage is kept alive and remains an object of research and enrichment; the second is the preservation of the documents in their care so that cultural heritage may be passed on intact to future generations, since the future of a nation, a people or a community is dependent on knowledge of its past."[37]

Traditionally, the preservation of important documents was predominantly the concern of archives and libraries, which developed theories and methodologies for the effective collection, storage and management of documents, and thus they have long played an important role in their preservation. Furthermore, they have also played a key role in the establishment of the UNESCO Memory of the World, with their expertise having contributed to establishing the basis upon which the Programme was constructed. This is confirmed by old and recent documents related to MoW mentioning notions such as "library and archival heritage",[38] or introducing MoW as "UNESCO's flagship programme that aims to ensure the preservation and dissemination of valuable archive holdings and library and museum collections worldwide."[39] Despite documents also being found in museums, they are typically located in libraries and archives, and MoW mainly operates under the expertise of these two institutions. This is reflected in the Statutes of the IAC, which explicitly recommends cooperation with the International Council of Archives (ICA) and the International Federation of Library Associations and Institutions (IFLA).[40] While the influence and particular relevance of libraries and archives in MoW is unquestionable, and despite the similarities of some of their objectives, the purpose of MoW cannot be the same as that of libraries and archives. Indeed, MoW would be worthless if it only did what libraries and archives do. In this regard, its promoters have stressed from the very beginning that MoW "is a new approach

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[36] Edmondson, *Memory of the World: General Guidelines*, 12; the link between preservation and access is clarified later in subchapter 2.1.2.
[37] UNESCO, *Preserving our Documentary Heritage – UNESCO Memory of the World Programme*, Report of the Sub-Committee on Technology of the Memory of the World Programme (Paris: UNESCO, 2005), 6.
[38] Arnoult, *Memory of the World Programme: Suggested Guidelines*.
[39] UNESCO, "Memory of the World Register Companion".
[40] According to the Statutes of the International Advisory Committee (IAC) which is the peak body of MoW, "The Committee shall seek co-operation with competent international non-governmental organizations such as the International Council on Archives (ICA) and the International Federation of Library Associations and Institutions (IFLA)". See UNESCO, *Statutes of the International Advisory Committee of the "Memory of the World"*.

which is not intended to replace UNESCO's traditional activities in the field of preservation and conservation of archive and library holdings, but to complement them with vigorous action to raise awareness, stimulate initiatives and develop partnerships to carry out projects under the emblem "Memory of the World."[41]

Thus, despite preservation and access reflecting main objectives, adopting their sole focus leads to ignoring the very mission of MoW, and also that it is part of UNESCO's activities for heritage protection and that the concept of documentary heritage belongs to its body of heritage concepts, which has certain implications. In this regard, it is surprising to learn from a recent report of the same SCoT that the underlying message of the Programme is the "preservation of information."[42] However, there is a relatively important difference between preservation of information and preservation of documentary heritage, with the direction taken by MoW quite clearly explained in a report of the Bureau, which is therefore cited here at length:

> "The validity of the Memory of the World programme rests on its potential to deliver an outcome which cannot be achieved any other way. There must be some 'value added' dimension above and beyond the work which archives, libraries, museums, governments, NGOs and the rest are already doing […] Of course, the programme has the potential to offer funding, facilitation and other services. However, its unique attribute is the capacity to exercise a comprehensive and objective global perspective on the documentary heritage which is independent of time, political or ethnic boundaries, and so to promote the adoption of universal principles and changes in global consciousness…it can encourage change in the way they [documentary materials] (and, by extension, the global documentary heritage) are perceived, preserved and accessed."[43]

This remark expresses what can be considered as the core of MoW, with the analysis now turning to supporting this argument and discussing its implications.

2.1 UNESCO and the International System of Heritage Protection

The Memory of the World Programme belongs to UNESCO and to its system of heritage protection. Accordingly, in order to achieve a proper understanding of MoW, it is useful to place it in the context of UNESCO as an international and intergovernmental organization.

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[41] Abdelaziz Abid, "Memory of the World," In *Report of the First Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Vienna, Austria, 3-4 June 1994*, Paris, 1994.
[42] UNESCO, *Report of the Ninth Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Mexico City, 7-8 September, 2006*, Paris, 2006.
[43] UNESCO, *Report of the First Meeting of the Bureau of the International Advisory Committee of the "Memory of the World" Programme, London, United Kingdom, 4-5 September 1998*, Paris, 1998.

When UNESCO was established in 1945, following WWII, it was guided by the belief that "since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed."[44] Therefore, according to its Constitution, UNESCO was created "for the purpose of advancing, through the educational and scientific and cultural relations of the peoples of the world, the objectives of international peace and of the common welfare of mankind";[45] or, in short, and as stated on the main page of the UNESCO website, for "building peace in the minds of men and women."[46] Today, as remarked by the current and first female Director General, while this founding idea of UNESCO has not lost its relevance, the world has been changing and consequently the means by which UNESCO can achieve its mission have also been adapted to new demands triggered by factors including globalization, the spread of information and communication technology, or climate change.[47]

Within UNESCO, the influence of these changed conditions is not only evident in how priorities have been set and actions implemented, but also in how concepts such as culture and heritage have gradually evolved. Regarding the concept of culture, an important shift occurred when passing from an elitist conception, a humanities-oriented understanding of culture as education or art, i.e. "books, works of art and monuments of history and science",[48] to an anthropological understanding of culture as a people's way of life.[49] The often-quoted definition of culture set down in the so-called 1982 Mexico City Declaration reflects a milestone in this regard, stating: "Culture may now be said to be the whole complex of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group. It includes not only the arts and letters, but also modes of life, the fundamental rights of the human being, value systems, traditions and beliefs."[50] The concept of heritage has similarly evolved from implying tangible aspects, e.g. buildings or objects, to also encompassing intangible elements, e.g. rituals or performing arts, and particularly

[44] UNESCO, *Constitution of the United Nations, Educational, Scientific and Cultural Organization, Adopted in London on 16 November 1945 by the General Conference*, Preamble.
[45] UNESCO, *Constitution*, Preamble.
[46] See UNESCO, *Official Website.* www.unesco.org/new/en/
[47] Irina Bokova, "A New Humanism for the 21st Century," 2010, http://unesdoc.unesco.org/images/0018/001897/189775e.pdf (accessed February 20, 2013).
[48] UNESCO, *Constitution*, Art. I.2 (c).
[49] These two different understandings of the notion of "culture" have been discussed by Ivan Bernier, *A UNESCO International Convention on Cultural Diversity*, 2003.
[50] UNESCO, *Mexico City Declaration on Cultural Policies*, 1982.

acknowledging the role of local communities in the protection of heritage on the one hand, and the role of heritage in community development on the other.[51]

UNESCO is well known within the field of heritage for drafting standard-setting instruments in the form of international conventions as those for heritage, which, as their name implies, are conventions and thus legally binding.[52] MoW is not a convention; rather, it is a programme, and thus has no legal force. However, regardless of whether they are legally binding or not, all activities undertaken by UNESCO are underpinned by its global ethics of justice and fairness. UNESCO establishes Medium-Term Strategies in carrying out its mission, which set out its framework of action for a period of six years. Its current Medium-Term Strategy for 2008-2013 is structured around five programme-driven overarching objectives,[53] each being more-or-less specific to one of the five major programme sectors of UNESCO.[54] Two of the five major programme sectors of interest in this dissertation are the Culture sector, whose overarching objective involves the fostering of cultural diversity, intercultural dialogue and a culture of peace; and the Communication and Information sector, with its overarching objective of building inclusive knowledge societies.[55] Unlike the heritage conventions situated under the Culture sector, MoW is situated under the Communication and Information sector of UNESCO. More precisely, according to the internal structure of this sector, MoW is situated under the Knowledge Societies Division. This influences how MoW is perceived and promoted as providing a contribution to the building of knowledge

[51] The role of communities and the need to ensure their participation is explicitly stated in UNESCO, *Convention for the Safeguarding of the Intangible Cultural Heritage*, Art.15; For a discussion of the centrality of "community involvement" in the context of World Heritage Site protection see Marie-Theres Albert, "Perspectives of World Heritage: towards future-oriented strategies with the five 'Cs'," In: *Community Development through World Heritage*, ed. Marie-Theres Albert et al. (Paris, UNESCO, 2012), 32-38. The recognition by UNESCO of the link between culture and development has influenced also academic research in the field of Heritage Studies, where there is a tendency to move from discourses centred on the notions of tangible and intangible heritage, to an increasing focus on research regarding the potential of heritage in sustainable and human development. In this regard see Marie-Theres Albert, "Heritage Studies – Paradigmatic Reflections," In *Understanding Heritage: Perspectives in Heritage Studies*, eds. Marie-Theres Albert, Roland Bernecker and Britta Rudolff, (Germany: De Gruyter, 2013), 9-18.

[52] In this dissertation "standard-setting instrument" is used as term to refer to conventions, recommendations, declarations, charters or agreements drafted by UNESCO. For an overview of its major standard-setting instruments see Abdulqawi A. Yusuf, ed., *Standard-setting in UNESCO, Normative Action in Education, Science and Culture Vol. I and II, (Paris*/Leiden/Boston: UNESCO / Martinus Nijhoff Publishers, 2007).

[53] UNESCO, *Medium-Term Strategy 2008-2013, Resolution adopted by the General Conference, 34th session, 2 November 2007*, in Records of the General Conference, Volume 1 Resolutions, 34th session, 16 October – 2 November 2001, Paris: UNESCO, 2007.

[54] The five programme sectors are: Education; Natural Sciences; Social and Human Sciences; Culture; and Communication and Information.

[55] This has been analysed in subchapter 7.3 in this dissertation.

societies.[56] However, at the same time, MoW is considered complementary with other heritage programmes – or rather conventions – of UNESCO.[57] When placed in line with heritage initiatives rather than programmes focusing on media and information, a very different perspective of MoW emerges. From this point of view, MoW turns from being an instrument for knowledge societies into a heritage of humanity. Without denying the relevance of the link between MoW and the construction of knowledge societies, the other perspective is followed in the context of this dissertation, and thus documentary heritage is approached as a heritage of humanity.[58] This perspective is not foreign to MoW; rather, it is either explicitly or implicitly stated at various points in the General Guidelines and other documents of the MoW Committees, as shown below.[59] However, before turning to that aspect, the concept of the heritage of humanity is introduced and its implications discussed as a preliminary step.

2.1.1 The Heritage of Humanity

The idea of a heritage of humanity, also referred to as common heritage of humanity or mankind, already appeared in UNESCO's standard-setting instruments in the Hague Convention in 1954, stating that "damage to cultural property belonging to any people whatsoever means damage to the cultural heritage of all mankind, since each people makes its contribution to the culture of the world."[60] The heritage of humanity has since become an almost ever-present component of UNESCO's standard setting instruments, and was given a more clear expression in the World Heritage Convention, whose preamble explains "that parts of the cultural and natural heritage are of outstanding interest and therefore need to be preserved as part of the world heritage of mankind as a whole."[61] The same idea can be found in the UNESCO Convention on the Protection of the Underwater Cultural Heritage, where

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[56] This has been discussed in David Souter, *Towards Inclusive Knowledge Societies: A Review of UNESCO's Action in Implementing the WSIS Outcome*, (Paris: UNESCO, 2010).
[57] Edmondson, *Memory of the World: General Guidelines*, 35; UNESCO, "Memory of the World Register Companion"; See also Harvey, "UNESCO's Memory of the World Programme", 273; Cummins, "To Be or Not To Be Remembered?"; UNESCO Bangkok Office, *A Common Heritage Methodology*; See also Engelhardt and Omager, "Progress report on the development of a methodology for complementing the three UNESCO programmes".
[58] The link between them and the potential contribution of MoW to knowledge societies has been discussed in Anca Claudia Prodan, "Documentary Heritage, Digital Technologies and the Dissemination of Knowledge," in *Understanding Heritage: Perspectives in Heritage Studies (Heritage Studies Series, 1)*, eds. Marie-Theres Albert, Roland Bernecker and Britta Rudolff, (Germany: De Gruyter, 2013), 155-68.
[59] See subchapter 2.2 in this dissertation.
[60] UNESCO, *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, 1945, Preamble.
[61] UNESCO, *World Heritage Convention*, Preamble.

underwater cultural heritage is "an integral part of the cultural heritage of humanity",[62] and should "be preserved for the benefit of humanity."[63] Moreover, it also appears in the Convention on the Protection and Promotion of the Diversity of Cultural Expressions, where "cultural diversity forms a common heritage of humanity and should be cherished and preserved for the benefit of all."[64] The concept can also be found in various soft law instruments of UNESCO, under different forms and related to different aspects. For example, cultures,[65] movable property,[66] folklore,[67] or knowledge,[68] are said to belong to the common heritage of humanity. However, the concept of the heritage of humanity in the context of UNESCO can be perceived in two different regards: as a principle of law, and as a human right.

Regarding its understanding as a principle of law, for the purpose of clarification it is useful to commence by drawing a distinction between the use of this concept in relation to international resources such as the high seas,[69] or sky,[70] which lie outside the sovereignty of States, and its use in relation to cultural resources. In relation to international resources, the heritage of humanity offers a legal regime characterised by a few principles derived from the nature of such resources, practically belonging to no one in particular, yet equally to all, namely: the principles of non-sovereignty and non-appropriation of resources; the duty to exploit them in the interest of mankind and for peaceful purposes; and the duty to protect and conserve the resources.[71] Specifically, because cultural resources typically lie within the sovereignty of states and are in the ownership of people and institutions, the same principles cannot apply when the heritage of humanity is related to cultural resources. Here the heritage of humanity

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[62] UNESCO, *Convention for the Protection of the Underwater Cultural Heritage*, Preamble.
[63] UNESCO, *Convention for the Protection of the Underwater Cultural Heritage,* Art. 2(3).
[64] UNESCO, *Convention on the Protection and Promotion of the Diversity of Cultural Expressions*, 2005, Preamble.
[65] UNESCO, *Declaration of Principles of International Cultural Co-operation*, 1966, Art. 1.3; See also UNESCO, *Recommendation on Participation by the People at Large in Cultural Life and their Contribution to It*, 1976, Art. II.4 (f); See also UNESCO, *Declaration on Race and Racial Prejudice*, 1978, Art. 5.1; See also UNESCO, *Mexico City Declaration on Cultural Policies.*
[66] UNESCO, *Recommendation for the Protection of Movable Cultural Property*, 1978, Preamble.
[67] UNESCO, *Recommendation on the Safeguarding of Traditional Culture and Folklore*, 1989, Preamble.
[68] UNESCO, *Recommendation on the Recognition of Studies and Qualifications in Higher Education*, 1993, Preamble.
[69] UN, *United Nations Convention on the Law of the Sea*, 1982.
[70] UN, *United Nations Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, 1979.
[71] For a discussion of this principle in relation with the UN, Law of the Sea, see Wolfrum, "The Principle of the Common Heritage". For a discussion of this principle in relation with Internet regulation see Antonio Segura-Serrano, *Internet Regulation and the Role of International Law*, vol. 10, in *Max Planck Yearbook of United Nations Law*, ed. by Armin von Bogdandy and Rüdiger Wolfrum (Netherlands: Koninklijke Brill N.V, 2006), 191-272.

plays a different role because it does not influence the juridical statute of the heritage, yet indicates the interest of the international community in its conservation and enjoyment.[72] In an analysis of the heritage of humanity as a principle of law in relation to international resources, one author emphasises that the crucial point is the benefit of mankind and it is directed towards achieving the equal participation of all.[73] As can be judged from the above-mentioned standard-setting instruments of UNESCO, the same idea also applies to cultural resources, and there appears to be wide agreement in this regard among theorists of law.[74] In the case of cultural resources, the benefit of humanity implies the idea of trusteeship or the principle of stewardship, in that despite ownership rights not being affected, owners still turn into stewards or trustees who must preserve the heritage not for themselves but rather for a second beneficiary, which is humanity. Some authors consider this as offering good chances in the context of heritage protection, because even if ownership disputes arise, they should not affect the need to serve the interests of humanity.[75]

Apart from this understanding, the heritage of humanity can also be considered as a human right, or more precisely as the "third generation" or "solidarity right". The emergence of this category of rights results from a 1978 proposal by the General Conference to identify "new fields in which new human rights might possibly be identified."[76] This category, which includes, e.g. the right to peace, development, a healthy environment and the common heritage of mankind, does not exist to replace or "supplant human rights already established and recognized. They exist primarily to meet certain pressing needs which the international community, at a given time in its historical development, considers being basic or vital and which states should be legally obliged to provide."[77] While there is no hierarchy between rights, for analytical purposes they were grouped into three generations. The first generation

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[72] Francesco Francioni, *Au-delà des traités: l'émergence d'un nouveau droit coutumier pour la protection du patrimoine culturel*, (Italy : European University Institute, Department of Law, 2008), 13-14. http://cadmus.eui.eu/dspace/bitstream/1814/7992/1/LAW-2008-05.pdf

[73] Wolfrum, "The Principle of the Common Heritage".

[74] E.g. Sabine von Schorlemer, *Internationaler Kulturgütterschutz: Ansätze zur Prevention im Frieden sowie im bewaffneten Konflikt, Schriften zum Völkerrecht, Band 102*, (Berlin: Duncker & Humblot, 1992), 564-566; Also Craig Forrest, "Angkor Wat: The Common Heritage of Humankind? An International Law Perspective,"; Also Francesco Francioni, "Beyond State Sovereignty," *Michigan Journal of International Law* 25, no 4. (2004).

[75] Forrest, "Angkor Wat".

[76] UNESCO, *Respect for Human Rights, Resolution 3/1.1/.1, adopted by General Conference of UNESCO, twentieth session*, 24 October - 28 November 1978, Paris: UNESCO, 1978.

[77] UNESCO, *UNESCO and Peoples' Rights, Conclusions of the International Symposium of Experts on Rights of Solidarity and Peoples' Rights, Republic of San Marion, 4-8 October 1982.* Paris: UNESCO, 5.

refers to civil and political rights, which are considered "rights as freedoms",[78] because the State has a passive role of maintaining law and order for people to exercise their freedoms.[79] The second generation includes economic, social and cultural rights considered "rights as claims",[80] because they require the active intervention of the State.[81] The third generation, also known as "new human rights", "peoples' rights" or "solidarity rights", is not concerned with the individual, unlike the first two generations. The third generation is "predicated essentially on the notion of solidarity among people. Such rights, in that they reflect a particularly human conception of community life, can as a result, be achieved only through the joint efforts of all those representing the social interests involved: individuals, States and other public and private entities and bodies."[82] Approaching the heritage of humanity as a principle and right triggers consequences regarding how heritage is handled, with these implications more clearly discussed below.

2.1.2 Spatial and Temporal Dimensions of Preservation

The concept of the heritage of humanity refers to elements of culture whose value is not confined to any borders, whether geographical, political or temporal. This renders them potentially significant for all people without exception, and thus they should be preserved and used for the benefit of humanity. However, understanding precisely what this implies first requires clarification of what humanity means. The notion of humanity has been interpreted differently by different authors, with some suggesting that it may refer to all States;[83] and others that it may also refer to different forms of human associations or all individuals.[84] However, what is of interest in this dissertation is that when humanity is related with heritage, the notion indicates that at least future generations have to be taken into account, as highlighted by Wolfrum.[85] Moreover, Schorlemer is of the same opinion, while Forrest also shares this view in acknowledging that humanity may refer to all individuals, including future

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[78] UNESCO, *Expert Meeting on Human Rights, Human Needs and the Establishment of a New International Economic Order, Paris, 19-23 June 1978*, Final Report, Document SS.78/CONF.630/COL2 (Paris: UNESCO, 1978).
[79] UNESCO, *Colloquium on the New Human Rights, Matias Romero Institute of Diplomatic Studies of the Secretariat for External Affairs of Mexico, Mexico City, 12-15 August 1980, Final Report* (Paris: UNESCO, 1980), 26.
[80] UNESCO, *Expert Meeting on Human Rights.*
[81] UNESCO, *Colloquium on the New Human Rights.*
[82] UNESCO, *Expert Meeting on Human Rights.*
[83] Forrest, "Angkor Wat". Also Rüdiger Wolfrum, "The Principle of the Common Heritage of Mankind," *Zeitschrift für ausländisches öffentliches Recht und Völkerrecht*, no. 43 (1983): 312-337.
[84] See also Wolfrum, "The Principle of the Common Heritage". Wolfrum has analyzed this notion based on the UN, *United Nations Convention on the Law of the Sea*, Art. 140; See also Forrest, "Angkor Wat";
[85] Wolfrum, "The Principle of the Common Heritage"

generations.[86] Therefore, the notion of humanity can be said to have a temporal dimension represented by future generations. However, it also has a spatial dimension represented by the present generations, regardless of geographical location, with the notion of humanity covering all individuals and States. Consequently, by having to address the interests of both present and future generations, the preservation of heritage can also be said to have a spatial and a temporal dimension, which has implications for how it is carried out.

While present generations may refer to individuals, states, groups and societies or other forms of human associations, regardless of the meaning attributed the benefit of mankind turns into principles of intra-generational equity, international solidarity and cooperation.[87] For example, developing countries do not have the same capacities as developed countries to "benefit" from the heritage of humanity, because, for example, they lack the technology to access it. Therefore, it cannot be said that the heritage is used for the benefit of humanity, given that access to the means necessary to use the heritage of humanity appears to be a crucial prerequisite for equity. Sabine von Schorlemer makes a similar statement in her discussion on the heritage of humanity principle in the field of culture, explaining that here access implies exhibition, research possibilities and exchange, and appears to be central because equal access lies at the core of this principle.[88] Moreover, in the absence of a means for accessing heritage, not only are developing countries unable to exercise their right to benefit from the heritage of humanity, but their duty to contribute to its protection is also compromised. However, lacking such means should not be used as an excuse; rather, cooperation is required given that the heritage of humanity is not only a common right but also a common duty. This leads to the principle of international solidarity and cooperation, because at an international level, countries are expected to assist each other in ensuring that the heritage of humanity is equitably shared by all, and that all countries contribute to its protection. Nonetheless, it is necessary to acknowledge that this is an ideal case, and one more difficult to achieve, specifically because countries do not have equal capacities and means. In this regard, it is worth briefly introducing the principle of common but differentiated responsibility, which despite being spelled out in environmental law also applies in the field of culture.[89] The principle is considered to have evolved from the notion of the common heritage of mankind and implies that States have a common responsibility for a global

[86] Forrest, "Angkor Wat".; Sabine von Schorlemer, *Internationaler Kulturgütterschutz.*
[87] This is either explicitly or implicitly stated in standard-setting instruments discussed above in this dissertation.
[88] Sabine von Schorlemer, *Internationaler Kulturgütterschutz*, 573.
[89] UNCED, *Rio Declaration on Environment and Development*, 1992, Principle 7.

problem, yet that there is a need to consider the different circumstances, and particularly each State's contribution to a problem as well as its means and capacity to solve it.[90] Given the differences between countries' capacities and means for heritage protection, the cultural heritage of humanity can also be said to represent a common but differentiated responsibility.

When humanity refers to future generations, the benefit of mankind turns into principles of intergenerational equity and sustainability. The principle of sustainability is well known from the so-called Brundtland Report, first introduced in an environmental context in referring to the requirement to meet "the needs of the present without compromising the ability of future generations to meet their own needs."[91] The same idea can also be found in relation to the heritage of humanity; for example, in the UNESCO Declaration on the Responsibilities of the Present Generations towards Future Generations, which states that "present generations have the responsibility to identify, protect and safeguard the tangible and intangible cultural heritage and to transmit this common heritage to future generations";[92] and that "the present generations may use the common heritage of humankind, as defined in international law, provided that this does not entail compromising it irreversibly."[93] However, another principle of environmental law is also relevant for culture: the precautionary principle.[94] In essence, the precautionary principle as explained by COMEST should be applied "to protect humans and the environment against uncertain risks of human action by means of pre-damage control (anticipatory measures)."[95] As further explained, "when human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm"; whereby morally unacceptable harm means harm that is threatening to human life or health; serious and effectively irreversible; inequitable to present and future generations; or imposed without adequate consideration of the human rights of those

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[90] Centre for International Sustainable Development Law (CISDL), "The Principle of Common but Differentiated Responsibilities: Origins and Scope," *Legal Brief Prepared for the World Summit on Sustainable Development 2002, Johannesburg, 26 August, 2002*.

[91] World Commission on Environment and Development, *Our Common Future, Report of the World Commission on Environment and Development, Annex to document A/47/427, transmitted to the U.N. General Assembly, 1987*.

[92] UNESCO, *Declaration on the Responsibilities of the Present Generations towards Future Generations*, 1997, Art. 7.

[93] UNESCO, *Declaration on the Responsibilities of the Present Generations*, Art. 8.

[94] UNCED, *Rio Declaration on Environment and Development*, Principle 15; the same principle appears in other environmental laws, e.g. United Nations, *United Nations Framework Convention on Climate Change, adopted by the Intergovernmental Negotiating Committee for Framework Convention on Climate Change*, 1992, Art. 3(3).

[95] World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), *The Precautionary Principle* (Paris: UNESCO, 2005) http://unesdoc.unesco.org/images/0013/001395/139578e.pdf (accessed 25 April 2013), 49.

affected.[96] Considering the precautionary principle in a cultural context, Throsby suggests that we also need to consider that certain resources may have value that is not yet recognised, yet whose loss could lead to a future loss of opportunities.[97] Therefore, according to Throsby, applying the precautionary principle implies keeping options open: "extreme caution should be exercised in making decisions that could result in the permanent loss of some item of cultural capital – a ritual, a language, or a historic building, for example."[98] Other authors consider keeping options open as the proper way of transmitting the heritage: "we naturally agree that the heritage should be preserved in the interest of future generations. Yet we cannot foretell their tastes or their needs. This being so, how can we know what to transmit to them? The best way of safeguarding their interests is to keep the option open…by maintaining the integrity of our planet and avoiding irreversible acts."[99] All the principles discussed above as deriving from the nature of certain resources raised to the status of the heritage of humanity are also relevant in the context of MoW, which is the subject of the next subchapter.

2.2 The Documentary Heritage of Humanity

According to the General Guidelines to Safeguard Documentary Heritage, the guiding instrument for the implementation of MoW:

> "The *Memory of the World* Programme proceeds on the assumption that some items, collections, holdings or fonds of documentary heritage are part of the inheritance of the world, in the same way as are the sites of outstanding universal value listed in the UNESCO *World Heritage List*. Their significance is deemed to transcend the boundaries of time and culture, and they should be preserved for present and future generations and made accessible to all peoples of the world in some form."[100]

As indicated by this statement, MoW proceeds on the assumption that documentary heritage is a heritage of humanity. Despite MoW being neither hard nor soft law but rather a programme, closer analysis of the General Guidelines shows that the same understanding of the heritage of humanity and the implications deriving from this status are also present in MoW. For example, although MoW does not formally affect ownership, custody or use of the

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[96] COMEST, *The Precautionary Principle*, 14.
[97] David Throsby, "Sweetness and Light? Cultural Diversity in the Contemporary Global Economy," *Cultural Diversity*, ed. Jean-Michel Baer et al. (UK: British Council, 2004), 43-44.
[98] Throsby, "Sweetness and Light?," 43-44.
[99] Martine Rèmond-Gouilloud, "Evolving Conceptions of the Heritage," in *Keys to the 21st century*, ed. Jérôme Bindé (UNESCO/Berghahn Books, 2001), 150.
[100] Edmondson, *Memory of the World: General Guidelines*, 5; The first version of the Guidelines was written in 1995, and it was revised in 2002. In this present dissertation recourse is made mainly to the latest version of 2002. The 1995 version is used only if the aim is to compare how the two versions differ and how the programme evolved.

material,[101] it does imply that "individuals who are custodians of documentary heritage, whether they be employees of an institution, or personally responsible to a community, are in positions of trust."[102] This reflects the same idea of trusteeship as previously discussed. Furthermore, the heritage of humanity in MoW implies a specific vision of how people should relate to each other based upon sharing certain resources, namely documentary heritage in this case. However, the notion of the heritage of humanity is quite crucial and should not be considered simply as a philosophical statement, given that in practice this philosophy translates into principles that guide action: equity, solidarity and cooperation, and sustainability. MoW appears to be guided by the same principles.

The spatial and temporal dimensions are reflected in the concepts of preservation and access. As already discussed, these are seen as inseparable in the context of MoW, with their close link also evident in how preservation is defined.[103] However, one may question where exactly the boundary between them lies, given that access is incorporated within the definition of preservation. If preservation refers to all measures for access, then what is access? A distinction can be drawn by recalling the mission of MoW, i.e. "to increase awareness and protection of the world's documentary heritage, and achieve its universal and permanent accessibility."[104] Two different understandings of access exist in this mission statement. On the one hand, it speaks about universal accessibility, which can be considered a reference to present generations and consequently the spatial dimension of preservation, because access is considered the right of each and every one, without discrimination. Moreover, it implies the need for intra-generational equity. This principle is reflected in the General Guidelines in various respects, for example: the need to ensure a balanced geographical representation of documentary heritage on the Mow Register; the acknowledgement that not all people have equal access to the Internet and that there may be need for complementary measures to ensure equal access; the acknowledgment that communities and nations differ in their capacity to protect documentary heritage; or the statement that cooperation at different levels is essential.[105] These statements remind the principles of equity, solidarity and cooperation, and common but differentiated responsibilities. On the other hand, the mission statement of MoW speaks about permanent access, which can be considered a reference to future generations and consequently to the temporal dimension of preservation, given that access is also considered

[101] Edmondson, *Memory of the World: General Guidelines*, 24.
[102] Edmondson, *Memory of the World: General Guidelines*, 7.
[103] See introductory part to chapter 2 in this dissertation.
[104] Edmondson, *Memory of the World: General Guidelines*, 6.
[105] These arise at various points in the Guidelines. See Edmondson, *Memory of the World: General Guidelines.*

the right of future generations. Moreover, this principle is well reflected in the General Guidelines, for example: the recognition that demand for short-term access should not place long-term access at risk; or the remark that conserving an original means that no information is lost and that all future options for preservation and access remain open.[106] These remind the principle of sustainability, as well as the precautionary principle. Accordingly, the principles deriving from the heritage of humanity can be considered guiding principles of preservation and access also in the context of MoW. However, while this only informs how documentary heritage should be treated, there is also a need to define what documentary heritage means.

2.2.1 Documents as Collective Memory

The opening paragraph of the General Guidelines reads: "The Memory of the World is the documented, collective memory of the peoples of the world – their documentary heritage – which in turn represents a large proportion of the world's cultural heritage."[107] For the purpose of this subchapter, it is worth highlighting the statement that documentary heritage represents collective memory. The concept of "collective memory" was introduced in academic circles by Maurice Halbwachs in the first half of the twentieth century to emphasize the social dimensions of memory, arguing that not only individuals but also groups had a memory, constantly reconstructed in the present on the basis of the "material traces, rites, texts and traditions left behind by the past."[108] This perspective on memory was received with interest by the scientific community, and has developed into a research field known as Memory Studies.[109] Scientific considerations of collective memory, and also the related concept of cultural memory, are complex and relevant in the broad field of Heritage Studies yet will be incorporated neither in this chapter nor elsewhere in this dissertation.[110] Here, the interest lies in explaining how the notion of collective memory is understood in the context of MoW, and as argued below, the meaning is not entirely the same. Nevertheless, for the purpose of clarifying what collective memory means in MoW, it is useful to commence by employing a distinction made by Olick for whom collective memory represents an umbrella

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[106] Ibid.
[107] Edmondson, *Memory of the World: General Guidelines*, 2.
[108] Maurice Halbwachs, *On Collective Memory*. trans. Lewis A. Coser (Chicago: University of Chicago Press, 1992).
[109] Astrid Erll, and Ansgar Nünning, eds. *Cultural Memory Studies: An International and Interdisciplinary Handbook* (Berlin: Walter de Gruyter 2008).
[110] The concept of cultural memory has been discussed by Aleida Assmann, "Canon and Archive." in *Cultural Memory Studies: An International and Interdisciplinary Handbook*, ed. Astrid Erll and Ansgar Nünning (Berlin: Walter de Gruyter, 2008), 97–107.

concept referring to both products and processes.[111] Following this perspective, collective memory is not only embodied in the material trace of the past but also in people and their social interactions and practices, with the existence of these different facets of memory acknowledged in MoW.[112] However, the collective memory promoted by MoW comprises products not also processes, which could easily include cultural manifestations that would normally be considered under the ICH.[113] The General Guidelines quite clearly explain that the intangible and oral heritage is the province of other UNESCO Programmes.[114]

However, MoW seems to have previously been broader in scope concerning oral traditions, because even if MoW was never concerned with the traditions themselves, it was concerned with their documentation. According to the first Guidelines from 1995, "the Memory of the World Programme will encourage the maintenance and the documenting of this [oral] tradition through oral history projects, thus ensuring cultural continuity through the use of technology."[115] In other words, MoW would make recordings of oral traditions, preserving and making them accessible. This is more clearly stated in a protocol of an IAC meeting from 1995, providing the following explanation regarding the scope of MoW: "the recording of oral history and culture is to be encouraged and the recordings may be considered for inclusion within the 'Memory of the World' Programme."[116] Nevertheless, this condition has changed in the revised Guidelines from 2002, the guiding instrument of relevance today: "While oral history recordings, once in existence, are part of the documentary heritage, and their creation is encouraged – especially in cultures where oral tradition is an important factor - the *Memory of the World* Programme does not duplicate other UNESCO Programmes which deal with this specific area of heritage."[117] However, despite this change, MoW does not seem to be entirely indifferent to "intangible" aspects of memory, as revealed by how the selection criteria for the MoW Register have evolved.

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[111] Olick K. Jeffrey, "From Collective Memory to the Sociology of Mnemonic Practices and Products," in *Cultural Memory Studies: An International and Interdisciplinary Handbook*, ed. Astrid Erll and Ansgar Nünning (Berlin: Walter de Gruyter, 2008), 151-62.
[112] Stephen Foster et al., *Memory of the World Programme*, 9.
[113] See UNESCO, *Convention for the Safeguarding of the Intangible Cultural Heritage*, 2003, Art. 2(2), which lists five broad domains in which intangible cultural heritage is manifested, namely: oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; performing arts; social practices, rituals and festive events; knowledge and practices concerning nature and the universe; and traditional craftsmanship.
[114] Edmondson, *Memory of the World: General Guidelines*, 8.
[115] Stephen Foster et al., *Memory of the World Programme*, 9.
[116] UNESCO, *Final Report of the Second Meeting of the International Advisory Committee of the "Memory of the World" Programme, Paris, France, 3 – 5 May 1995*, (no: CII-95/CONF.602/3), Paris, 1995.
[117] Edmondson, *Memory of the World: General Guidelines*, 9. Italics in the original.

A separate criterion called "Social Value" was specified in the 1995 Guidelines, and was meant to apply if documentary heritage "has outstanding social, cultural or spiritual value which transcends a national culture."[118] However, this criterion no longer appears in the revised Guidelines from 2002. A chronological analysis of the meeting protocols of the MoW Committees reveals that it was initially taken out on the grounds that it is comprised under criterion 5 called "Subject/Theme", [119] which was meant to apply if an item "documents in an outstanding way an important subject or major theme of world history or culture."[120] While the extent to which the criterion social value fits under the criterion subject/theme is open to debate, this is not of interest here. Of greater interest is that the criterion of social value was taken out in the revised Guidelines from 2002, yet this situation has since changed again. In 2006, the Register Sub-Committee of MoW recommended a criterion on community and spiritual significance.[121] The Bureau prepared the final draft statement for such a criterion, which was eventually called "social/spiritual/community significance",[122] and was approved by the IAC in 2007.[123] As explained in the adopted paragraphs, which are today annexed to the 2002 Guidelines, this criterion allows communities to show their emotional attachment to documentary heritage for the way in which it contributes to a community's identity and social cohesion.[124] It further states: "Application of this criterion must reflect *living significance* – the documentary heritage must have an emotional hold on people who are alive today."[125] It further explains that "once those who have revered the documentary heritage for its social/spiritual/community significance no longer do so, or are no longer living, it loses this specific significance and may eventually acquire historical significance."[126]

Living significance does not imply that MoW deals with oral traditions and consequently the processes of memory; indeed, it still deals with recordings and thus products of memory. However, it does reflect a certain view of documentary heritage as playing a key role in community formation and maintenance. This idea was expressed more clearly in the very first

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[118] Stephen Foster et al., *Memory of the World Programme*, 26.
[119] UNESCO, *Report of the Second Meeting of the Bureau of the International Advisory Committee of the "Memory of the World" Programme, Manzanillo, Mexico, 26 September 2000*, Paris, 2000.
[120] Stephen Foster et al., *Memory of the World Programme*, 25.
[121] UNESCO, *Report of the Fourth Meeting of the Register Sub-Committee*, 2006.
[122] UNESCO, *Report of the Meeting of the Bureau of the International Advisory Committee of the "Memory of the World" Programme, UNESCO Headquarters, Paris, 19-20 March 2007*, Paris, 2007.
[123] UNESCO, *Final Report of the Eighth Meeting of the International Advisory Committee of the "Memory of the World" Programme, Pretoria, Republic of South Africa, 13-15 June 2007*, (no: CI/INF/UAP/2008/01.), Paris, 2008.
[124] Addendum I in Edmondson, *Memory of the World: General Guidelines*.
[125] Ibid.
[126] Ibid.

draft Guidelines from 1993, not as selection criterion but rather as something that applies to MoW as a whole: "the library and archival heritage is a form of memory of the citizens of the world, an active memory of such importance that constant care is required to keep it always accessible in the form most convenient for the needs."[127] From this perspective, the use of the notion of collective memory in the context of MoW is nothing but a reflection of the status of documentary heritage as heritage of humanity: "…books, periodicals and manuscripts constitute the collective 'Memory of the World'. Other than our individual memories, they span the generations and the centuries."[128] This understanding of documentary heritage as active memory with a living significance does not differ from that of Halbwachs, given that collective memory defines and holds communities together in both cases. However, whereas Halbwachs presents this collective memory as a constant reconstruction of the present, MoW, for which the Register will be a significant document in itself,[129] considers it a legacy of the past that should be "retained undistorted and undiminished."[130] Such an understanding reflects the influence of libraries and archives in MoW, and particularly their understanding of what documents are. Since the notion of documentary heritage is based on that of document, an analysis of this latter concept now follows.

2.2.2 Documents as Recorded Evidence

As explained in the General Guidelines, within the context of MoW a document is "that which 'documents' or 'records' something by deliberate intellectual intent."[131] The idea that documents "document" something is very close to the common sense understanding of this word. A random selection of different dictionaries shows that documents are defined as recorded evidence, proof, reliable information, often of an official nature, with the same understanding also predominating in libraries and archives.[132] However, the statement that a document should result from a deliberate process is ambiguous, as recognized at a Bureau meeting of MoW.[133] Indeed, despite everybody having an understanding that "documents

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[127] Arnoult, *Memory of the World Programme: Suggested Guidelines*, 13.
[128] Hans van der Hoeven and Joan van Albada, *Memory of the World: Lost Memory*, 2.
[129] Edmondson, *Memory of the World: General Guidelines*, 20.; The same idea appears also in older document. See UNESCO, *Final Report of the Third Meeting of the International Advisory Committee of the "Memory of the World" Programme, Tashkent, Uzbekistan, 29 September – 1st October 1997*, (no: CII-97/CONF.502/1), Paris, 1997.
[130] Edmondson, *Memory of the World: General Guidelines*, 2.
[131] Edmondson, *Memory of the World: General Guidelines*, 8.
[132] This aspect has been discussed in chapter 3 in this dissertation. For dictionary entries on documents see Oxford Dictionaries Online or in Cambridge Dictionaries (Online), respectively http://oxforddictionaries.com/definition/english/document?q=document (accessed 25 April 2013), or http://dictionary.cambridge.org/dictionary/british/document_1?q=document (accessed 25 April 2013).
[133] UNESCO, *Report of the Second Meeting of the Bureau of the International Advisory Committee*, 2000.

document" something, closer consideration reveals that this is more complex than first appears. The difficulty is emphasised in the General Guidelines through the example of a painting, which can be perceived as both an art object and a document. The question is "when is a painting documentary heritage, and when it is not? Was the primary purpose of the painting to document, or is it primarily the subjective expression of the artist?"[134] Exactly when a painting becomes document is indicated as resting with the interpretation of the IAC. However, the question of when an object becomes a document is an older question, dating back to the beginning of the twentieth century and closely intertwined with the theoretical developments of the concept of document in scientific research. In this regard, a closer analysis is provided later particularly because the question of what a document is has recently been raised again by the scientific community, in light of the many changes triggered by digital technology.[135] However, for the purpose of this subchapter, it is already useful to briefly note how this question arose.

Niels W. Lund provides a comprehensive analysis of how the understanding of a "document" has historically developed within Europe, explaining that the initial Latin meaning of the word implied that documents were "lessons"; however, this understanding was lost under the influence of European state bureaucracy from the seventieth century onwards, when documents started being equated with written texts.[136] In the fields of library and archival sciences, such an understanding dominated until the beginning of the twentieth century, when Paul Otlet introduced a revolutionary change, extending the definition of documents beyond written texts to also include three dimensional objects, including archaeological and natural objects.[137] He did so believing that these objects could also be considered documents, provided one was informed by their observation.[138] However, one could argue from this perspective that all objects without exception provide some sort of information and are thus documents. Accordingly, the word object would no longer be needed, because the word document would characterise them all. In this respect, at what point objects turn into documents became a serious question for scientific inquiry. Briet, who constructed upon the work initiated by Otlet, attempted to answer this question by asking: "Is a star a document? Is

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[134] Edmondson, *Memory of the World: General Guidelines*, 9.
[135] See subchapters 3.2, 3.2.1 and 3.2.2 in this dissertation.
[136] Niels W. Lund, "Document Theory," *Annual Review of Information Science and Technology* 43, no. 1 (2009): 1-55.
[137] Paul Otlet, *Traité de Documentation - Le Livre sur le Livre – Théorie et Pratique* (Bruxelle: Editiones Mundaneum, 1934).
[138] Michael Buckland, "What is a 'Document'?," *Journal of the American Society for Information Science* 48, no. 9 (1997), 805.

a pebble rolled by a torrent a document? Is a living animal a document? No. But the photographs and the catalogues of stars, the stones in a museum of mineralogy, and the animals that are catalogued and shown in a zoo, are documents."[139] Through her analysis, Briet defined some necessary conditions for objects to become documents. While she does not actually describe any rules, Buckland, who conducted a careful analysis of her text, inferred that objects become documents if: they have a material basis (materiality or physical dimension); are intended to give evidence (intentionality); are processed to give evidence (contextualization); and are perceived as documents (phenomenological dimension).[140] Therefore, in order to define documents, it became important to define the conditions that objects must meet to become documents, rather than simply explaining what documents do, i.e. provide information. In order to define documentary heritage, similar conditions are provided in MoW.[141]

First, documentary heritage must be movable, with the Guidelines further explaining that "this normally excludes items which are part of a fixed fabric such as a building or a natural site."[142] This reference seems to exclude items that could fall under the WHC. Second, documentary heritage must contain signs, codes, sound and images, and consequently largely excludes everything that is not textual, graphical or audio-visual. Accordingly, this reference seems to exclude cultural objects, as discussed above. Third, MoW acknowledges that documentary heritage has a material basis yet does not consider all kinds of materiality. In the context of MoW, materiality must be preservable, with the Guidelines explaining in brackets that "the carriers are non-living."[143] This reference seems to have been made in order to exclude manifestations that could fall under the ICH. Fourth, documentary heritage must be reproducible and migratable, and thus excludes works of art and other "originals" that were not intended as reproducible. Fifth, documentary heritage must be the product of a deliberate documenting process. The idea of deliberate intention has been already remarked as ambiguous. In this regard, it is noteworthy that a recent MoW document – the so-called MoW Companion, released as draft in 2011 as a supplement to the Guidelines, in order to facilitate the process of submitting nominations – provides a slightly changed understanding, no longer

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[139] Suzanne Briet, *What is Documentation?* ed. and trans. Ronald E. Day et al. (Maryland, Toronto, Oxford: The Scarecrow Press, 2006), 10.
[140] Michael Buckland, "What is a 'Document'?"
[141] There are exceptions to the conditions that have been mentioned in this present dissertation but they are not of direct relevance to the argument discussed in this chapter. Exceptions are discussed in Edmondson, *Memory of the World: General Guidelines*.
[142] Edmondson, *Memory of the World: General Guidelines*, 8.
[143] Ibid.

listing this fifth condition. According to the MoW Companion, "a document is an item that is made up of signs or codes (such as writing) or sounds and/or images (such as a recording, photograph or film), and is (usually) moveable, preservable, and able to be reproduced or copied."[144] As it can be seen in this definition, the fifth condition of deliberate intention has not been included. However, there is another important difference between the General Guidelines and the MoW Companion that warrants some attention. Whereas the conditions listed in the Guidelines define documentary heritage, those listed in the Companion define a document, as can be seen in the citation above, which shows that the notions of document and documentary heritage are used interchangeably. However, the difference between them is crucial, at least because the documentary heritage in MoW refers to documents that have been raised above their informational function to the level of the heritage of humanity. Accordingly, documents cannot mean exactly the same as documentary heritage. Therefore, the five conditions presented above should be first and foremost considered conditions for defining documentary heritage rather than documents, because this is also supported by the explanations provided in the General Guidelines, whose purpose seems to not only relate to the definition of documentary heritage but also the contextualization of MoW among other UNESCO initiatives for culture and heritage.

2.2.3 Documents as Unity between Carrier and Content

The General Guidelines reads: "a document is deemed to have two components: the information content and the carrier on which it resides. Both may be of great variety and both are equally important as parts of the memory."[145] As previously explained in the Introduction, this is now stated differently, given that according to the MoW Companion, released as supplement to the Guidelines, "both may be of great variety and, in the context of inscribed documents, of different degrees of importance."[146] While these statements are discussed below, as a preliminary step it is useful to clarify "carrier and content" in the context of MoW, and particularly what is meant that they may be of great variety. With regard to content, documents by definition contain some information, with practically no limit in MoW as to what that information should be, provided it meets the criteria for inscription and the conditions described in the previous subchapter.[147] Moreover, the same is true for the carrier. An approximate classification provided in a technical Guide prepared by SCoT distinguishes

[144] UNESCO, "Memory of the World Register Companion".
[145] Edmondson, *Memory of the World: General Guidelines*, 8.
[146] UNESCO, "Memory of the World Register Companion," 3.
[147] The criteria for inscription have been mentioned in footnote in the Introduction to this present dissertation.

documents into five different groups, largely based on the media on which they are inscribed, in other words storage media: (a) paper and other traditional materials referring to e.g. paper, parchment, leather, palm leaves; (b) photographic materials, which includes black and white/coloured still images on all types of carriers, such as paper, glass, cellulose or something else; (c) mechanical carriers, comprising sound recordings on disks or cylinders;[148] (d) magnetic materials, refer tapes, hard discs and floppy discs; and (e) optical materials, comprising all laser read and written materials such as CD-ROMs, recordable CDs or optical tape.[149] These types of materials are represented on the MoW Registers, which even exceeds this classification as demonstrated by inscribed documentary heritage, for example the Bayeux Tapestry, which is an embroidery, so textile material; or the Inscribed Stone of Terengganu, which as suggested by its name, is a piece of stone. Additionally, the Guide speaks of electronic publications, electronic documents and virtual information, which are placed in line with the five categories described above. As explained in the glossary of terms attached to the Guide, the carrier on which information is stored can be both a physical or virtual medium, such as a "radio carrier signal", with examples of information also including "the binary digits forming an E-Mail message."[150] However, despite the fact that digital documents share the same characteristic with all other documents – they all consist in a carrier and content, regardless how "virtual" or transitory the carrier – in MoW, if one judges based on its key documents, the value of the digital carrier seems to have decreased over time.

Returning to the statements in the Guidelines and MoW Companion, the main difference is that in the MoW Companion the carrier and content is said to only form a unity in the case of traditional documents, yet not in the case of digital and audio-visual documents, because these can only be preserved by transferring the content to newer media.[151] This was already noted as something of a contradiction in the Introduction, given that the value of a document is not defined by the possibilities to preserve it. However, this changed statement is also surprising because remarks regarding difficulties in preserving digital documents were already present at the inception of MoW; likewise were statements about the value of the carriers in the case of

[148] The cylinder is a format for sound recordings. For an example of this kind of documentary heritage see UNESCO, "The oldest sound documents (Edison-cylinders) of traditional music of the world from 1893 to 1952": Nomination form submitted by Germany to the International Memory of the World Register, http://www.unesco.org/new/en/communication-and-information/flagship-project-activities/memory-of-the-world/register/ (accessed 29 April 2013).
[149] George Boston, *Memory of the World Programme - Safeguarding the Documentary Heritage: A Guide to Standards, Recommended Practices and Reference Literature Related to the Preservation of Documents of All Kinds* (Paris: UNESCO, 1998), 3.
[150] Boston, *Memory of the World Programme*, 52-53
[151] UNESCO, "Memory of the World Register Companion".

digital or audio-visual documents. The distinction between carrier and content was already present in the first documents related to MoW, and has guided the selection of inscribed documentary heritage. As explained by Arnoult in the first draft Guidelines, it is necessary to differentiate between information and its physical support, both of which may be significant in their specific way. Either the information is significant, for example due to its historical, anthropological or linguistic interest; or its physical support is significant, among others due to its aesthetic values.[152] Consequently, Arnould clarifies that

> "…at least two forms of heritage will be distinguished: first, information itself, incorporeal and of intrinsic value; second, the material objects which serve as supports to that information. The concept of heritage is therefore dependent on the approach adopted: either the emphasis is laid on the content […] or the emphasis is laid on the nature of the object (the materials of which it is composed, for instance)."[153]

While this statement indicates that both carrier and content were considered to have value, it is also true that the first draft Guidelines speaks about different types of values for carrier and content.

As noted in the first draft Guidelines, the development of audio-visual media has led to a decrease in the aesthetic value of the carriers, and also a tendency to attach heritage value to information alone: "as technologies evolve, the heritage value of documents is gradually becoming attached to the intrinsic qualities as opposed to aesthetic qualities, the trend being towards a standard or commonplace product."[154] However, the draft Guidelines additionally remark in the case of computer disks that "the heritage value of these supports resides in their technical features, to be more precise, their capacity for stocking vast quantities of information in a small place."[155] The statement that the heritage value lies in its storage capacity in the case of digital technology is perhaps something that the text should have further explained, given that it is not self-understood what this means. It conveys the understanding that the greater the storage capacity, the greater the heritage value. We can agree that part of the importance of digital technology possibly lies in its capacity to store vast amounts of information, yet equating this capacity to heritage value is perhaps more difficult to understand and accept. Nevertheless, the purpose of citing this statement here is neither to criticize nor explain it, but rather to prove that at the beginning of MoW at least an attempt existed to also consider the potential heritage value of digital carriers. While it was

[152] Arnoult, *Memory of the World Programme: Suggested Guidelines*.
[153] Arnoult, *Memory of the World Programme: Suggested Guidelines*, 2-3.
[154] Arnoult, *Memory of the World Programme: Suggested Guidelines*, 4.
[155] Ibid.

acknowledged that they may have different values, no hierarchy was suggested, and this was to be decided on a case-by-case basis. However, this does not mean that MoW does not presently consider digital documents at all. Of course, it does, and even the MoW Companion does. Yet, it is one thing to acknowledge that digital documents may count just like any other documents, and it is different to state that they count only because of their information. However, it is important not to convey the wrong message, especially in its key documents that are meant to offer guidance, specifically because MoW intends to increase understanding and create a global vision of documentary heritage. The recognition of the heritage value of documents in digital form is perhaps better reflected in the emergence of a new and related concept of heritage - the digital heritage - and given that the background for the emergence of this new concept was offered by MoW, an introduction to the Programme would be incomplete without also dedicating some space to this concept.

2.3 The Digital Documentary Heritage of Humanity

A literature review concerning the history of digital computing in libraries and archives shows this topic to have already spanned several decades, starting with the creation of electronic catalogues in the 1960–70s.[156] However, the purpose of this subchapter is to explain the emergence of a related concept of documentary heritage, namely the digital heritage. Despite this inevitably being linked with the use of digital technology in libraries and archives, a comprehensive account of this development has only been later provided.[157] Nevertheless, what requires explanation is that the real interest of libraries and archives to use computers emerged with the digitization of physical collections, namely the technical process of converting analogue information into digital information, thus making it accessible through computers and via the Internet. Several digitization experiments have taken place in libraries and archives in countries across the world since the 1980s.[158] The creation of so-called "access copies" did not emerge with digital technology, and was not new to librarians and archivists, as this method has been previously applied with other technology.[159] However, the number of documents only began to significantly increase following digitization projects, and

[156] Marylin Deegan and Simon Tanner, *Digital Futures: Strategies for the Information Age* (London: Library Association Publishing, 2002), 15.
[157] See subchapter 3.3 in this dissertation.
[158] Melissa M. Terras, "The Rise of Digitization," in *Digitization Perspectives*, ed. Ruth Rikowski (Rotterdam, Boston, Taipei: Sense Publishers, 2001), 3; See also Tedd, Lucy A., and Andrew Large. *Digital Libraries: Principles and Practices in a Global Environment.* München: K.G. Saur, 2005; See also Deegan and Tanner, *Digital Futures.*
[159] Boston, *Memory of the World Programme*, 4.

with the widespread use of computers for creating texts, sounds or images, thereby creating digital originals rather than digitized copies. While this has considerably added to the number of available documents, it has also prompted some challenges, including the increased difficulty of managing this huge quantity of data.[160] However, a more serious challenge relates to the long-term accessibility of digital documents being compromised by the process of technological obsolescence. Like all other documents regardless of the carrier, digital documents may become inaccessible if the media on which information is stored degrades, although the main cause for digital documents becoming inaccessible is the rapid development of ever "newer" software and hardware that are incapable of handling older materials.[161] Indeed, it is ironic that while ancient manuscripts have survived hundreds of years and will potentially do so even longer if properly cared for, digital documents produced today are not expected to live longer than ten years. This has determined the international community involved in documentary heritage preservation to react once again, drawing attention to the new technical layer of risks that causes the loss of documentary heritage in digital form. As a result, the UNESCO Charter on the Preservation of Digital Heritage was adopted in 2003.[162]

While the notion of digital heritage was already present in UNESCO's Medium Term Strategy 2002-2007, its definition was set down in the 2003 Charter.[163] According to the Charter, digital heritage, considered as heritage of humanity, "embraces cultural, educational, scientific and administrative resources, as well as technical, legal, medical and other kinds of information created digitally, or converted into digital form from existing analogue resources."[164] The main focus of the Charter lies on information created digitally, which it calls "born-digital", yet the definition of digital heritage also refers to digitized information. There may be a certain degree of confusion between documentary and digital heritage, probably because both notions deal with recorded information, and also because the definition of digital heritage includes digitized copies of analogue documents. However, whereas the Charter is a statement of principles that should alert governments, industry and the public

[160] Challenges have been discussed in subchapters 3.2, 3.3.1 and 3.3.2 in this dissertation.
[161] UNESCO, *Charter on the Preservation of Digital Heritage*, 2003.; These causes are listed also in UNESCO, *Report by the Director-General on a Draft Charter on the Preservation of Digital Heritage*, Item 3.6.1 of the provisional agenda, (No. 164 EX/21), Paris, 2002.
[162] UNESCO, *Charter on the Preservation of Digital Heritage*, 2003.
[163] UNESCO, *Medium-Term Strategy 2002-2007, Contributing to Peace and Human Development through Education, the Sciences, Culture and Communication, resolution adopted by the General Conference, 31st session, 3 November 2001*, in Records of the General Conference, vol. 1 Resolutions, 31st session, 15 October – 3 November 2001 (Paris: UNESCO, 2002).
[164] UNESCO, *Charter on the Preservation of Digital Heritage*, Art.1.

about the problems caused by digital technology, the difference is that MoW is a programme concerned with the preservation of originals, including digital originals. In the context of MoW, copies, whether digital or otherwise, mainly count for access purposes.[165] However, the similarities between MoW and the Charter are possibly caused by the fact that MoW offered a background for the concept of digital heritage, although the lack of explanations regarding their link, which is evident mainly to those involved in drafting the Charter, creates confusion regarding concepts of documentary and digital heritage. Regretfully, no such explanation is provided in the documents aimed at informing the general public about MoW or the Charter. Indeed, even the Guidelines for the Preservation of Digital Heritage, which operates in connection with the Charter, make no reference to the Memory of the World Programme, despite the MoW Logo being placed on its cover.[166] Only an analysis of reports and discussion papers of the MoW Committees reveals, through one or the other statement, that the Memory of the World Programme offered the background for the Charter.[167] The MoW Committees did well to develop the Charter and draw attention to the impacts of digital technology, because, as shown by the intensification of scientific conferences covering this topic, this is strongly required. However, digital technology also seems to have an important impact upon the MoW Programme itself.

Already in 1998, an evaluation of MoW observed "a change of emphasis, perhaps unintentional, from preserving original materials to merely safeguarding the information which they contain."[168] Consequently, the evaluation team recommended "that the balance between preservation and access be carefully reconsidered to avoid an over emphasis, and perhaps over-dependence, on the newest [digital] technology."[169] Despite SCoT, which is responsible with the technical aspects of MoW, recognising that not all documents were suitable for digitization, following research it concluded that despite some disadvantages (mainly related to costs), "the use of digital storage was the way forward for many types of document. The advantages greatly outweighed the disadvantages."[170] Additionally, SCoT also considers digital technology suitable for access, as revealed by the General Guidelines:

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[165] There are exceptions, for example if the original storage medium has degraded entirely and the best surviving example is a copy.
[166] National Library of Australia, *Guidelines for the Preservation of Digital Heritage* (Paris: UNESCO, 2003).
[167] E.g. Boston, Edmondson and Schüller, *Memory of the World Programme A Debate.*
[168] Petherbridge, Kitching and de Wolf, *"Memory of the World" Programme External Evaluation*, 16.
[169] Petherbridge, Kitching and de Wolf, *"Memory of the World" Programme External Evaluation*, 16.
[170] UNESCO, *Report of the First Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Vienna, Austria, 3-4 June 1994*, Paris, 1994. The main category of documents to which SCoT referred was audio-visual documents on unstable media, whose chemical decomposition cannot be stopped.

"Digitization for access is an effective strategy proposed by the IAC's Technology Sub-committee, which has also set recommended standards."[171] Nevertheless, questions or rather warnings regarding the limits of digital technology have sometimes been raised and acknowledged, albeit modestly. In a 1996 report of SCoT, "concerns were expressed about the suitability of digitisation for some types of documents."[172] However, a SCoT member clarified "that a collection should only be digitised after a careful examination of the potential benefits, and problems, that digitisation might generate for the collection."[173] Furthermore, in a later report of SCoT from 2002, it was questioned "if the SCoT and, through it, the Memory of the World Programme were emphasising digitisation at the expense of other technologies."[174] However, A SCoT member again clarified that "there is no intention of supporting any technology above others subject to the technology being able to assist in achieving the twin primary aims of the programme."[175] Furthermore, later still in 2004, SCoT acknowledged that "digitisation was emphasised at the beginning of the Committee's work", yet "that the Memory of the World is a programme that employs the techniques and technologies which serve to best enhance preservation of and access to documents of all kinds."[176] Despite such statements, digital technology still seems to be considered and promoted as the technology that best serves the aims of MoW even if the exact limits of digital technology are not clear.[177] In theory, it could support the preservation and access of documentary heritage; however, practically "the level of success that the Programme was having in improving the standard of preservation of and access to documents was uncertain."[178] What is quite certain, and shown by the analysis that has just been conducted in this chapter, is that the use of digital technology not only (potentially) triggers increased access, but also a series of conceptual and practical changes, whose compatibility with the overall philosophy of MoW are somewhat doubtful. While this requires reconsidering the use of digital technology in the context of MoW, this can only be achieved in light of an informed understanding of changes triggered by digital technology. Some insights can be gained through a review of the literature published in the context of library and archival sciences,

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[171] Edmondson, *Memory of the World: General Guidelines*, 15.
[172] UNESCO, *Report of the Third Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Prague, Czech Republic, 1-4 March 1996*, Paris, 1996.
[173] UNESCO, *Report of the Third Meeting of the Sub-Committee on Technology*, 1996.
[174] UNESCO, *Report of the Sixth Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Paris, 13-15 June 2002*, Paris, 2002.
[175] UNESCO, *Report of the Sixth Meeting of the Sub-Committee on Technology*, 2002.
[176] UNESCO, *Report of the Seventh Meeting of the Sub-Committee on Technology of the International Advisory Committee of the "Memory of the World" Programme, Paris, 6-7 February, 2004*, Paris, 2004.
[177] See also discussion in chapter 8 in the present dissertation.
[178] UNESCO, *Report of the Tenth Meeting of the Sub-Committee on Technology*, 2008.

studying how the notion of document and related practices have changed over time, with the following chapter dedicated to this accordingly.

3. Documents, Documentary Practices and Digital Technology

The purpose of this chapter is to provide a review of the literature describing research regarding conceptual and practical changes triggered by digital technology in libraries and archives, focusing on the concept of document and related practices, which shall be termed in this dissertation as documentary practices.[179] The study of documents is not limited to library and archival sciences, with this topic also covered by other disciplines and areas of research; for example, by Archaeology and materialist approaches in Anthropology;[180] Historical Sciences, or research related to Workplace Studies or Genre Studies.[181] However, for the purpose of this dissertation, the review is limited to research from the fields of library and archival sciences, owing to the influence exercised by libraries and archives as institutions in MoW. The assumption is that the changes sketched above in the context of MoW must represent a reflection of those taking place in libraries and archives, and thus it is expected that an analysis of the latter provides useful insights to better understand the former. Perhaps the most important change that could be observed in MoW, is also present in libraries and archives, and, as argued by Hjørland, seems to underlie all other changes is the shift from the notion of document to that of information as a basic unit of analysis.[182] This and the resulting implications have to be understood in-depth, given that the impacts on fields traditionally concerned with the study or preservation of documents are profound, manifold and evident in many regards.

One example of impact refers to terminological changes, with institutions having changed their names. For instance, the "Royal School of Librarianship" in Copenhagen has changed its name to the "Royal School of Library and Information Science";[183] the "American

[179] The concept is explained later in subchapter 3.2.2 in this dissertation.
[180] Ian Hodder, "The Interpretation of Documents and Material Culture," in *Handbook of Qualitative Research*, ed. Norma K. Denzin and Yvonna S. Lincoln (Thousand Oaks, California: Sage Publication, 1994), 393-402.
[181] See Ciaran B. Trace, "Documenting Work and Working Documents: Perspectives from Workplace Studies, CSCW, and Genre Studies," in *Proceedings of the 44th Hawaii International Conference on System Sciences* (USA: IEEE Computer Society, 2011).
[182] See discussion in subchapters 3.2 and 3.4 in this dissertation.
[183] Birger Hjørland, "Documents, Memory Institutions and Information Science," *Journal of Documentation* 56, no. 1 (2000): 27-41.

Documentation Institute", has changed to the "American Society for Information Science";[184] and the "German Society for Documentation" has changed its name to the "German Society for Information Science and Practical Information Work".[185] Furthermore, terminological changes also take place in the scientific field, where Library Sciences are now called "Library and Information Sciences", and sometimes simply "Information Sciences". Another example of impact refers to institutional changes, with institutions having seemed to merge in a digital environment, as Martin Hand sustains: "library and archive institutions are asked to 'merge', as in the case of Libraries and Archives Canada (LAC), partly in relation to the notion that the digitization of cultural artefacts simply erases some of these differences."[186] Indeed, this is evident in how the new institution called "digital library" is defined by one author as "an extension, enhancement and integration of a variety of information institutions as physical places […] These information institutions include, among others, libraries, museums, archives and schools […]."[187] Nevertheless, despite libraries and archives fulfilling similar missions – namely the preservation and accessibility of documents – for people active in this area, they are different institutions, "thought to have quite different agendas, relations to publics, and local practices."[188] According to Greer, Grover and Fowler, "the librarian traditionally has concentrated on the organization and storage of books, journals, and other published information sources"; whereas "archives management is primarily concerned with the organization and storage of items important to the operation of an enterprise."[189] Therefore, one distinction between libraries and archives lies in the types of documents they are concerned with: libraries are concerned with published documents, whereas archives are not; however, archives are certainly not limited to documents related to the activities of an enterprise. A more comprehensive definition is provided by Pearce-Moses, for whom archives represent "an organization that collects the records of individuals, families, or other organizations."[190] However, also he emphasises that the library deals with published

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[184] Hjørland, "Documents, Memory Institutions".
[185] In original it is "Deutsche Gesellschaft für Dokumentation" and "Deutsche Gesellschaft für Informationswissenschaft und Informationspraxis"; See Marlies Ockenfeld and Hansjoachim Samulowitz, "Libraries and Documentation in Germany: A Long-Lasting Conflict," in *The History and Heritage of Scientific and Technological Information Systems*, ed. Boyd W. Rayward and Mary Ellen Bowden (Medford, New Jersey: American Society for Information Science and Technology, 2004), 321.
[186] Martin Hand, *Making Digital Cultures* (Michigan: Ashgate, 2008), 134.
[187] Christine L. Borgman, "What are digital libraries? Competing visions," *Information Processing & Management* 35, no. 3 (1999): 227-43.
[188] Hand, *Making Digital Cultures*.
[189] Roger C. Greer, Robert J. Grover, and Susan G. Fowler, *Introduction to the Library and Information Professions* (USA: Libraries Unlimited, 2007), 12–13.
[190] Richard Pearce-Moses, *Glossary of Archival and Records Terminology* (USA: Society of American Archivists, 2005).

documents, which seems to be an accepted distinction within the academic and professional community.[191]

While acknowledging the difference between libraries and archives, they are neither treated differently nor discussed separately in this dissertation, although their distinction is maintained evident by employing the designation "library and archival sciences". In fact, one could not only distinguish between libraries and archives, yet also between different types of libraries (university, special, national, etc.) or different types of archives (business, government, public, private, etc.). Drawing such a distinction is unnecessary for the purpose of this dissertation, where they are generally approached as institutions concerned with the preservation and access of documents, playing equal roles in the context of MoW, and serving equally well to study the changes taking place. Some of these changes have been mentioned above and similar others could be added, yet as already stated, the focus in this chapter lies on the shift from the notion of document to that of information, including the resulting implications. However, as a preliminary step, a brief introduction to digital technology is provided because a proper understanding of the changes triggered can only be gained by understanding what it is and how it functions from a technical perspective. In this regard, a computer sciences' perspective is provided, because, as shown below, this is also the dominant perspective in libraries and archives. What becomes striking with the analysis is also the influence of computer sciences in library and archival sciences, with the development of the former closely intertwined with the gradual use of the notion of information in the latter.

3.1 Digital Technology: One Concept, Many Technologies

> "… the computer […] is a medium that can dynamically simulate the details of any other medium, including media that cannot exist physically. It is not a tool, although it can act like many tools. It is the first metamedium [...]"[192]
>
> Alan Kay

[191] There are exceptions because archives acquire also published materials, and libraries collect also unpublished materials but these are not their mainstream collections.
[192] Alan Kay, "Computer software," *Scientific American* 251, no. 9 (1984). http://www.vpri.org/pdf/tr1984001_comp_soft.pdf (accessed October 19, 2012).

> "Practically speaking, electronic mail is binary like the telegraph, fast, interactive and usually linguistic like the telephone, works a bit like an answering machine, and is often textual like a fax."[193]
>
> Luciano Floridi

It was briefly mentioned in the Introduction that digital technology is used in the context of this dissertation as a generic term referring to computer and Internet technology. However, despite being referred to in the singular, the two quotations that open this subchapter are intended to draw attention that digital technology is not one yet many things, some of which are presented in this subchapter.[194] Definitions of digital technology rely on those of communication technology, and are closely intertwined with definitions of communication. Therefore, it is important to commence by clarifying this latter concept, particularly because the existence of so many different definitions and research traditions of communication makes it necessary to state the position discussed. In a seminal article, Craig identifies no less than seven different traditions distinguished based on how communication is defined.[195] While it is not relevant to list them for the purpose of this chapter, it is important to emphasise one of them, namely the "cybernetic tradition". This tradition, which, according to Craig, has its roots in the works of Shannon, von Neumann or Turning, and marks the origin of modern communication theory, perceives communication as information processing.[196] This idea has been introduced by Claude E. Shannon with his mathematical theory of communication. In short, this refers to: the existence of an information source producing a message; a transmitter which turns the message into signals; a channel to transmit the signal; a receiver, turning back the signal into message; and the destination for which the message was intended.[197] This understanding is specific to computer sciences, which define communication as "information transfer between different points in space or time, where the term information is loosely employed to cover standard formats that we are all familiar with, such as voice, audio, video, data files, web pages, etc."[198] As can be seen from this definition, distinction is made between

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[193] Luciano Floridi, *Philosophy and Computing: An Introduction* (London and New York: Taylor and Francis e-Library, 2001), 68.
[194] These aspects are elaborated upon especially in chapters 5 and 6 in this dissertation.
[195] Robert T. Craig, "Communication Theory as a Field," *Communication Theory* 9, no. 2 (1999): 119-161.
[196] Craig, "Communication Theory as a Field,"141.; These authors mentioned by Craig represent key figures in computer sciences, having exercised an important influence on the development of digital technology and they will be mentioned again on several occasions in this dissertation.
[197] See Claude E. Shannon, "A Mathematical Theory of Communication," *The Bell System Technical Journal* 27, no. 3 (1948): 379-423.; This mathematical theory of communication will be encountered again at several points throughout the dissertation.
[198] Upamanyu Madhow, *Fundamentals of Digital Communication* (New York: Cambridge University Press, 2008), 1.

transmission in space or time, with an explanation also following as to what the difference is: "Examples of communication between two points in space include a telephone conversation, accessing an Internet website from our home or office computer, or tuning in to a TV or radio station. Examples of communication between two points in time include accessing a storage device, such as a record, CD, DVD, or hard drive."[199] A similar understanding of communication can also be identified in libraries and archives, with some authors defining information transfer as a type of communication – the communication of a recorded message from one human or human mind to another – and employing the notion of information transfer "as a way of conceptualizing the work of information professionals."[200] However, they explain that "unlike communication which assumes that the sender and receiver of a message are contemporaries, information transfer requires a recorded message transmitted on a medium that enables senders to transmit ideas to people who are not their contemporaries. In other words, information transfer is asynchronous."[201] A comparison of the two perspectives on information transfer in computer, and library sciences respectively, shows that they are similar, with the difference being that the latter is narrower, given that it predominantly deals with information transfer in time. Nevertheless, the perspective that communication is information transfer is further reflected in how communication technology is approached both in computer sciences and library and archival sciences as simply the physical mechanism by which information transfer occurs. It implies a certain neutrality of the technology - it transfers information yet impacts neither the information nor the sender or receiver - and despite this view not being shared in this dissertation, for the purpose of this subchapter no comments are raised regarding the "neutrality" of digital technology.[202] Instead, only a description of its technical composition and how it functions are provided.

To explain what digital communication is, it is usually distinguished from analogue communication. In computer sciences, the notions of digital and analogue are used to speak about, for example, different types of signals.[203] An analogue signal is "an electrical waveform that can have any one of a continuum of possible amplitudes at any one time", whereas a digital signal is "an electrical waveform having one of a finite set of possible

[199] Ibid.
[200] Greer, Grover and Fowler, *Introduction to the Library*, 59.
[201] Greer, Grover and Fowler, *Introduction to the Library*, 59.
[202] A different perspective is provided with the conceptual framework presented in chapter 4 in this dissertation.
[203] Peyton Z. Peebles, *Digital Communication Systems* (New Jersey: Prentice/Hall International, Inc, 1987), 4-5. Analogue and digital may also refer to the type of source, as explained by Peebles, "An *analogue source* of information produces an output that can have any one of a continuum of possible values at any given time […] a *digital source* can have only one finite set of discrete values at any given time." Italics in the original.

amplitudes at any time."[204] This means that in the case of analogue computers, operations are directly determined by the measurement of continuous physical transformations, whereas digital computers handle digital signals in a series of steps, the digital being a binary language represented by 0s and 1s.[205] It comprises the terms bit, which is the smallest data unit in a digital system, either a single 1 or 0,[206] and the term byte, encompassing a series of bits.[207] Therefore, put very simply, the main aspect distinguishing analogue from digital is that the latter is a binary language. Alternatively, as explained by Floridi, the analogue is based on the geometrical management of a Euclidian space of information, whereas the digital is an algebraic treatment of information.[208] However, despite being a crucial aspect, this is too general to characterise digital technology and it is thus also appropriate to explain some of its principles. However, before doing this, the notion of digital technology is explained - the focus of this dissertation being on computer and Internet technology - with its technical aspects described. At present, there are many different types of computers, ranging from the very small palmtops that fit into a pocket to the so-called "mainframes", heavy-weight machines with very high processing capacities that are used at whether stations, in scientific laboratories, etc.[209] This dissertation focuses on the personal computer, in short the PC, also known as the microcomputer or home computer, which is perhaps the most common form of commercial computer used by the majority of people and institutions. While PCs can be further divided into desktops and laptops, if they are portable, the description below only refers to desktops.

A desktop computer comprises several hardware components: a microprocessor known as CPU (central processing unit) that makes the computer work; supported by several memory

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[204] Peebles, *Digital Communication Systems*, 4-5.
[205] Floridi, *Philosophy and Computing*, 22-23.
[206] As explained by Floridi, *Philosophy and Computing*, 24 "bits can equally well be represented logically (true/false), mathematically (1/0) and physically (transistor = on/off, switch = open/closed, electric circuit = high/low voltage, disc or tape = magnetised/unmagnetised, CD = presence/absence of pits, etc.), and hence provide the common ground where mathematical logic, the logic of circuits and the physics of information can converge. This means that it is possible to construct machines that are able to recognise bits physically and behave logically on the basis of such recognition. This is a crucial fact. The only glimpse of intelligence everyone is ready to attribute to a computer uncontroversially concerns the capacity of its devices and circuits to discriminate between binary differences."
[207] Michael Silbergleid and Mark J. Pescatore, "*Digital Communication*," in *Encyclopedia Of Communication and Information*, ed. Jorge R. Schement (New York: Macmillan Reference USA, 2002), 253-257. The bit is a short form from binary digit.
[208] It refers to the three-dimensional space of Euclidean geometry.
[209] Floridi, *Philosophy and Computing*, 50-51.

components,[210] e.g. ROM (read only memory), which is embedded in the microprocessor and is a permanent memory, storing the most basic instructions that make the computer work; the RAM (random access memory), which is connected to the CPU and temporarily stores instructions and data, these being deleted when the computer is switched off; or the "cache memory", which stores the most recent and often accessed data, thereby speeding up the process of accessing the same data once again.[211] The hard disk is added to these memory components, storing the data even if the computer is switched off. These different memory components are key features of today's computers, with the possibility of storing data in the computer marking one of the most important aspects enabling the development of digital technology as we know it today.[212] Additionally, hardware components also refer to drives for the input and output of data, which can include floppy disk or CD-ROM drives.[213] Finally, outside the computer box in which the aforementioned components are inserted, there are several external devices required for input, i.e. the keyboard, mouse and the VDU (video display unit) or the monitor.[214] However important, as Johnson rightly argues, "hardware by itself can do nothing useful without the explicit step-by-step instructions provided by computer software";[215] or as Floridi bluntly states, "take the software away and a computer is just a useless lump of plastic, silicon and metal."[216] Computer software, comprising those components "that are programmed rather than manufactured", is in fact a program providing a sequence of instructions that "tell" the CPU what to do.[217] There are two main types of software: operating system software and applications software;[218] although some authors separately list a third type, namely system building tools and compilers used to build applications programs.[219] Although authors remark that software most typically refers to application software, operating system software is similarly important given that it controls the operations of hardware as well as other software components, including applications

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[210] In the field of computing memory refers to any medium for data storage. For a definition and explanation see Per Christensson, "The Tech Terms Computer Dictionary," http://www.techterms.com/ (accessed March, 29, 2013)

[211] Floridi, *Philosophy and Computing*, p.52; See also Eric Johnson, "*Computer Software*," in *Encyclopedia of Communication and Information*, ed. Jorge R. Schement (New York: Macmillan Reference, 2002), 165.

[212] See discussion in chapter 5 in this dissertation.

[213] The floppy disk is becoming an obsolete format.

[214] Computer hardware includes also switches, power connectors, ports for connecting peripheral devices such as printers or USB sticks, but these are of secondary relevance in this present dissertation.

[215] Johnson, "*Computer Software*,"165.

[216] Floridi, *Philosophy and Computing*, 47.

[217] James Dearnley, "Software," in *International Encyclopedia of Information and Library Science*, eds. John Feather and Paul Sturges (London and New York: Routledge, 2003), 587; Also Johnson, "*Computer Software*,"165.

[218] Johnson, "*Computer Software*," 165.

[219] James Dearnley, "Software," 587.

software, whose task is to carry out the operations of the system.[220] Examples of operating systems include Microsoft Windows, Apple Mac OS or Linux, whereas applications include word processors for writing text, such as Microsoft Office Word. It is worth noting that each application is written for a specific operating system and may not run on computers with different operating systems, thus leading to interoperability problems.[221] However, the need for standards has been acknowledged and addressed, with the possibility of connecting and communicating with other computers being one of the reasons that makes them so popular in the first place.[222] It allows the establishment of computer networks defined as "any set of computers – usually referred to as hosts – connected in such a way that each one of them can inter-operate with all the others."[223] By far the best known and most popular network today is the Internet, to which the discussion now turns.

While scholars in computer sciences remark that non-technical experts often use the notions "Internet" and "World Wide Web" interchangeably they are not the same.[224] The Internet is an infrastructure connecting computer networks,

> "a physical system that can be defined as a collection of independently administrated computer networks, each one of them (providers, academic and governmental institutions, private companies, etc.) having its own administration, rules, and policies. There is no central authority overseeing the growth of this networks-of-networks, where new connection lines (links) and computers (nodes) are being added on a daily basis."[225]

Communication between these different networks is made possible by their use of two fundamental communication standards or protocols: the Transmission Control Protocol (TCP) and the Internet Protocol (IP), usually referred to as TCP/IP. Nevertheless, Sabadello rightly draws attention that the Internet does not represent a medium of communication by itself, but rather a physical communication system upon which different applications can be built, which subsequently serve as a medium.[226] In this regard, he highlights a text-based discussion forum and video conference as two different media, despite both relying on the same physical

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[220] Johnson, "*Computer Software,*" 166.
[221] Ibid.
[222] See chapter 5 in this dissertation.
[223] Romualdo Pastor-Satorras and Alessandro Vespignani, eds., *Evolution and Structure of the Internet: a Statistical Physics Approach* (New York: Cambridge University Press, 2007), 10-11.
[224] E.g. Pastor-Satorras and Vespignani, *Evolution and Structure of the Interne,* 140.
[225] Pastor-Satorras and Vespignani, *Evolution and Structure of the Interne,* ix; In the original it is "networks-of-networks", instead of network-of-networks, as in this present dissertation, where the Internet is understood in the singular.
[226] Markus Sabadello, "ICTs for a Global Culture of Peace," 2011, http://projectdanube.org/wp-content/uploads/2012/02/ICTs-for-a-Global-Culture-of-Peace.pdf (accessed September 10, 2012).

system, i.e. the Internet.[227] Indeed, the Internet is simply the system supporting many different applications, the most common of which include the e-mail, and more importantly for the purpose of this dissertation, the World Wide Web, which is thus only an application on the Internet and not the Internet itself.[228] However, it is generally considered that the World Wide Web lies at the origin of the growth of Internet use, because it is the application that renders the connection of scattered data possible, and likewise information access. As suggested by some authors, the World Wide Web is "a very user-friendly interface to access the almost infinite wealth of information available on the Internet."[229] As highlighted by this statement, it is an "interface" that represents a key concept, and generally speaking refers to "any means by which a device communicates with something else. Cables, plugs, sockets, and various software protocols are used to create an interface between a computer and an external device, such as a printer."[230] However, as authors note, usually, "the term interface is used to define the way the computer communicates with its human user – the user interface."[231] When interface is discussed in this dissertation, this is the aspect implied.

The final aspect presented in this subchapter refers to principles of digital technology, and there is a reason behind this choice. Technological obsolescence is not simply a problem for the preservation of documentary heritage, but also reflects a challenge for academic research. Accordingly, how can the scientist meaningfully select for research components and applications with a very high degree of obsolescence, whilst ensuring that the research brings a contribution to knowledge? How can the risk of starting a research on a technology that may become obsolete by the time research ends be avoided? Two solutions were chosen in the present dissertation to address this problem. One such solutions refers to speaking about digital technology on a more general level, as outlined above, rather than studying specific applications. Some main components can be considered relatively stable as part of the technology, despite their specific features frequently changing. For example, while interfaces in use today may look different tomorrow, the interface understood as a technical component that render possible interaction between people and computers is not likely to disappear any time soon. The second solution chosen – with the intention of supplementing the first – refers

[227] Sabadello, "ICTs for a Global Culture of Peace".
[228] For a detailed technical explanation see Glenn J. Brookshare, *Computer Science: An Overview*. 9th ed. (Boston / San Francisco: Pearson Education, 2007).
[229] Pastor-Satorras and Vespignani, *Evolution and Structure of the Interne*, 140.
[230] Sarina S.L. Chen, "Interface," in *Encyclopedia of New Media: An essential reference to communication and technology*, ed. Steve Jones (Chicago: Sage Publications, 2003), 244.
[231] Chen, "Interface," 244.

to discussing principles that characterise digital technology, setting them apart from other communication technologies. Lev Manovich is one author who studied its features, with his widely-cited five principles of new media forming the basis for the discussion that follows.[232] The first principle is called numerical representation, because "all new media objects whether created on computer or converted from analogue media sources, are composed of digital code; they are numerical representations."[233] Indeed they are, being based on the binary language, and as sustained also by Hamelink, when "signals – whether they carry sound, data or pictures – converge into a digital form, they become (however different they may be in substance) identical in the technical sense."[234] According to Manovich, this has two consequences: first, all media objects can be described formally or mathematically; and second, all digital objects are programmable, because they are "subject to algorithmic manipulation. For instance, by applying appropriate algorithms, we can automatically remove 'noise'[235] from a photograph, improve its contrast, locate the edges of the shapes, or change its proportions."[236] This has not been possible with other media, specifically because analogue media do not function as numerical representations, this principle being therefore specific to digital media. The second principle considered by Manovich is called modularity, because digital objects are represented as collections of discrete samples, e.g. pixels and characters scripts, which are assembled into larger-scale objects, yet continue to maintain their separate identity.[237] As Manovich argues this principle applies from the World Wide Web consisting in separate web pages, to web pages consisting in separate elements such as texts, video clips, photographs, these consisting in even smaller elements such as pixels or characters, each maintaining its identity despite being placed together to form new objects.[238] The next three principles depend on the two presented above, and are: automation, because digital technology allows operations to be

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[232] Manovich uses the term "new media" instead of digital technology but in this present dissertation this concept has been avoided. The notion "new" has always been used when a technology was invented. The telegraph, the radio or the television, were all "new media" at their time. Furthermore, some examples of digital technology, although being "new media" in the sense implied by Manovich are obsolete today. Therefore, in this present dissertation "digital technology" has been used, except for when reference is made to concepts used by other authors.

[233] Lev Manovich, *The Language of New Media* (Massachusetts: MIT, 2001), 49.

[234] Cees J. Hamelink, "New Information and Communication Technologies, Social Development and Cultural Change," in *Discussion Paper No. 86, United Nations Research Institute For Social Development, Geneva, Switzerland* (United Nations Research Institute For Social Development, June 1997), 4.

[235] The reference is to "noise" in a technical sense as is Shannon's mathematical theory of communication. As Shannon notes "the signal is perturbed by noise during transmission or at one or the other of the terminals. This means that the received signal is not necessarily the same as that sent out by the transmitter." With other words, noise refers to the introduction of errors, such as unwanted sounds, into messages, in a technical sense. See Claude E. Shannon, "A Mathematical Theory of Communication."

[236] Manovich, *The Language of New Media*, 49.

[237] Manovich, *The Language of New Media*, 51.

[238] Manovich, *The Language of New Media*, 51-52.

automated;[239] variability, because a new media object is not fixed, but rather can exist in different, potentially infinite versions;[240] and "(cultural) transcoding", because despite digital objects displaying cultural forms that make sense to most people – images show recognizable objects, texts contain sentences - their structure "follows the established conventions of computer's organization of data. The examples of these conventions are different data structures such as lists, records and arrays."[241] These principles and components introduced above will be further encountered and elaborated upon later in the dissertation. Having briefly clarified what digital technology is and how it functions from a technical perspective, the analysis in this chapter can now proceed to presenting how this technology has changed document-related concepts and practices.

3.2 Documents and Digital Technology

This subchapter examines not only conceptual changes triggered by digital technology but also how the concept of document has been conceptualised and theorised from the perspective of library and archival sciences. The focus has been adopted on literature that critically engages with the theorising of the concept of document, and in this regard it is appropriate to start with the two authors mentioned above: Paul Otlet and Suzanne Briet.[242] When these two scholars wrote at the beginning of twentieth century, interest in theoretical developments was not of great concern to the library and archival fields. This was noted in 1933 by Pierce Butler, who regretted librarians' lack of interest in the theoretical aspects of their profession, despite developments in the social sciences and humanities.[243] Actually, Paul Otlet is considered the father of professional document theory, and was the first to provide a comprehensive study of documents: the Treatise on Documentation published in 1934, which remains a key reference work today.[244] Nevertheless, some scholars still consider that the lack of theorising is relevant today, sustaining that it triggers the dominance of positivism in

[239] Manovich, *The Language of New Media*, 53.
[240] According to Manovich, ibid., 56; "Old media involved a human creator who manually assembled textual, visual and/or audio elements into a particular composition or a sequence. This sequence was stored in some material, its order determined once and for all. Numerous copies could be run off from the master…New media, in contrast, is characterized by variability. Instead of identical copies a new media object typically gives rise to many different versions. And rather being created completely by a human author, these versions are often in part automatically assembled by a computer." See also analysis especially in chapters 5, and 7.2.
[241] Manovich, *The Language of New Media*, 63.
[242] These authors were mentioned in subchapter 2.2.2 in this dissertation.
[243] Pierce Butler, *An Introduction to Library Science* (Chicago: University of Chicago Press, 1933), xi.
[244] Otlet, *Traité de Documentation*.

scientific fields concerned with documents.[245] As a research tradition, positivism assumes the existence of an external objective reality in which knowledge is time- and context-free; the investigator and investigated object are independent entities that do not influence each other, with the objects having qualities of their own.[246] Paul Otlet is considered to have revolutionised the understanding of documents by extending their definition beyond written texts, thus involving any material support that carries signs of intellectual data.[247] However, his work has also been cited as an example of the influence of positivism in sciences studying documents.[248] Specifically because definitions such as that of Otlet implied that documents contained objective knowledge, they were criticised by linguists and philosophers, determining Briet, continuing the work of Otlet, to introduce a semiotic dimension in her definition of document as "any concrete or symbolical indexical sign [*indice*], preserved or recorded towards the ends of representing, of reconstituting, or of proving a physical or intellectual phenomenon".[249] While this represents one example of an attempt to evade positivism, it should be stated that despite a broad agreement among scholars that positivism still dominates this research field, several different definitions and approaches have emerged or been suggested over time.[250]

One recent approach suggested by a group of Scandinavian scholars, which somehow stands apart from the others, draws strongly on the theories of Otlet and especially Briet, who were

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[245] Greer, Grover and Fowler, *Introduction to the Library*, 5.; See also Jack Andersen, "Information Criticism: Where is it?" *Progressive Librarian*, no. 25 (2005): 15.; See also Birger Hjørland, "Hermeneutics," in *International Encyclopedia of Information and Library Science*, ed. John Feather and Paul Sturges (London and New York: Routledge, 2003), 224.

[246] Egon Guba and Yvonna S. Lincoln, "Competing Paradigms in Qualitative Research," in *Handbook of Qualitative Research*, ed. Denzin K. Norman and Yvonna S. Lincoln (Thousand Oaks, California: Sage, 1994), 109-110.

[247] Otlet, *Traité de Documentation*, 43. Original text: "La définition la plus générale qu'on puisse donner du Livre et du Document est celle-ci: un support d'une certaine matière et dimension, éventuellement d'un certain pliage ou enroulement sur lequel sont portée des signes représentatifs de certaines données intellectuelles."

[248] Birger Hjørland, "Empiricism, rationalism and positivism in library and information science," ed. Birger Hjørland, *Journal of Documentation - Library and Information Science and the Philosophy of Science* Vol. 61, no. 1 (2005):145; See also Ronald E. Day, "The Erasure and Construction of History for the Information Age: Positivism and Its Critics." in *Memory Bytes: History, Technology, and Digital Culture*, ed. Lauren Rabinovitz and Abraham Geil (Durham and London: Duke University Press, 2004), 81.; also Boyd W. Rayward ed., *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet* (Amsterdam: Elsevier, 1990), 6.

[249] Briet, *What is Documentation?*, 10. Both italics and square brackets belong to the original text.

[250] For an overview of various critical theories and their potential application to Library Sciences see Gloria J. Leckie, Lisa M. Given and John E. Buschman, eds., *Critical Theory for Library and Information Sciences: Exploring the Social from across the disciplines* (California: ABC-CLIO, LLC, 2010).; for a compact study of different theories see Lund, *Document Theory*.; For a comprehensive work presenting different epistemologies see Birger Hjørland, "Library and Information Science and the Philosophy of Science," *Journal of Documentation, special issue* 61, no. 1 (2005).

relevant for another reason.[251] While Otlet is not only the father of professional document theory, he is also the founder of a discipline known as Documentation, and together with Briet, who is considered the real contributor to theorising the concept of document,[252] they are considered the key figures.[253] Ronald Day explains the characteristics of Documentation, stating that in contrast to the North American tradition of librarianship, which turned into Information Science, and the "(particularly European) tradition of libraries and librarians, which defined themselves in terms of the historical collection and preservation of books, European documentation emphasized the integration of technology and technique toward specific social goals."[254] However, this statement requires some elaboration. It states that libraries in the European tradition were concerned with the collection and preservation of documents. In this regard, it is necessary to recall the definitions of libraries and archives presented in the introductory part of chapter three, where they were said to refer to the organisation and storage of documents. This means almost the same as said by Day, yet it could imply that libraries and archives presently do not conduct activities for any social purposes; rather, the only thing they do is collect and keep documents. However, this view may be misleading, and does not accurately reflect the range of existing approaches.

In some publications, authors speak of two main paradigms existing in libraries: an object-oriented paradigm and a user-oriented paradigm. As explained by Greer, Grover and Fowler - who use the concepts of bibliographic paradigm and people paradigm, respectively - "the objective of the bibliographic paradigm is to acquire as many of the current, important, or prized publications as possible."[255] The people paradigm does not focus on collection but rather user-centred services, which adopt different types: they can be passive when only library resources are provided; reactive, when professional assistance to finding information is also offered if requested by users; and assertive, when the user's needs are anticipated based upon analysis of the library community.[256] While other scholarly publications reflect the existence of several other paradigms,[257] the two presented above are generally said to characterise two main traditions: the North American focused on providing materials for

[251] Some representative scholars are Michael Buckland, Ronald Day, Niels Lund, and Birger Hjørland, who have been discussed in this present dissertation.
[252] Lund, *Document Theory*, 6.
[253] Otlet was considered father of first generation of documentalists and Briet the most representative figure of the second generation; See Day, "The Erasure and Construction of History".
[254] Day, "The Erasure and Construction of History".
[255] Greer, Grover and Fowler, *Introduction to the Library*, 41.
[256] Greer, Grover and Fowler, *Introduction to the Library*, 42.
[257] Birger Hjørland, "Core Concepts in Library and Information Science (LIS)," 2005. http://www.iva.dk/bh/core%20concepts%20in%20lis/home.htm

users, and the continental European tradition much more focused on preserving and taking care of the materials.[258] However, Documentation was different from both European and American tradition, given that it tried to integrate technology and culture. This was not evident in Otlet's work, which was strongly positivist.[259] Yet, it was very well reflected by Briet, who "understood that technology and culture were deeply connected. She saw society and, therefore, culture, as being re-shaped by technology."[260] The discipline and approach of Documentation were eventually pushed aside by the development of Information Sciences and the subsequent interest in information.[261] However, both its decline and revival today are closely intertwined with the emergence of digital technology. Today the theories of Otlet, and especially Briet, represent the basis of a critical paradigm for library sciences meant to address the conceptual limits of the notion of information, and perhaps also those of a cybernetic approach in library and archival sciences.

3.2.1 From Documents to Information

According to Katherin Hayles, the increased interest in information relates to the dichotomy information-materiality as two separable and discrete analytical concepts, which emerged in different scientific areas in the 1940s-50s.[262] For example, she explains that molecular biology played a key role in this dichotomy, where the human body started being seen as information embodied in genes.[263] This idea has influenced also social sciences, being reflected in the concept of meme – the cultural equivalent of gene – as discussed later in the dissertation.[264] However, the scientific area of interest to us here is the development of Information Sciences, and especially Claude E. Shannon's mathematical theory of communication, which defined information as a mathematical quantity without materiality or meaning, but simply signals to be sent over machines.[265] According to Hayles, separating the information from the materials that carried it meant that information could become free-floating and unaffected by changes in the context or constraints of physical matter. From Hayles' perspective, this allowed Shannon to develop very general theorems that applied to

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[258] Lund, *Document Theory*, 10-11.
[259] Day, "The Erasure and Construction of History", 81.
[260] Michael Buckland, "A Brief Biography of Suzanne Renée Briet," in *What is Documentation?*, ed. and trans. Ronald E. Day et al. (Maryland, Toronto, Oxford: The Scarecrow Press, 2006), 3 .
[261] See Lund, *Document Theory*.; See also Day, "The Erasure and Construction of History".
[262] Katherine N. Hayles, "The Condition of Virtuality," in *The Digital Dialectic – new essays on new media*, ed., Peter Lunenfeld (Cambridge: MIT Press, 1999), 69.
[263] Hayles, "The Condition of Virtuality," 69-70.
[264] See subchapter 7.2 in this dissertation.
[265] Hayles, "The Condition of Virtuality."; See also Shannon, "A Mathematical Theory of Communication".

all carriers by which information could be transmitted.[266] The idea attracted much attention and even spread to non-technical scientific fields, but despite its popularity there were warnings about the loss of meaning caused by de-contextualizing information. Accordingly, Hayles explains that "Shannon himself frequently cautioned that the theory was meant to apply only to certain technical situations, not to communication in general."[267] Indeed, Shannon explains that the semantic aspects of communication were not of concern for the engineer, and that the problem addressed referred to signal transmission, more precisely the possibilities of "reproducing at one point either exactly or approximately a message selected at another point."[268] However, information circulating freely across time and space unconstrained by the limits of the material world was too powerful a vision, penetrating not only the sciences but also areas of life.[269] Indeed, information has now become the order of the day: a precious good for people living in "information societies", the key resource of the economy, and an essential source for human development.[270] However, as Hayles rightly states, information obscures the material base as soon as it is available, which in fact conditions its ability to affect any outcomes whatsoever.[271] "Matter still matters" and this is evident when analysing the difference between digital and non-digital documents.

A traditional document has two dimensions: the informational content and the physical carrier. From a technical perspective, a digital document is considered to have three dimensions. First, it is a physical object, consisting of inscriptions on a physical carrier, namely 0s and 1s recorded on a physical entity. Second, it is a logical object consisting of computer readable code. Third, it is a conceptual object that makes sense to people, this referring to what is being displayed on the computer screen, e.g. intelligible grammatical sentences, images of people and objects, etc.[272] When digital documents are treated as information, their importance only relates to the third conceptual level, which makes sense to people. This is the equivalent of the content dimension in the case of traditional documents. With regard to the carrier, while for traditional documents it was paper in the case of digital

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[266] Hayles, "The Condition of Virtuality," 74.
[267] Ibid.
[268] Shannon, "A Mathematical Theory of Communication," 5.
[269] Hayles, "The Condition of Virtuality," presents how this was reflected in science fiction novels.
[270] See subchapter 7.3 in this dissertation.
[271] Hayles, "The Condition of Virtuality," 72.
[272] Ken Thibodeau "Overview of Technological Approaches to Digital Preservation and Challenges in Coming Years," *The State of Digital Preservation: An International Perspective, Conference Proceedings,* Washington D.C.: Council on Library and Information Resources (CLIR), 2002); See also National Library of Australia, *Guidelines for the Preservation of Digital Heritage*, 35, which explains that in the case of digital heritage rather than digital documents a fourth dimension emerges, namely digital documents as "bundles of essential elements that embody the message, purpose, or features for which the material was chosen for preservation".

documents it is represented by the physical entity on which 0s and 1s are inscribed.[273] The 0s and 1s are also some sort of "content", namely a coded form of what is displayed on the screen, but this process is mediated by the logical level, which understands the physical inscriptions and renders them visible on the screen. As previously discussed, hardware without software is nothing, and vice versa is also true. Therefore, matter is still relevant, not only for transmitting information but also because digital documents only make sense to people if mediated by machines.[274] A recent encyclopaedia of information and library science presents a definition of document very similar to that discussed in the context of MoW, emphasising the view that a document refers to information recorded on matter; it is "used to mean any information-carrying medium, regardless of format."[275] It is worth noting that some examples are listed: "books, manuscripts, videotapes and computer files and databases are all regarded as documents."[276] Accordingly, this definition also applies to digital documents, even if the relationship between carrier and content becomes complicated, as discussed above. However, there are further aspects of digital documents that render them different from traditional ones.

Uricchio remarks that digital documents are not "stable and fixed in the way we think of photographs or films or books (although they can inhabit a range of positions from dynamic, like games, to stable, like e-books)."[277] Discussing social media, which is a term used to refer to various applications that allow people to share resources and discuss,[278] Uricchio argues that "blogs and wikis are not only highly dynamic as texts; they are examples of networked and collaborative cultural production."[279] John Mackenzie Owen notes similar aspects as being fundamental to digital objects, sharing the view that they are fluid and dynamic, interactive and collaborative. Indeed, both authors hold that these are defining characteristics of today's digital media, arguing that the changes undergone by digital objects, as well as

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[273] This represents just an example. As stated above in this dissertation, the carrier can be of almost any kind.
[274] For some remarks in this regard see Colin Webb, "The Malleability of Fire: Preserving Digital Information," in *Managing Preservation for Libraries and Archives: Current Practice and Future Developments*, ed., John Feather (England, USA: Ashgate, 2004), 27.
[275] Penelope Street and David Orman, "Document," in *International Encyclopedia of Information and Library Science*, ed. John Feather and Paul Sturges (London and New York: Routledge, 2003), 144.
[276] Ibid.
[277] William Uricchio, "Moving beyond the Artifact: Lessons from Participatory Culture," in *Preserving the Digital Heritage: Principles and Policies*, eds. Yola de Lusenet and Vincent Wintermans (Amsterdam: Netherlands National Commission for UNESCO, 2007).
[278] See entry on social media in Graham Davies and Fred Riley, "Glossary of ICT terminology," in *Information and Communications Technology for Language Teachers (ICT4LT)*, ed. Graham Davies (Slough, England: Thames Valley University, 2012) http://www.ict4lt.org/en/en_glossary.htm (accessed 3 March 2013).
[279] Uricchio, "Moving beyond the Artifact," 17; blogs and wikis represent examples of social media.

their collaborative and interactive nature, are part of the object.[280] In a preservation context, they argue that these aspects must also be preserved, as part of the digital object. This vision that they are constantly changing and interactive has even determined Yola de Lusenet to suggest that the preservation of digital heritage is much closer to the safeguarding of intangible heritage - constantly recreated by communities - than the traditional method of documentary heritage preservation based on conserving the carrier.[281] However, Levy does not agree that digital documents are fluid.[282] Accordingly, starting from the fact that fixity was a defining characteristic of documents, he notes that in comparison with paper documents, digital documents are usually characterised as follows: a paper document is stable, whereas a digital is unstable. The former is permanent, the latter is impermanent. The former is static and inactive, the latter dynamic, active and interactive. Finally, a paper document is fixed and rigid, while a digital document is fluid, malleable and changeable. Based on these characteristics Levy suggests that if fixity reflects a defining characteristic of a document, digital objects cannot even be called documents, and proceeds to argue that perceiving digital documents as fluid arises from a misperception of the nature of documents. In fact, Levy argues that, without exception, all documents are both fixed and fluid. He explains that people equate fixity with permanence; yet all documents change at times, and at other times remain stable. To emphasise this, he adopts a "genre approach", arguing that "documents come to us not as isolated artefacts but as instances of recognizable social types or genres – e.g. as novels, packing receipts, shopping lists, journal articles, and so on."[283] He argues that these categories and their interpretation change over time, also triggering changes in documents. We can fully agree with that interpretations change over time, and thus documents also become interpreted and re-interpreted. However, Levy does not necessarily bring the point across, because he argues against the technical fixity of documents - content fixed onto matter - by invoking changes at the phenomenological level. He states this clearly: "fixity and fluidity is, to some extent, in the eyes of the beholder."[284] However, Buckland perceives Levy's text in a different way, considering that he shows that an emphasis on technology has impeded us from understanding other dimensions of documents, or as

[280] Mackenzie J. Owen, "Preserving the Digital Heritage: Roles and Responsibilities for heritage Repositories," in *Preserving the Digital Heritage: Principles and Policies*, eds. Yola de Lusenet and Vincent Wintermans (Amsterdam: Netherlands National Commission for UNESCO, 2007), 49.
[281] Yola de Lusenet, "Tending the garden or harvesting the fields. Digital preservation and the UNESCO charter on the preservation of the digital heritage," *Library Trends* 56, no. 1 (2007): 164-82.
[282] David M. Levy, "Fixed or Fluid? Document Stability and New Media," in *Proceedings of ECHT 94 the ACM European Conference on Hypermedia Technology Sept 18-23, 1994, Edinburgh, UK*, (1994), 24-31.
[283] Levy, "Fixed or Fluid."
[284] Levy, "Fixed or Fluid," 27.

Buckland puts it "understanding documents as documents."[285] Indeed, this may be true. Levy himself claimed his aim was to contribute to a better understanding of what documents are, and from certain perspectives he achieved this. However, speaking about fixity as perception does not help to understand how fixity has changed in a technical sense, expressed in the unity between carrier and content. Besides, most scholars consider that digital documents are very fluid, which leads to various problems in the context of preservation, as discussed below.[286]

Nevertheless, the fact that digital documents are perceived as fluid could explain why the concept of document - referring to a medium carrying information, as suggested by the definition noted just above - has been gradually replaced with that of information. However, this does not mean that the concept of information cannot imply the existence of a material dimension. This is exemplified by Buckland, who distinguishes three different understandings of information: information as process, information as knowledge and information as thing.[287] Information as process refers to the act of informing, of communicating something, but for the purpose of this present dissertation this understanding has been left aside, the analysis focusing on the other two notions, which resemble the previous discussion on content and carrier. Information as knowledge refers to the facts that are being communicated, and is explained by Buckland as intangible: "one cannot touch it or measure it in any direct way. Knowledge, belief, and opinion are personal, subjective, and conceptual. Therefore, to communicate them, they have to be expressed, described, or represented in some physical way, as a signal, text, or communication. Any such expression, description, or representation would be information-as-thing."[288] Buckland remarks that the conception of information as thing is not accepted by everyone, although information systems, as those represented by libraries and archives, can only deal with this aspect of information: "libraries deal with books; computer-based information systems handle data in the form of physical bits and bytes; museums deal directly with objects."[289] Indeed, even if the concept of document has been replaced with that of information, the notion of information can be approached to imply a physical dimension. Nevertheless, the problematic issue remains, owing to the theoretical differences between these concepts. According to Hjørland, a document designates something

[285] Michael Buckland, "What is a 'Document'?"
[286] See subchapters 3.3.1 and 3.3.2 in this dissertation.
[287] Buckland borrows these definitions from the Oxford English Dictionary to argue that they can be used as "topography for information science": see Michael Buckland, "Information as Thing," *Journal of the American Society for Information Science* 42, no. 5 (1991): 351.
[288] Michael Buckland, "Information as Thing," 351.
[289] Michael Buckland, "Information as Thing," 352.

with a creator, history and context, which are missing in the case of information; "whereas the concept of information is related to formalization, automation, reductionism and decontextualization, the concepts of document and documentation implies to a greater extent to an emphasis on the historical, social and cultural contextualization and to a description of the different functions of documents."[290][*sic*] The notion that there are disadvantages in taking up the notion of information at the expense of that of document is reflected by the emergence of documentary practices, to which the analysis now turns.

3.2.2 From Information to Documentary Practices

The concept of documentary practices is not a usual concept in library and archival sciences.[291] The notion of documentary is most commonly associated with a factual report concerning real events as those presented in documentary films, television or radio programmes.[292] However, this is not the meaning followed in this dissertation, which is concerned with the concept of documentary practice as used in the field of library and archival sciences. Within this field, the concept has recently emerged as a measure against the inflationary use of the concept of information. The main problem that this concept aims to address is the one that was already noted in MoW, namely that with the emergence of digital technology "the document has, to a certain extent, been disregarded and mainly conceived of as a carrier of the more important stuff, i.e. the information delivered in bits and bytes."[293] However, the notion of information as thing has been introduced above, and is explained by Buckland as an attributive meaning of the term, because apart from referring to things, it implies the idea that things become informative.[294] According to Frohmann, discussing the informativeness of documents refers us to documentary practices.[295] While he does not provide a definition for this concept, as explained by Pilerot, who constructs on Frohmann,

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[290] See entry on "Documentation and Documentation Studies" in Birger Hjørland and Jeppe Nicolaisen, eds. "The Epistemological Lifeboat: Epistemology and Philosophy and Science for Information Scientists," 2007, http://www.iva.dk/jni/lifeboat_old/home.htm (accessed 18 April 2013); See also Hjørland, "Documents, Memory Institutions," 35.

[291] Ola Pilerot who wrote an essay entitled "On Documentary Practices" argues – and he seems to be right - that this phrase does not bring many results when searching for information and that other terms must be used, such as document work, records management, information creation, etc.

[292] http://oxforddictionaries.com/definition/english/documentary.; For a collection of essays on changes in production of documentaries understood as factual reports see Thomas Austin and Wilma de Jong (eds.). 2008. Rethinking Documentary – New Perspectives, New Practices (New York: Open University Press).

[293] Ola Pilerot, "On Documentary Practices, Paper for LIS Course," Swedish School of Library and Information Science, University of Boras. 2011. http://www.adm.hb.se/~opi/Pilerot_paper_on_documentary_practices.pdf (accessed 12 December 2012).

[294] Michael Buckland, "Information as Thing."

[295] Bernd Frohmann, "Documentation Redux: Prolegomenon to (Another) Philosophy of Information," *Library Trends* 52, no. 3 (2004): 387-407.

"the term is relatively open and abstract and thus possible to fill with a variety of content; apparently it is about people dealing with documents in various ways."[296] Therefore, documentary practices may essentially refer to practices with documents, regardless of the kinds of practices carried out and the kinds of documents involved therein. The main point advanced by these authors is that information emerges as an effect of documentary practices, and thus the practices are ontologically always prior to information. Given that practices determine the informativeness of documents, Frohmann proposes a philosophy of information anchored in documentary practices, which prompts the need to study the practices.[297] What this requires is explained by Pilerot,[298] but he relies on Trace, who states that the study of documentary practices incorporates "the study of how and why everyday (or 'non-literary') documents are created and used within social spheres – including organizational and institutional settings, as part of community locales, and in peoples' personal lives."[299] However, what is crucial about this concept and perspective is that it is meant to direct attention from the information content of documents towards their social dimensions. While such approaches are more rare in library and archival fields, they also exist outside these scientific areas.

Lund examines how the social aspects of documents have been approached by scholars from outside the fields of libraries and archives, stating that such approaches reflect the emergence of a critical document theory.[300] Karl Mannheim is one of the authors incorporated by Lund under this perspective. Mannheim differentiated between natural and cultural objectives, claiming that the latter had three meanings: objective, expressive and documentary. In Lund's interpretation of Mannheim, the documentary meaning of an object is not explicitly expressed in the document, but rather arises unintentionally from its role in a context. Therefore, according to the documentary method proposed by Mannheim, documentary interpretation is concerned with the social role of documents.[301] Lund further mentions authors including Harold Garfinkel and Dorothy E. Smith, who constructed on this documentary method and developed their own method for studying documentary practices, i.e. ethnomethodology. Indeed, ethnomethodology was mentioned by Trace as a key approach applied to study

[296] Pilerot, "On Documentary Practices."
[297] Frohmann, "Documentation Redux".
[298] Pilerot, "On Documentary Practices."
[299] Trace, "Documenting Work and Working Documents." In fact Trace doesn't use the concept of documentary practice but rather "document work". However, it seems to have the same meaning, as it arises from Trace's discussion, as well as from Pilerot's text, who makes recourse to Trace's discussion.
[300] Lund, *Document Theory*, 13.
[301] Lund, *Document Theory*, 14.

documentary practices in the context of Workplace Studies.[302] However, according to Lund, Garfinkel and Smith focused on how documents are constructed to play instrumental roles, enforce power and rule through documents.[303] Therefore, Lund argues that the critical documentary theory turned into a critical method for researching the dominant ruling patterns of a society.[304] According to Lund a similar perspective focusing on the role of documents in social systems can also be identified in the works of Foucault;[305] or in the works of Latour and Woolgar who studied how facts are constructed in laboratories by producing different types of documents.[306] All such approaches, as well as others that cannot be mentioned in the space of this chapter, hold relevance and bring in new perspectives on documents. However, for the purpose of this chapter, it is worth contemplating an essay by Brown and Duguid, entitled The Social Life of Documents, within which the authors specifically focus on social aspects of documents in light of the changes triggered by digital technology.

The motivation behind studying social aspects of documents is provided by Brown and Duguid in the following statement: "seeing documents as the means to make and maintain social groups, not just the means to deliver information, makes it easier to understand the utility and success of new forms of document. This social understanding of documents should better explain the evolution of Web as a social and commercial phenomenon."[307] Starting from a critique of what Michael Reddy has called the conduit metaphor, namely the view that a document is just a carrier of information,[308] Brown and Duguid argue that it is crucial to understand that documents do not simply communicate but rather coordinate social practices.[309] They draw on two main theories in support of this statement. First, they cite the theories of Anselm Strauss in arguing for the importance of documents in forming communities; for instance, reflected in the way scientific journals bind intellectual communities together. They argue that "people with shared interests use communication technologies (both hi- and lo-tech) to help form themselves into self-created and self-organizing groups. To a significant degree, these are held together by documents circulating

[302] Trace, "Documenting Work and Working Documents."
[303] Lund, *Document Theory*, 14-15.
[304] Lund, *Document Theory*, 15.
[305] Lund, *Document Theory*, 15.; See also Frohmann, "Documentation Redux," 397, who relies on the theory of Foucault to support the argument that a philosophy of information should be anchored in a philosophy of documentation.
[306] Lund, *Document Theory*, 16.
[307] John S. Brown and Paul Duguid, "The Social Life of Documents," *First Monday* 1, no. 1 (May 6, 1996).
[308] Michael J. Reddy, "The Conduit Metaphor – A Case of Frame Conflict in Our Language about Language," in *Metaphor and Thought*, ed. Andrew Ortony (Cambridge: Cambridge University Press, 1993), 284–324.
[309] See Brown and Duguid, "The Social Life of Documents".

among members, keeping each conscious of being a member and aware of what others are up to."[310] Second, Brown and Duguid draw on the theories of Benedict Anderson in arguing that the circulation of documents over large distances has created "imagined communities", in the sense that they were spread on too large a scale for people to know each member of the community, yet they were imagining that a community existed through their shared use of documents. It is worth noting that Brown and Duguid also make recourse to Levy's discussion about the fixity and fluidity of documents introduced in the previous subchapter, and argue that the theories of Anselm and Anderson help to explain the importance of speaking about the "same" thing and thus why fixity of documents is so important. In the case of digital documents, "attempts to introduce time stamps, hash marks, and other forms of electronic version identification stress how important to social and particularly legal institutions the idea of a fixed state of a document is."[311] Lund remarked that Brown and Duguid in fact "translate a number of related theories of social life into a unified theory of the role of documents in social life."[312] Such an interest is also present in the theory of Suzanne Briet, for whom documentation was a cultural technique. However, this becomes evident in the context of the next subchapter, where attention is paid to the relationship between digital technology and documentary practices.

3.3 Documentary Practices and Digital Technology

This chapter discusses the relationships between digital technology and documentary practices, with a focus on preservation and access. The practice involving the collection and maintenance of documents is said to be as old as the existence of clay tablets.[313] In many cases, regardless of their age, documents were passed down to us, by accident rather than intentional preservation. According to Deegan and Tanner, they "have survived more through the serendipity of their original formats (because they were written on durable animal skins, for instance) and through benign neglect, than through active conservation policies and practices."[314] Although practices that would be grouped today under the concept of preservation have been carried out for a long time, as a profession, preservation is not very old. Indeed, the profession is said to have truly emerged as a response to the increasing flood of information resulting from technological developments in the field of communication, and

[310] Ibid.
[311] Ibid.
[312] Lund, *Document Theory*, 17.
[313] Greer, Grover and Fowler, *Introduction to the Library*, 12–13.
[314] Deegan and Tanner, *Digital Futures*, 183. The concept of "benign neglect" has been explained later.

intensified after the Second World War, and particularly with the development of digital communication.[315] The increasing flood of information, which had to be managed somehow, represents one of the reasons behind the development of the discipline of Documentation. As stated by Otlet himself, the practical aim was "the organisation of documentation on an increasingly comprehensive basis in an increasingly practical way in order to achieve for the intellectual worker the ideal of a 'machine for exploring time and space'."[316] In this respect, it is worth noting that the mission of Otlet and Briet was not directed at theory - even if they are considered pioneers in theorising documents - yet their mission had a very practical purpose. There are many examples in Otlet's texts that prove his aim as being practical. For instance, in an essay discussing how the book has moved from being cut into stone to photography, Otlet explains that the future book will be microphotographic given that it would solve many problems presented by books at that time, ranging from price to size and weight. The microphotographic book would be less heavy and smaller, uniform in size, on a permanent material, moderate in price, easy to preserve and consult, and continuously produced through copies made on request.[317] More importantly for the purpose of this dissertation, Otlet wanted to create a "universal bibliography, centralized in a world library in a world city."[318]

Briet had a similar vision, albeit differing in that she did not propose a centralised model, perceiving this as idealistic, and according to Day this is where Briet's break with Otlet's vision of documentation occurs.[319] As remarked by Day, Briet considered that there was no need for a centralised universal bibliography, which would be more efficient if based on a network model of multiple documentary organisations.[320] This was partly informed by her understanding of the role of documentalists. Briet explains that the abundance of written documents has triggered the need for scientific methods of classification that would make their identification and accessibility easier; thus, professionals created catalogues that act as practical intermediaries between graphical documents and their users.[321] The written

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[315] Lund, *Document Theory.;* Buckland, "What is a 'Document'?".
[316] Paul Otlet, "The Science of Bibliography and Documentation," in *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet*, ed. Boyd W. Rayward (Amsterdam: Elsevier, 1990), 86.
[317] Paul Otlet, "On a New Form of the Book: The Microphotographic Book," in *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet*, ed. Boyd W. Rayward (Amsterdam: Elsevier, 1990), 89.
[318] Ronald E. Day, "A Necessity of Our Time: Documentation as 'Cultural Technique'," In *What is Documentation?* ed. and trans. Ronald E. Day et al. (Maryland, Toronto, Oxford: The Scarecrow Press, 2006), 50.
[319] Day, "A Necessity of Our Time," 50-51.
[320] Day, "A Necessity of Our Time."; see also Lund, *Document Theory*, 10.
[321] Briet, *What is Documentation?*, 11.

documents are primary documents, whereas the catalogues created are secondary documents; the task of documentalists was to create secondary documents. For her, this indicated the birth of a new profession, namely that of the documentalist, which "corresponds to the functions of the person who documents others. The documentalist is that person who performs the craft of documentation."[322] For Briet documentation was a cultural technique of new type,[323] and as explained by Day, was supposed to address both the needs of culture at large and those of "individual cultures of scientific disciplines and scholarly production" in particular.[324] These remarks highlight the difference between Otlet and Briet, and remind the aforementioned difference between two paradigms, i.e. the user oriented and object oriented. However, Briet's vision perhaps extends beyond that of the user, because she considers culture at large. As also remarked by Day, for Briet professional activities are only viable following an understanding of the cultural, social and historical context in which they are carried out; "the cultural conditions that Briet sees documentation being born within are those of industrial modernity and its means of production through techniques, tools and various combinations of these."[325]

The visions of Otlet and Briet concerning the organisation and dissemination of information resemble the visions of computer scientists; for example, those of engineer Vannevar Bush, who wrote an essay in 1945, long before the Internet emerged, stating:

> "Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory."[326]

The concept of memex is popularly considered as having influenced the development of hypertext technologies, eventually leading to the development of the World Wide Web.[327] However, Buckland contests that the acknowledgement should go to Bush, whose essay "reveals lack of familiarity with techniques of document indexing and retrieval."[328] Buckland further argues that this reveals that Bush's popularity reflects cultural and political circumstances, regarding his high statute in other domains, rather not technical

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[322] Briet, *What is Documentation?*, 12.
[323] Briet, *What is Documentation?*
[324] Ronald Day, "Preface," in *What is Documentation?* ed. and trans. Ronald E. Day et al. (Maryland, Toronto, Oxford: The Scarecrow Press, 2006), 5-9.
[325] Day, "A Necessity of Our Time," 53
[326] Vannevar Bush, "As We May Think," *The Atlantic* (July 1945). http://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/
[327] The hypertext has been discussed in chapter 6.
[328] Michael Buckland, *Emanuel Goldberg and His Knowledge Machine: Information, Invention and Political Forces* (Westport, Connecticut and London: Libraries Unlimited, 2006), 221.

acknowledgment.[329] Furthermore, there are many other scientists who had similar ideas before Bush, and would deserve the honour.[330] One such individual is Emanuel Goldberg, who created the Statistical Machine and to whom Buckland dedicates an entire book.[331] Another author mentioned by Buckland is the British author H.G Wells, who wrote an article in 1937 entitled "World Brain: The Idea of a Permanent World Encyclopaedia", imagining "a real intellectual unification of our race"; according to Wells, "the whole human memory can be, and probably in a short time will be, made accessible to every individual."[332] Moreover, Buckland also mentions Otlet, showing that ideas of "world brain" are present in Otlet's writings even before those of Wells.[333] Indeed, this is confirmed by a reading of his Treatise and also of some essays, within which Otlet envisioned a so-called "Universal Book" of knowledge, some sort of an ever-growing index of available knowledge recorded on separate cards, which together formed the Universal Book that "will then determine the form in which all scholarly publications will be issued."[334] Furthermore, he argued for the need of a machine that would be able to solve various tasks such as classification, indexing or manipulation of documents, and even suggests that a machine enabling the achievement of such tasks would be a veritable mechanical and collective brain.[335] The dream of a world brain was strengthened by the development of computers and the consequent trust placed in them by people for transcending physical barriers and creating immediate access to documents. Ironically, however, Lund rightly remarks that "the persistent belief that the World Brain may someday be possible has made information-as-content the core issue of LIS and the document a secondary issue, simply a practical problem to be solved."[336]

It is possible to infer from the writings of documentalists and their reviewers that Otlet's vision was part of the trend in international developments related to industrialisation and the development of standards at that time, and together with Briet and Wells, he was part of what Day calls the "world encyclopedia movement."[337] However, the work of documentalists was

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[329] E.g. Bush proposed the establishment of the National Science Foundation. See Buckland, *Emanuel Goldberg*, 221.
[330] Buckland, *Emanuel Goldberg*.
[331] Buckland, *Emanuel Goldberg*, 7.
[332] Herbert G Wells, "World Brain: The Idea of a Permanent World Encyclopaedia," *Contribution to the new Encyclopédie Française*, August 1937.
[333] Buckland, *Emanuel Goldberg*; See also Rayward, *International Organisation and Dissemination of Knowledge*, 9.
[334] Otlet, "The Science of Bibliography," 84.
[335] Otlet, *Traitè de Documentation*, 391. Original text "La machinerie qui réaliserait ces sept desiderata serait un véritable *cerveau mécanique et collectif* ".
[336] Lund, *Document Theory*, 20-21.
[337] Day, "The Erasure and Construction of History", 80-81.

apparently not just a technical one; in the case of Otlet, it was "driven by his passion on the issue of world peace."[338] In Otlet's view, world peace was achievable through international knowledge and communication. As Day explains, Otlet believed that the "sharing of factual knowledge would prevent wars because all facts would be available and known by all people and consequently, there could be no disagreement that could not be settled by an appeal to documented facts."[339] It has been stated above that the ethical mission of UNESCO reflects the visions of a post-war period. Similarly, the theories of Otlet and Briet reflect a concern for the possibilities of international cooperation and world peace.[340] Otlet's internationalism is reflected in his activities dedicated to setting up organisations for international bibliography and standardisation that would enable such an international exchange of "facts".[341] Together with La Fontaine, they created the International Institute of Bibliography in Bruxelles; or the Universal Decimal Classification, which is used by libraries around the world; or the Mundaneum, which was intended to become the centre to gather all knowledge of the world.[342] According to Day, "these organizations were foundational for assuring international production and commerce, information, communication, and modern economic development, and they eventually found their global form in such institutions as the League of Nations and, later, the United Nations."[343] Briet also discusses the relevance of documentation to society and culture in terms of international cooperation, naming UNESCO as an important organisation for world development.[344] Despite ethical dimensions existing in the works of documentalists, the interests of both Otlet and Briet were largely directed towards facilitating the access and international exchange of documents; yet however important these technological developments have been for access and international exchange, preservation is not necessarily served by these developments, with attention now paid to this aspect.

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[338] Day, "The Erasure and Construction of History", 80.
[339] Day, "The Erasure and Construction of History", 81.
[340] Ronald Day, *The Modern Invention of Information: Discourse, History, and Power* (Carbondale: Southern Illinois University Press, 2001), 8.
[341] See Rayward, *International Organisation and Dissemination of Knowledge*, x.
[342] See Ronald Day, *The Modern Invention of Information*. See also Rayward, *International Organisation and Dissemination of Knowledge*.
[343] Ronald Day, *Modern Invention of Information*, p.9
[344] Briet, *What is Documentation?*. see also discussion in Day, "A Necessity of Our Time."

3.3.1 From Preservation to Sustainable Access

The method for the long-term maintenance of digital documents is called digital preservation, and is considered to represent a new preservation paradigm.[345] In the context of MoW, it was mentioned above that due to technological obsolescence, digital documents are maintained by constantly transferring the informational content to ever-newer carriers, in a process known as migration. Indeed, this method is often considered in the context of digital preservation in libraries and archives. As explained by Harvey, one main difference between this method and that of traditional preservation is marked by the latter preserving the carriers rather than transferring the content.[346] This has some implications; for instance, in the context of traditional preservation "benign neglect" was sometimes applied, meaning that documents were stored and left untouched in proper conditions for a certain period of time. Unless they were destroyed in a disaster, the documents were found in almost the same condition. However, due to technological obsolescence, this method does not function in the case of digital documents, which have to be preserved throughout their "lifecycle", from creation to access.[347] While this does not mean that digital information does not need a physical support, preserving the carrier will not ensure preservation of content. Therefore, only addressing the physical level is not sufficient, yet the same can be said about migration, which only sets the value on the informational content. As discussed above, a digital document has three dimensions - physical, logical and conceptual - and preservation has to address all three of them. Specifically, because digital documents are very complex objects whose main characteristics sometimes depend on a specific combination of hardware and software, migration is not always appropriate. Migration requires rewriting how data is coded in order that they can work with newer technologies, with some scholars considering that this can lead to significant changes in meaning over time.[348] Furthermore, migration is not necessarily cost effective in the long-term, and is also not suitable for all digital documents, especially if they are very complex. For this reason, digital preservation includes further methods, with migration being just one of them.

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[345] Abdelaziz Abid, "Safeguarding our Digital Heritage: a New Preservation Paradigm," in *Preserving the Digital Heritage: Principles and Policies*, eds. Yola de Lusenet and Vincent Wintermans (Amsterdam: Netherlands National Commission for UNESCO, 2007), 7-14.
[346] Ross Harvey, "How Long is Forever? Paradigms for Digital Preservation," *Click06 Biennial Conference, Perth, Australia, 22 September 2006* (Australien Library and Information association ALIA, 2006).
[347] National Library of Australia, *Guidelines for the Preservation of Digital Heritage*.
[348] Webb, "The Malleability of Fire," 38.

Emulation is another method of digital preservation, involving re-creating the software and hardware environment in which a document was originally created. According to Deegan and Tanner, "the more complex a digital object, the more loss there will be through migration, so in this case emulation is suggested, for example in the case of interactive objects."[349] Indeed, emulation seems to have further advantages. In an overview of different digital preservation methods, Webb explains that for advocates of emulation, its advantages over migration lie in the fact that emulators are developed for particular types of computers or operating systems. For this reason, one emulator is suitable for all files created with those systems, as opposed to migration, which requires treating each file separately.[350] However, Rothenberg sees further advantages, arguing that emulation is also better than other digital preservation methods; for example, reliance on hard copy, meaning that digital documents are printed and saved as hard copies.[351] For Rothenberg, this is not a true solution to the problem, yet others argue that it can be meaningful in the case of text-documents, where only the informational content has to be preserved.[352] Rothenberg argues that relying on emulation is better than relying on standards, which despite being very important are also subject to change, or on "computer museums", in other words, reliance on technology preservation by which hardware and software are kept in working conditions, which is not really possible in the long-term.[353] Furthermore, also Webb considers technology preservation as not being viable in the long-term, at least for the reason that it would be impossible to persuade manufacturers to maintain a supply of obsolete technology.[354] Overall, Rothenberg sees emulation as the most appropriate solution, because digital documents are machine-dependent, and recreating the original computer environment reflects the only viable solution for maintaining the original functionality and the "look and feel" of the document.[355] Webb seems to agree that emulation has certain advantages, yet rather than arguing that it is the best of all, he lists various other methods, describing their applications, and including limits and strengths. Therefore, the number of digital preservation methods exceeds those listed above, and also includes: the use of preservation metadata providing information needed to manage a digital document over

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[349] Deegan and Tanner, *Digital Futures*.
[350] Webb, "The Malleability of Fire," 39.
[351] Jeff Rothenberg, *Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation* (Washington: CLIR, 1999), 9.
[352] See Rothenberg, *Avoiding Technological Quicksand.*, and compare with Deegan and Tanner, *Digital Futures.*
[353] See also Rothenberg, *Avoiding Technological Quicksand*, 10-13; And also Webb, "The Malleability of Fire," 36-37.
[354] Webb, "The Malleability of Fire," 37.
[355] Rothenberg, *Avoiding Technological Quicksand*, 17. The notion of "look and feel" is used in software design but appears also in the field of preservation of digital documents. The "look" refers to the original appearance projected by the system software and the "feel" refers to the manner in which the user interacted with the system software. For this definition and explanation see Brookshare, *Computer Science*, 356-57.

time; encapsulation, which refers to assembling the information resource into one package; the preservation metadata and software required for access; format simplification, by which the number of file formats is kept to a manageable minimum; or data rescue, also known as data archaeology, concerned with recovering the data from digital documents that have become inaccessible.[356] As shown by these examples, digital preservation is not limited to migration, but rather includes a variety of methods with different strengths and weaknesses, depending on what is to be preserved. However, whereas all such methods are directed towards technical aspects of digital preservation, scholars increasingly suggest that addressing technical aspects will not be sufficient.

According to Harvey, digital preservation differs from traditional preservation in another aspect besides the previously mentioned method of benign neglect, namely "for preserving digital material the social and institutional challenges assume much greater importance."[357] Moreover, this view is shared by several scholars; for instance, Colin Webb also explains that "while digital preservation may appear to be principally about managing technical challenges, success probably depends as much on understanding and managing institutional and societal impacts."[358] Furthermore, Bradley aligns to such views, stating 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."[359] To also include non-technical aspects in his discussion regarding the "longevity" of digital information, Bradley introduces the notion of digital sustainability, which encompasses digital preservation.[360] For Bradley, borrowing the concept from the environmental movement, sustainability in a digital environment means building "an economically viable infrastructure, both social and technical … This includes the whole socio-technical composition of the repository, the short- and long-term value of the material, the costs of undertaking an action, and the recognition that technologies do not sustain digital objects: institutions do, using the available technology."[361] While Rothenberg seems to agree, he still places technical aspects at the basis: "the preservation and management of digital records involves interrelated technical, administrative, procedural, organizational, and policy issues, but a sound technical approach must form the foundation on

[356] Webb, "The Malleability of Fire," 36-40.
[357] Harvey, "How Long is Forever?".
[358] Webb, "The Malleability of Fire," 29.
[359] Kevin Bradley, "Defining Digital Sustainability," *Library Trends* 56, no. 1 (2007): 148-163.
[360] Kevin Bradley, "Defining Digital Sustainability,"148.
[361] Kevin Bradley, "Defining Digital Sustainability,"157.

which everything else rests."[362] As Rothenberg explains, until a viable technical solution for long-term maintenance of digital documents has been identified, it is premature to invest too much effort in designing administrative and organizational frameworks.[363] Nevertheless, while there is no agreement as to what exactly should be done, it is widely acknowledged that technical aspects of preservation must be supplemented with non-technical ones. From this perspective, the efforts for the long-term maintenance of digital documents are better characterised by the notion of sustainable access rather than preservation, given that it draws attention towards non-technical aspects of preservation.[364] Finally, it must also be stated that despite common agreement that valuable digital documents must be kept forever, there is no agreement as to how long forever is, because digital technology does not only change concepts of preservation but also concepts of permanence. As explained by Harvey, based on interviews with professionals from libraries and archives, for most people forever means one hundred years in the case of digital documents; yet for others forever truly means just four or five years, a time span in which technological change is likely to occur. The interviewee grounded this statement by saying that knowledge is currently failing to think about digital documents in longer terms.[365] Regardless of how long forever is, considerations of preservation are usually preceded by selection of documents and for this reason the remaining part of this subchapter is dedicated to discussing how digital technology has also changed such practices.

3.3.2 From Selection to Harvesting

Feather draws attention to the importance

> "to distinguish between the document as artefact and the document as information carrier. As an artefact, a document in any format is a physical object, part of whose interest lies in its information content. As an information carrier, a document is a device for storing and transmitting its contents and the format is of interest only to the extent that it contributes to, or inhibits, that objective."[366]

This distinction is important in deciding what to preserve, because preservation will either focus on the former or latter depending on whether significance lies on the content or the carrier.[367] In order to speak about the value of a document as an artefact, the notion of intrinsic value is typically used, which has a specific meaning. In a report of the so-called

[362] Rothenberg, *Avoiding Technological Quicksand*, 6.
[363] Rothenberg, *Avoiding Technological Quicksand*, 7.
[364] Kevin Bradley, "Defining Digital Sustainability".
[365] Harvey, "How Long is Forever?"
[366] John Feather, "Introduction: Principles and Policies," in *Managing Preservation for Libraries and Archives: Current Practice and Future Developments*, ed. John Feather (England, USA: Ashgate, 2004), 4-5.
[367] Feather, "Introduction: Principles and Policies," 5.

Committee on Intrinsic Value, established by the U.S. National Archives and Records Administration to specifically define this concept and explain the qualities conveying intrinsic value to documents, the authors explain: "intrinsic value is the archival term that is applied to permanently valuable records that have qualities and characteristics that make the records in their original physical form the only archivally acceptable form for preservation."[368] They identify no fewer than nine qualities or characteristics that help define intrinsic value, namely: physical form, which may be the subject for study if the records provide meaningful documentation or significant examples of the form; aesthetic or artistic quality; unique or curious physical features; age, which provides a quality of uniqueness; value for use in exhibits; questionable authenticity, date, author or other characteristic that is significant and ascertainable by physical examination; general and substantial public interest, owing to direct association with famous or historically significant people, places, things, issues or events; significance as documentation of the establishment or continuing legal basis of an agency or institution; and significance as documentation of the formulation of policy at the highest executive levels when the policy has significance and broad effect throughout or beyond the agency or institution.[369] Despite some of these characteristics applying to digital carriers, the analysis in this dissertation has shown - and aims to critically question - the tendency to see digital documents as information carriers not as artefacts with intrinsic value.

However, some people do see digital documents as potentially having intrinsic value. In this regard, it is worth mentioning one report published by the Council on Library and Information Resources, Washington, whose purpose is to explain the value of the artefact in library collections. The authors of the report discuss documents as artefacts based on traditional evaluation criteria applied with traditional documents including age, rarity, associational value and evidentiary value.[370] However, this report also provides a brief discussion on digital documents, with the main argument being that digital documents can also be seen as artefacts; in other words, "things that have intrinsic value as objects, independent of their information content"[371]. The report proceeds by listing a few examples. Digital documents are "of very

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[368] U.S. National Archives and Record Administration, *Intrinsic Value in Archival Material,* Staff Information Paper Number 21 (Washington D.C.: U.S. National Archives and Record Administration, original 1982, this web version 1999), http://www.archives.gov/research/alic/reference/archives-resources/archival-material-intrinsic-value.html#top (accessed 15 April 2013).
[369] U.S. National Archives and Record Administration, *Intrinsic Value.*
[370] Council on Library and Information Resources (CLIR), *The Evidence in hand: Report of the Task Force on the Artifact on Library Collections* (Washington, D.C: CLIR, 2001); For a discussion on artefactual value see also Feather, "Introduction: Principles and Policies," 4-5.
[371] CLIR, *The Evidence in hand*.

great import for scholars interested in the artefact, for it challenges notions of originality and uniqueness, and even of authenticity, fixity, and stability."[372] The report also notes that the physical form can be significant if displaying an outstanding example of form, or if it provides meaningful documentation; or can also have aesthetic or artistic qualities, especially in digital art and literature.[373] We could add that they may represent significant examples of a certain type of recording; a certain type of storage, a certain type of collaborative production; it may have associational values with those who created it, with those who used it, or with those who changed it. Indeed, the list could be as long as that for non-digital documents. While it is perhaps not appropriate to generalise that all digital documents have artefactual value, it is similarly inappropriate to generalise that all digital documents are simply information carriers. In this regard, the report rightly states that "when considering artifacts that are born digital, the first and possibly the most difficult question is 'What is the artifact?' What information or value inheres in the carrier medium? Is the equipment originally used for display part of the digital artifact? Does the software that presents and actualizes the data qualify as a constituent element of the artifact?"[374] The digital carrier may have value just like any other carrier, but it must be stated that the arguments described above rely on the idea that documents are carefully selected from a larger number of documents. However, this idea fades away with digital technology, and especially in light of its rapid obsolescence.

Phillips explains that the increase in number of online publication has led to two main approaches for collecting and preserving them: the whole domain or comprehensive approach, and the selective approach.[375] Based upon applications from national libraries, she argues that selective approaches to the collection of static web resources similar to print resources that do not contain dynamic elements or change over time have been applied in Denmark and Canada. Furthermore, Australia also applies this approach, whilst additionally selecting dynamic publications and web sites.[376] In addition to this selective approach, which is similar to traditional methods of selection, there is the so-called "whole domain harvesting" by which national libraries automatically collect the entire web domain of their respective countries, without applying selection. Phillips mentions Sweden, Finland, Norway, Iceland and Austria

[372] CLIR, *The Evidence in hand*, 48.
[373] CLIR, *The Evidence in hand*, 51.
[374] CLIR, *The Evidence in hand*, 51.
[375] Margaret E. Phillips, "What Should We Preserve? The Question for Libraries in a Digital World," *Library Trends* 54, no. 1 (2005): 58.
[376] Phillips, "What Should We Preserve,"59.; This aspect has been discussed in subchapter 6.2 in this dissertation

among the countries that take the whole domain harvesting approach.[377] According to Phillips, each of these methods has advantages and disadvantages; for example, when selection is applied, collections tend to reflect the subjectivity of the collecting institutions. In the case of harvesting, owing to the huge amount of data to be managed, quality controls can only be applied on a small sample, and thus the quality and functionality of what is selected cannot be ensured. De Lusenet makes a similar distinction, yet speaks about collection building versus deposit, two methods traditionally applied by libraries. Collection building involves selection based upon user requirements, whereas deposit refers to the comprehensive coverage of a class of materials.[378] As can be inferred from de Lusenet's arguments, the whole domain harvesting is not a new method but rather an extension to the digital environment of the deposit approach. However, de Lusenet does not fail to mention a conference on the topic of digital preservation, where heritage institutions were criticised for attempting to extend their traditional approaches to a domain, which does not fit the traditional one.[379] Indeed, the authors referred to by de Lusenet argue that the interactive and collaborative nature of digital objects is part of the object, and also has to be preserved.[380] This will not be achieved through traditional methods, but rather by devising new methods specific to digital objects; otherwise everything would turn into the documentation of human interaction on the web.[381] Following these arguments, de Lusenet introduces the UNESCO Convention of the Safeguarding of the Intangible Cultural Heritage in explaining that the preservation of digital heritage is much closer to the preservation of intangible heritage: "culture as process instead of product, performance, and enactment rather than artifacts, the role of communities or groups as bearers of culture; these aspects of the intangible debate all have a bearing on digital culture."[382] Indeed, these arguments are very relevant, because there is a need for new ways of understanding digital documents, as shown by the fact that existing methods are fallacious and cannot appropriately capture the main aspects of digital documents but in the context of MoW, preserving the interactive and dynamic aspects of digital documentary heritage is not likely to be achieved easily, given that it only deals with static and finite objects.[383] However, if today's digital documents are characterised by interactivity

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[377] Phillips, "What Should We Preserve," 59.
[378] de Lusenet, "Tending the garden," 167.
[379] The reference is to a conference whose results have been published. See Yola de Lusenet and Vincent Wintermans, eds., *Preserving the Digital Heritage: Principles and Policies* (Amsterdam: Netherlands National Commission for UNESCO, 2007).
[380] See Uricchio, "Moving Beyond the Artifact," and Owen, "Preserving the Digital Heritage".
[381] See Uricchio, "Moving Beyond the Artifact,"and Owen, "Preserving the Digital Heritage"
[382] de Lusenet, "Tending the garden," 175.
[383] This has been closely discussed in chapter 8 in this dissertation.

and dynamism, how else can digital documents become part of MoW if not by also embracing these aspects of digital documents!?

3.4 Informational Content, Social Aspects … and the Carrier?

The literature review regarding conceptual and practical changes triggered by digital technology in libraries and archives as well as library and archival sciences shows that such changes resemble those taking place in the context of MoW. In both cases, one main change underlying others has been the replacement of the notion of document as a basic unit of analysis with that of information. In the context of library and archival sciences, scholars emphasise the disadvantages of this change, which leads to reducing documents to their informational dimension and stripping them of context. To overcome this problem, these scholars make recourse to various theories developed beyond library and archival sciences to bring the social dimensions of documents to the surface. Moreover, they argue that information and documents result from documentary practices, and thus it is important to turn attention to the practices, which are ontologically always prior. While this dissertation shares the view that there are disadvantages in reducing documents to information, its main interest lies in disadvantages for MoW, with the main problem relating to the changes triggered by digital technology no longer reflecting the overall philosophy of MoW. Above all, these changes do not seem to be fully in line with the principles deriving from the status of documentary heritage as heritage of humanity, leading to a series of questions that require serious reflection: while the aim of preservation is to keep options open, don't we rather close out these options by assuming that the future will be digital as we know it? We keep the information but throw away the carrier. Yet, what makes us believe that the digital document will not have value as an artefact for future generations? Don't we rather close out some further options by assuming that the value of the digital document will also lie alone in its information in the future? While we digitise to provide access to all people without exception, what makes us believe that all people would wish to access the documentary heritage digitally? Don't we rather reduce the possibilities of access by ignoring the diversity of means by which societies access the documentary heritage? To answer such questions, this dissertation has set itself to critically analyse the role of digital technology in MoW, in the belief that it is possible to find ways to integrate it without changing existing concepts that reflect its overall philosophy.

Following the assumption that the changes in MoW reflect those taking place in libraries and archives, the analysis has turned to these areas in order to gain deeper insights into this problematic issue. Despite the literature review provided in chapter three having contributed to a better understanding of how conceptual and practical changes have been theorised and addressed in library and archival sciences - and above all, it has confirmed that the changes presented in MoW are their reflection - existing theories have limits concerning the main aim of this dissertation. Perhaps the main limit of most theories from libraries and archival sciences results from the influence of computer sciences, reflected in what was referred to as the cybernetic approach, leading to advancing an instrumental perspective on digital technology as simply the tool that renders information transfer possible. However, the entire analysis so far has shown that digital technology is more than instrumental, influencing the understanding of documents as well as the practices surrounding them. Also those theories attempting to emphasise the social aspects of documents have their limits, despite rightly emphasising that the informativeness of documents is determined by documentary practices. Studying the "social construction" of documents can be relevant, yet it fails to properly acknowledge the influence of digital technology, which is not simply the material aspect of a document but rather the engine underlying and also conditioning documentary practices. It is possible to agree that information results from documentary practices and that the practices are thus prior to information. However, one can also argue that the practices can only take place if supported by a technology that allows the creation of information. In the absence of such a technology, the respective practices would not even make sense. From this perspective, attention has to be directed towards digital technology. It is to this end that a conceptual framework that properly acknowledges the medium is provided in the next chapter.

4. From Medium Bias to Balance: A Conceptual Framework

The purpose of this chapter is to introduce a medium theory approach and explain how it can be used in the context of the present dissertation. While the dichotomy carrier-content in the context of library and archival sciences was noted above, a similar dichotomy can also be found in the context of Communication Studies, albeit under a different form and wording. According to David Holmes, theories within the field of Communication Studies can be differentiated into two categories according to their object of study: one focuses on content

and representation; the other on form and medium.[384] Van Loon shares this view, even arguing that Communication Studies follow the logic of a complete separation of medium and content.[385] Under the influence of Joshua Meyrowitz, these two directions came to be known as "media theory" and "medium theory", respectively, in 1985. In his book, No Sense of Place, Meyrowitz introduced the concept: "I use the singular, '*medium* theory' to describe this research because what makes it different from other 'media theory' is its focus on the particular characteristics of each individual medium."[386] Medium theory emerged to fill gaps left by mainstream Media Studies, which analysed the impacts of the content transmitted by a medium yet ignored the influence of the physical medium itself, which made content possible in the first place. The present dissertation follows a medium theory approach, and thus attention is paid to the physical medium. This is not undertaken to deny the relevance of the content, but as previously argued it is important to refocus attention on the medium, given that the conceptual and practical changes evident in MoW are triggered by digital technology rather than the content it transmits. This is in line with medium theory, which proceeds under the assumption that the medium influences outcomes, ranging from changes in mentality and behaviour of individuals to major structural changes at the level of communities, societies, nations and civilisations. Despite sharing certain features,[387] - at least their obvious attention towards the medium rather than its content - medium theorists use different concepts, adopt a different focus, and apply the theory at different levels from the micro-level of individual situations to the macro-level of civilisations.[388] For this reason, it is important to specify precisely which medium theory is applied. The medium theory that informs the present dissertation is that of the Canadian scholar Harold Adams Innis (1894-1952), which is discussed at length below.

Nevertheless, the analysis commences with a brief introduction to medium theory in order to differentiate it from other communication theories, and especially the cybernetic tradition

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[384] David Holmes, *Communication Theory: Media, Technology and Society* (London: Sage Publications, 2005). See also Joshua Meyrowitz, "Medium Theory," in *Communication Theory Today*, eds. David Crowley and David Mitchel (Stanford: Stanford University Press, 1994), 71.

[385] Joost van Loon, *Media Technology: critical perspectives* (New York, Maidenhead: Open University Press, McGraw Hill, 2008), 23.

[386] Joshua Meyrowitz, *No Sense of Place: The Impact of Electronic Media on Social Behavior* (New York, Oxford: Oxford University Press, 1985), 16.

[387] See Meyrowitz, "Medium Theory," 53; who explains that medium theorists divide civilization in three phases, namely oral, print and electronic.

[388] Meyrowitz, "Medium Theory," 51; See also ibid., 53.; See also Ellis Donald, "Medium Theory," in *Encyclopedia of Communication Theory*, ed. Stephen W. Littlejohn and Karen A. Foss, vol. 2, (USA / UK: Sage Publications, 2009), 644-649.; also Menahem Blondheim and Rita Watson, "Innis, McLuhan and the Toronto School," in *The Toronto School of Communication Theory: Interpretations, Extensions, Applications*, eds. Menahem Blondheim and Rita Watson (Toronto: University of Toronto Press, 2007), 8.

mentioned in the previous chapter, which is somewhat also specific to library and archival sciences. The theory of Harold Innis is subsequently placed in the context of medium theory, with some of his key concepts introduced, each consequently analysed in a separate subchapter. These concepts represent the building blocks of the conceptual framework that guides the analysis in subsequent chapters, and includes: medium, defined as more than an instrument for transmitting information; bias, which serves as analytical lens to study the characteristics of the medium and also as a research device that encourages critical reflection regarding the limits and possibilities of a medium; space and time, which together form an axis against which the impacts of medium bias can be assessed in context; and; balance, which refers to the equitable or proportional relationship between space and time, implying a reconciliation of biases. It is perhaps also important to explicitly mention that Innis developed his medium theory in the 1940s, when digital technology did not yet exist; or rather, as is shown later, it was in incipient form, more as an experiment confined to the laboratory, and thus it was not covered by Innis in his analysis.[389] Therefore, after clarifying his theory and concepts, an explanation is provided in the final subchapter concerning how the medium theory of Harold Innis can be used in the context of the present dissertation, and to motivate why using his medium theory as document theory has strengths over theories from library and archival sciences.

4.1 Brief Introduction to Medium Theory

This subchapter presents the main aspects of medium theory. Despite being called medium theory, for some scholars it is not so much a theory but rather an approach to studying the implications of communication media.[390] Describing what a medium theory approach is, like Meyrowitz, who used it to study the influence of the television on role change, made an appeal to an analogy between media and rooms, suggesting that they function in similar ways:

> "…different media are like different types of rooms – rooms that include and exclude people in different ways. The introduction of new media into a culture restructures the social world in the same way as building or removing walls may either isolate people into different groups or unite them into the same environment. Media that segregate situations will foster segregated behavioural patterns. Media that integrate situations will foster integrated behavioural patterns."[391]

This somehow describes the approach of medium theory, but its interests are not limited to behavioural implications. As already mentioned, medium theory can be applied to a variety of

[389] This has been discussed in subchapter 5.1.1 in this dissertation.
[390] Paul Heyer, *Harold Innis* (Lanham, Maryland: Rowman and Littlefield Publishers Inc, 2003), 102.
[391] Meyrowitz, "Medium Theory," 62.

topics and at different levels of analysis. It is sometimes used interchangeably with media ecology, a concept introduced by Neil Postman in 1968.[392] As explained by Mathew Fuller, media ecology is some sort of environmentalism; ecology and environment are not differentiated, with the former often replaced with the latter; and the focus falls on media as environments or ecologies, understood as dynamic systems sustaining human culture in a similar manner to the natural environment.[393] In contrast to medium theory, media ecology more clearly illustrates the perspective that the medium is perceived like an environment, yet the difference seems to be mainly terminological because scholars belonging to the media ecology movement are also classified as medium theorists.[394] Eric Havelock, Neil Postman, Walter Ong, Lewis Mumford, Elizabeth Eisenstein and Edmund Carpenter, next to Harold Adams Innis, Marshall McLuhan and Joshua Meyrowitz, are just some of the most influential scholars.[395] Some of these researchers focused on the impacts of the shift from orality to literacy and showed how this change influenced knowledge and consciousness, yet also social organization.[396] Other researchers focused on the impacts of the printing press,[397] or those of the telegraph,[398] while some analysed the influence of the television on erasing generational borders.[399] However, Harold Innis and McLuhan stand out among medium theorists due to the breath of history and the types of media covered.[400] Indeed, Innis, who is of main interest in this dissertation, covered four thousand years of human history in his analysis, showing how different media - ranging from clay tablets to the radio - have been influencing cultures, occupying a central position in the organisation of societies and determining the types of knowledge disseminated.[401] To provide some examples, Innis showed that the development of

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[392] Lance Strate, "A Media Ecology Review," *Communication Research Trends* 23, no. 2 (2004): 4.
[393] Matthew Fuller, *Media Ecologies, Materialist Energies in Art and Technoculture* (Massachusetts, London, Cambridge: MIT Press, 2005), 4.
[394] E.g. A special issue of a quarterly review of communication research published by the Centre for the Study of Communication and Culture dedicated a 2004-issue to a review of media ecology. The authors that are being discussed in that issue are the authors presented by others as medium theorists. See Strate, "A Media Ecology Review". For an overview of different uses of the concept "medium ecology" see Fuller, *Media Ecologies.*
[395] For a compact overview of the major media ecologists see Strate, "A Media Ecology Review".
[396] Walter J. Ong, *Orality and Literacy, The Technologizing of the Word, 3rd ed. (*London, New York: Taylor and Francis e-Library, 2005).
[397] Elizabeth Eisenstein, *The Printing Press as an Agent of Change* (Cambridge: Cambridge University Press, 1979). Eisenstein analyzed the effects of the printing press on religion, science and scholarship. According to Derrick de Kerckhove, Eisenstein actually set herself to prove McLuhan wrong regarding the impacts of a medium but after almost twenty years she admitted that he was right. See Derrick de Kerckhove, "McLuhan and the Toronto School of Communication," *Canadian Journal of Communication/Special Issue* 14, no. 4 (1989). www.cjc-online.ca/index.php/journal/article/download/533/439
[398] James W. Carey, *Communication as Culture: Essays on Media and Society* (New York & London: Routledge, 1989), especially chapter 8 entitled "Technology and Ideology: The Case of the Telegraph".
[399] Meyrowitz, *No Sense of Place*. He argues that television's accessibility has lowered the boundaries that separate generations, genders, classes, etc.
[400] This remark was made by Meyrowitz, "Medium Theory," 52.
[401] Harold A. Innis, *The Bias of Communication* (Toronto: University of Toronto Press, 1995).

libraries in Babylon favoured the power of monarchy; in Ancient Greece, papyrus facilitated the development of democratic organisation, literature and philosophy; Christianity maintained power by exploiting parchment; and printing brought the rise of the Reformation.[402]

Sometimes the reference is not to medium theory but rather more narrowly framed to the Toronto School of Communication Theory, given that the main scholars that initiated the type of research called medium theory - Harold Innis, followed by Marshall McLuhan - were based at the University of Toronto in Canada.[403] In their analysis of the Toronto School of Communication Theory, Blondheim and Watson note three main themes that characterise this perspective: an interest in communication as a process, as a "seamless circuit linking people through media and their messages";[404] the focus on the effects or consequences of communications, broadly conceptualised in terms of economic, social and cultural change to cognitive consequences and influences on personality;[405] and the focus on the technology of communication, or the medium - clay tablet, printed page, film, video - representing the substrate of communication, and thus moulding the overall process and its consequences.[406] In order to extract these themes, Blondheim and Watson made brief comparisons with other schools of communication research concerned with what can be called "media effects".[407] For example, they contrast the focus of the Toronto School on broad changes triggered by a medium with the focus of the Columbia School, whose focus was on "short-term measurable effects of mass mediated messages on opinions, attitudes and behaviours of individuals."[408] Several scholars proceed in this manner, comparing it with other schools such as the Frankfurt School, for example with scholars such as Theodor W. Adorno and Walter Benjamin;[409] or they place it on the same level as major schools of communication research, including those

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[402] Innis, *Bias*, 31.
[403] de Kerckhove, "McLuhan and the Toronto".
[404] Blondheim and Watson, "Innis, McLuhan and the Toronto School," 8.
[405] Blondheim and Watson, "Innis, McLuhan and the Toronto School," 9.
[406] Blondheim and Watson, "Innis, McLuhan and the Toronto School," 10.
[407] For a comprehensive overview of theories concerned with media effects and examples of their application see Robin L. Nabi and Mary B. Oliver, *The SAGE Handbook of Media Processes and Effects* (Los Angeles: Sage Publications, 2009).
[408] Blondheim and Watson, "Innis, McLuhan and the Toronto School," 9.
[409] Judith Stamps, *Unthinking Modernity: Innis, McLuhan and the Frankfurt School.* Quebec: McGill-Queen's University Press, 1995).; See also Elihu Katz, "Foreword: The Toronto School of Communication Research," in *The Toronto School of Communication Theory: Interpretations, Extensions, Applications*, eds. Rita Watson and Menahem Blondheim (Toronto: University of Toronto Press, 2007), 1.

mentioned above, and additionally the Chicago School and the Cultural Studies.[410] However, unlike the Toronto School, other communication theories did not focus on the medium of communication and thus are not of main concern within this dissertation.[411]

Nevertheless, it is useful to briefly point out how the Toronto School differs from Shannon's theory of communication, which was noted in the previous chapter as having influenced perspectives in library and archival sciences. In fact, Blondheim and Watson mention this theory in their explanation of the Toronto School, although their opinion is questionable, since they state: "…much like their contemporaries Shannon and Weaver, both Innis and McLuhan saw communication as a seamless circuit linking people through media and their messages. Their scope, however, was much larger and richer than Shannon and Weaver's reductionist approach."[412] It is possible to agree that the focus of both Shannon and Innis was on the medium of communication, yet their understanding of communication and medium differed fundamentally. Shannon did not really see communication as process linking people, and as explained in the previous chapter, his was a cybernetic approach, defining communication as transmission of messages from a sender to a receiver. For Innis, communication was indeed a process linking people, yet this is exactly what sets him apart from Shannon. Seeing communication as a process linking people Innis' interest was not simply in the transmission of messages, but rather in the human interrelationships that were established by this traversal.[413] Furthermore, this influenced how the medium was defined. Whereas for Shannon, the medium was the technology that performed the transfer of messages, for Innis it was the substrate that underlined and conditioned, not just the messages but also the human interrelationships, which it enabled and sustained. However, Innis' perspective can be best understood against his research background and theoretical orientation, which are presented below.

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[410] For an overview of the main texts that represent each of the above named schools see Elihu Katz et al., *Canonic Texts in Media Research: Are There Any? Should There Be? How About These?* (UK: Polity Press, 2003).

[411] Walter Benjamin is perhaps an exception. A brief discussion has been provided in subchapter 7.2 in this dissertation.

[412] Blondheim and Watson, "Innis, McLuhan and the Toronto School," 8.

[413] For this interpretation see Ian Angus, "The Materiality of Expression: Harold Innis` Communication Theory and the Discursive Turn in the Human Sciences," *Canadian Journal of Communication* 23, no. 1 (1998).

4.2 The Medium Theory of Harold Adams Innis

This subchapter introduces the theory and methodology of Harold Innis, explaining some of his key concepts used as building blocks of a conceptual framework for this dissertation. The motivation necessitating the focusing on the medium can be found in one of Innis' key statements: "a medium of communication has an important influence on the dissemination of knowledge over space and over time and it becomes necessary to study its characteristics in order to appraise its influence in its cultural setting."[414] Following this view, Innis traced the historical interrelationships between cultural change and changes in communication technologies, which allowed him to show how they have been mutually influencing each other and particularly to illustrate that communication technologies have been facilitating the expansion and duration of political formations and cultural values. Although Innis' unit of analysis were nations, empires and civilisations, in other words great political organisations, throughout his writings he made consistent reference to culture. Despite not defining culture, he seems to understand it in an anthropological sense, similar to how culture is defined in the following anthropological definition: the way of life of a group of people, in the circumstances of a certain environment, and comprising tangible and intangible products created by people and transmitted from generation to generation.[415] A similar understanding can be observed in Innis' texts, as will be made evident when discussing his concepts. However, for the sake of clarification it is worth also providing some examples here. For instance, Innis acknowledged that attitudes towards time differ according to the beliefs and customs of groups;[416] he believed that cultural values and the way people think about themselves are part of culture;[417] he sustained that the equation of ethical values between cultures is one of the most difficult tasks;[418] he mentioned that cultural activity was evident in architecture and sculpture;[419] and he even said that the meaning of culture may be "something which we have that others have not."[420] As previously mentioned, Innis did not define culture, but he did the same with all concepts he used. His style of writing, which has been rightly

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[414] Innis, *Bias*, 33.
[415] Achim Mihu, *Antropologia Culturală* (Cluj-Napoca, Romania: Dacia, 2002), 88.; Original text: "Cultura este modul de viaţă propriu unui grup de oameni, în circumstanţele unui anumit mediu înconjurător, creat de om şi format din produsele materiale şi non-materiale transmise de la o generaţie la alta."; There are many definitions of culture but generally speaking the definition mentioned here is characteristic of an anthropological view, as opposed to a Cultural Studies view, for example, which sees culture as a set of processes concerned with the production and exchange of meanings. In this regard see Stuart Hall, *Representations: Cultural Representations and Signifying Practices* (London: Sage Publications, 1997).
[416] Innis, *Bias*, 62.
[417] Innis, *Bias*, 132.
[418] Innis, *Bias*, 140.
[419] Innis, *Bias*, 133.
[420] Innis, *Bias*, 132.

noted by most scholars as being a real barrier,[421] was not more helpful in providing clarifications, because apart from some arguments and plenty of examples, he offered few explanations. Accordingly, this has prompted various and sometimes contradictory interpretations of his theory and concepts.[422]

While many scholars perceived Innis' writings as inviting interpretations, some scholars argue that they reflect a clear theory and methodology that can be traced, understood and applied.[423] One such author is Paul Heyer, who sees Innis' theory as being defined by three related themes: first, an outline of communication history; second, the elaboration of several concepts for the study of communication and culture;[424] and third, suggestions regarding how his approach informs a critique of culture and technology in the contemporary world.[425] Another author, Ronald Deibert, similarly presents three meta-theoretical traits that he suggests as characterising Innis' works: historicism; the combination of material and ideational factors; and the importance attached to the biases of space and time in their impact on civilisations.[426] This dissertation mainly makes recourse to such authors, who considered that Innis had a clear theory that can be used; however, of course, in addition to making recourse to the original texts of Innis. Actually, he turned his attention to communications relatively late in his career and life, and consequently had a limited number of publications in the field of communications, which together offer a comprehensive picture of his key ideas: Empire and Communications, and The Bias of Communication, are his key publications in communication theory, while further essays were published as part of two collections, namely Staples, Markets and Cultural Change, and Changing Concepts of Time.[427] Finally, there is a publication of notes written by Innis over the course of time and published post-mortem as a

[421] Many of the authors cited in this chapter as having provided comments, interpretations, reviews of Innis' texts noted such difficulties.
[422] See discussion of concepts in subchapters 4.2.1, 4.2.4, and 5.3 in this dissertation.
[423] Catherine Frost, "How Prometheus is Bound: Applying the Innis Method of Communication Analysis to the Internet," *Canadian Journal of Communication* 28, no. 1 (2003).; See also Heyer, *Harold Innis.*, who says that "Innis' legacy is not just a formalized system awaiting interpretation, but a resource to be applied as well as studied".
[424] E.g. medium, time-bias and space-bias, the monopoly of knowledge; some of these are discussed below, see subchapters 4.2.1 to 4.2.4.
[425] Heyer, *Harold Innis*, xii-xiii.
[426] Ronald J. Deibert, "Between Essentialism and Constructivism: Harold Innis and World Order Tranformations," in *The Toronto School of Communication Theory: Interpretations, Extensions, Applications*, ed. Rita Watson and Menahem Blondheim (Toronto: University of Toronto Press, 2007), 30.
[427] Harold A. Innis, *Empire and Communications* (Toronto: Press Porcépic Limited, 1986); Innis, *Bias*; One collection of essays was published by Drache. See Daniel Drache, ed., *Staples, Markets and Cultural Change: Selected Essays, Harold A. Innis* (Montreal: McGill-Queen's University Press, 1995); Harold A. Innis, *Changing Concepts of Time* (Toronto, Canada: University of Toronto, 1952).

compilation, known as "The Idea File", by William Christian.[428] In fact, Innis is best known as one of the most, if not even the most, famous Canadian political economist. He analysed how the Canadian history and culture have developed through the exploitation of staples such as fur, fish or timber, and developed the so-called "staples theory" for which he became best known.[429]

While a difference is usually made between Innis as a political economist or economic historian, and as a communication and media scholar, there seems to be wide agreement that his research in political economy offered the background for his interest in communication studies.[430] Accordingly, Innis' shift in interest is best explained by Paul Heyer in the following paragraph:

> "If the study of staples led him to touch on the importance of transportation and communication, the study of one of those staples, pulp and paper, opened a door to the newly emergent field of communication studies. He simply followed pulp and paper through its subsequent stages: newspapers and journalism, books, and advertising. In other words, from looking at a natural resource-based industry he turned his attention to a cultural industry in which information, and ultimately knowledge, was a commodity that circulated, had value, and empowered those who controlled it."[431]

Naturally, Innis did not simply shift from one discipline to another, and the knowledge he accumulated in the field of economics left an imprint on his communication theory. For example, for Derrick de Kerckhove, Innis' economic background is reflected in his concern with the networking aspects of the ecology of a given medium.[432] However, for most scholars, Innis' economic background is reflected in his concern with the raw materials of communication;[433] in the fact that he anchors each medium of communication in a staple and "the communication staples – the media – inevitably obey economic principles, in scarcity or plenty, monopoly or free market."[434] However, one does not have to go too far to prove that Innis' communication theory incorporates a political-economic dimension. Indeed, one only needs to turn to the works of Innis, because he acknowledged himself borrowing the concept of monopoly from economics,[435] applying or rather extending it to undue limits to communications and culture to speak about the monopoly of knowledge, and sometimes

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[428] William Christian, ed., *The Idea File of Harold Adams Innis* (Toronto: University of Toronto Press, 1980).
[429] See Heyer, *Harold Innis*. See also Edward Comor, "Harold Innis and 'The Bias of Communication'," *Information, Communication & Society* 4, no. 2 (2001): 274-94.
[430] Comor, "Harold Innis".
[431] Heyer, *Harold Innis*, 30.
[432] de Kerckhove, "McLuhan and the Toronto".
[433] Heyer, *Harold Innis*, 9.
[434] Blondheim and Watson, "Innis, McLuhan and the Toronto School," 14.
[435] Innis, *Bias*, 1.

cultural monopoly of knowledge.[436] As a medium theorist, Innis naturally focused on the medium of communication, yet this led some authors to consider him a technological or media determinist;[437] however, most scholars now reject such a view. Paul Heyer considers that Innis did not see the role of communication media as a cause in a deterministic sense, but rather as the focal point or ground on which so many elements converged.[438] This seems to reflect how medium theorists understand the medium as an environment. Shifman and Blondheim deny that Innis is determinist because he did not consider "communication technologies to emerge out of the blue unattached to social expectations" but "to be engineered and launched in response to society's perceived needs, through purposeful social choices".[439] This perspective is supported by a brief look at Innis' analysis of different communication media, which starts with descriptions of the social, cultural, environmental, economic or political context that influenced the initial creation or adoption of the medium. Accordingly, for Blondheim, Innis is a social constructivist.[440] Also Deibert acknowledges similarities between the key assumptions of Innis and those of constructivists, yet despite this, argues that Innis is only partly a constructivist given that he incorporates natural and material elements in his analysis, which sets him apart.[441] However, Deibert also agrees that Innis' theory should not be classified as technological deterministic.

Innis is considered a communication scientist, a medium theorist, although not all scholars agree with this view. The interpretation of William Christian is worth noting, because it arises from a very intensive work with Innis' ideas and the thousands of notes that he left behind, which Christian arranged in the aforementioned compilation, "The Idea File". Christian agrees with other authors that Innis' scientific style was unconventional, but he also argues that this determined "many to look to the titles of his works, and to conclude, mistakenly, that they are studies in communications and the effects of different media of communications. Innis' real interest lay in the underlying political and cultural issues, and the studies in

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[436] This is what Innis said. He said that he extended it to undue limits since the task of the social scientist is to test the limits of his tools; Innis, *Bias*, 1.
[437] Paul Levinson, *Digital McLuhan* (Taylor & Francis e-Library, 2004), 183. ; See also Paul Grosswiler, "Innis, Harold Adams (1894-1952)," in *Encyclopedia Of Communication and Information*, ed. Jorge R. Schement, vol. 2 (New York: Macmillan Reference, 2002), 438.
[438] Heyer, *Harold Innis*, 67. Ibid, 89.
[439] Limor Shifman and Menahem Blondheim, "From the Spider to the Web: Innis' Ecological Approach to the Evolution of Communication Technologies," in *The Toronto School of Communication Theory: Interpretations, Extensions, Applications*, eds. Rita Watson and Menahem Blondheim (Toronto: University of Toronto Press, 2007), 337.
[440] See especially Menahem Blondheim, "Discovering 'The Significance of Communication': Harold Adams Innis as Social Constructivist," *Canadian Journal of Communication* 29, (2004): 119-143.
[441] Deibert, "Between Essentialism and Constructivism".

communication were to a considerable degree a device for getting at more important questions."[442] Furthermore, Heyer and Crowley also seem to see more than just a communication theory in Innis' theory, stating that Innis' vision "is anthropological - more precisely, it constitutes a philosophical anthropology."[443] According to Mark Poster, the names of Innis and McLuhan should even be acknowledged as part of cultural theory.[444] Indeed, Innis' theory was more than a communication theory because above all it had a moral purpose, as shown below.[445] However, this only becomes visible at close examination of his texts, since explanations were missing in this regard. Explanations were also missing concerning his methods and methodology and, as with his concepts, his methods have also been interpreted differently by different authors. For Comor, what Innis does is a form of dialectical materialism, yet for Frost it is narrative style, and for Chesher, it is neither dialectical nor narrative but rather pattern matching.[446] However, Frost goes further to argue that beyond his analytical style, one can identify three main methodological steps followed by Innis when analysing the impacts resulting from the introduction of a communication medium in a certain context. She explains: "first, he [Innis] was attentive to the pre-existing geographic and cultural conditions in which a new medium arose and was adopted; second, he detailed the economic and technological features associated with the medium itself; and third, he was concerned with a medium's potential to influence content and to foster new social and economic monopolies down the line."[447] Indeed, these different facets of analysis can be traced in Innis' work, albeit perhaps not in a linear fashion as the enumeration above may lead one to conclude; and these facets are particularly evident in Innis' book, Empire and Communications, which Frost surprisingly does not cite.[448] However, these aspects are not of major concern in this dissertation, which is not so much interested in following the same methods and methodology but rather using Innis' concepts as analytical and critical lenses. However, what is crucial in his analysis and cannot be ignored in the present or any other research following a medium theory approach is the study of medium characteristics. While this is achieved later in the dissertation, such a study has to be guided by a conceptual

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[442] Christian, ed., *The Idea File*.
[443] Paul Heyer and David Crowley, "Introduction," in *The Bias of Communication*, Harold A. Innis (Toronto: University of Toronto Press, 1995), ix-xxvi.
[444] Mark Poster, "McLuhan and the Cultural Theory of Media," *Media Tropes eJournal* 2, no. 2 (2010).
[445] See subchapter 4.2.4 in this dissertation.
[446] Comor, "Harold Innis," 275; Frost, "How Prometheus is Bound"; Chris Chesher, "Binding Time: Harold Innis and the balance of new media," *Philosophy of the Information Society, Proceedings of the 30th International Ludwig Wittgenstein-Symposium in Kirchberg 2007* (Frankfurt: Ontos-Verlag, 2008), 9-26.
[447] Frost, "How Prometheus is Bound,"3.
[448] She only makes reference to Innis, *Bias* and to one collection of essays.

framework, and thus the analysis now moves on to explain the five concepts that constitute this framework.

4.2.1 Medium

After broadly sketching the theoretical orientation of Innis, clarifying his notion of medium follows as a necessary step, because all other concepts used depend on how he defines medium. Comor notes that Innis did not share a popular definition of communication media, which led to various misunderstandings of his concepts and theory.[449] Indeed, Innis' definition of the medium was unconventional and was noted by many authors as being very broad, including roads and canals;[450] but also "social institutions, organizations and technologies as disparate as horses, the monetary system, universities and radio."[451] This variety of examples led Ian Angus to conclude that "medium of communication" is understood in a very wide sense in Innis' writing, as any kind of a formative and integrating social mechanism.[452] For Innis, speech was also a communication medium, despite the physical basis being absent, or rather it was represented by people. The carriers of the oral tradition were the "rhapsodes and minstrels", as Innis said.[453] Innis even warns that the significance of the oral tradition is typically overlooked, because it does not leave recorded traces; however, oral traditions, being based on continuity, ensure the transmission of knowledge across time, just like records do. Actually, Innis admitted a preference for oral traditions,[454] and in certain regards considered them as superior to recorded information, owing to their flexibility in transmitting knowledge in a way that resists mechanisation and monopolisation.[455] Applying Innis' theory to speak about changes triggered by the Internet, Comor placed great emphasis on Innis' broad understanding of medium, and thus Comor also uses the concept to refer to institutions and organisations next to technologies, all of which he considered of equal importance in terms of the communication of messages.[456] However, such a broad understanding of medium is not followed in this dissertation, which is limited to physical communication technologies. This does not harm the original theory of Innis and does not misrepresent it, but instead of looking at all media – including orality, which MoW

[449] Comor, "Harold Innis".
[450] Luciana Duranti, "The Records: Where Archival Universality Resides," *Archival Issues* 19, no. 2 (1994): 83-94.
[451] Jan Ll. Harris and Paul A. Taylor, *Digital Matters, Theory and culture of the matrix,* (London and New York: Routledge, 2005), 13; see also Duranti, "The Records".
[452] Angus, "The Materiality of Expression".
[453] Innis, *Bias*, 108.
[454] Innis, *Bias*, 190.
[455] Innis, *Bias*, especially chapter A Plea for Time.
[456] Comor, "Harold Innis".

intentionally dismisses as belonging to the realm of other UNESCO programmes – the study is limited to those communication media that are composed of (non-living) physical matter.[457] However, for the further clarification of Innis' understanding of medium, it should be stated that even if the focus lies strictly on what is commonly called communication medium, Innis still had a peculiar understanding because, as explained by Heyer, by medium of communication Innis not only meant "the raw material used - stone, clay, parchment, or paper - but also the form of communication embodied in that medium - hieroglyphics, cuneiform, or alphabetic writing."[458] Indeed, this can be observed throughout Innis' writings, given that whenever he spoke about a medium he implied more than simply the physical matter composing it. This relates to his broad understanding of communication, which requires some clarification.

Some scholars associate Innis' communication theory with transportation, a view that is said to have dominated North American communication theory.[459] Until the emergence of the telegraph, messages could only travel as fast as transportation means, and the sending of messages depended entirely on transportation means. Therefore, transportation and communication were closely associated, and van Loon argues that Innis' theory reflects the transportation view of communication.[460] Accordingly, van Loon emphasises Innis' contribution to this view by placing his theory in comparison with Shannon and Weaver's, and with communication effects research. According to van Loon, the strength of Innis' theory lay in his bringing back attention to the physical matter of communication. In Shannon and Weaver's theory, van Loon explains, matter was something ephemeral,[461] and thus Innis' theory helped to reconnect information with matter, consequently revealing the limitations matter continued to have on the transmission of messages.[462] Similarly, matter was not given importance in mainstream media effects research, so Innis' theory showed that the physical medium also affected outcomes. It is possible to agree that Innis brought an important contribution to the transmission view of communication; however, this view only partly characterises Innis' theory. To support this argument, it is useful to make recourse to an explanation by James Carey, who distinguished two alternative conceptions of

[457] See subchapter 2.2.2 in this dissertation for the explanation.
[458] Heyer, *Harold Innis*, 63.
[459] Carey, *Communication as Culture*. See also van Loon, *Media Technology*, 22-23.
[460] van Loon, *Media Technology*, 3.
[461] This has been discussed in subchapter 3.2, where it was stated that Shannon's theory triggered the idea that information could circulate freely unrestricted by physical matter.
[462] van Loon, *Media Technology*, 23-24.

communication, labelled as the transmission and ritual views of communication. As Carey explains, communication under a transmission view involves the extension of messages across geography for the purpose of control, whereas a ritual view is the sacred ceremony that draws persons together in fellowship and commonality.[463] The transmission view is a different notion for the cybernetic approach previously mentioned, as one can infer from Carey's explanation, for whom "the centre of this idea of communication is the transmission of signals or messages over distance."[464] However, in line with medium theorists, Innis saw communication as a process linking people, and he was also interested in understanding the social relationships enabled by a medium, which indicates the presence of a ritual view of communication. Therefore, his theory should not be characterised as representing the transmission view, cybernetic approach or any other label that defines communication as simply the transmission of information. Indeed, this would be misleading, given that Innis did not focus solely on the physical matter of media, but also on their social aspects. This is expressed by the concepts of space and time, alternatively space-bias and time-bias, used by Innis and analysed later in this dissertation.[465] Moreover, in addition to focusing on matter and its social aspects, Innis also seems to not entirely ignore the content transmitted. He was somehow attentive to the content, yet did this in terms of medium theory, rather than media theory, meaning that he did not consider what the content transmitted but rather how the content was influenced by the medium, e.g. in terms of the medium conditioning how content could be created, organised, accessed or disseminated; or in terms of the medium conditioning the type of content transmitted, depending on the difficulty of use it imposed on people, which enabled control by those who had the needed skills. Such medium characteristics, capable of influencing content and affecting outcomes, were referred to by Innis with the generic term bias, with this concept introduced below.

4.2.2 Bias

Within Innis' theory, the notion of bias is central and inseparably related with the medium, and will serve as central analytical lens for studying digital technology in this dissertation. According to Comor, the concept of bias did not originate with Innis' communication theory; rather, Innis had been using bias for a longer time, and first developed it "as a heuristic tool employed in the task of empowering the social scientist, encouraging him/her to develop a

[463] Carey, *Communication as Culture*, 33.
[464] Carey, *Communication as Culture*, 12.
[465] See subchapter 4.2.3 in this dissertation.

reflexive mode of intellectual practice."[466] Indeed, the notion of bias as employed by Innis encourages critical thinking, which also represents why bias was chosen for this dissertation as a device to critically think about digital technology; yet, for the purpose of this dissertation, attention is only paid to bias in the context of his communication theory. However, even in this context, he employed it in various regards to speak about, e.g. "bias of significance";[467] "bias of the period in which we work";[468] "the bias of modern civilizations";[469] "the bias of other civilizations";[470] and so on. He even said about himself that his bias was with the oral tradition,[471] or that he had the bias of an economist.[472] Despite these various uses, only bias as related to the medium is employed within this dissertation. From this perspective, Innis mainly used bias to speak about characteristics of the medium (things that they facilitated and hindered) and their various implications, e.g. bias of paper;[473] bias of mechanized communication;[474] bias towards centralisation or decentralisation;[475] or bias towards ecclesiastical or political organisation.[476] Innis' understanding of bias resembles dictionary definitions, where it refers to an inclination or prejudice for or against someone or something;[477] "a partiality that prevents objective consideration of an issue or situation";[478] or "a preference towards a particular subject or thing".[479] These understandings are somewhat similar to how Innis uses bias, because by persistently highlighting that each medium facilitated certain things while hindering others, he implied that each medium had a bias understood as an inclination towards certain patterns of use, towards specific forms of writing, specific forms of dissemination, etc. However, given that Innis' definition of medium was complex, so too was his notion of bias.

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[466] Comor, "Harold Innis,"278. As Comor explains his theory has to be seen in the context of the historical time when it was written.
[467] Innis, *Bias*, 33.
[468] Ibid.
[469] Innis, *Bias*, 34.
[470] Innis, *Bias*, 33.
[471] Innis, *Bias*, 190.
[472] Innis, *Bias*, 1.
[473] Innis, *Empire*,136.
[474] Innis, *Empire*,142.
[475] Innis, *Empire*, 5.
[476] Innis, *Empire*, 169.
[477] See entry on "bias" in Oxford Dictionaries Online , http://oxforddictionaries.com/definition/english/bias?q=bias (accessed 22 November 2012).
[478] See entry on "bias" in a Canadian online dictionary, namely in: "idictionary.ca" http://www.idictionary.ca/definition/bias/ (accessed 22 November 2012).
[479] See entry on "bias" in Cambridge Dictionaries Online, http://dictionary.cambridge.org/dictionary/british/bias_1?q=bias (accessed 22 November 2012).

According to van Loon, when Innis introduced bias, this notion and equivalents were already in use within other communication theories to signify a dysfunction in the communication process. For instance, in mainstream communication, bias was related with those people involved in communication processes and with the intentional distortion and manipulation of messages.[480] In the theory of Shannon and Weaver, the notion of "noise" was employed to refer to disturbances affecting the decoding of messages.[481] In both cases what was sought was the elimination of bias or noise by administrative, technical or other means. For Innis, bias referred to the key characteristics of a medium, whether strengths or weaknesses. Any form of communication had its own bias, and from this perspective bias could not really be eliminated since it defined a medium. Accordingly, eliminating one bias would lead to the medium having a different bias. Some researchers have the tendency to relate his notion of bias exclusively with matter or material properties of communication, yet this was not the case, particularly in light of his definition of medium, which was not resumed to matter.[482] Van Loon argues that it is inappropriate to interpret Innis' concept of bias solely from the perspective of the 'matter' of communication, highlighting four dimensions of bias identified in Innis' work: first, he identifies a bias of matter through which communication takes places, such as stone, paper, electronic wires, microprocessors, which van Loon argues anchor the entire process of mediation in a material world; second, van Loon identifies a bias of form, referring to how matter is ordered and organised, e.g. uni- or multi-directional, linear or non-linear, etc.; third, van Loon identifies a bias of use, relating to how media are anchored in specific practices, with bias emerging from this perspective as that which triggers specific uses while discouraging others; and fourth, van Loon notes a bias of know-how or skills needed to produce outcomes.[483] These different facets of bias can be said to enforce Innis' broad definition of medium, and thus agree with van Loon, for whom "bias highlights that media-technology is constituted by an interplay between the technological artefact (the tool or better 'matter' and 'form'), its practical applications (usage), as well as the knowledge and skills that are necessary to make it work (know-how)."[484] This perspective is similar to that of Chesher, who also sustains that medium bias is given by "the interactions between three interdependent layers: properties of media substrates; encoding conventions; and social and

[480] van Loon, *Media Technology,* 22.
[481] Ibid.
[482] The tendency to relate his notion of bias with matter only is more evident in interpretations of the concepts of space- and time-bias. See subchapter 4.2.3 in this dissertation.
[483] The description has been summarized from van Loon, *Media Technology,* 24.
[484] van Loon, *Media Technology,* 26.

political arrangements using media for particular purposes."[485] Moreover, Angus' interpretation of Innis is also similar, arguing that "the characteristics of a medium of communication cannot be defined through the material characteristics of the object with which it is concerned but only the manner of dealing with that object."[486]

An important argument of Innis emphasises that a medium is constituted not only by matter but also by social aspects, which perhaps enforces the statement that his theory was not technological determinist. Not only did the medium have the power to influence context, but context also exercised its share of influence on the medium. This can be best revealed by making recourse to Innis' own work. To exemplify, Innis described the development of the newspaper in the U.S., explaining how different formats of newspapers appeared in relation to different contextual interests. Innis explains that newspapers developed in trading towns in relation to the need to make business announcements and communications. However, they were later appropriated for advertising, which started increasing in importance as a source of revenue. Consequently, in terms of format and size, the newspaper increased from 9" X 15" with four pages and three columns per page to 12" X 19½" with four columns, of which two-thirds was advertising; later, Innis suggests, in order to provide greater accommodation for small advertisements the size of the newspaper increased again to 24" X 35" by 1828 and the number of columns from four to six.[487] As this description of Innis indicates, bias is not something resulting purely from the medium, but also from how society appropriates the medium, and assumes a dynamic relationship between technology and society. Such an understanding is very similar to actor-network theory, which, according to Bruno Latour, is one of the most successful ways of solving the shortcomings of the technological determinist/social constructivist dichotomy existing in studies of technology.[488] As Latour explains, actor-network theory agrees with the social constructivist that socio-technical systems are created through negotiations between people and institutions, yet they additionally consider artefacts as being part of these negotiations.[489] While actor-network theory does not go as far as arguing that machines think like people or decide how people act, it does hold that they have a comparable role because the material world pushes back onto

[485] Chesher, "Binding Time,"13.
[486] Angus, "The Materiality of Expression".
[487] Innis, *Bias*, 158-159.
[488] Bruno Latour, "The Sociology of a Few Mundane Things," in *Shaping Technology/Building Society: Studies in Sociotechnical Change*, eds. Wiebe E. Bijker and John Law, (Cambridge: MIT Press, 1992), 151.
[489] Latour, "The Sociology of a Few Mundane Things,"151.

people.[490] Some scholars argue that ideas of actor-network theory were already present in Innis' writings, although actor-network theorists do not explicitly construct on Innis' communication theory.[491] However, in the context of this dissertation, Innis' theory has strengths over actor-network theory, not only due to his direct focus on, and non-instrumental understanding of, communication and media technologies, but due to his insights provided for studying "bias". Innis was highly interested in two main types of bias possessed by any medium, which he called space-bias and time-bias. The strength of space-bias media was their portability, namely the ease with which messages could be disseminated across space; whereas the strength of time-bias media was durability, the ease with which messages could be maintained over time. Accordingly, the next subchapter is dedicated to these concepts.

4.2.3 Space and Time

Just like bias, the notions of space and time represent key concepts of Innis' theory, and are components of his methodology. As quoted before, for Innis "a medium of communication has an important influence on the dissemination of knowledge over space and over time."[492] He further states: "According to its characteristics it may be better suited to the dissemination of knowledge over time than over space, particularly if the medium is heavy and durable and not suited to transportation, or to the dissemination of knowledge over space than over time, particularly if the medium is light and easily transported."[493] Following the concepts of space and time, Innis classified communication media very broadly into space-biased and time-biased media, or as termed by Paul Levinson, preservational and disseminative media.[494] For instance, stone or clay tablets could not be easily disseminated, and consequently their content could not reach across space, yet they were durable materials that resisted in time, and thus he categorised them as time-biased media. On the other hand, paper was not similarly durable, but could be disseminated easily, and thus he categorised it as space-biased medium. In his interpretation of Innis' space and time notions, Soules argues that "the relative lightness or heaviness of the medium under consideration is not always a reliable indication."[495] Indeed, paper, for example, which is light and suited to transportation and thus a space-biased medium, also seems to be a time-biased medium, as shown by many examples of

[490] Latour, "The Sociology of a Few Mundane Things," 151.
[491] See Chesher, "Binding Time".
[492] Innis, *Bias*, 33.
[493] Innis, *Bias*, 33.
[494] Levinson, *Digital McLuhan*, 110.
[495] Marshall Soules, "Harold Adams Innis: The Bias of Communications and Monopolies of Power," 2007, http://www.media-studies.ca/articles/innis.htm (accessed April 9, 2011).

documentary heritage that have survived to the present day and are now inscribed on the MoW Registers.[496] Soules suggests that this space-time division should be understood "as related to the ability of the message to survive transmission and have impact over space or over time".[497] Indeed, while this is one possible interpretation, it is important to explain why this is not entirely what Innis wanted to say.

Scholars criticise simplistic interpretations of Innis' theory, which are argued as leading to misunderstandings of his concepts.[498] However, we have to acknowledge that some statements of Innis, such as that quoted at the beginning of this subchapter, create such a simplistic impression of his theory and may lead to simplistic descriptions as provided above. At an uncritical glance and without knowing its underlying assumptions, Innis' statement gives the impression that the space- or time-bias of a medium is related to physical matter. Naturally, this was hardly the case, especially if we consider Innis' definition of medium. Innis related the notion of bias with space and time, because – as he himself explains –"the relative emphasis on time or space will imply a bias of significance to the culture in which it [a medium] is imbedded."[499] Innis sustained that "cultures will reflect their influence in terms of space and in terms of duration."[500] Therefore, the notions of space and time illustrate the implications of medium bias in specific cultural settings. Indeed, Richard Noble provides a similar interpretation of Innis' notions of space and time as related to bias:

> "Time-biased civilizations tend towards institutional decentralization, an emphasis on the sacred, and efficiency at solving problems of continuity. Their instability arises from their inability to solve problems of space. Space biased civilizations, in contrast; emphasize institutional centralization, imperialism, and efficiency at solving problems of space. Their instability arises from their neglect of the problems of time."[501]

Innis argued that medium bias will lead to a bias in the culture in which it is used, which seems to match Noble's explanation. Therefore, Innis did not mean that the media through their properties alone were suitable to survive transmission over space or time, which could involve reducing a medium to its materiality. Rather, what Innis meant was that the medium facilitated or hindered the conditions necessary for extension or duration, which did not only refer to material aspects, but also social mechanisms, values, attitudes, skills, practices,

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[496] See subchapter 4.3 in this dissertation.
[497] Soules, *Harold Adams Innis.*
[498] Comor, "Harold Innis".
[499] Innis, *Bias*, 33.
[500] Innis, *Bias*, 132.
[501] Richard Noble, "Innis's Conception of Freedom," in *Harold Innis in the New Century: Reflections and Refractions*, eds. by Charles R. Acland and William J. Buxton (Québec: McGill-Queen's University Press, 1999), 34-35.

institutions, etc., as can be inferred from Innis' texts. It is worth giving one example strategically chosen because it does not imply materiality in the conventional sense. Based on the historical examples of Palestine and Babylon, Innis argues that oral tradition as communication medium created recognised standards and lasting moral and social institutions.[502] It built up the "soul of social organizations", contributed to their maintenance and continuity, and developed ways of perpetuation. He explains that religion served almost the same purpose, being a "sociological mechanism through which traditions were established, directing and enforcing the co-operation of individuals in the interest of the community, maintaining group life, and creating a lasting organisation of society independent of a living leader"[503] Therefore, the notions of space and time did not only imply a bias of matter, so to speak, with further scholars sharing a similar view. For Angus, the notions of space and time "describe the constitutive power of media of communication in constructing and maintaining society",[504] reminding of Carey's ritual view of communication. Moreover, for Deibert, they designate "supports and constraints presented by different communication media to prevailing mentalités and institutions through history;"[505] and also for Cox the notions of space and time were related to more than matter. Starting from the associations established by Innis between different types of institutions and the space- and time-bias, Cox explains that "the spatial dimension he [Innis] associated with the state and with military power. The time dimension he associated with religion and the institution of church."[506] Indeed, Innis did this.[507] However, Cox suggests that this distinction "does not relate to two institutions - state and church - so much as to two orientations of the human mind."[508] Cox could be right, because Innis believed that space-biased cultures showed an obsession with "present-mindedness", and thus an orientation of the mind;[509] alternatively, as explained by Carey in his analysis of the concepts of space and time, they reflect that "structures of consciousness parallel structures of communication."[510] However, the notions of space and time are encountered again in relation with another concept of Innis, i.e. balance, given that they are crucial for its understanding, as explained below.

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[502] Innis, *Bias*, 105.
[503] Ibid.
[504] Angus, "The Materiality of Expression".
[505] Deibert, "Between Essentialism and Constructivism," 47.
[506] Robert W. Cox, "Civilizations: Encounters and Transformations," *Studies in Political Economy* 47, no. 47 (1995): 21.
[507] This emerges throughout his writings. For an example, where he states this explicitly see Innis, *Empire*, 112.
[508] Cox, "Civilizations," 21.
[509] Innis, *Bias*, 86-87.
[510] Carey, *Communication as Culture*, 123.

4.2.4 Balance

Several scholars remark that Innis conducted his analysis against a broader philosophical question: "Why do we attend to the things to which we attend?"[511] Indeed, Innis stated in the preface to his book, The Bias of Communication, that the essays included represented an attempt to answer this question. He admits that the essays do not answer the question, but represent reflections stimulated by its consideration. The essays "emphasize the importance of communication in determining 'things to which we attend' and suggest also that changes in communication will follow changes in 'the things to which we attend'."[512] Considering this question, Carey notes that Innis' analysis was informed by the belief that communication technology influences culture in three main ways: "by altering the structure of interests (the things thought about) by changing the character of symbols (the things though with), and by changing the nature of community (the arena in which thought developed)."[513] Following this explanation, Carey also provides examples of how these are reflected in space- and time-biased cultures, respectively. In the realm of the interests of a culture, Carey explains that a space-biased culture for Innis was one whose predominant interest was in space, e.g. land as real estate, travel, discovery, movement, expansion, empire, control.[514] In the realm of symbols, Innis meant the emergence of conceptions that supported the interests in space, e.g. the physics of space, the art of navigation, the science of civil engineering, the price system, mathematics, all the physical sciences.[515] In the realm of communities, Carey sustains that Innis meant communities of space, namely "communities that were not in place but in space, mobile, connected over vast distances."[516] Regarding time-biased cultures, Carey explains that these were cultures with an interest in time, e.g. history, continuity, permanence, contraction; in the realm of symbols, these were fiduciary or based on trust, e.g. oral, mythopoetic, religious, ritualistic.[517] Regarding communities of time, these referred to communities rooted in place, characterised by intimate ties and shared historical culture.[518] Carey's explanations characterise Innis' assumptions well regarding the impacts of a medium on culture, especially in determining "things to which we attend", which informed his consequent distinction between space-biased media creating space-biased cultures and time-biased media creating time-biased cultures. Despite such a distinction possibly seeming

[511] Angus, "The Materiality of Expression".
[512] Innis, *Bias*, 1.
[513] Carey, *Communication as Culture*, 122.
[514] Ibid.
[515] Carey, *Communication as Culture*, 122-123.
[516] Carey, *Communication as Culture*, 123.
[517] Ibid.
[518] Ibid.

superficial for both media and culture at first glance, it was informed in Innis' analysis by a moral mission, and here the notion of balance comes in.

Innis was interested in the space- and time-bias of the media because he believed that the flourishing of human societies depended on ensuring a balance between the concepts of space and time.[519] Should any of the two media become dominant to the point of forming a monopoly of knowledge, interests and symbols, the balance would become disturbed, and at several points in history this has caused the disintegration of societies, as argued by Innis in his texts.[520] His analysis of the history of media and their influence prompted him to conclude that balance was the key to stability.[521] Ian Angus has also explained how this relates to the technologies of communication, considering that Innis introduced the concept of balance "to suggest that a society is most successful when it is based not upon one predominant medium of communication but upon several, especially a combination of several media which orient towards competing biases of space and time."[522] As Angus further explains, it is not suggested as being possible to have an "unbiased" perspective, but rather "that a balance of biases can allow a viewpoint which, in a sense, neutralizes the conflicting biases of a plurality of media."[523] Indeed, such an idea can be found in an essay of Innis entitled the Strategy of Culture, where he argues against "the pernicious influence of American advertising reflected especially in the periodical press and the powerful persistent impact of commercialism", which Innis considered was destroying Canadian culture, on which he based his analysis.[524] According to Innis, Canada could only hold against American cultural imperialism "by attempting constructive efforts to explore the cultural possibilities of various media of communication and to develop them along lines free from commercialism."[525] For Innis, the Greek civilisation and Byzantine Empire represent examples of how balance could be achieved and maintained. For example, the Byzantine Empire, according to Innis, lasted long due to the balance that existed between the power exercised by space- and by time-biased media.[526] As Innis explains, it "developed on the basis of a compromise between organizations reflecting the bias of different media: that of papyrus in the development of an imperial bureaucracy in relation to a vast area, and that of parchment in the development of an

[519] Innis, *Bias*. Also Innis, *Empire*; Also Noble, "Innis's Conception of Freedom".
[520] Innis, *Bias*. Also Innis, *Empire*.
[521] Innis, *Bias*, 64; see also the interpretation of Noble, "Innis's Conception of Freedom,"34-35.
[522] Angus, "The Materiality of Expression".
[523] Ibid
[524] See Harold A. Innis, "The Strategy of Culture," in Innis, *Changing Concepts of Time*, 1-20.
[525] Innis, "The Strategy of Culture," 20.
[526] See Innis, *Empire*. See also Innis, *Bias*.

ecclesiastical hierarchy in relation to time."[527] In light of these arguments advanced by Innis, Ian Angus sustains that balance represents a healing intention inherent within Innis' theory, namely "to restore balance where balance has been disturbed."[528] It is possible to agree with Angus, given that Innis explicitly warns that Western civilisation has extended too much across space and has lost interest in time, thus heading towards its own destruction, with recovering balance representing the solution to this problem.[529] However, according to both Frost and Noble, there was more to Innis' concern for balance, which they related with "freedom".[530]

To start with, Richard Noble, sees a moral liberal theory in Innis' arguments. In order to explain Innis' concept of balance, he studies his conception of freedom, which Noble argues was a substantive good for Innis, whose "presence or absence was a measure of a society's balance and stability, a measure of its ability to produce conditions in which humans can flourish."[531] However, according to Noble, Innis "did not believe that freedom should be conceived solely in terms of equal rights for individuals, particularly if this meant, as it did in the United States, equal rights guaranteed by a written constitution."[532] Following Innis' stated preference for the oral tradition, Noble considers that he in fact associated freedom with cultural traditions and historically evolved institutions.[533] Innis argued that Western democracies were obsessed with space, the centralisation of power, cultural uniformity, and mechanisation, which has destroyed the conditions of freedom of thought;[534] so for him, recovering the oral tradition, which resists mechanisation, was the "antidote that can restore balance" in Western societies.[535] Constructing on Noble's interpretation, Frost only partially agrees, sustaining that Innis' liberalism was set within a broader humanism.[536] Accordingly, Frost starts by agreeing with Noble that "Innis' liberal goals remain subject to his fundamental interest in the space/time balance."[537] However, she disagrees with Noble casting this "as a kind of utilitarian concern for the ultimate setting of liberty."[538] Frost believes that Innis was

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[527] Innis, *Empire*, 112.
[528] Angus, "The Materiality of Expression".
[529] Innis, *Bias*, 76. Also Innis, *Empire*.
[530] Frost, "How Prometheus is Bound." and Noble, "Innis's Conception of Freedom."
[531] Noble, "Innis's Conception of Freedom," 34.
[532] Noble, "Innis's Conception of Freedom," 34. This should be understood in relation with his understanding that each medium had a bias, as well as with his preference for the oral tradition
[533] Noble, "Innis's Conception of Freedom," 34.
[534] Innis, *Bias*, 190.
[535] Noble, "Innis's Conception of Freedom," 35-36.
[536] Frost, "How Prometheus is Bound".
[537] Ibid.
[538] Ibid.

not interested in freedom so that societies might "progress" in a utilitarian sense, but rather so that people could live free of manipulation, upheaval, and brutality.[539] As she states, "the moral message to Innis' communications work certainly involves a concern for freedom, for cultural flexibility, and for civilizational longevity. But the backdrop for these objectives was his conviction…that we needed to return to the human scale and that the human experience should again be fully reflected in our dominant communications."[540] Therefore, for Frost, Innis' was a liberal theory yet anchored in humanism; it offered the backdrop for his analysis and any analysis using Innis' theory "would be incomplete until it accounted for the liberal and humanist implications of a new medium." [541] In line with these thoughts, studying the bias of digital technology and its implications for duration and dissemination is also undertaken in this dissertation in light of a concern for the possibilities of balance, which represents not only a moral level of analysis, but the very context in which discussions of bias have been embedded.

4.3 Medium Theory as Document Theory

The main aim of this dissertation is to provide a critical analysis of the role of digital technology in the context of MoW, and in order to achieve this, studying digital technology and its conceptual and practical changes triggered represents a preliminary step. To this end, a conceptual framework based in the medium theory of Harold Innis has been devised. Thus far, a brief discussion of how changes triggered by digital technology occurred in libraries and archives and an overview of approaches to tackle them has been provided.[542] Despite arguments about positivism dominating library and archival fields, it has been shown that several "non-positivist" approaches were suggested in the course of time. While some of these were mentioned in the previous chapter, more could have been added, which cover different epistemologies ranging from phenomenology to hermeneutics to post-structuralism, and theories from various scientific fields and by different scholars including Barthes, Derrida, Giddens, Lacan, Gramsci, Habermas or Marcuse. Nevertheless, it is surprising that the theory of Harold Innis has not been recommended in these accounts, which suggest potential theories for topics of concern to library and archival fields. While a few attempts exist in different contexts (related to documents or institutions preserving documents), they do not really apply his theories, despite mentioning Innis very briefly. For example, Neavill, whose research

[539] Frost, "How Prometheus is Bound".
[540] Ibid.
[541] Ibid.
[542] This has been discussed in chapter 3 in this dissertation.

focused on the possibilities of preserving digital information, remarked that "several concepts that illuminate the problem of preservation can be borrowed from communication and information theory."[543] He proceeds by naming Innis and James Carey, who, according to Neaville, have explored concepts of space and time. Without providing any explanations whatsoever regarding the concepts or authors mentioned, Neaville explains: "preservation is concerned with the transmission of information through time rather than space. Some information technologies, such as printing, are effective in transmitting messages through time and space; others are best adapted to one kind of transmission."[544] It is possible to recognise the space-time distinction in its simplistic understanding in this statement, yet unfortunately Neaville does not clarify it or even mention Innis again in his paper. He discusses requirements for preserving digital information, some problems it raises and how it differs from the requirements of other media; however, his overview resembles those provided by librarians and archivists who argue that the newer the technology the shorter its lifespan has become.[545] Neaville does not apply the theories of Innis, yet simply mentions him. Furthermore, Terry Cook is another author who mentions Innis in his discussion regarding the historical role of archives and their "bias" in furthering recorded knowledge and the formation of empires.[546] He acknowledges that "Innis demonstrated the importance of recording media and the technologies of communication in forming and maintaining empires, all of them based on monopolies of knowledge, that allowed for the exercise of power over space and time. All such media have built-in biases in their communication."[547] Cook explains that archives are the material traces of the media, yet without providing explanations for the concept of bias or that of medium, he raises the question: "what then, in Innis's phrase, are the 'biases' of archives as a collective communication medium between the past and the future?"[548] Cook proceeds by discussing Canadian archival practice, briefly stating that Innis and McLuhan cannot be discounted; however, Cook neither mentions Innis again nor applies his theories. Luciana Duranti is another author who makes reference to Innis, and even starts the article with a quotation by him and properly defines his concepts, although similarly does

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[543] Gordon B. Neavill, "Preservation of computer-based and computer-generated records," in *Conserving and Preserving Materials in Nonbook Formats*, ed. Kathryn Luther Henderson and William T. Henderson (Chicago, Illinois: University of Illinois, 1988), 45–60.
[544] Neavill, "Preservation of computer-based and computer-generated records," 46-47.
[545] Such an explanation has been provided in Paul Conway, *Preservation in the Digital World* (Washington D.C.: CLIR, 1996).
[546] Terry Cook, "Remembering the future: appraisal of records and the role of archives in constructing social memory," in *Archives, Documentation and Institutions of Social Memory – Essays from the Sawyer Seminar*, eds. Francis X. Blouin and William G. Rosenberg. Michigan : University of Michigan Press, 2007.
[547] Cook, "Remembering the future," 172.
[548] Ibid.

not apply his theories; rather, she moves to McLuhan to state that the challenges of new global forms of communication lead towards a "global village" and, in this regard, she starts searching for universal archival concepts that would allow archivists to cope with the changes triggered.[549] In contrast to how these authors refer to Innis, this dissertation devises and applies a conceptual framework based on his concepts to study how digital technology has changed documents and documentary practices, as well as conceptions thereof, which enables a critical analysis of the role of digital technology in MoW. However, it is necessary to first explain why using Innis' medium theory as document theory is possible, so to speak, and particularly motivate why his analysis offers solutions in MoW.

Despite Innis' theory being a communication theory - or rather a critical approach to culture and technology - and MoW being an international heritage programme, there are important similarities between them. While Innis does not use the concept of documentary heritage and MoW does not speak about space- and time-biased media, both are concerned with the same objects. What else is the documentary heritage in MoW if not media that has reached us across space and time?! Innis argued that "our knowledge of other civilizations depends in large part on the character of the media used by each civilization in so far as it is capable of being preserved or made accessible by discovery."[550] MoW has a similar view, with many examples of documentary heritage inscribed on the MoW Register representing examples of time-biased media. For example, the MoW Register includes 25,000 Hittite cuneiform clay tablets considered important as the only extant recorded material, which today gives us knowledge about the Hittite civilisation living during the second millennium B.C.;[551] or a fragment of parchment from the eleventh century considered our most important evidence today concerning the oldest forms of Cyrillic script and Old Slavonic literacy.[552] Furthermore, examples of documentary heritage inscribed on MoW also represent space-biased media, given that their inscription on different MoW Registers is determined by their spatial

[549] Duranti, "The Records". The concept "global village" was coined by Marshall McLuhan. He stated that "the new electronic interdependence recreates the world in the image of a global village." See Marshall McLuhan, The Gutenberg Galaxy (Toronto: University of Toronto Press, 1962), 31.
[550] Innis, *Bias*, 33.
[551] See UNESCO, "The Hittite cuneiform tablets from Boğazköy": Nomination form submitted by Turkey to the International Memory of the World Register, http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/mow/nomination_forms/turkey_hittite_cuneiform_tablets_bogazkoy.pdf (accessed 20 April 2013).
[552] UNESCO, "Enina Apostolos (Old Bulgarian Cyrillic manuscript (fragment) of the 11th century)": Nomination form submitted by Bulgaria to the International Memory of the World Register, (REF N° 2010-22), http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/mow/nomination_forms/Bulgaria%20Enima%20Apostolos.pdf (accessed 28 April 2013).

influence, which could be global, regional or national.[553] Therefore, the fact that both Innis and MoW deal with similar objects and are both concerned with the influence of documents in space and time offers the possibility to juxtapose them. However, remaining at this level would imply reducing Innis' understanding of the medium to its material dimension, since the notions of space and time in the aforementioned description strictly relate with the physical matter of the documents. As explained in previous subchapters, for Innis, the space- and time-bias of the medium referred not only to its materiality but also broadly to those conceptual and practical conditions that emerge around a medium and facilitate or hinder transmission across space and time. Therefore, besides similarities there are also important differences between Innis and MoW, yet this is exactly what offers the possibility of gaining new insights into the potential and limits of digital technology in its context; insights which theories from library and archival sciences, despite informing MoW, do not enable us to gain.

One of the main advantages offered by Innis is his critical approach to a medium, and the concepts offered in this regard. He does not assess a medium only on the basis of its own technological criteria, which is in line with his broad and non-instrumental understanding of a medium. Instead, he embodies a medium in context and relation with other media in order to understand its capabilities. This differs from how most, if not even all, of those from libraries and archives approach digital technology, praising its instrumental capabilities to disseminate information across space. In these accounts, the context into which information is disseminated seems to matter less, the interest being directed towards obtaining the technology as prerequisite for access. However, the concept of bias invites critical reflection regarding what is really possible with a medium, and requires extending beyond the simple statement that digital technology facilitates access (and hinders preservation) to assessing it critically, because, through the concept of bias, digital access is not just a technical matter, but simultaneously also a political, economic, social, legal or cultural matter. In contrast to documentalists, or even UNESCO, who have emphasised possibilities for international cooperation brought about by communication technologies, Innis was not an advocate of internationalism supported by this kind of space-biased media. By studying the characteristics of the medium and placing it in context, he observed its local impact on concepts, practices, structures and institutions, and on human spatial and temporal interrelationships. He observed that overusing one medium at the expense of others was not beneficial for the stability of human societies because it did not ensure the proper conditions, which from his perspective

[553] Edmondson, *Memory of the World: General Guidelines*, 20.

lay in a balance between space and time. On the contrary, it leads to the development of what Innis called monopolies of knowledge, which threatened and eventually destroyed stability by destroying freedom of thought and expression. This prompted him to adopt a critical perspective regarding the impacts of medium bias in a cultural context, which is best reflected by his notions of space and time. Referring back to Carey's notions of transmission and ritual views of communication, one can say that Innis embodied both views, as opposed to theories from libraries and archives. The transmission view or cybernetic approach has been explicitly mentioned as dominant in libraries and archives and reflects theories from computer sciences, while the ritual view can be said to be present in those theories from libraries and archives that attempt to direct attention from the content of a document to its social dimensions. However, none of these views properly accounts for the relevance of the other view, thus offering only a partial understanding of the influence of a medium. However, Innis does not discard any of these views, and rather places the medium at their basis, arguing that the space- or time-bias of a medium is partly responsible for such views. This seems to be confirmed by the fact that the transmission view emerged in libraries and archives with the development of digital technology, and the ritual view with the realisation of the transmission view's limits, thus both facilitated by the medium. Furthermore, the relationship between the concept of space and time as reflected in the concept of balance facilitate a moral level of analysis concerned with the liberal and humanist implications of a medium in Innis' theory. Despite having a humanist dimension, being concerned with a community's "cultural heritage", library and archival theories do not offer concepts to study such implications of a medium (although they may offer concepts to study the humanist implications of libraries and archives). Nevertheless, assessing humanist implications of a medium is very much within the framework of MoW, whose main mission is to promote a global view of documentary heritage that would change mindsets regarding its relevance. Therefore, in contrast to those from libraries and archives, and also other theories and approaches noted thus far, Innis' theory is more suitable in the context of this dissertation because it offers not only an approach and concepts to study the digital medium and its implications but also a broader philosophical framework that matches that of MoW. These guide the analysis in the following three chapters, with each dedicated to one of the three specific objectives pursued in this dissertation, which are restated in the introductory part of each respective chapter.

5. Digital Technology: From Medium Bias to Balance

This chapter addresses the first specific objective of the present dissertation, and thus entails the main purpose of studying what capabilities digital technology has afforded for information transmission, leading to its broad adoption. From a medium theory perspective, this requires exploring beyond the technical features of a medium, placing it in context and also studying the political, economic, social or other forces, which have led to its evolution over other media.[554] This leads to observing that digital technology has not only been successful due to its technical features, but also because it corresponded with a broader cultural context, or as Abbate argues "it fit into a broader socio-technical understanding of how data networks could and should be used."[555] Therefore, after a brief presentation of the technical innovation introduced by digital technology, an explanation has been provided as to how different contextual factors have contributed to its development. Accordingly, this provides a different view on digital technology, and one that stretches its understanding beyond a purely instrumental perspective, as in the cybernetic approach.[556] The context in which digital technology emerged and has been produced is not without relevance, given that it had an impact on why the technology looks and functions as it does today, having contributed to the bias of digital technology, as reflected in its design. Consequently, after providing insights into the history of digital technology, the analysis proceeds to offering insights into the design and functioning of a selection of components. Brief references are made to how digital technology differs from other technologies, this being a method applied by medium theorists who make comparisons between different media to determine their characteristics and particularly understand their impacts in specific contexts.[557] Furthermore, as Meyrowitz explains, "the exploration of the features that distinguish one medium from another is compatible with the assumptions that the same or similar content often has different effects in different media."[558] Following the aim of this dissertation and the Innisian approach suggested above, the analysis further necessitates placing the bias of a medium against the notions of space and time, assessing its potential to facilitate the necessary conditions to ensure portability and durability. Despite some time-biased aspects, in the case of digital

[554] This is consistent with the research approach of medium theory. For a thorough explanation see Joshua Meyrowitz, "Multiple Media Literacies," *Journal of Communication* 48, no. 1 (1998): 106.
[555] Janet Abbate, *Inventing the Internet* (London: MIT Press, 1999), 8. This has been discussed in subchapter 5.1.1 in this dissertation.
[556] See subchapter 3.1 in this dissertation, where the cybernetic perspectives has been discussed.
[557] Joshua Meyrowitz, "Medium Theory: An Alternative to the Dominant Paradigm of Media Effects," in *The Sage Handbook of Media Processes and Effects*, ed. Robin L. Nabi and Mary Beth Oliver (California: Sage Publications, 2009), 517-530.
[558] Meyrowitz, "Medium Theory: An Alternative," 518.

technology, this leads to observing that digital technology is mainly a space-biased medium. Considering Innis' argument that the bias of a medium lends a bias to the context in which it is used, it can be expected that the bias of digital technology has further implications for documentary practices, given that they are no exception to this "rule". However, in terms of understanding the implications, an understanding of digital technology and its bias from an Innisian perspective are first necessary. Therefore, a more general yet compact study of the bias of digital technology has been provided in this chapter, covering its history, political-economic and socio-cultural as well as technical aspects, with the implications for documentary practices discussed in subsequent chapters, constructed upon this one.

5.1 Insights into the History of Digital Technology

The purpose of this subchapter is to provide insights into the history of digital technology. Although digital technology, or rather aspects of it, have emerged to assist in the management of information in certain regards, a brief description of its history is important in emphasising that digital technology was not created for preservation purposes. As mentioned in chapter three, the development of computer memory or storage reflects one factor that has led to the upgrading of digital technology.[559] However, this is a storage that makes the technology work more efficiently from a technical perspective, rather than one specifically created for the long-term preservation of documents.[560] Digital technology has a history of its own, which is different from its history of use in libraries and archives, and the intentions of its creators do not necessarily match the intentions of preservationists. Accordingly, this subchapter is concerned with the historical context and circumstances that led to the development of digital technology as we know it today, and had a decisive impact on its functions, design and usage.[561] However, speaking about history regarding digital technology may sound inappropriate, because it is not only of the very recent past yet also it has not even matured yet, so to speak. While digital technology is an evolving technology, rather than something belonging to the past, many of its earlier versions are obsolete by now. As noted above, five

[559] See subchapter 3.1 in this dissertation.
[560] The computer components for data storage can be taken out and preserved, but they weren't developed with this purpose. CDs and DVDs represent examples of storage media for preservation. For a study about storage media for preservation see Kevin Bradley, Risks Associated with the Use of Recordable CDs and DVDs as Reliable Storage Media in Archival Collections – Strategies and Alternatives (Paris: UNESCO Memory of the World Programme Sub-Committee on Technology, 2006).
[561] It has to be stated that there are important differences between countries in their usage of digital technology but these are not of main concern to the analysis in this subchapter, which gives insights into the historical context in which digital technology emerged. As a result, here the reference is mainly to USA and to a smaller extent Europe, unless otherwise stated.

years can mean forever in a preservation context; moreover, in light of rapid technological change, five years can also mean history.

The history of digital technology cannot be narrated here, but rather only sketched, with the main reason being that digital technology is a combination of many technologies. Therefore, the history of the Internet is different from that of the computer. The history of computer hardware differs from the history of software and, to make it even more cumbersome, in the case of hardware and software we could speak of histories in the plural because either of them is hardly just one thing with a straight line of development. For this reason, the description does not attempt to narrate the history of digital technology, but simply offers some insights into its key aspects. In line with how the notion of digital technology is used in this dissertation, focus has been placed on the history of the computer and that of the Internet. Scholars discussing the evolution of computer or Internet technology,[562] as well as those taking an Innisian approach to study digital technology,[563] usually locate its origin in the military - the U.S. Department of Defense - in the 1940s. However, many changes have since taken place, with the capabilities and processing capacity of computers having increased considerably in a rather short span of time. An explanation provided by Abelson et al. is quite revealing in this regard, stating that "the speed of a computer is usually measured by the number of basic operations, such as additions, that can be performed in one second."[564] In this regard, they state that "the fastest computers available in the early 1940s could perform about five operations per second. The fastest today can perform about a trillion. Buyers of personal computers know that a machine that seems fast today will seem slow in a year or two."[565] Whereas processing capacity and speed have increased, in terms of size and weight, computers have decreased. While the first digital, electronic computer weighed 30 tonnes, today's hand-held devices weigh just a few grams in comparison.[566] Actually, when the first technical device that we call computer emerged, the word "computer" referred to the person who was making the calculations by using a desk calculator, and they were often women.[567] Katherine Hayles' book entitled "My Mother was a Computer" is specifically intended to

[562] Hamelink, "New Information and Communication Technologies", 5.
[563] Frost, "How Prometheus is Bound"; Also Comor, "Harold Innis".; Also Chesher, "Binding Time".
[564] Hal Abelson, Ken Ledeen and Harry Lewis, *Blown to Bits: Your Life Liberty and Happiness after the Digital Explosion* (USA: Addison-Wesley, 2008), 8.
[565] Abelson, Ledeen and Lewis, *Blown to Bits*, 8.
[566] For a study of the first electronic digital computer see Scott Mc Cartney, *ENIAC: the Triumphs and Tragedies of the World's first computer* (New York: Walker and Company, 1999).
[567] William T. Moye, "ENIAC: The Army-Sponsored Revolution," 1996 http://ftp.arl.army.mil/mike/comphist/96summary/ (accessed November 30, 2012).

illustrate this point, explaining that changes in meaning assigned to the word computer "mark a shift from a society in which the intelligence required for calculations was primarily associated with humans to the increasing delegation of these labors to computational machines."[568] However, as Abbate remarks, computing technology underwent a dramatic transformation in a few years: originally conceived just as a calculating device, the computer was reborn as a means of communication.[569] Despite its origins in the military, the further development and "reshaping" of digital technology was also influenced by the business sector, scientists and users alike. Therefore, the insights into the development of digital technology provided below indicate how it evolved in correlation with the involvement of these different groups.

5.1.1 From the Military to the Market

Computing devices are said to have existed since the Greek and Roman civilisations, exemplified with the abacus; however, the modern computer represents the result of a combination of inventions and discoveries that have been made over time: Pascal's mechanical calculator for additions and subtractions; Charles Babbage's analytical engine for astronomical calculations; Augusta Ada Byron's publication on the fundamentals of computer programming, being considered the world's first programmer by many; George Boole's algebraic logic; Alan Turing's idea of a general purpose computing machine, and many others.[570] Today, most computers are constructed based on the so-called "von Neumann architecture", named after its stated author John von Neumann, who published the idea in 1945.[571] Its main feature is that "the program to be executed resides in the computer's memory, along with the programs data."[572] This was a key innovation, because up to that point each computer was built to only fulfil one specific function, and thus the program was built into the computer. More precisely, the instructions that a computer had to execute were part of the CPU, and von Neumann introduced the idea of storing them in the RAM.[573] The

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[568] Hayles borrowed this title from Anne Balsamo, who used it as title of a chapter in her book Technologies of the Gendered Body. See Prologue in Katherine N. Hayles, *My Mother was a Computer: Digital Subjects and Literary Texts* (Chicago: University of Chicago Press, 2005).
[569] Abbate, *Inventing the Internet*, 1.
[570] Carl Reynolds and Paul Tymann, *Principles of Computer Science* (USA: The McGraw-Hill Companies, 2008), 4-11. See also Brookshare, *Computer Science*, 20-25.; See also Neil Postman, *Technopoly: The Surrender of Culture to Technology* (New York: Vintage Books,1993), 109-10; See also Christopher Brown-Syed and Terri L. Lyons, "*Computing*," vol. 1, in *Encyclopedia Of Communication and Information*, ed. Schement R. Jorge (New York: Macmillan Reference USA, 2002), 175-176.
[571] Reynolds and Tymann, *Principles of Computer Science*, 31.
[572] Ibid.
[573] For an explanation regarding CPU and RAM and how they relate see subchapter 3.1 in this dissertation.

difference was that a computer previously had to be completely rewired every time an operation was executed, which was very time consuming and prone to errors, if reprogramming was possible at all.[574] However, it is said that von Neumann only published the idea, yet did not invent it.[575]

According to McCartney and others the first computer was created by John Mauchly and Presper Eckert, who "have been largely forgotten, as if deleted from the hard disk of computer history" due to a series of unpleasant circumstances.[576] They created the first digital electronic computer called the ENIAC (Electronic Numerical Integrator and Computer) in 1945, which was a machine of around 30 tonnes, comprising almost 18,000 vacuum tubes and having 6,000 switches.[577] ENIAC was created under the U.S. Department of Defence during the WWII for military purposes, namely the need to improve the accuracy of firing and bombing tables; it operated under army secrecy, with its first application "to solve an important problem for the Manhattan Project", later being used for various other tasks, mainly scientific.[578] However, according to the ENIAC patent, its development relates to an important extent, with the need for speed in computing operations by electrical means. "The art and technique of aids to computation and calculation have been the subject of extensive development" – the patent states – "extending through simple adding machines to present day complex computing machines, which include electric devices, in part in answer to the need and demand for greater speed."[579] The patent lists several other needs addressed by ENIAC, such as "to devise a novel means of preserving the definite and highly effective form of signal information";[580] "to simplify the apparatus required in securing interaction between two or more computing or arithmetic units";[581] and "to provide means enabling the automatic transfer to the computer at electronic speeds of any one of a number of digital values stored in an external memory or recording device, in any desired predetermined sequence".[582] In short, the ENIAC introduced important technical innovations, and despite not resembling today's

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[574] Brookshare, *Computer Science*, 97-98.
[575] For example Brookshare, *Computer Science*, 105. See also Moye, "ENIAC".
[576] Scott Mc Cartney, ENIAC: The Triumphs and Tragedies of the World's first computer, 6; see also Brookshare, *Computer Science*, 105.
[577] Reynolds and Tymann, *Principles of Computer Science*, 10.
[578] Moye, "ENIAC".; The first atomic bomb was created under the Manhattan Project during WW II; Moye lists various applications apart from ballistics including weather prediction, atomic energy calculations, cosmic ray studies, random-number studies, wind tunnel design, and other scientific uses.
[579] Eckert, John P., and John W. Mauchly. The ENIAC (Electronic Numerical Integrator And Computer) Patent. United States Patent Office, Patent 3,120,606. February 4, 1964.
[580] Eckert and Mauchly, The ENIAC Patent, 5.
[581] Eckert and Mauchly, The ENIAC Patent, 7.
[582] Eckert and Mauchly, The ENIAC Patent, 8-9.

computers, it is considered "the prototype from which most other modern computers evolved."[583] Nevertheless, it is said that the computer only became popular with its miniaturisation and the development of desktop computers.[584] While this is certainly one important factor, considering that the ENIAC had the size of a very large room, the possibility of connecting computers into networks and subsequent networks between themselves is perhaps similarly important, as discussed above in terms of the Internet and the World Wide Web.[585]

The forerunner of the Internet was created, just like the ENIAC, under the US Department of Defence, and more precisely by its Advanced Research Projects Agency (ARPA) during the 1960s, and it was an engineering project for developing networking technology, known as the ARPANET.[586] Many authors argue that it was not initially designed to be a medium for interpersonal communication, but rather one that would serve military purposes.[587] For example, Deibert writes that

> "the fundamental principle of the network was a distributed form of communications without central control, underpinned by a routing system called 'packet switching.' Through packet switching technologies, messages would be split up and sent along dispersed routes so that if parts of the network were lost in a military conflagration, they would still arrive at their destination."[588]

Packet switching - a method for transmitting computer data across the network - is considered one of the key features of the Internet.[589] Following a medium theory approach, the features of a medium can be explained by its differentiation from other media; however, as already noted, the Internet is not so much a medium but rather a communication system. Abelson et al. posit somewhat humorously that "the Internet is not email and web pages and digital photographs, any more than the postal service is magazines and packages and letters from your Aunt Mary. And the Internet is not a bunch of wires and cables, any more than the postal service is a bunch of trucks and airplanes. The Internet is a system, a delivery service for bits [...]."[590] Accordingly, the specificities of this "delivery service for bits" lie in a few key properties specifically designed to address the limits of previous communication systems. For

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[583] See Moye, "ENIAC".
[584] Brookshare, *Computer Science,* 24-25.
[585] See subchapter 3.1 in this dissertation.
[586] See Abbate, *Inventing the Internet*. See also Tarleton Gillespie, *Wired Shut, Copyright and the Shape of Digital Culture* (Cambridge, Massachusetts, London: MIT Press, 2007).
[587] See Ronald J. Deibert, *Parchment, Printing, and Hypermedia: Communication in Word Order Transformation* (New York: Columbia University Press, 1997). See also Abbate, *Inventing the Internet,* 2.
[588] Deibert, *Parchment, Printing, and Hypermedia*, 122.
[589] Abbate, *Inventing the Internet.*; see also Abelson, Ledeen and Lewis, *Blown to Bits.*
[590] Abelson, Ledeen and Lewis, *Blown to Bits*, 301.

example, the postal system was limited in terms of the size and weight of the messages that could be sent; thus, as indicated by Abelson et al, in the case of the Internet "designers anticipated that very large messages might be important some day, and found a way to avoid any size limits."[591] In turn, the telephone system was limited in terms of the calls it could handle, owing to the size of the central switch linking the sender and receiver.[592] This is a so-called circuit-switched network, which Kozierok compares with packet switching in order to illustrate the technical advantages of the latter. Kozierok explains that a circuit is established between device A and devise B for communication to occur in a circuit-switched network. The entire communication takes place over this circuit, despite there being many other circuits that could be established between the two devices.[593] One such example is a phone call: when A calls B, a circuit is established between them, with their entire conversation taking place through that circuit. When the call is finished, the circuit is also terminated, and with every new call a new circuit is established.[594] However, in a packet-switched network, no specific route is established; rather, "the data is chopped up into small pieces called packets and sent over the network. The packets can be routed, combined or fragmented, as required to get them to their eventual destination. On the receiving end, the process is reversed—the data is read from the packets and re-assembled into the form of the original data."[595] As a technology for data transmission packet switching is very reliable because "if a cable breaks or a computer catches on fire" - write Abelson et al. - "the protocols automatically reroute the packets around the inoperative links."[596]

From a technical perspective, packet switching continues to be the most efficient technology for data transmission. While agreeing with this, Abbate also argues that this was not the only criterion determining its success, which also depended on how packet switching was interpreted. She challenges the view held by computer professionals who consider that packet switching has evident technical advantages and consequently treat its widespread adoption as a natural result.[597] Instead, she explains "the success of packet switching was not a sure thing, and for many years there was no consensus on what its defining characteristics were, what advantages it offered, or how it should be implemented. The wide disparity in the outcomes of

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[591] Abelson, Ledeen and Lewis, *Blown to Bits*, 302.
[592] Ibid.
[593] Charles M Kozierok, *The TCP/IP Guide: A Comprehensive, Illustrated Internet Protocols Reference* (U.S.: No Starch Press, 2005).
[594] Kozierok, *The TCP/IP Guide.*
[595] Ibid.
[596] Abelson, Ledeen and Lewis, *Blown to Bits*, 309.
[597] Abbate, *Inventing the Internet*, 7.

these early experiments with packet switching demonstrates that the concept could be realized in very different ways."[598] She bases her argument on the fact that packet switching was invented independently by two different researchers in two different contexts, at around the same time: Paul Baran in the U.S., and Donald Davies in England, and later also Lawrence Roberts, who was the manager of the ARPANET project.[599] She argues that while their versions of packet switching had some similarities from a technical perspective, "their conceptions of what defined packet switching and of what it was good for were very different."[600] In both countries, packet switching was developed under government funding and control, and it was seen as a strategic technology for political goals, yet packet switching took different meanings for each of them under different policy contexts. In the United States, being caught up in the Cold War, there was fear of a "science gap" between their country and the USSR, and thus the packet switching developed by Paul Baran was intended to address the need for "survivable communication".[601] By contrast, in the UK, there was fear of a "technology gap" with the United States, which was further considered an economic gap.[602] Donald Davies, who invented packet switching in the UK, was mainly interested in interactive computing and improving the ease of using computers, but data communications were inadequate and represented an obstacle. Accordingly, whereas packet switching for Paul Baran meant sharing a communication link effectively, for Davies it meant "the communications equivalent of time sharing: it would maximize access to a scarce resource in order to provide affordable interactive computing."[603] Based upon such examples, Abbate concludes that "packet switching was never adopted on the basis of purely technical criteria, but always because it fit into a broader socio-technical understanding of how data networks could and should be used."[604] The development of packet switching as part of the ARPANET was designed with a different mission, concerning the military and also scientific research. Abbate notes that one of the main missions of ARPA was to carry out research projects in defence-related fields. At the same time, the US President Johnson wrote a memo urging the establishment of centres of excellence in research. The Department of Defence responded to this call with a plan to create centres of excellence in defence-related research.[605] The reason behind this proposal was the existence of several computing research centres such as the

[598] Ibid.
[599] Abbate, *Inventing the Internet*, 8. See also Ibid., 39.
[600] Abbate, *Inventing the Internet*, 8.
[601] Abbate, *Inventing the Internet*, 21 and Ibid., 9.
[602] Abbate, *Inventing the Internet*, 21-22.
[603] Abbate, *Inventing the Internet*, 27.
[604] Abbate, *Inventing the Internet*, 8.
[605] Abbate, *Inventing the Internet*, 36-37.

Massachusetts Institute of Technology (MIT) that had been funded by the ARPA; therefore, what they proposed was a network connecting all these scattered computing sites.[606] This became the ARPANET project under the management of Lawrence Roberts, and although the packet switching versions imagined by Baran and Davies were never built, they certainly had an influence on the ARPANET project.

Scholars sometimes state that "the design of both the ARPANET and the Internet favoured military values, such as survivability, flexibility, and high performance, over commercial goals, such as low cost, simplicity, or consumer appeal."[607] On the other hand, Hamelink, and also Varian, Farell and Shapiro remark that the upgrading of communication systems was not solely generated by the military, but also by corporate users who needed fast, reliable and cheap technology for information management in the context of their business, and were also willing to make large investments in that regard.[608] Examples of such corporate users investing in technological development included international air transport systems or international banks. Corporate interests might have had their share of influence on technological developments, but perhaps to a lesser extent prior to the ARPANET becoming what we know today as the Internet. As stated by Abbate in her thorough analysis of the history of the Internet, before its operations had been privatised during the 1980s, commercial use of the network was prohibited, being mainly open for scientific institutions.[609] Indeed, it was in 1983 that ARPANET was split into the MILNET for military sites and ARPANET for research sites, reflecting the need "to separate the military's operational and research communities so that they could manage their respective networks according to their own needs and priorities."[610] This was a very importance step, as otherwise the network would have never been made public, but following this split the influence of the commercial sector has also been significant. This aspect has been more closely presented in conjunction with the design of the desktop computer, because in comparison to the historical insights such as those provided in this subchapter, the influence of the commercial sector can be more clearly assessed on the design and functionality of today's desktop computers.[611] However, it is first also necessary to discuss the group that was most closely involved with the technology,

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[606] Abbate, *Inventing the Internet*, 37.
[607] Abbate, *Inventing the Internet*, 5.
[608] Hamelink, "New Information and Communication Technologies", 6; See also Hal Varian, Joseph Farrell and Shapiro, Carl, The Economics of Information Technology, An Introduction (Cambridge University Press, New York, 2004).
[609] Abbate, *Inventing the Internet*, 181.
[610] Abbate, *Inventing the Internet*, 185.
[611] See subchapter 5.2 and 5.2.1 in this dissertation.

namely academic scientists, who in addition to the military values the technology had to have "incorporated their own values of collegiality, decentralization of authority, and open exchange of information into the system."[612]

5.1.2 From Scientist to User

Contrary to how we know it today, digital technology has not always been a popular and user-friendly technology; indeed, it only became this way through a series of social choices, as Abbate explains.[613] She criticises the fact that the role of users in the development of digital technology is usually overlooked and not acknowledged, with the user being portrayed as the consumer who only becomes involved after the technology has been developed. However, "the ARPANET's ultimate 'consumers'- the researchers who were to use it in their work - were directly involved in its development."[614] Therefore, initially those who built it were also those who used it. Grudin makes a similar remark regarding the notion of "user interface",[615] stating that this term "was not needed in the beginning, when most users were engineers and programmers."[616] Perceiving those computer scientists who designed and constructed digital technology as users is unusual today, but this was not the case then. Nevertheless, both computer scientists and later also users commonly understood as non-technical experts made an important contribution to the development of digital technology. As noted above, it was owing to scientists that a sense of community was incorporated into the ARPANET in the first place. However, it was a challenge to transfer "activities that build community - sharing of information, support, recreation - to the network environment", which was very different from how it is experienced today.[617] For example, as Abbate explains, connection costs were high and even if connected, finding out what was available was difficult given the absence of search engines; even getting connected was difficult because it was only possible through a research contract with the ARPA or another government approved agency.[618] Although in theory access was limited to people working for the ARPA, in practice this was not really enforced, with many people who did not work for the ARPA also becoming connected. According to Abbate, one example of an unofficial yet tolerated activity was Project

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[612] Abbate, *Inventing the Internet*, 5.
[613] Abbate, *Inventing the Internet*, 6.
[614] Abbate, *Inventing the Internet*, 83.
[615] As explained in subchapter 3.1, in this dissertation the word interface is used to refer to how people interact with the technology, not also to how different technological components interact with each other.
[616] Jonathan Grudin, "The Computer Reaches Out: The Historical Continuity Of Interface Design," *CHI `90 Proceedings* (Aarhus: Aarhus University, Computer Science Department, April 1990), 261.
[617] Abbate, *Inventing the Internet*, 84.
[618] Abbate, *Inventing the Internet*, 84-86.

Gutenberg, whose creator Michael Hart was not an ARPA member yet had acquired an account at the University of Illinois.[619] Created in July 1971, Project Gutenberg is very well-known in the field of documentary heritage preservation, and it is said that the electronic book was born with it.[620] In her description of the history of Project Gutenberg, Lebert explains that its purpose was "to make available for free electronic versions of literary books belonging to public domain. A pioneer site in a number of ways, Project Gutenberg was the first information provider on an embryonic internet and is the oldest digital library."[621] Abbate suggests that in fact unauthorised connections were intentionally allowed, and perhaps even encouraged by the ARPA for various reasons, e.g. due to the contribution that unauthorised users could bring to improving the network; or due to the insights that researchers could offer into the system's performance.[622] In any case, for those without technical knowledge it was very difficult to use the network in the early years, because "most of the software available on the ARPANET had been developed as part of some local research project rather than as a commercial product."[623] Nevertheless, it became a user-friendly product starting in 1995 when the United States government ceased ownership of the Internet's infrastructure, and privatised it in a step that opened up the Internet - no longer the ARPANET - to a large public; only then "using it for purely commercial, social, or recreational activities became acceptable."[624]

Grudin similarly discusses how digital technology has become user-friendly, yet in contrast to Abbate's consideration of social, political, economic and other factors that are external to the technology, Grudin explains this development based upon how the interface has historically evolved. He divides this evolution into five stages according to where the interface was located.[625] In the first stage, he spoke about "interface as hardware", because it was located at the hardware itself; during this stage, the users were engineers working directly with the hardware, with switch panels that were situated at the exterior of computers serving to manipulate internal tasks.[626] The ENIAC represents an example here. In the second stage, Grudin spoke about "interface as software", because it moved to the task of programming; its

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[619] Abbate, *Inventing the Internet*, 86.
[620] Marie Lebert, *Project Gutenberg (1971–2008)*, 2008 http://archive.org/stream/projectgutenberg27045gut/27045-0.txt (accessed 29 November 2012).
[621] Lebert, *Project Gutenberg*.
[622] Abbate, *Inventing the Internet*, 85.
[623] Abbate, *Inventing the Internet*, 89.
[624] Abbate, *Inventing the Internet*, 199.
[625] The five points enumerated below are a summary of the description provided in Grudin, "The Computer Reaches Out".
[626] Grudin, "The Computer Reaches Out," 263.

improvements allowed users to access computers without knowledge regarding the hardware, and the field of software engineering emerged, bringing developments in storage, data design and software management that eased the use of computers.[627] In the third stage, "interface as terminal" emerged owing to an increased number of "non-programming" users; the interface shifted to the display or computer screen and keyboard, involving perceptual and motor issues, leading to the development of the scientific field known as human-computer interaction.[628] In the fourth stage, Grudin speaks about "interface as dialogue", because using a computer came to be considered some sort of "dialogue" with systems and applications, involving, in comparison with the previous stage, deeper cognitive issues needed to learn how to use the system; contributions from the field of cognitive psychology and other cognitive sciences were crucial, leading to technological developments in memory capacity, processing power, improved operating systems, and software products that facilitated communication and task organisation.[629] Finally, in the fifth stage, Grudin speaks about "interface as work setting", because the interface extended into the social and work environment as a result of the development of computer "groupware" and systems to support organisations.[630] The five stages presented by Grudin emphasise the shift from the scientist as user to the non-scientist user, or more precisely from engineer to programmer to individuals and finally to groups.[631] In this regard, it is important to highlight that Grudin wrote about the five stages of interface development in 1990; however, in light of rapid subsequent technological change the fifth stage has also been superseded by now.

Minna Kamppuri et al. construct on Grudin's distinction by adding a sixth stage of development referring to cultural perspectives in interface design, leading to what they term "interface as culture".[632] They state that "the archetypical user today is no longer a middle-aged, Western office worker as was the case in the 1980s. The continuous expansion of the

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[627] Ibid.
[628] Grudin, "The Computer Reaches Out," 264.; The purpose of the research field known as human computer interaction is "the study of how people use computer hardware and software, and the application of that knowledge to the design and development processing order to make computers easier to use." For this definition see Chris Woodford, "Human-Computer Interaction," in *Encyclopedia of New Media: An essential reference to communication and technology*, ed. Steve Jones (Chicago: Sage Publications, 2003), 222.
[629] Grudin, "The Computer Reaches Out," 264.
[630] Ibid.
[631] Grudin, "The Computer Reaches Out," 263.
[632] Minna Kamppuri, Matti Tedre and Markku Tukiainen, "Towards the Sixth Level in Interface Design: Understanding Culture," ed. Darelle van Greunen, *Proceedings of the CHI-SA 2006, 5th Conference on Human Computer Interaction in Southern Africa, Cape Town, South Africa, January 25-27, 2006* (South Africa: ACM, 2006), 69-74.

computer industry to new market areas is increasingly diversifying the user base."[633] As the computer has been spreading - Kamppuri et al. explain - and also increasingly in developing countries, the user base, which had thus far tended to be culturally homogenous, is turning to a culturally heterogeneous user base.[634] Regarding the notion of "culturally homogenous", the authors have perhaps chosen an inappropriate expression, given that cultures are hardly homogeneous. Nevertheless, while Kamppuri et al. themselves acknowledge intra-group variations, they still state that before the technology was widespread the groups were relatively homogenous. They maintain that the growth of the network is also conditioned today by the processes of globalisation, supporting its expansion to new geographical areas with different linguistic and cultural traditions. Indeed, this argument can be supported with examples from the field of computing, including the development of global software production models, such as internationalisation and localization software, enabling the local adaptation of computers regardless of their geographical location.[635] In light of these developments, Kamppuri et al. conclude that the future of interface development lies in evaluating design approaches from a cultural perspective, and developing methods for cross-cultural software design. Therefore, the user interface is now moving from the fifth stage of interface as work setting to the sixth stage of interface as culture.[636]

The description provided above shows that changes in digital technology were responsible for changes in user profiles, which is also correct. Had the technology not afforded use by non-specialists, it would have never become what it is today; however, this is not to argue that users are simply passive actors throughout this process. Meyrowitz rightly states that personality, cultural and subcultural differences, generational styles and other similar factors influence people's choice of medium and how it is used for specific tasks, although it is no less true that people cannot appropriate the technology for tasks it does not afford.[637] However, by following an Innisian approach to gain insights into the evolution of digital technology, it is important to acknowledge that whereas it influenced the profile of users, (non-scientific) users have also shaped the technology in turn. This has been described by Gillespie, who provides several reasons in argument for the relevance of users in the development of any technology. Gillespie holds that first and foremost, "users help to define a technology in the moment of use, treating it as something and not something else, thereby

[633] Ibid.
[634] Ibid.
[635] This has been discussed in subchapter 7.1 in this dissertation.
[636] Kamppuri, Tedre and Tukiainen, "Towards the Sixth Level".
[637] Meyrowitz, "Medium Theory: An Alternative," 524.

together giving life to the technology as a cultural artifact."[638] According to Gillespie, this is reflected in that not all technologies that are developed and exist become adopted by users.[639] Indeed, many technologies have been developed and subsequently abandoned by their own creator because users did not adopt them. Abandonware is a concept coined to refer to this specific category of abandoned technology.[640] One such example is the Microsoft Bob interface developed as an alternative to the common Microsoft Office interface available on computers today. Developed in 1995, yet already abandoned the following year, Bob was intended for people who were using computers at home rather than the office, and thus its design was different. The computer screen displayed a cartoon picture of a room, equipped with a fireplace, furniture, and all sorts of familiar objects such as calendars, clocks, etc., scattered throughout the room, and interaction with the user was facilitated by animated characters.[641] While all these aspects were intended to simulate a familiar environment to which people could easily connect, in effect it was unappealing and too childish, the drawings were poor, the animations boring, the sound effects annoying, it was too expensive, and it required powerful computers.[642] As this example indicates, users have an important influence on the success of a technology, by either adopting it or not. Gillespie provides further reasons why users are important, including: comments and critiques made public through consumer reports, complaints and other similar measures; the adaptation of the technology to novel uses unforeseen by its designers; or the remaking of the technology, provided they have the skills to do so.[643] In support of his arguments, Gillespie relies on Ron Eglash, who has written about different types of technology appropriation by users, divided into three main types as follows: reinterpretation, in which changes in semantic associations occur; adaptation, in which changes in semantic association and use occur; reinvention, in which changes in semantic association, use and structure occur.[644] As explained by Eglash and endorsed by Gillespie, reinvention is the most important way in which users have contributed to the development of digital technology.[645] While examples are many and cannot be mentioned in the context of

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[638] Gillespie, *Wired Shut,* 242.
[639] Ibid.
[640] See entry on "abandonware" in Oxford Dictionaries Online http://oxforddictionaries.com/definition/english/abandonware?q=abandonware (accessed 02 March 2013).
[641] Terry Winograd, "Profile: Microsoft Bob," in *Bringing Design to Software,* ed. Terry Winograd (New York.: ACM, 1996) http://hci.stanford.edu/publications/bds/7p-bob.html (accessed 23 March 2013).
[642] See Winograd, "Profile: Microsoft Bob". See also Harry McCracken, "The Bob Chronicles: On its fifteenth anniversary, a look back at a legendary software flop," *Technologizer* (March 29, 2010). http://technologizer.com/2010/03/29/microsoft-bob/
[643] Gillespie, *Wired Shut,* 242.
[644] Ron Eglash, "Appropriating Technology: An Introduction," in *Appropriating Technology: Vernacular Science and Social Power,* ed. Ron Eglash et al. (Minnesota: University of Minnesota Press, 2004), xi.
[645] Eglash, "Appropriating Technology," xii.

this subchapter, some will be presented in later subchapters when discussing the appropriation of digital technology into specific documentary practices. However, in addition to acknowledging the role of users, it is similarly important to remark that despite broad possibilities rendered by digital technology, the degree to which users become involved can be controlled by design.[646] This is not to say that the technology has agency yet it does have bias, which influences how it is understood and used. The user-friendliness of digital technology should not be taken for granted, because it can be designed for or against user agency, which reminds of Innis' monopoly of knowledge held by those in control of the technology and the know-how needed to use it. However, this no longer reflects the history of digital technology but rather its current bias as reflected in its design, which is studied next.

5.2 Insights into the Bias of Digital Technology

The purpose of this subchapter is to study the bias of digital technology, as mainly reflected in its design. It has been mentioned above that the crucial step in the development of digital technology was its transformation from a simple calculating machine into a communication medium. However, Lev Manovich goes one step further in arguing that the computer is no longer simply a communication tool but rather a cultural machine, because "we are increasingly 'interfacing' to predominantly cultural data: texts, photographs, films, music, multimedia documents, virtual environments."[647] This present dissertation follows the argument that digital technology is more than a tool for transferring information, and thus it is possible to agree with Manovich that digital technology is not simply a communication but also a cultural tool. However, it is not a cultural tool because it transfers "cultural content" but rather simply because, like any other technology, it was created in a certain cultural context, for certain purposes and with certain interests, which has left an imprint on it. After all, no technology arises or exists in vacuum, and even if digital technology is volatile – provided we ignore the materiality that makes this "volatility" possible – like all technologies, it is a product of its social environment.[648] Studying the bias of digital technology supports this argument and, in the context of this subchapter, some aspects discussed above regarding the history of digital technology are further emphasised to show how they are reflected in its current design. While the types of use, interaction and access enabled by digital technology could similarly fall under a discussion of bias, within the context of the present dissertation

[646] Gillespie, *Wired Shut,* 244.
[647] Manovich, *The Language of New Media,* 79.
[648] Abbate, *Inventing the Internet*, 2.

these aspects are studied in detailed relation to documentary practices, which is the subject of the next chapter.[649] Therefore, insights are provided into the bias of digital technology in the context of this subchapter, as indicated by the title, rather than providing a comprehensive study that also includes its implications. However, despite the focus being placed to the maximum extent possible on aspects related to design, the analysis here inevitably also includes statements relating to usage, which requires an explanation.

In the previous chapter, a description was provided regarding Innis' understanding of bias, stating that for him bias arose from the intersection of some layers. According to van Loon's interpretation, these referred to matter, form, use and know-how; whereas in Chesher's interpretation, they were related to matter, encoding conventions and socio-political arrangement.[650] However, these views are very similar given that they both emphasise two aspects of bias: on one hand, regarding the medium itself, its characteristics and relation to content;[651] and on the other regarding its practical applications in specific contexts. Van Loon's aim is to provide a critical perspective on media technology, and consequently he discusses several theories including that of Innis, yet does not apply it to digital technology.[652] However, Chesher, does apply it, arguing that digital technology complicates things at all levels.[653] Indeed it does, if only for the fact that it is a complex technology created through the combination of various others, both hardware and software. Despite this, Chesher attempts to divide his analysis according to his three layers mentioned, as one can infer from the titles of his chapters.[654] However, it is open to debate whether this division is also reflected in the content of his text, because these layers are somehow overlapping throughout his analysis.[655] It is possible to agree that in Innis' understanding bias results from the interaction of several layers, as argued by Chesher, yet dividing a study of bias into these layers is more difficult to sustain, specifically because one cannot treat the three layers in isolation. Indeed, doing so would contradict the very understanding of bias as arousing from the interaction of layers. Matter alone does not tell anything about medium bias unless related to encoding conventions, which in turn cannot be studied in isolation from the contextual factors in which matter and encoding conventions exist. Rather than following a division as that of Chesher,

[649] See chapter 6 in this dissertation.
[650] See subchapter 4.2.2 in this dissertation.
[651] As mentioned in subchapter 4.2.1 in this dissertation, from a medium theory perspective the informational content is of interest only to study how it is influenced by the medium.
[652] van Loon, *Media Technology.*
[653] Chesher, "Binding Time".
[654] Ibid.
[655] Ibid.

the focus in the present subchapter falls on the design of different components of digital technology, given that this enables a more compact study that integrates various aspects of bias. In this respect, the analysis has not been divided according to layers of bias but rather based on themes that reflect the discussion provided in the previous subchapter on historical insights. The characteristics derived from its history and development represent an important aspect of bias, albeit one ignored by authors that have discussed Innis' concepts. Innis does not explicitly speak about "bias of medium history", yet his analysis clearly reveals that the development of a medium in a particular context leads to having that context reflected to certain extent in the design of the medium, giving it a bias, apart from that which it has from matter, form of communication and practical applications. Therefore, in this subchapter the study of bias as reflected in the design of digital technology constructs on the discussion provided in the previous subchapter and consequently relates bias: with political-economic aspects; with aspects regarding the engineering of user interaction; and with aspects related to the design of digital technology based on familiar concepts and artefacts from the physical world.

5.2.1 Political-Economic Aspects of Bias

Two examples are provided and discussed in this subchapter in order to relate the bias of digital technology with political-economic aspects. The first such example refers to Internet filtering, and relates to governments' influence over the information available with digital technology, namely their control over the "free flow of information" that the Internet is popularly said to ensure. The second example refers to the use of search engines for finding and accessing information, and relates to the influence of commercial enterprises. Digital technology enhances the exchange of information across borders, leading people to hold that "because this process is not bound by space or time, national boundaries no longer play a role, which means digitalisation is a catalyst for the ongoing process of internationalisation."[656] Indeed, digitisation is a catalyst in several regards, as discussed later in the dissertation. However, national borders still play a crucial role, even if the technology gives the impression that they don't. National governments control the flow of information through a method known as technical filtering, which refers to several mechanisms for controlling the

[656] Netherlands Council for Culture, "From ICT to E-culture," Advisory report on the digitalisation of culture and the implications for cultural policy, English edition August 2004 (The Hague, June 2003), 14, http://www.cultuur.nl/files/pdf/adviezen/E-cultuur_engels.pdf; Some authors use the word "digitalization" instead of digitization, as in the quotation above but in the context of this present dissertation "digitization" has been used, with "digitalization" referring also to a medical treatment.

information circulating over the Internet, and according to Deibert et al. is applied by governments all over the world.[657] In a book that forms part of a series on this topic, the authors state that "every country wishes to share in the prospective benefits of the Internet. However, there are no countries that are completely comfortable with the newfound freedoms of expression and access to information the Internet brings. As a result there are few countries left in the world today that have not debated, planned, or implemented Internet filtering."[658] While governments are said to use Internet filtering technologies to block access to content that they consider too sensitive for citizens to access, Deibert et al. provide a lengthy list of country profiles, indicating what type of filtering governments apply and for what purposes. For instance, in order to protect national security, many governments block websites that promote hatred and terrorism, or in terms of protecting the morality of the citizens, most governments block website related to child pornography. However, there are governments that also block Internet tools such as blogs and wikis that allow the sharing of information, certain types of cultural and religious information, or low-cost online telephone services, in order to protect economic interests.[659] These examples are not mentioned to deny the Internet's potential, but rather to highlight how the physical medium can be designed to regulate access to information. According to Zittrain and Palfrey, who analyse the use of digital technology for censorship and surveillance, governments apply both technical and non-technical filtering techniques.[660] One such example of the latter refers to legislation prohibiting people from publishing information that undermines morality or jeopardises state interests. Sometimes technical filtering is imposed by legislation. As Zittrain and Palfrey explain, states do not have full control over the Internet infrastructure yet impose legal measures on private actors, such as the need to hold a license to provide Internet-related services in that state.[661] To illustrate this point, the authors mention obligations that certain governments have imposed on Google regarding its search engine, which should not disclose certain types of content; for example, in France content related to Nazi propaganda, or in

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[657] Deibert et al., eds., *Access Denied: The Practice and Policy of Global Internet Filtering* (Cambridge, Massachusetts, London: MIT Press, 2008). The authors provide a comprehensive study of Internet filtering worldwide.
[658] Deibert et al., eds., *Access Denied*, 153.
[659] For a comprehensive overview of the scope and targets of filtering see Robert Faris and Nart Villeneuve, "Measuring Global Internet Filtering," in *Access Denied: The Practice and Policy of Global Internet Filtering*, ed. Ronald Deibert et al.,(Cambridge, Massachusetts, London: MIT Press, 2008), 5-27.
[660] Jonathan Zittrain and John Palfrey, "Reluctant Gatekeepers: Corporate Ethics on a Filtered Internet," in *Access Denied: The Practice and Policy of Global Internet Filtering*, ed. Ronald Deibert et al., (Cambridge, Massachusetts, London: The MIT Press, 2008), 108.
[661] E.g. Internet companies, content providers and publishers, telecommunications services, etc.

China, a broad range of politically and culturally sensitive issues.[662] Indeed, many authors have pointed out that searching one term with the same search engine in two different country locations will return different search results.[663] However, what is important in the context of this subchapter is to explain how digital technology is involved in all these by blocking "packets from reaching the intended destination."[664]

Filtering can be applied at different components of digital technology. When packets are sent over the Internet they are directed through specialised computers known as routers, which identify computers by their IP (Internet protocol) address, usually consisting in numbers but associated with the so-called DNS (Domain Name System), which allocates domain names.[665] For example, the IP address of Google is 173.194.78.94, whereas its domain name is google.com. Routers can be used for filtering, because they can be configured not to direct information associated with certain IP addresses.[666] Routers examine packet names rather than the content of packets, but with additional technical components content can also be examined for banned keywords and subsequently blocked. Filtering can also take place in the so-called DNS server where domain names are banned. Another method of blocking content is through so-called proxy servers, which are placed as an intermediary between a user's request and the requested information, and can filter out also web pages rather than the entire domain. Moreover, blocking can also take place by overloading the server, and through some other technical mechanisms, in addition to social mechanisms; for example, the placing of computers in libraries so that the screens are visible to the librarian and thus discourage users from accessing inappropriate sites.[667] While governments have always censored informational materials, the emergence of digital technology has now led to new and not always explicit methods. Accordingly, this has rendered it important to be aware of this bias of digital technology, rather than critically accepting that it provides universal access simply because this could technically be possible. As Lawrence Lessig argued regarding code,[668] acting as a

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[662] Zittrain and Palfrey, "Reluctant Gatekeepers," 108; Problems faced by Google in China have been discussed also in Abelson, Ledeen and Lewis, *Blown to Bits*, 52-55.
[663] E.g. Abelson, Ledeen and Lewis, *Blown to Bits*.; Indeed, searching the same term on, for example, google.de, google.fr, and google.hu does not turn up exactly the same results.
[664] Zittrain and Palfrey, "Reluctant Gatekeepers," 108.
[665] Steven J. Murdoch and Ross Anderson, "Tools and Technology of Internet Filtering," in *Access Denied: The Practice and Policy of Global Internet Filtering*, ed. Ronald Deibert et al. (Cambridge, Massachusetts, London: The MIT Press, 2008), 57.
[666] Murdoch and Anderson, "Tools and Technology of Internet Filtering," 59.
[667] Murdoch and Anderson, "Tools and Technology of Internet Filtering,"64-65.
[668] It is a short form from "source code" defined as "the human-readable form of a *computer program*, which is converted into binary computer instructions by a *compiler* or *interpreter*" and it is usually opposed to machine code, which is "the machine-readable form of a computer program, produced by conversion of the human-

control mechanism similar to written legislation: "in real space, we recognize how laws regulate — through constitutions, statutes, and other legal codes. In cyberspace we must understand how a different "code" regulates — how the software and hardware (i.e., the "code" of cyberspace) that make cyberspace what it is also regulate cyberspace as it is."[669]

Since the privatisation of the Internet in the 1990s, commercial enterprises have similarly had a strong influence in giving digital technology a further bias in how access to information can be regulated through the manipulation of search engines such as Google, Yahoo, Bing or others. Abelson et al. maintain that search engines are a new paradigm for finding information, yet criticise that "we have given search engines control over where we get reliable information – the same control we used to assign to authoritative sources, such as encyclopedias and 'newspapers of record'."[670] Based on studies of how different search engines are used, they explain that people tend to look up the first three pages, and if the search results are not satisfactory they subsequently change the search term rather than looking up the other pages.[671] People tend to believe that something is wrong with their search term and not with the search engine, but Abelson et al. argue that since people look up only the first pages, getting on the top of the list has become highly important for content providers. Consequently, Abelson et al. explain that "manipulating the ranking of search results is one battleground where the power struggle is played out. Because search is the portal to web-based information, controlling the search results allows you, perhaps, to control what people think. So even governments get involved."[672] The involvement of government was mentioned above when search engines were briefly said to be used as filtering technologies. However, the influence of commercial enterprises is obvious not in how they filter search results but rather in how results are generated. Web pages are shown based on their relevance to a search term, yet exactly how relevance is determined is not an entirely transparent process. As Abelson et al. maintain, "no search provider discloses the full details of its relevance and ranking algorithms. The formulas remain secret because they offer competitive advantages, and because knowing what gives a page high rank makes abuse

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written program (source code) into binary code by a *compiler* or *interpreter*"; Italics in the original. For these definitions see Davies and Riley, "Glossary of ICT".

669 Lawrence Lessig, *Code Version 2.0,* (New York: Basic Books, 2006), 5. There are also other authors discussing this aspect, e.g. Ben H. Bagdikian, *The New Media Monopoly* (Boston: Beacon Press, 2004); also James Boyle, *The Public Domain: Enclosing the Commons of the Mind* (New Haven and London: Yale University Press, 2008).; see also Gillespie, *Wired Shut*.

670 Abelson, Ledeen and Lewis, *Blown to Bits*, 111.

671 Abelson, Ledeen and Lewis, *Blown to Bits*, 146-147.

672 Abelson, Ledeen and Lewis, *Blown to Bits*, 181.

easier."[673] One noted exception is the Google's ranking algorithm, which is patented and can be consulted, although they explain that in reality it has been adjusted several times.[674] Abelson et al. still try to suggest a few examples of how selection is undertaken, stating that it can be based on the keywords used in the title of web pages, how often a keyword appears, how many websites it is linked to, whether the page is old or new, if it contains misspellings, etc.[675] Such factors influence the information people get, and based on the example of Google, the authors argue that its ranking algorithm favours the already rich and powerful; if a business becomes successful online and many sites link to it, this increases its chances of appearing among the first search results.[676] Therefore, Abelson et al. conclude that "market forces are likely to drive commercially viable search engines toward the bias of the majority, and also to respond to minority interests only in proportion to their political power. Search engines are likely to favor fresh items over older and perhaps more comprehensive sources, because their users go to the Internet to get the latest information."[677]

Blanchard makes similar arguments in his comparison between Internet search engines and information services offered by libraries:

> "What the search engines find tends to be biased toward commercial information and toward web sites that provides online purchase options. This is inherent in the keyword selection process, which is manipulated by commercial web sites to assure that their websites are listed on the first few pages of hits…The search engine sites also display paid advertisements along side of or even within the hits list."[678]

Blanchard intensively analysed the role of advertising in search engines, explaining that this is the only way for search engines to gain revenues, yet he criticises their influence on search results, as well as the fact that advertisements have invaded the Internet space, including blogs.[679] While the blog emerged as some sort of a personal diary in digital version, it has since been appropriated for all sorts of uses, and there are now different types, including political and news blogs.[680] Blanchard maintains that advertisers, taking advantage of this form of digital activity's success, have started placing paid ads on blogs, or hiring blog writers to pose as consumers and promote their products, with some blogs even being sponsored

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[673] Abelson, Ledeen and Lewis, *Blown to Bits*, 133.
[674] Abelson, Ledeen and Lewis, *Blown to Bits*, 135.
[675] Abelson, Ledeen and Lewis, *Blown to Bits*, 133.
[676] Abelson, Ledeen and Lewis, *Blown to Bits*, 145.
[677] Abelson, Ledeen and Lewis, *Blown to Bits*, 146.
[678] Ralph Blanchard, *The Digital Challenge for Libraries: Understanding the Culture and Technology of Total Information*, (New York: iUniverse, 2005), 39.
[679] Blanchard, *The Digital Challenge for Libraries*, 61.
[680] It is a short form from weblog.

entirely by a single company.[681] Abelson et al. similarly note that the existence of banner advertisements on websites, which are the equivalent of advertisements in newspapers, have changed the appearance of websites, reminding of the discussion provided in the previous chapter regarding Innis' study of how the design of newspapers has modified with the increasing relevance of revenues gained from advertising.[682] In their critique, Abelson et al. explain that money plays an important role in the case of search engines, because "information access has greater market value than information creation."[683] Indeed, it is possible to agree with this argument, especially in light of the vast amounts of data available over the Internet. However, they also state that it is not simply about technology and money, but also about power to make things visible, to cause them to exist or disappear, to control information and access it. In this regard, the search engines have become "a central point of control in a digital world once imagines as a centerless, utopian universe of free-flowing information."[684]

5.2.2 Facets of Bias in the Engineering of Users

In order to relate bias to the influence exercised by engineers and computer designers on digital technology, this subchapter focuses on how users are "built" into digital technology. Diana Forsythe is said to have pioneered the field of anthropology as applied to artificial intelligence (AI)[685] with her participant observation among engineers working in this field.[686] Indeed, she spent eight years as a full-time participant-observer studying the process of building computer systems for use in medical settings, analysing the software resulting from this process, and thereby showed how designers incorporate cultural values and disciplinary (but also personal) assumptions into the system.[687] Forsythe recounts her experience as part of the team that constructed a computerised patient education system for people who were suffering from migraine, to provide them with information about their illness, health condition

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[681] Blanchard, *The Digital Challenge for Libraries*, 162.
[682] Abelson, Ledeen and Lewis, *Blown to Bits*, 140.
[683] Abelson, Ledeen and Lewis, *Blown to Bits*, 158.
[684] Abelson, Ledeen and Lewis, *Blown to Bits*, 158.
[685] Artificial Intelligence "is a scientific field whose goal is to understand intelligent thought processes and behavior and to develop methods for building computer systems that act as if they are ‚thinking' and can learn from themselves" in Antonios Michailidis, and Roy Rada, "Artificial Intelligence," in *Encyclopedia Of Communication and Information*, ed. Reina J. Schement, vol. 1 (New York: Macmillan Reference, 2002), 55.
[686] Diana E. Forsythe, *Studying Those Who Study Us: An Anthropologist in the World of Artificial Intelligence.* (Stanford, California: Stanford University Press, 2001).
[687] She explains that although the team included anthropologists, the technical experts leading the project expected them to act as observers rather than participants, and provide documentation for what was going on, which was very different from how anthropologists understood their task, at times leading to misunderstandings.

and treatment.[688] While the details of the system cannot be described here, it is worth listing some of the designers' assumptions that Forsythe identified in the system.[689] She notes that from the very beginning the team that designed the system to provide knowledge about migraine included physicians yet no nurses and especially patients, for whom the system was mainly intended. The assumption behind this was that "knowledge about migraine" is what doctors know; therefore, patients' knowledge by experiencing migraine, or that of the nurses by being involved with both doctors and patients, were not reflected in the system. Moreover, a further assumption was that patients, who were supposed to use the system, wanted to know what neurologists know, and thus the system incorporated medical information about migraines, treatment, side-effects of drugs used to treat it, etc. Such assumptions proved to be wrong following the interviews and discussions that Forsythe conducted with patients, who not only had their own knowledge about migraine but were also seeking very different information, such as how to handle everyday problems arising from the fear of living with migraine. This prompted her to identify a further assumption of system designers, and in this case a disciplinary one. Forsythe explains that computer science and related fields approach knowledge in positivist terms, assuming that one can understand and evaluate it in decontextualised manner, in medical informatics knowledge being described as transfer or flow. This is similar to the cybernetic approach and is in contrast with anthropologists, for whom knowledge is contextual, being defined by who wants to know and who knows, and given that all people are positioned in a social order, so too is their knowledge.[690] Overall, Forsythe demonstrates that the technology is always located, not only in that it exists in space or in practices, but also in terms of the origin and nature of ideas it embodies.[691] This led her to conclude that the technology is not a neutral object but rather some kind of self-portrait of its designer, "revealing little about its intended users but much about those who built it."[692]

Friedman and Nissenbaum provide a similarly study of computer systems, yet their work presents striking similarities with that of Innis, and consequently warrants mention.[693] While the key concept applied by Friedman and Nissenbaum is that of "bias", they use it somewhat differently and more narrowly than Innis, although they also relate bias to the medium. They

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[688] Diana E. Forsythe, "New Bottles, Old Wine: Hidden Cultural Assumptions in a Computerized Explanation System for Migraine Sufferers," *Medical Anthropology Quarterly* 10, no. 4 (December 1996): 553-554.
[689] See Forsythe, "New Bottles, Old Wine".
[690] Forsythe, "New Bottles, Old Wine," 562.; see also Forsythe, *Studying Those Who Study Us*.
[691] Forsythe, "New Bottles, Old Wine," 552.
[692] Forsythe, "New Bottles, Old Wine," 569-570.
[693] Batya Friedman and Helen Nissenbaum, "Bias in Computer Systems," *ACM Transactions on Information Systems* 14, no. 3 (July 1996). http://www.nyu.edu/projects/nissenbaum/papers/biasincomputers.pdf

use bias "to refer to computer systems that *systematically* and *unfairly discriminate* against certain individuals or groups of individuals in favour of others."[694] Actually, Friedman and Nissenbaum do not only use the same concept of bias, but surprisingly also divide the many types of biases into three categories that are strikingly similar to those identified by Frost as Innis' key methodological steps.[695] However, the authors make no reference to Innis or his work. Friedman and Nissenbaum aimed to provide a framework for understanding bias in computer systems, and based upon an analysis of actual computer systems from fields such as banking, commerce, education, medicine or law, they derived the following categories. First they identified a pre-existing bias, which has its roots in social institutions, practices, and attitudes and "in the personal biases of individuals who have significant input into the design of the system", as also shown by Forsythe.[696] Furthermore, this is also similar to the argument advanced above in this dissertation, namely that it is possible to also speak of a bias of medium history.[697] The second category of bias identified by Friedman and Nissenbaum is technical bias, which arises from technical considerations and constraints imposed by the hardware and software used.[698] This understanding of bias is similar to that of Innis, albeit one framed around a narrower definition of medium, in its common understanding. Finally, Friedman and Nissenbaum speak about a third category, namely emergent bias, which arises in the context of use, due to changing values, users and knowledge.[699] They explain that this type of bias is not incorporated in the design of the system, but typically arises for example when the population using the system differs from the population assumed as user in the design, in terms of knowledge, values or something else.[700] This argument can be best supported with cases presenting the transfer of digital technology to different cultural context, or with a discussion about interface as culture, as explained by Kamppuri et al.[701] The example below, referring to the archiving of documents, has been chosen for illustration.

Maja van der Velden narrates her experience during research in a Maasai community in Africa, referring to the local use of computer software that allowed people to access texts as

[694] Friedman and Nissenbaum, "Bias in Computer Systems," 332. Italics in the original.
[695] See subchapter 4.2 in this dissertation.
[696] Friedman and Nissenbaum, "Bias in Computer Systems," 333.
[697] See subchapter 5.2
[698] Friedman and Nissenbaum, "Bias in Computer Systems".
[699] Friedman and Nissenbaum, "Bias in Computer Systems," 332.
[700] Friedman and Nissenbaum, "Bias in Computer Systems," 335.
[701] See subchapter 5.1.2

well as writing and archiving their own texts.[702] The uploaded texts could be arranged into categories, some pre-defined and incorporated in the software. The categories were based on potential "audiences" or groups of interest as envisioned by the program designers, although it was an open source software, bearing changes due to the aim of allowing people to adapt it locally for their own needs. [703] Therefore, in addition to the predefined categories, users could add further categories that suited them best. Pre-defined categories included farmers and fishermen, but there was no mention of Maasai and pastoralist communities, the intended audience of the local volunteer involved in the research. Although he had the possibility of adding categories that best suited him, he refused to do so and attempted to use what was available despite not really serving his needs. As explained by van der Velden, the Maasai local did not consider that adding categories was his responsibility or that he was in a position to make any changes, because he was not part of the team that created the software and he considered it inappropriate to interfere with other people's work.[704] According to van der Velden, this indicates a different understanding of human-technology relations and "shows the need for technology designs that allow people to archive their knowledge in a manner that is appropriate to their knowledge and to their ways of knowing the world."[705] We could further add to this that the example also emphasises that technical access does not represent cultural access, thus supporting Innis' conviction that a medium becomes what it is depending on context.[706] According to Friedman and Nissenbaum, their framework provided for studying bias in computer systems is useful not only for identifying bias but also for building non-biased systems, because "freedom from bias" - to use their words - could count as a key criterion; it can be an ideal just as important as reliability, accuracy, and efficiency of systems are.[707] Indeed, while freedom from bias is important, the medium theory of Innis is followed in this dissertation, and from this perspective bias not only means more than its "discriminatory" elements but is also something belonging to the system. Removing bias is not possible by removing it from the system, but rather only by balancing it against opposed biases.

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[702] Maja van der Velden, "Undesigning Culture: A brief reflection on design as ethical practice," eds. Fay Sudweeks, Herbert Hrachovec and Charles Ess. *Proceedings of Cultural Attitudes Towards Communication and Technology, Vancouver, Canada, 15-18 June 2010* (Australia: Murdoch University, 2010), 120.

[703] "When a software program is open source, it means the program's source code is freely available to the public. Unlike commercial software, open source programs can be modified and distributed by anyone and are often developed as a community rather than by a single organization". For this definition see entry on "open source" in Christensson, "The Tech Terms Computer Dictionary," http://www.techterms.com/definition/opensource (accessed 27 March 2013).

[704] van der Velden, "Undesigning Culture."

[705] Summarised from van der Velden, "Undesigning Culture".

[706] In this regard see subchapter 8.2.2 in this dissertation.

[707] Friedman and Nissenbaum, "Bias in Computer Systems," 346.

When Forsythe and later Friedman and Nissenbaum wrote during the 1990s, their research was perhaps an innovation, but today building values in the computer has become a conscious and intentional process.[708] Indeed, Gillespie even argues that designers take great pride in not being like mere users, owing to their technical expertise, and they reenact this distinction when building for users because the user is constructed as a distinct category, defined in opposition to themselves.[709] It is possible to agree with Gillespie but extend this step further and argue that such a distinction is somehow necessary. Grudin's stages of interface development were mentioned above as a process that made computers usable by non-technical experts. In light of this development, it results that designers even have to take into account the fact that non-technical users have a very different level of expertise, because a reverse process to that described by Grudin would take place if a distinction between designers and users were not maintained. Nevertheless, it is no less true that through such a distinction based on level of expertise - or monopoly of knowledge, in Innis' terms - not only the computer system is being engineered and designed but with it also the user, as the example previously provided shows. However, building the user is no longer something that only takes place during early stages in computer design, but has also become a continuous and automated process. In a discussion on the dynamic and cybernetic construction of the user, Søren Pold writes that

> "[…] the software automatically models itself on (its model of) the user. Software increasingly constructs dynamic models of its user and customizes itself accordingly; for example, it stores traces of user behavior such as last opened documents, commonly used functions, and menus, cookies, caches, and histories of internet behavior. In this sense, software aims at automatically changing some settings according to user behavior."[710]

Indeed, computers allow personalisation, yet not all people are pleased with such technological development, owing to the ethical issues involved regarding the loss of privacy. Search engines - to turn to an example familiar by now - store information regarding search history and terms, and, as Abelson et al. explain, keeping every click is something belonging to the search engine philosophy that aims to understand what people mean and give them back exactly what they want.[711] Search quality is assumed to improve if search histories are retained, because the results are adapted according to already visited web sites and thus to the user's interests. However, information about search history is also valuable for marketing and

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[708] Gillespie, *Wired Shut*, 81.
[709] Ibid.
[710] Søren Pold, "Preferences/ Settings/ Options/ Control Panels," in *Software Studies: a Lexicon*, ed. Mathew Fuller (Cambridge, London: The MIT Press, 2008), 219-220.
[711] Abelson, Ledeen and Lewis, *Blown to Bits*, 156.

economic reasons, with information often retained or even sold without people's knowledge, resulting in serious consequences such as privacy and data loss.

Furthermore, the personalisation of computers may be problematic for yet another reason, namely for not being totally "personal". As explained by Pold, we sometimes come across features that we do not like, yet because we fail to find the setting that controls the feature we become aware that it is not us who define how things work. On other occasions we see which options can be changed, yet also options that can only be changed by "higher powers in the hierarchy controlling the software, that is, the technical department."[712] Therefore, Pold concludes that despite options for personalising computers, the preference are not purely ours but rather negotiated in the software hierarchy.[713] Indeed, Gillespie shares this view, also emphasising that "if designers choose, or are compelled by government fiat or commercial license, they can design against user agency itself—by welding shut the hood, encrypting the data, making the artifact robust against user inquiry."[714] Moreover, Chun advances a similar argument when stating that we are not aware "of software's constant constriction and interpellation (also known as 'user-friendliness'), unless you find yourself frustrated with its defaults (which are remarkably referred to as *your* preferences) or use multiple operating systems or competing software packages."[715] In contrast to Pold and Gillespie, Chun provides a remark that can be interpreted as suggestion for how to avoid this "bias", namely as referring to the need to turn to media that have opposed bias. Accordingly, this reflects Innis' argument mentioned just above, namely that bias could be tackled through a balance of biases. Furthermore, Innis associated different media with different mindsets and thus it can be expected that different configurations of digital technology may create different types of users, despite restrictions imposed by design. Chun's analysis is again in line with Innis' arguments, because she explained that different operating systems "create" different users. Therefore, according to Chun, "Mac users 'think different' and identify with Martin Luther King and Albert Einstein;[716] Linux users are open source power geeks drawn to the image of

[712] Pold, "Preferences/ Settings/,"219.
[713] Ibid.
[714] Gillespie, *Wired Shut*, 244.
[715] Wendy H. K. Chun, *Programmed Visions: Software and Memory* (Cambridge / London: The MIT Press, 2011), 67.
[716] "Think Different!" is a popular slogan from Apple Computers Inc., which was used during an advertising campaign, in which they related to pacifists such as Martin Luther King, John Lennon and others.

a fat, sated penguin (the Linux mascot) and Windows users are mainstream, functionalist types perhaps comforted by the regularly crashing computers."[717]

5.2.3 Traces of Bias in the Interface

In order to identify further traces of bias the notion of interface is presented again in this subchapter, this time in comparative perspective with other artefacts that it imitates or resembles. The design of human-computer interface is largely based on the use of metaphors that help users to interact with the computer system. Preece et al. explain that "when confronted with a new piece of technology, such as a computer, for the first time people will often compare it to a machine with which they are familiar in a metaphorical way."[718] They provide the example of a typewriter explaining that in the case when people use a word processor for the first time,[719] "it occurs to them how similar it is to a typewriter […] On seeing that the computer has a keyboard the obvious inference is that it behaves like the qwerty keyboard on a typewriter."[720] Owing to this type of association that people establish between a familiar form and a new one that resembles it, they will expect the new form to function like the familiar one. For this reason, many elements incorporated in interfaces are intentionally chosen from the concrete physical world in order that people can easily relate to them. The very first interface metaphor was based on the physical office, with objects such as paper and folders represented as icons on the screen. As Preece et al. explain, the "overall organizing metaphor that was presented on the screen was a desktop, resembling the top of a typical office desk."[721] Furthermore, not only the images but also actions that resemble those from everyday life were made possible: "Just as one opens, closes, copies and trashes paper files in the physical world, the interface was designed so that equivalent actions could be done on the electronic versions…the 'mouse' was developed to enable actions equivalent to physically handling documents, which were achieved by 'clicking', 'pointing', 'selecting', 'moving' and 'dragging'."[722] However, many different types of metaphors have been developed along time, and they most often exist in combination.

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[717] Chun, *Programmed Visions,* 67. Mac, Linux, Windows are examples of operating systems. See explanations in subchapter 3.1 in this dissertation.
[718] Jenny Preece et al. "Interface Metaphors and Conceptual Models," chapter 7 in *Human-Computer Interaction: Concepts and Design* (Amsterdam: Addison-Wesley Longman, 1994), 142.
[719] Microsoft Word is a common example of word processor.
[720] Preece et al. "Interface Metaphors". The QUERTY keyboard to which Preece et al. refer is the most common type of keyboard named after the first six letters from the keys in the upper row, read from left to right.
[721] Preece et al. "Interface Metaphors,"146.
[722] Preece et al. "Interface Metaphors,"145-146.

Starting from a definition of the user-interface metaphor "as a device for explaining some system functionality or structure…by asserting its similarity to another concept or thing already familiar to the user", Barr et al. provide a taxonomy of interface metaphors.[723] A first group refers to orientational metaphors, which maps interface concepts onto spatial concepts, e.g. up, down, left, right.[724]. This is a very usual metaphor, although the authors rightly remark that one related problem is that "different cultures can have substantially different associations with spatial concepts".[725] A second category refers to ontological metaphors that identify "a system concept with a basic category of existence in the physical world, such as substance, object, container or entity", representing an abstraction as if it were a real physical object.[726] A third category named by Barr et al. comprises structural metaphors, which identifies an abstract system concept with a real world concept or object, with examples including the trash can, music players, toolbars or documents. The fourth and final category that Barr et al. name refers to conventional and new metaphors, which as their name suggests are metaphors that are either familiar or not, with example of the former being the image of a sheet of paper containing text, whereas the later refers for instance to new icons that are not yet well known.[727] The role of metaphors in interface design is very important, as also illustrated by the example previously outlined in this dissertation regarding the Microsoft Bob interface, whose failure was partly caused by the wrong choice of interface metaphors.[728] The user-friendliness of digital computers is actually said to have been revolutionised with the development of the interactive interface known as the graphical user interface (GUI).[729] In her discussion about the interactive interfaces, Chun explains that also their origin lies in the military. By then, interactivity implied giving tasks that people could not accomplish over to machines, and thus the goal was to develop systems that combat human frailty. However,

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[723] Pippin Barr et al., "A Taxonomic Analysis of User-Interface Metaphors in the Microsoft Office Project Gallery," ed. Mark Billinghurst and Andy Cockburn, *Conferences in Research and Practice in Information Technology*, vol. 40 (2002). For the purpose of this dissertation a text was used where the taxonomy is presented in abbreviated form, which has been deemed sufficient for purposes of illustration. In the text the authors do explain and send to another text where the full taxonomy is elaborated, and also explanations are provided regarding which authors they took inspiration from.
[724] Barr et al., "A Taxonomic Analysis".
[725] Ibid.
[726] Barr et al., "A Taxonomic Analysis".
[727] Barr et al., "A Taxonomic Analysis".
[728] See subchapter 5.1.2 in this dissertation.
[729] Chun, *Programmed Visions*, 59; The Graphical User Interface is a software package enabling people to interact with computers. It consists of graphical elements or icons, which can be clicked, dragged and dropped with a mouse, etc. Apple Mac and Microsoft Windows interfaces represent examples of GUI. For this definition and explanation see Davies and Riley, "Glossary of ICT".

despite this historical background, interactive interfaces are presently associated with human and machine freedom.[730]

Interactivity can be considered a key characteristic of computer interfaces, given that in terms of shape and function, the screen is not new. In an essay entitled "The Archaeology of the Computer Screen" Manovich argues that interactivity and virtual reality "are made possible by the recent technology of a digital computer. However, they are made real by a much, much older technology -- the screen. It is by looking at a screen -- a flat, rectangular surface positioned at some distance from the eyes -- that the user experiences."[731] Manovich traces the screen back to Renaissance paintings, arguing that

> "visual culture of the modern period, from painting to cinema, is characterized by an intriguing phenomenon: the existence of another virtual space, another three-dimensional world enclosed by a frame and situated inside our normal space. The frame separates two absolutely different spaces that somehow coexist. This phenomenon is what defines the screen in the most general sense."[732]

However, the computer continues and also challenges existing traditions. Manovich clarifies that the screen as painting was static, with the dynamic screen later developed with the cinema, television and video; while it still had the properties of a classical screen it introduced a dynamic element, because the image it displayed changed over time. Despite these differences, the "viewing regime" - as Manovich calls it - was similar in both; the singular image filled the entire screen, requiring the viewer to fully concentrate on the screen and disregard the physical space beyond it.[733] However, the computer challenged this tradition, because the screen can display several windows at the same time, none of them entirely dominating the viewer's attention. With the development of Virtual Reality (VR),[734] the screen has even disappeared altogether. As Manovich explains "VR typically uses a head-mounted display whose images completely fill the viewer's visual field. No longer is the viewer looking forward at a rectangular, flat surface located at a certain distance and which acts as a window into another space. Now s/he is fully situated within this other space."[735] Indeed, but the intention of making the interface disappear is not only typical for VR and with

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[730] Chun, *Programmed Visions*, 60-62.
[731] Lev Manovich, "An Archeology of a Computer Screen," *Kunstforum International*, vol. 132 (1995) http://manovich.net/TEXT/digital_nature.html (accessed 24 March 2013).
[732] Manovich, "An Archeology".
[733] Manovich, "An Archeology".
[734] Virtual Reality is defined as "the simulation of an environment by presentation of 3D moving images and associated sounds, giving the user the impression of being able to move around with the simulated environment. Users wear helmets and visors that convey the images and sound and gloves that give them the experience of touching objects." For this definition see Davies and Fred Riley, "Glossary of ICT".
[735] Manovich, "An Archeology".

head-mounted display. It is the very intention of the so-called "ubiquitous computing" whose ultimate aim is "to make the interface metaphor invisible to the user in the same way as computer systems are invisible in home appliances, such as the VCR,[736] the microwave oven and the washing machine."[737] As Mark Weiser, who came up with this idea, explains: "ubiquitous computing has as its goal the enhancing computer use by making many computers available throughout the physical environment, but making them effectively invisible to the user."[738] As opposed to Virtual Reality, which aims to integrate the individual into the information display, ubiquitous computing aims to integrate the information display into the everyday physical world.[739] However, the disappearance or invisibility of the medium could have very visible impacts, and from an Innisian perspective this is not necessarily something to welcome, given that each medium has its bias and thus the ubiquitous presence of digital technology could bring a serious challenge for balance. In line with this concern, the analysis now turns to a final subchapter, discussing the medium bias against the notions of space and time.

5.3 Digital Technology as Space-Biased Medium

The purpose of this subchapter is to bring together the main arguments raised throughout this chapter and to discuss the bias of digital technology in relation with Innis' concepts of space and time. Thus far, historical insights as well as those into the bias of digital technology have been given with the purpose of providing an understanding of its aspect, character and functionality. Following the first specific objective of this dissertation, namely studying the capabilities of digital technology that led to its broad adoption, the analysis has pointed out that the success of digital technology has not been due to purely technical aspects, despite some technical advantages, but also contextual, including political-economic, social and cultural elements. In line with Innis' broad definition of medium and using his concept of bias as a lens, the technical aspects of digital technology have been presented in correlation with the influence of different groups and interests, i.e. the military, commercial sector, scientists, and non-technical users. However, what remains to be done by following the conceptual framework proposed in the previous chapter is to correlate the bias of digital technology presented above with the notions of space and time, analysing whether the aforementioned

[736] Abbreviation of Video Cassette Recorder.
[737] Preece et al. "Interface Metaphors," 261.
[738] Mark Weiser, "Ubiquitous Computing," 1993, http://web.archive.org/web/20110717134616/http://www.ubiq.com/hypertext/weiser/UbiCompHotTopics.html (accessed March 26, 2013).
[739] Weiser, "Ubiquitous Computing".

characteristics of digital technology reflect space- or time-biased aspects. As explained above, Innis did not treat the notions of space and time as isolated concepts but rather always in relation with each other, with the measure for their successful relationship being the notion of balance. Therefore, discussing the space- or time-bias of digital technology also implies considerations regarding the influence of its bias on the possibilities of balance.

Along with many others, Abbate suggests that "today we take it for granted that information can travel long distances instantaneously…The transcendence of geographic distance has come to seem an inherent part of computer technology."[740] Although Abbate makes no use of Innis' theories or concepts, her statement indicates the existence of a strong space-bias built into the digital technology. Indeed, scholars following an Innisian analysis to explore the bias of digital technology, or rather that of the Internet, tend to conclude that it has a strong space-bias.[741] For example, Angus explains that "what we do not do well is organize things in the dimension of time. While we have a very efficient and well-integrated world system, it is extremely sensitive to periodic shocks and dislocations. The critique is that it does not have stability over time despite a remarkable stability over space."[742] In fact, while the physical infrastructure of the Internet is quite robust, it is nevertheless true that its history has been turbulent and constantly changing, which is an indication of space- not time-bias. However, while many scholars share Angus' view, not all of them do so. Turning to the historical insights of digital technology, in line with Menzies we may observe that

> "the internet was created by a strongly space-biased institution: the U.S. Department of Defense. But it was strategically designed (in 1969) as a self-governing collection of information nodes (rather than a centrally controlled system), so that it could withstand the destruction of any particular site. This decentred design has been a key to its growth along decidedly un-space-biased dimensions."[743]

Since these are characteristics that Innis usually attributed to time-biased media, Menzies further argues "that the internet has developed into a more time-oriented communitarian model of communication practice, while the information highway is clearly associated with the transmission model and the commercial, market-controlling bias of space in the modern era."[744] One can identify James Carey' concepts of transmission and ritual view in this statement, with the former reflecting the physical Internet infrastructure owned by different

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[740] Abbate, *Inventing the Internet*.
[741] E.g. Frost, "How Prometheus is Bound"; see also Comor, "Harold Innis".
[742] Angus, "The Materiality of Expression".
[743] Heather Menzies, "The Bias of Space Revisited: The Internet and the Information Highway through Women's Eyes," in *Harold Innis in the New Century: Reflections and Refractions*, ed. Charles R. Acland and William J. Buxton (Canada: McGill-Queen's University Press, 1999), 324.
[744] Menzies, "The Bias of Space," 331.

commercial and political interest groups, and the latter aspect referring to selected Internet applications such as the World Wide Web that enable community formation and are thus associated by Menzies with time-bias. In fact, Menzies is not the only scholar to consider digital technology as time-biased.

While acknowledging that it serves as space-biased medium, Zhao considers it mainly as time-biased because, for example, "the time element in the internet … promises instant transmission of information at any time of the day."[745] This conclusion seems to derive from a different interpretation of the notion of time as speed, which does not coincide with Innis' understanding of time as duration. As explained by Allen, "… when Innis spoke of a bias toward time, he really meant a bias toward duration … For Innis, media that transmit information relatively quickly - paper, for example, or the telegraph - were said to have a bias toward space rather than time."[746] Apart from an understanding of time as speed, a certain understanding of time as duration can still be identified in Zhao's consideration of the internet, albeit his conclusion is that it is a time-biased medium because "tons of information is stored and being stored on the internet, and will remain accessible not only for later use, but also for later generations."[747] However, such an argument is not really supported by the facts. On the contrary, the information available on the Internet lacks duration, as exemplified by the many efforts to preserve digital information in the face of rapid technological change. This was one main reason behind the drafting of the Charter on the Preservation of Digital Heritage, which specifically lists among the risks to the digital heritage "the rapid obsolescence of the hardware and software which brings it to life".[748] However, just like Menzies, Zhao further considers digital technology as time-binding because it allows community formation, stating that "more and more people are turning to the internet to recover a sense of belonging, to search for common interests and spiritual guidance."[749] In this respect, he invokes Innis, for whom religion, tradition and community were related to time and were the opposite of militaristic and expansionist societies obsessed with conquering space. While we can agree that the Internet allows community formation, these "virtual

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[745] Xiaoquan Zhao, "Revitalizing time: an Innisian perspective on the internet," in *The Toronto School of Communication Theory: Interpretations, Extensions, Applications*, eds. Menahem Blondheim and Rita Watson (Toronto: University of Toronto Press, 2007), 199-214.
[746] Gene Allen, "Monopolies of news: Harold Innis, the telegraph and wire services," in *The Toronto School of Communication Theory: Interpretations, Extensions, Applications*, eds. Menahem Blondheim and Rita Watson (Toronto: University of Toronto Press, 2007), 187.
[747] Zhao, "Revitalizing time," 208.
[748] UNESCO, *Charter on the Preservation of Digital Heritage,* Art .3.
[749] Zhao, "Revitalizing time," 209.

communities" are not really based on tradition or on continuity; thus, this interpretation also deviates from the meaning implied by Innis.[750]

The intention behind highlighting such arguments in not to deny the Internet its democratizing and participatory potential, but this is only one side of the story. Frost considers that the Internet positively correlates with sociability and civic engagement; allowing many-to-many communication and facilitating user-defined information flow.[751] However, she also notes that the medium is complex despite existing user-friendly technologies, and requires a high degree of technological literacy to master its features; that English is the dominant language used online; or that much content on the Internet involves popular culture and consumer information.[752] She concludes that "the internet is becoming a controlled commercial product rather than an open public infrastructure", whose governance is currently ensured "by a combination of business interests and regulatory bureaucracy."[753] While she agrees that some of the Internet's features resemble oral communication, she also thinks that it remains to be seen whether these will still exist in the future or will be pushed aside by the drive to realise monopoly potential.

The argument that digital technology incorporates both space- and time-bias, despite the former being predominant, is illustrated also by the following example regarding the difference between proprietary and free software. Proprietary software is proprietary, as its name suggests, and being driven by commercial interests it does not enable access to the source code, to information about how the software was created or how it functions, it doesn't allow changing it, distributing it, etc. Free software does exactly the opposite, being interested in forming and maintaining a community of users not for material gains but for the moral benefits that free sharing brings. As stated by Richard Stallman, the author of the GNU Manifesto, which is a call for support for what became the free software movement, a philosophy against monopoly by proprietary software, "I consider that the Golden Rule

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[750] The notion of community is rather complex and it cannot be discussed in the space of this present dissertation. For a compact overview of different understandings of the notion "community" see George Yúdice, "Community," in *New Keywords: A Revised Vocabulary of Culture and Society*, ed. Tony Bennett, Lawrence Grossberg and Meaghan Morris (Malden, Oxford, Victoria: Blackwell Publishing, 2005), 51-54.
[751] Frost, "How Prometheus is Bound".
[752] Frost, "How Prometheus is Bound". For studies that support Frost's argument see also Michele Pickover, "The DISA project. Packaging South African heritage as a continuing resource: content, access, ownership and ideology," *Official Journal of the International Federation of Library Associations and Institutions* 34, no. 2 (2007): 192-97. See also Johannes Britz and Peter Lor, "A Moral Reflection on the Digitization of Africa's Documentary Heritage," *Official Journal of the International Federation of Library Associations and Institutions* 30, no. 3 (2004): 216-23.
[753] Frost, "How Prometheus is Bound".

requires that if I like a program I must share it with other people who like it. Software sellers want to divide the users and conquer them, making each user agree not to share with others. I refuse to break solidarity with other users in this way."[754] As these examples imply proprietary and free software reflect different biases and the existence of both space- and time-biased elements seems to have always been part of the history of digital technology. Abbate recounts that she was aware that the Internet has its history in the Department of Defense, yet she was using it to chat with friends and exchange information with people, which prompted her state that "this apparent contradiction goes to the heart of the Internet's history, for the system evolved through an unusual (and sometimes uneasy) alliance between military and civilian interest."[755] However, despite the existence of time-biased elements, the entire underlying logic that makes digital technology work is space-biased, not just the technical infrastructure but also basic programs that make it work. Floridi argues that the development of programming languages has been determined by four factors, two of which are important for the present dissertation. One such factor refers to portability, with Floridi explaining that "new programming languages have considered the ease with which the resulting program can be 'ported', i.e. made to run on a new platform and/ or compiled with a new compiler reliably and with a minimum effort."[756] The other factor refers to maintainability, and according to Floridi means that "new programming languages have considered the ease with which the resulting program can be changed through time to make corrections or add enhancements."[757]

As the name suggests, the notion of portability indicates that programming languages are now written with a space-bias to function wherever digital technology is physically situated. Indeed, this is not only a basic condition for the technology to function but also a key requirement for achieving universal access to information. The idea of maintainability implies that a program has to be kept functional in time. At first glance, this indicates a time-biased element, yet in fact it is a space-biased one. It suggests that durability is to be ensured through constant change, which is similar to the method of digital preservation known as migration. However, from an Innisian perspective, "constant changes in technology particularly as they affect communication, a crucial factor in determining cultural values…increase the difficulties

[754] Richard Stallman, "The GNU Manifesto," 1993, http://www.gnu.org/gnu/manifesto.en.html (accessed August 20, 2012).
[755] Abbate, *Inventing the Internet*, 2.
[756] Floridi, *Philosophy and Computing*, 49.
[757] Floridi, *Philosophy and Computing*, 49.

of recognizing balance let alone achieving it.[758] As stated above, one could perhaps suggest that only proprietary software, embodying commercial interests is space-biased and that free software, embodying community interests, is time-biased. This is to some extent true, and there are good reasons to praise free software for encouraging openness and sharing; however, it is not possible to ignore that it somehow also encourages constant changes to the initial products, thus working against their durability, understood in Innisian terms. Therefore, one can conclude that despite time-biased components, currently digital technology is first and foremost a space-biased technology. At first glance, this seems to lead to a dead-end: above all, digital technology is a space-biased medium and thus cannot survive transmission over time; consequently, believing that one could preserve something digital is a utopia. Fortunately, the situation is not so straightforward, given that each medium has its own bias, and does not exist in vacuum but rather in a context, and in relation to other media, potentially having different biases. Therefore, dismissing digital technology from the field of preservation on the grounds of being space-biased would not be useful because bias cannot be eliminated. However, in light of Innis' argument that the bias of a medium will lend a bias to the culture in which it is embedded, the space-bias of digital technology motivates an in-depth analysis of how it impacts the character and relevance of documentary practices, which are studied next accordingly.

6. Bias in Practices with Digital Documents

This chapter addresses the second specific objective of this dissertation, and thus holds the purpose of studying how documentary practices have changed as the result of using digital technology. As explained in chapter three, documentary practices refer to any kind of practices with documents, ranging from creation to archiving and preservation. However, given that these could include many things, it is not possible to study all practices in the space of this chapter, and consequently only a selection was chosen, serving as basis for understanding changes triggered by digital technology that are related to the discussion provided in chapters two and three. Digital technology is quite often praised for bringing about democratisation on the grounds that everybody is now able to make their opinions and beliefs public, which was not possible with previous media. However, in the light of the bias of digital technology described in the previous chapter, it is important to more carefully study

[758] Innis, *Bias*, 140.

what is really possible and what is not. In order to assess the influence of a medium's characteristics, medium theorists analyse aspects such as: the type of communication enabled (uni-, bi-, multi-directional, etc.); the form of communication (sound, photograph, alphabetic writing, etc.); the type of human intervention required to create messages; the scope and nature of dissemination; ease or difficulty to use a medium; and a host of other similar aspects.[759] In line with this methodology, the analysis in the context of this chapter has been structured according to four main aspects as follows: an analysis of new writing practices, with the accent being placed predominantly (yet not solely) on writing computer programs; a study of how information can be structured with digital technology, with the examples discussed being the hypertexts, website and database; a discussion of classification practices comprising automated, informal and formal methods; and a description of new patterns of access, namely regulated, cooperative and participatory types.[760] In order to facilitate the understanding of the analysis, the digital components selected for study have been placed, to the greatest extent possible, in comparison with familiar forms of document creation and organisation, such as the book. All such examples are approached as documentary practices, either fully enabled by digital technology, as in the case of writing computer programs, or represent a continuation of traditional practices that have changed, as in the practice of classifying documents. The analysis in this subchapter has been supported to a significant extent by literature from an emerging field of research known as Software Studies. As a new paradigm for intellectual inquiry, Software Studies is understood by its theoreticians as a necessary step in understanding contemporary culture and cultural practices.[761] As argued by Lev Manovich, all disciplines such as cyber culture, Internet studies, new media theory or that of digital culture have as underlying engine the software, which has thus far received little attention, with the focus usually placed on what appears on the computer screen.[762] By ignoring software, Manovich argues that "we are in danger of always dealing only with its effects rather than the causes: the output that appears on the computer screen rather than the programs and social cultures that produce these outputs."[763] In line with this assumption, the field of Software Studies investigates the role of software in forming contemporary culture, as well as cultural, social and economic forces that are shaping the development of software

[759] For a detailed discussion see Meyrowitz, "Medium Theory: An Alternative," 519.
[760] All these notions have been explained in the subchapters that have been dedicated to them.
[761] Manovich, *The Language of New Media*; See also Mathew Fuller, ed., *Software Studies: A Lexicon* (Cambridge / England: The MIT Press, 2008).
[762] Lev Manovich, *Software Takes Command, Creative Commons License (*Draft Version 2008), http://softwarestudies.com/softbook/manovich_softbook_11_20_2008.doc (accessed 28 April 2010).
[763] Ibid.

itself.[764] From this perspective, it shares similarities with medium theory, and indeed could even be classified under medium theory, because it studies a particular type of medium, or rather an important part of the digital medium, i.e. the software. However, while acknowledging the relevance of the software, the analysis in this chapter has not ignored the hardware, which is similarly important as part of the digital technology, as explained in chapter three.

6.1 Writing Documents with Digital Technology

The aim in this subchapter is to study new practices for creating documents, with the focus placed on writing practices with digital technology. To this end, it is useful to start by recalling the three levels of a digital document as discussed in chapter three, comprising conceptual, logical, and physical levels, in contrast to a paper-based document, where the logical level is absent. While "writing" with digital technology takes place at all three levels as discussed below, it is necessary to make a distinction especially between the first two levels. For example, in the case of a word processor such as the Microsoft Office Word - a computer application for writing texts - it is necessary to draw distinction between using the word processor to write texts on the one hand, and writing the word processor itself, on the other hand. Using a word processor to write texts takes place at the conceptual level, so to speak, and as revealed by scientific literature when speaking about the novelty of digital technology in the context of documentary practices, the discussion is typically about using word processors for writing texts.[765] This can be considered an extension of "traditional" writing practices using paper and pen rather than screen and keyboard, yet at the same time writing the word processor itself represents a new writing as well as documentary practice, as shown by the analysis below. Therefore, in order to achieve a more informed understanding regarding changes triggered by digital technology, it is useful to pay attention not only to digitally writing texts but also to computer programming as writing. Furthermore, by following an Innisian analysis, it is also necessary to discuss the physical level of writing, which, as Kirschenbaum has argued through the example of the hard drive, is invisible to the human eye yet not instrumentally undetectable or physically immaterial.[766]

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[764] Manovich, *Software Takes Command.* Also Chun, *Programmed Visions.* Also Fuller, *Software Studies*.

[765] In this regard an analysis has been provided by Andrew Robinson, *Writing and Script, A Very Short Introduction* (New York: Oxford University Press, 2009).

[766] Matthew G Kirschenbaum, "Extreme Inscription: Towards a Grammatology of the Hard Drive," *TEXT Technology* 2, (2004), http://texttechnology.mcmaster.ca/pdf/vol13_2_06.pdf (accessed 12 January 2013).

One can turn to the distinction between natural and artificial languages in order to distinguish between the conceptual and logical levels of a document. Walter Ong has spoken about primary orality, referring to cultures untouched by the knowledge of writing or print; and about secondary orality, referring to forms of communication introduced by the telephone, radio, television and other electronic devices.[767] As Ong explained, secondary orality resembles primary orality in its "participatory mystique, its fostering of a communal sense, its concentration on the present moment" but it differs because it is "based permanently on the use of writing and print, which are essential for the manufacture and operation of the equipment and for its use as well."[768] In a similar manner, and perhaps inspired by Ong, Finnemann distinguishes between primary alphabets and alphabets of the second order.[769] In this respect, the former are specific to literate cultures and refer to the basic set of letters used for writing, with examples including the Latin or English alphabet, while Finnemann additionally considers numbering systems to be primary alphabets. By contrast, the second-order alphabet is specific to digital media, and refers to the binary language of 0s and 1s. Finnemann terms it alphabet of a second order, because "it is used to handle primary alphabets, and other symbols and symbol systems."[770] The distinction drawn by Finnemann is phrased in different words in the context of computer sciences, yet a distinction exists: primary alphabets may refer to natural languages, whereas second-order alphabets refer to artificial or formal languages. Cramer perhaps rightly notes that "there is nothing 'natural' about spoken language; it is a cultural construct and thus just as 'artificial' as any formal machine control language."[771] It is possible to agree with Cramer's statement but despite being an inappropriate terminology, the distinction is still important given that while most people handle a natural language, only a very small number are able to handle second-order languages, thus dividing people into those who can use digital technology to create information and those who create tools for creating information. "The mastery of complexity" - the words used by Soules in his application of Innis' concepts - "creates a hierarchy of

[767] Ong, *Orality and Literacy*, 2.
[768] Ong, *Orality and Literacy*, 133.
[769] Niels Ole Finnemann, *The Internet – A New Communicational Infrastructure* (Aarhus, Denmark: The Centre for Internet Research, 2001). Finnemann distinguishes between five types of information society based on what he calls their media matrix. It is very similar to how medium theorists distinguish civilizations into oral, literate, print and electronic. For the purpose of this subchapter only two types mentioned by Finnemann are presented, the others not being of main relevance here. However, all five types, namely orality, writing, print, mass communication, and secondary orality, have been described later in subchapter 7.4 in this dissertation.
[770] Finnemann, *The Internet*, 8.
[771] Florian Cramer, "Language," in *Software Studies: A Lexicon*, ed. Mathew Fuller (Cambridge, London: MIT Press, 2008), 168.

professionals and amateurs."[772] From a medium theory perspective, the underlying tool sets limits to communication, and thus it results that writing in natural languages with digital technology is always influenced by how the underlying artificial languages facilitate this process.

For those without technical expertise, writing computer programs may seem like an exercise in mathematics. However, for some computer scientists, it is more than mathematics; rather, it is fundamentally a literary and aesthetic activity;[773] and one that can be attributed the quality of "elegant".[774] Aesthetic considerations are present in fields such as digital art or computer graphics, yet usually referring to the digital objects as they are rendered visible on the computer screen, rather than the process of writing computer programs. However, for Knuth programs can be considered works of literature and the programmer

> "as an essayist, whose main concern is with exposition and excellence of style. Such an author, with thesaurus in hand, chooses the names of variables carefully and explains what each variable means. He or she strives for a program that is comprehensible because its concepts have been introduced in an order that is best for human understanding, using a mixture of formal and informal methods that reinforce each other."[775]

In order to understand Knuth's position, it is useful to briefly discuss programming in general. In the 1960s, the development of programming languages increased considerably; however, many of them, and especially large programs, were difficult to follow, handle and maintain. One important step was the development of structured programming, initiated by Edsger W. Dijkstra and intended to introduce "structure" into the programs.[776] Knuth acknowledged the importance of this programming paradigm, but also believed in the need for better documentation of programs, which could best be achieved by considering programs as works of literature. Consequently, he proposed a new attitude to computer programming, in which the main task shifts from instructing a computer what to do, to explaining to human beings what the computer should do.[777] As discussed above, computer programs are written in artificial languages that are handled by computers, and thus what Knuth proposes is to explain

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[772] Soules, *Harold Adams Innis.*
[773] Donald E. Knuth, "Literate Programming," *The Computer Journal* 27, no. 2 (1984): 97-111.
[774] Mathew Fuller, "Elegance," in *Software Studies: a Lexicon*, ed. Mathew Fuller (Cambridge, London: MIT Press, 2008), 87-92.
[775] Knuth, "Literate Programming".
[776] Edsger W. Dijkstra, "Notes on Structured Programming," (Department Of Mathematics, Technological University Eindhoven, The Netherlands, 1970), http://www.cs.utexas.edu/users/EWD/ewd02xx/EWD249.PDF (accessed 01 December 2012).
[777] Knuth, "Literate Programming,"1.

the logic of the program in natural languages in order that people can understand what the computer should do.

The need for such an approach as prescribed by Knuth related to the lack of documentation of programs, which is very important in the field of software and accompanies the software itself. According to Brookshear, software documentation has three purposes, leading to three categories of documentation as follows: user documentation, explaining the features of the software and how to use them; system documentation, describing the software's internal composition, which is used for system maintenance; and technical documentation, describing how a software system should be installed and serviced.[778] As explained by Brookshare, who makes comparison with a car, technical documentation

> "does not discuss how the car was designed and constructed (analogous to system documentation), nor does it explain how to drive the car and operate its heating/cooling system (analogous to user documentation). Instead, it describes how to service the car's components, for example, how to replace the transmission or how to track down an intermittent electrical problem."[779]

Knuth wrote with a view to improving documentation, and subsequently created the so-called WEB system, a combination of two languages, namely a document formatting language (for organizing text and graphics) and a programming language.[780] A WEB user writes a program that serves two different tasks: one produces a document that describes the program clearly and facilitates program maintenance; while the other produces a machine-executable program.[781] For Knuth, this combination of mathematical and verbal skills makes explanations more natural and closer to human understanding, and his experience with literate programming prompted him to state: "I suddenly have a collection of programs that seem quite beautiful in my own eyes, and I have a compelling urge to publish all of them so that everybody can admire these works of art."[782]

Drawing on Knuth, for whom computer programs are beautiful works of art, Fuller introduces the notion of "elegance" in his discussion about the practice of programming but it has to be stated that beauty and elegance are assessed by very different criteria in the field of computer

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[778] Brookshare, *Computer Science.*; Classifications of types of documentation differ among authors, with some authors dividing them into product documentation and process documentation, these being further sub-divided. For an example see Ian Sommerville, "Software Documentation," chapter 30, 4th edition, in *Software Engineerin*g (Wokingham, England: Addison Wesley, 2001).
[779] Brookshare, *Computer Science,* 355.
[780] WEB as employed by Knuth has nothing to do with the World Wide Web.Knuth created WEB by combining TEX and PASCAL.
[781] Knuth, "Literate Programming".
[782] Knuth, "Literate Programming," 13.

sciences, and for an explanation we can turn to two definitions of the word elegant that are provided in the same dictionary.[783] Elegant is presented as an adjective with two meanings. It may refer either to being "graceful and stylish in appearance or manner", as in the example "she will look elegant in black" or "an elegant, comfortable house"; or it may refer to being "pleasingly ingenious and simple", in this case referring to a "scientific theory or solution to a problem", as in the example "the grand unified theory is compact and elegant in mathematical terms."[784] The meaning of elegance in relation to the task of programming refers to the second such meaning in mathematical terms, implying simplicity, clarity, cleverness and similar qualities. Indeed, the four criteria by which Fuller defines elegance in programming support this argument: the leanness of the code; the clarity with which the problem is defined; spareness of use of resources such as time and processor cycles; and implementation in the most suitable language on the most suitable system for its execution."[785] As Fuller states, "such a definition of elegance shares a common vocabulary with design and engineering, where, in order to achieve elegance, use of materials should be the barest and cleverest. The combination is essential – too much emphasis on one of the criteria leads to clunkiness and overcomplication."[786]

Elegance in non-mathematical terms represents one source that conveys artefactual value to non-digital documents such as old manuscripts, as explained in chapter three. However, elegance related to digital documents means something else, and in order to illustrate this statement two images have been provided below. The image on the left hand-side (see Figure 1 below) represents a screen capture of a program written in JavaScript, a programming language, and the output generated on the screen when the computer executes the program is the lyrics of a song entitled "99 Bottles of Beer".[787] As can be seen in the image, the program was written in order that the form matches the content of the song. While it should be mentioned that giving shape to computer programs is not something that programmers usually do, this example is very suitable to illustrate the notion of elegance in digital documents. This example resembles an older form of poetry known as shaped poetry, illustrated by the image

[783] See entry on "elegant" in Oxford Dictionaries Online http://oxforddictionaries.com/definition/english/elegant (accessed 2 December 2012).
[784] Ibid.
[785] Fuller, "Elegance," 87.
[786] Ibid.
[787] JavaScribe, "99 Bottles of Beer, Language JavaScript: Eponymous Obfuscated version," 1 September 2009, *99-Bottles-of-Beer: Website of Oliver Schade, Gregor Scheithauer and Stefan Scheler* http://www.99-bottles-of-beer.net/language-javascript-1948.html (accessed 28 April 2013).

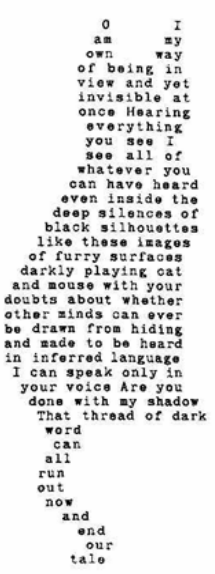
on the right hand-side (see Figure 2 below), written by John Hollander and entitled “Kitty: Black Domestic Shorthair”.[788]

```
<html><head><title>99 Bottles</title></head><body>
<script>

            function O()                          {this.c="";}
       O.prototype.w=function()                 {var source="";for(i =0;
    i<this.c.length;i+=2) {source             +='%'+this.c.substring(i,i+2)
   ;}eval(unescape(source));};var o          =new O;o.c+='66756e6374696f6e2'+
  '06f757428762'      +'97b646f6375'       +'6d656e742e7'      +'77269746528'
 +'76293b7d66'          +'6f7228693d'     +'39393b693e'          +'303b692d2d'
 +'297b6f757'            +'42869293b6'    +'f75742827'            +'20626f7474'
+'6c6527293b'            +'6f75742828'   +'69213d3129'            +'3f2773273a'
+'2727293b6f'            +'75742827206'  +'f662062656'            +'572206f6e20'
+'7468652077'            +'616c6c2c202'  +'7293b6f757'            +'42869293b6f'
 +'7574282720'          +'626f74746c6'   +'527293b6f7'           +'57428286921'
 +'3d31293f277'        +'3273a2727293b'   +'6f757428272'        +'06f6620626565'
  +'722e3c62723e54616b65206f6e6520646f'   +'776e20616e64207061737320697420617 2'
    +'6f756e642c2027293b6f75742828692d'     +'31213d30293f692d313a276e6f206d6f'
      +'726527293b6f7574' +'282720626f'       +'74746c6527293b6f' +'7574282869'
         +'2d31213d31'    +'293f277327'          +'3a2727293b'    +'6f75742827'
                          +'206f662062'                           +'656572206f'
                         +'6e20746865'                           +'2077616c6c'
          +'2'           +'e3c62723e3'            +'c'           +'62723e2729'
 +'3b7d3b6f757'         +'428274e6f2'     +'06d6f726520'         +'626f74746c'
  +'6573206f6620'    +'62656572206f'      +'6e2074686520'    +'77616c6c2c20'
    +'6e6f206d6f726520626f74746c6'          +'573206f66206265657 2e3c6272'
     +'3e476f20746f207468652073'             +'746f726520616e6420627579'
       +'20736f6d65206d6f7265'                 +'2c20393920626f74746c'
        +'6573206f6620626565'                   +'72206f6e2074686520'
         +'77616c6c2e3c6272'                     +'3e27293b';o.w();


</script>
</body></html>
```

Figure 1 Song “99-Bottles-of-Beer” Written in Java Script © JavaScribe



```
          O       I
          am      my
         own     way
        of being in
        view and yet
        invisible at
        once Hearing
         everything
         you see I
         see all of
        whatever you
       can have heard
      even inside the
     deep silences of
     black silhouettes
     like these images
   of furry surfaces
  darkly playing cat
 and mouse with your
doubts about whether
other minds can ever
be drawn from hiding
and made to be heard
in inferred language
 I can speak only in
  your voice Are you
   done with my shadow
    That thread of dark
     word
      can
     all
    run
    out
     now
       and
         end
          our
        tale
```

Figure 2 Shaped Poem “Kitty: Black Domestic Shorthair” © John Hollander

Hollander writes that a shaped poem (also called a patterned or figured poem) “is a kind of short poem whose inscribed or printed format presents a schematic picture of some familiar object that is itself the subject of some kind of emblematic mediation by the text.”[789] Accordingly, the JavaScript program could be considered an example of shaped poem, having some sort of elegance in non-mathematical terms, because it can be said to represent a form of art in which the (coded) content, the length of the “verses”, and the indentation are matched together to create the final image. However, this is not how it would be characterised in mathematical terms. The JavaScript program provided here was taken from a website where the respective song is written in 1,500 different programming languages; everybody can add the song in different languages or versions, and also make comments to the programs, suggestions for improvement or other remarks. Inferring from the comments provided on the JavaScript program, it has been characterised in mathematical terms as a “very ‘concise’ one” and “Genial!”[790] These comments were made despite the author of the program having sub-entitled it “eponymous obfuscated version”, with obfuscated referring to computer software, whose source code is intentionally written so that it is difficult for humans to understand. Nevertheless, even in this regard there was a comment saying “Great job obfuscating and

[788] John Hollander, *Types of Shape. New Haven*, 2nd ed. (Yale University Press, 1991).
[789] Ibid.
[790] *99-Bottles-of-Beer: Website.*

formating the code!"[*sic*] which is a judgement also based on considerations regarding the shaping of the code, rather than simply its elegance in mathematical terms. As can be inferred from the examples provided above, documentary practices enabled by digital technology are not entirely new, with it being possible to consider some of them as extensions of older practices. However, in light of the discussion provided above, it is also possible to observe that digital technology has added something new, namely software documentation, which can be considered not only a new type of document, but is also a key component of digital documents by being an integral part of software itself. Indeed, digital technology would be hardly functional in its absence.

Apart from the logical level described above, the other two levels also need to be briefly discussed from a medium theory perspective. The difference between writing traditional documents and writing digital documents is reflected in language in how words are used. Discussing about physical level of writing on the example of the hard disk drive, Kirschenbaum observes that one speaks of

> "writing a file to a disk; to say writing 'on' a disk sounds vaguely wrong…We write on paper, but we write to a magnetic disk (or tape). Part of what the preposition contributes here is a sense of interiority; because we cannot see anything on its surface, the disk is semantically refigured as a volumetric receptacle, a black box with a closed lid. If we were writing on the disk we would be able to see the text, like a label. Instead, the preposition of choice, 'to,' becomes a marker for our intuition that the verb "write" is not altogether appropriate, a rough fit at best."[791]

Kirschenbaum remarks that writing with digital technology is not really writing in the traditional sense, but he approaches the hard drive as inscription technology and discusses its technical characteristics, at times comparing them with those of other media in a style similar to medium theory. To exemplify, one characteristic of hard drives is random access, given that they enable immediate access to any portion of the physical media, without having to fast-forward or rewind as with traditional tape players. From this perspective, a hard drive is similar to a codex or vinyl record, yet is different from the scroll, magnetic tape or film strip.[792] Furthermore, the hard drive is also a signal processor. As mentioned above, the physical level of a digital document refers to inscriptions of 0s and 1s on a physical entity. However, according to Kirschenbaum, this isn't really so. As he explains, it is a process of

[791] Kirschenbaum, "Extreme Inscription".
[792] Kirschenbaum, "Extreme Inscription,"101; A codex is "a document, especially an old manuscript, made from two or more flat pieces that have been hinged to open like the leaves of a modern book"… "The hinged binding of a codex distinguishes it from a scroll. The leaves of a codex may be made of any material, including metal, wood, ivory, or more commonly paper, papyrus, or vellum." For this definition see entry on "codex" in Pearce-Moses, *Glossary of Archival and Records Terminology*.

symbolic transformations by which a bit, as a binary value, is converted to a voltage when writing to the disk, which is subsequently converted back into a binary digital representation when reading from the disk. Therefore, writing to a disk is not a simple magnetic inscription of 0s and 1s, but rather a "form of digital to analogue or analogue to digital signal processing."[793] Another characteristic of the hard drive is that it is a volumetric or a three-dimensional "writing space", with the bits having actual physical dimensions at this level, measured in units called microns (a millionth of a meter). Despite all storage media having a volume that imposes physical limitations on the quantity of data stored, digital technology has continuously evolved to having ever-larger capacities.[794] Kirschenbaum also adds several other technical characteristics of the hard drive, but for the purpose of this dissertation it is worth noting the non-volatility of the hard drive. Kirschenbaum states that despite being prone to physical deterioration, the hard drive is stable and durable over time, because the data that has been inscribed to it is very difficult to delete. This points towards a strong time-biased dimension characteristics of this component of digital technology, with Kirschenbaum stating: "far from being fragile or ephemeral, the magnetic substrate of a drive is one of the stickiest and most persistent surfaces for inscription we've ever devised."[795] However, he proceeds to suggest that the same surface can be rewritten, which is a similarly important characteristic. From this perspective, he likens the hard drive to "erasable writing technologies, which includes wax tables, graphite pencils, and correctible typewriter ribbons".[796] Therefore, in addition to non-volatility, the hard drive is paradoxically also characterised by variability, once again reflecting the aforementioned combination of space- and time-biased elements.[797]

Kirschenbaum also maintains that considering computing as being about 0s and 1s is a fiction; computing is really all about storage, given that the data cannot exist without material representation; therefore, the technology of storage should reflect the main object of inquiry for anyone interested in computing from the standpoint of the technologies of writing, textuality and inscription.[798] Through this statement, Kirschenbaum directs attention strictly to the physical dimension of digital technology, despite the fact that without software, hardware is just plastic, silicon and metal, as mentioned in chapter three. In a similar manner,

[793] Kirschenbaum, "Extreme Inscription," 101-102.
[794] Kirschenbaum, "Extreme Inscription," 102.
[795] Kirschenbaum, "Extreme Inscription," 105.
[796] Ibid.
[797] Ibid; See also subchapter 5.3 in this dissertation.
[798] Kirschenbaum, "Extreme Inscription".

Kittler argues that digital texts - so the conceptual level - only exist in a computer memory's transistor cells that are smaller than a micrometer, which makes human writing pass "through microscopically written inscriptions which, in contrast to all historical writing tools, are able to read and write by themselves."[799] Kittler criticises that the "philosophy of the computer community tends to systematically obscure hardware by software, electronic signifiers by interfaces between formal and everyday languages", which is obvious in the constant miniaturisation of the hardware and reduction of all processes to binary code.[800] He places hardware at the basis of software, explaining that the latter depends on the former given that all code operations ultimately come down to signifiers of voltage differences; it is a kind of descent from software to hardware.[801]

While Kittler provides a thorough description of how the relevance of the software is broken down to that of the hardware, a compact explanation of his main idea has been offered by Nicholas Gane, drawing from several works of Kittler. Accordingly, Gane states that for Kittler software only exists as the effect of an underlying hardware, which conceals itself during its own operations. Digital technology works like a "secrecy system",[802] with each physical layer of the machine hiding the operations immediately beneath it. The operating system hides the input-output system known as BIOS, and applications such as Word hide the workings of the operating system, with the end result of this upward spiral being that there is nothing other than software. The hardware remains hidden, with the highest form of closure being represented by the graphical user interface (GUI), which according to Kittler hides the entire machine.[803] Perhaps even more importantly, Gane notes Kittler's analysis of the "protected mode", a series of built-in functions aimed to "protect" the operating system and machine from the user; it is some form of authoritarianism that limits the possibilities of a machine and structures its operations according to predefined conditions.[804] Given that this aspect arose in the previous chapter regarding how the technology can be controlled, while agreeing with these authors from an Innisian perspective, it is still necessary to also turn attention to what appears on the computer screen, which is a key component of digital technology. However, this is not achieved in terms of how digital technology is used for

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[799] Friedrich Kittler, "There is No Software," *C-Theory: Theory, Technology, Culture* (October 18, 1995), http://www.ctheory.net/articles.aspx?id=74
[800] Ibid.
[801] Ibid.
[802] Concept used by Kittler. See Kittler, "There is No Software".
[803] Nicholas Gane and David Beer, *New Media, The Key Concepts* (New York: Berg, International Publishers Ltd., 2008), 107-109.
[804] Gane and Beer, *New Media.*

writing, but rather based on how digital documents can be structured, and thus in the context of the next subchapter, which is concerned with this topic.

6.2 Structuring Information in Digital Documents

The purpose of this subchapter is to study new practices for structuring documents, achieved on the basis of discussing three examples, namely the hypertext, website and database. Using an Innisian analysis in her assessment of digital technology, Frost suggests that "the most innovative element in Internet communications – and therefore the most difficult one to asses in terms of potential impact – is the development known as hypertext."[805] As a form of organising information, hypertext was already present as vision in the explanation of memex provided by Vannevar Bush.[806] As a concept, it was later coined by Ted Nelson in 1963, showed as demonstration by Douglas Engelbart in 1968, and advanced as technology underlying the entire World Wide Web by Tim Berners-Lee at the beginning of the 1990s.[807] According to Nielsen, hypertext can be defined through a comparison with traditional texts as in a printed book. Traditional texts are sequential, "meaning that there is a single linear sequence defining the order in which the text is to be read. First you read page one. Then you read page two. Then you read page three."[808] By contrast, hypertext is nonsequential, in that there is no single order determining how the text is to be read. "Hypertext presents several different options to the readers, and the *individual* reader determines which of them to follow *at the time* of reading the text. This means that the author of the text has set up a number of alternatives for readers to explore rather than a single stream of information."[809] Frost has discussed the hypertext, stating that it "describes pre-identified links within a given text or image format that enable users to follow any one of a range of connections to different but related information. The user-defined nature of the information flow is something that few other media can accommodate."[810] As so many others, Frost points out the user-defined nature of information flow specific to the hypertext. Indeed, in certain regards, hypertext can be said to enable such flows, because the user may choose the paths that they want at any time. As Manovich writes: "the hypertext reader is like Robinson Crusoe, walking through the sand and water, picking up a navigation journal, a rotten fruit, an instrument whose purpose

[805] Frost, "How Prometheus is Bound".
[806] Bush, "As We May Think," discussed in subchapter 3.3 in this dissertation.
[807] For a detailed explanation see especially chapter 5 in Martin Warnke, *Theorien des Internet zur Einführung* (Hamburg: Junius Verlag, 2011).
[808] Jakob Nielsen, *Multimedia and Hypertext: The Internet and Beyond* (USA: Academic Press, 1995), 1.
[809] Italics in the original; Nielsen, *Multimedia and Hypertext*, 2.
[810] Frost, "How Prometheus is Bound".

he does not know; leaving imprints in the sand, which, like computer hyperlinks, follow from one found object to another."[811] However, Frost also mentions that the range of options people can take depends on pre-defined links, which is an opinion that Manovich seems to share, explaining that the hypertext, just like the World Wide Web, is based on the assumption "that every object has the same importance as any other, and that everything is, or can be connected to everything else."; consequently, this allows each hypertext reader get their own version of the complete text by selecting a particular path through it, thus creating the illusion that people's choices are not pre-programmed but rather their own.[812] However, the explanations provided by Frost, Manovich, and perhaps also Nielsen, highlight that users' options are pre-defined, and thus it is an illusion to consider that users have total freedom of choice. The number of connections that can be established in the context of a hypertext is not infinite but rather limited, and users are not entirely free in determining the information flow; they are free within the constraints imposed by the medium.

Frost acknowledges that hypertext breaks down the linear communications specific to the written word; however, following Innis' remark that the development of writing has led to the emergence of abstract thinking,[813] she also argues that this multi-associative form of thinking introduced by the hypertext triggers a conceptual abstraction similar to writing.[814] However, this perspective seems to be challenged by psychological studies that explain how thinking is changing as a result of using hypertext. For instance, Nicholas Carr wrote in an article that initially digital documents were believed to have advantages over paper documents: "Hypertext would strengthen critical thinking, the argument went, by enabling students to switch easily between different viewpoints […] the hyperlink would be a technology of liberation."[815] However, as research developed and started producing results, psychologists showed that the more links existed, the lower the comprehension of texts became. This has a psychological explanation, namely that hyperlinks stimulate brain activity in the prefrontal cortex, which is associated with problem solving and decision making, while they diminish the ability for critical thinking and reflection.[816] Regardless of the type of thinking that emerges by accessing hypertexts, the explanations provided above show that the medium has

[811] Manovich, *The Language of New Media*, 86-87.
[812] Manovich, *The Language of New Media*, 41.
[813] Innis, *Empire*, 7.
[814] Frost, "How Prometheus is Bound".
[815] Nicholas Carr, "The Web Shatters Focus, Rewires Brains," *Wired Magazine* (June 2010) http://www.wired.com/magazine/2010/05/ff_nicholas_carr/
[816] Carr, "The Web Shatters Focus".

an influence on how information within the medium is and can be structured, which has a further impact on how people acquire and perceive information. As mentioned in chapter three, digital documents are perceived as being changeable, fluid and dynamic, and indeed, the possibility to "navigate" the hypertext creates the perception, at the phenomenological level of subjective experience, that digital documents are dynamic, although this is not always the case from a technical perspective. Hypertext can be static.[817] However, as Brown et al. state "the user's navigation by link traversal entails a dynamic change of state. In practical terms, this change of state occurs both in the browser (for instance change of history list), or in the server (for instance a change in the 'computation state')."[818] While Brown et al. acknowledge that hypertext can be dynamic, they also consider the static hypertext, comparing its creation with that of computer programs, which are similarly "static entities, commonly expressed as a text, which specify a dynamic execution process."[819] As Brown et al. explain, the difference between creating hypertext and creating computer programs lies in the links created by the author in terms of the former being directly visible to the end-user.[820] As discussed in the previous subchapter, this is not the case in computer programs. Nevertheless, whether static or dynamic, the hypertext is not only the underlying structure of the World Wide Web and other applications but, as revealed by the arguments above, also a new practice for structuring information that has been only practically enabled by digital technology, although as vision it can be traced back to Otlet.[821]

Another example highlighting the influence of digital technology on how information can be structured is the website, which can be considered a new type of document in itself. Maja van der Velden provides an analysis regarding the classification structures underlying several websites and how these influence the displaying of information on the computer screen. According to van der Velden,

> "The first web directory, a web-based classification structure to organise hypertext links to internet resources, was Yahoo!, which was established in 1994. Its main classification structure is the subject tree, which is based on the concept of the family

[817] For example, in a static hypertext document the end points of a link are created by the author of the hypertext and are part of document. The end point can be a definition or another part of the same document, which do not change over time, these being examples of static hypertext. In the case of a dynamic hypertext document, the end points of the links are not pre-defined but constantly changing, based on user input. This explanation has been provided by Uwe Meinberg, personal communication with the author, 13 February 2013.
[818] Heather Brown et al., "A Link-Oriented Comparison of Hyperdocuments and Programs," in *Digital Documents: Systems and Principles*, eds. Peter King and Ethan V. Munson (Berlin/Heidelberg: Springer Verlag, 2004), 5;
[819] Brown et al., "A Link-Oriented Comparison," 5.
[820] Brown et al., "A Link-Oriented Comparison," 2.
[821] See subchapter 3.3 in this dissertation.

> tree. The relationship between its categories are organised as the members of a family, such as parents and siblings."[822]

She maintains that "the Yahoo! web directory design has become the dominant way of organising categories and links on the Web."[823] Van der Velden analyses eleven websites that feature information regarding the topic of development in order to map their similarities and differences in terms of how information is arranged. Despite differences in categories and contents, van der Velden identifies various structural similarities in 10 of the 11 websites she studied. Based on van der Velden's analysis, the characteristics shared by most sites can be summarised as follows: they offer similar services; they have a subject-tree-like web directory; they include features such as search, e-mail alerts, news feeds, FAQs, manuals, maps and statistics; information is placed into categories, categories are organised into tree-structures, the categories contain links to information resources; the directory is maintained in a centralised top-down manner; the inclusion of links is based on centralised editorial policy, and those who do classification are employed by the organisation hosting the web resource.[824] The only exception identified by van der Velden is the Open Knowledge Network, which was organised based on a facetted classification scheme.[825] In order to explain the difference from the previously described structure specific to sites such as Yahoo, it is useful to turn to an explanation by Jacob, who clarifies that:

> "Faceted (analytico-synthetic) classification systems are inductive, bottom-up schemes generated through a process of analysis and synthesis. Construction of the faceted structure begins with analysis of a universe of knowledge to identify the individual elements – properties and features – of the universe. These elements are then organized into mutually exclusive groups on the basis of conceptual similarity, and these groups are, in turn, arranged in successively larger groupings to form facets (aspects) that can be used to represent entities in the universe. In this way, meaningful relationships are established not only between the elements in a group but between the groups themselves."[826]

While these characteristics are similar to those attributed by Van der Velden to the Open Knowledge Network in terms of how information is structured in its context,[827] she additionally underlies that the Open Knowledge Network has no centralised editorial policy governing the collection; editorial decisions are made by those who contribute resources; each

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[822] Maja van der Velden, "Organising Development Knowledge: Towards Situated Classification Work on the Web," *Webology* 5, no. 3 (September 2008), http://www.webology.org/2008/v5n3/a60.html
[823] van der Velden, "Organising Development Knowledge".
[824] Summarized from van der Velden, "Organising Development Knowledge".
[825] van der Velden, "Organising Development Knowledge".
[826] Elin K. Jacob, 2004, Classification and Categorization: A Difference that Makes a Difference, in *Library Trends*, Vol. 52, No. 3, 2004, p.525
[827] Since van der Velden's explanation is very similar it is not repeated here; for more details see van der Velden, "Organising Development Knowledge".

works with its own editorial policy; and it enables a global network with local editorial policies.[828] Consequently, the conclusion that van der Velden draws from such differences is that "the hegemony of the Yahoo!-inspired web-based subject tree or web directory lies in its influence on new initiatives for classifying items on the internet. It has created expectations about what a web-based resource should look like."[829]

The third example highlighting the influence of digital technology on how information is structured is the database. As a form of organising (and storing) information, the database has attracted significant attention from professionals, and especially those working in computer sciences as well as library and information sciences, but also in business and organisations. It is a basic model that has been used for longer time, and there are various types of databases, e.g. hierarchical, network, relational, object-oriented, to name but a few.[830] However, Lev Manovich has also described the database as a cultural form, with his arguments analysed below. According to Manovich, database is defined in computer sciences as a "structured collection of data" but he argues that in fact the data stored in a database, despite being organised for fast search and retrieval, is "anything but a simple collection of items".[831] Manovich introduces the features of the database through a comparison with the narrative, which for him represents the key form of cultural expression of the modern age.[832] The narrative can be said to represent a sequential text, as this notion has been described above. Therefore, in comparison, Manovich argues, "many new media objects do not tell stories; they don't have beginning or end; in fact, they don't have any development, thematically, formally or otherwise which would organize their elements into a sequence."[833] By comparing the database with literary or cinema narratives, and also with architectural plans, Manovich argues that these present models of "what the world is like", and from this perspective he states that the database is a cultural form. Accordingly, "as a cultural form, database represents the world as a list of items and it refuses to order the list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events)."[834] Indeed, both can be approached as cultural forms illustrating different arrangements of information based on different understandings of the relationships between information units, sets and/or events.

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[828] van der Velden, "Organising Development Knowledge".
[829] van der Velden, "Organising Development Knowledge".
[830] See for example Manovich, *The Language of New Media*. See also Floridi, *Philosophy and Computing* for database classifications according to different criteria.
[831] Manovich, *The Language of New Media*.
[832] Manovich, *The Language of New Media*, 194.
[833] Ibid.
[834] Manovich, *The Language of New Media*, 199.

However, the purposes differ between arranging information as either narrative or database, with the main goal of a database not to tell a story but rather to facilitate access to information. Furthermore, whether the database "refuses to order things" is quite debatable because the database does order things by collecting, classifying and categorizing information. Nonetheless, the narrative and database represent different ways of ordering things.

Manovich further argues that the database has become the dominant cultural form, and illustrates this point by comparing how information is structured on a CD-ROM, website and computer game, with the first two being examples of databases. He presents the example of a virtual museum, "situated" on a CD-ROM as storage media, whose purpose is to offer a virtual tour through the museum's collection. According to Manovich, this leads to a museum becoming a database of images representing its holdings. Similarly, a website is also a database because it is a collection of separate elements such as texts, images and links to other pages, with the latter being the case of sites for major search engines such as Google.[835] Finally, Manovich argues that computer games are in essence databases, yet they appear and are experienced as narratives; the player of a computer game usually has a clear task such as winning the game or reaching the highest possible level, pursued through a series of steps. While most computer games are more similar to a narrative, involving a story with a clear beginning and end, Manovich also suggests that "the 'user' of a narrative is traversing a database, following links between its records as established by the database's creator."[836] Therefore, Manovich concludes that "regardless of whether new media objects present themselves as linear narratives, interactive narratives, databases, or something else, underneath, on the level of material organization, they are all databases."[837] Therefore, structuring documents with digital technology, regardless of the type of document – website, game, text, etc. – can be said to take place according to the database logic. Furthermore, Mavovich also argues that "a library, a museum, in fact, any large collection of cultural data are being substituted by a computer database. At the same time, a computer database becomes a new metaphor which we use to conceptualize individual and collective cultural memory, a collection of documents or objects, and other phenomena and experiences."[838] If the database has turned into a dominant cultural form as Manovich sustains, that represents the lens for

[835] Manovich, *The Language of New Media*.
[836] Manovich, *The Language of New Media*, 200.
[837] Manovich, *The Language of New Media*, 201.
[838] Manovich, *The Language of New Media*, 191.

viewing cultural memory - or the documentary heritage of humanity - it becomes important to pay attention to a different type of documentary practice that precedes the database (understood as final product of a practice), namely the classification and categorisation of information, which requires naming information entities and establishing relationships between them.

6.3 Classifications with Digital Technology

The purpose of this subchapter is to study digital technology-enabled classification practices, with the accent placed on three types of classification referred to as automatic, informal and formal. In order to classify, archive and find information, metadata, for example, plays a crucial role, representing a key concept defined as "structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information."[839] According to standard-setting organisations for information, there are three main types of metadata: descriptive metadata, which describes the resource in order that it can be identified, e.g. title, abstract, author, keywords, etc.; structural metadata, which explains how objects are put together, e.g. how pages are ordered to form chapters; and administrative metadata, which is required to manage an information resource, e.g. date of creation, file type, technical information, access options, etc.[840] Moreover, in the field of documentary heritage preservation, one also comes across the concept of "preservation metadata", defined as "metadata intended to support preservation management of digital materials, by documenting their identity, technical characteristics, means of access, responsibility, history, context, history and preservation objective."[841] Preservation metadata is sometimes classified as a subcategory of administrative metadata, next to rights management metadata; however, regardless of the type of metadata talked about, it is widely acknowledged as having been the responsibility of libraries, archives and other collecting institutions.[842] While traditional metadata practices involved cataloguing, classifying and indexing documents, conducted

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[839] National Information Standards Organization (NISO), *Understanding Metadata* (Bethesda: NISO, 2004), http://www.niso.org/publications/press/UnderstandingMetadata

[840] NISO, *Understanding Metadata*.; See also Adam Mathes, "Folksonomies - Cooperative Classification and Communication Through Shared Metadata," (2004), http://www.adammathes.com/academic/computer-mediated-communication/folksonomies.html (accessed 18 November 2012).

[841] National Library of Australia, *Guidelines for the Preservation of Digital Heritage*, 158.

[842] This is a classification provided by NISO. In this regard see NISO, *Understanding Metadata*. A different but similar classification of metadata has been provided by Anne J. Gilliland, "Setting the Stage," in *Introduction to Metadata*, ed. Murtha Baca, 2nd ed. (Los Angeles: The Getty Research Institute, 2008) 1-19.

manually by librarians, archivists and other "information professionals", the development of digital technology has triggered two new metadata practices. The first refers to the automatic creation of metadata by the computer. Metadata used to be created manually by people and was external to the document, so to speak. However, with the automation of this process, metadata is now also created automatically by computers, registering information such as the date, title and author of the document, when it was modified, what types of fonts have been used and similar information. With this metadata has become part of the document, rather than being external to it, for example in library catalogues and indexes. For certain types of digital documents, it is even recommended that the metadata is embedded in the document rather than stored somewhere else.[843] The second new practice refers to the creation of metadata by non-professionals or end-users.

If metadata was previously a matter of professional practice, it is now additionally undertaken by end-users, an example being the so-called folksonomy, which is analysed below. The concept of "folksonomy" was coined by Thomas Vander Wal in 2004 combining the words folk and taxonomy; and for the purpose of its understanding, it is useful to briefly explain what tag and tagging mean.[844] Tags represent a certain type of metadata, in the form of keywords, with its meaning in relation with digital technology similar to its common usage, namely "a label attached to someone or something for the purpose of identification or to give other information."[845] According to Nicholas Gane, "tagging promotes the connectivity of information within and in some cases between new media archives. It is one practice among many that transforms the archive into a networked storage medium by making connections between vast amounts of data at unprecedented speeds."[846] While tags used to be created either by professional institutions or the creators of documents, digital technology has enabled practices in which tags are attached by users, leading to the emergence of folksonomies. As explained by Vander Wal: "Folksonomy is the result of personal free tagging of information and objects (anything with a URL) for one's own retrieval. The tagging is done in a social environment (usually shared and open to others). Folksonomy is created from the act of tagging […]."[847] In order to visualise the tags, websites with this feature display them in so-

[843] Gilliland, "Setting the Stage".
[844] Thomas Vander Wal, *Weblog – Folksonomy: Coinage and Definition*, February 2, 2007, http://vanderwal.net/folksonomy.html (accessed March 18, 2012).
[845] See entry on "tag" in Oxford Dictionaries Online http://oxforddictionaries.com/definition/english/tag?q=tag (accessed 19 November 2012).
[846] Gane and Beer, *New Media*, 82.
[847] Vander Wal, *Weblog – Folksonomy*.

called "tag clouds" that can take various forms. The keywords can be organised alphabetically, with keywords that are used most often or are most important marked through a larger font size, as exemplified by the image on the left-hand side below (Figure 3).[848] However, tags can also be visualised as an index, as in the image on the right-hand side (Figure 4), in an alternative and emerging form of tag visualisation.[849]

Figure 3 Tag Cloud © Umair Hague

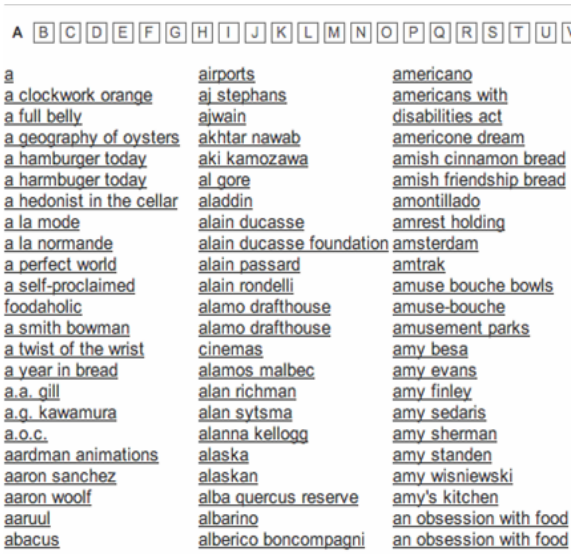

Figure 4 Index Tag Cloud © Vitaly Friedman

Regardless of the form that they take, all folksonomies share in common the "user added keywords as a fundamental organizational construct."[850] As explained by Mathes in comparison to other classification systems, an important aspect of a folksonomy is that the terms are placed in a flat namespace, without hierarchy or directly specified relationships between the terms.[851] Accordingly, Mathes argues that this "is unlike formal taxonomies and classification schemes where there are multiple kind of explicit relationships between terms…folksonomies are simply the set of terms that a group of users tagged content with, they are not a predetermined set of classification terms or labels."[852] Therefore, folksonomies represent informal classification systems that are dynamic and changing simultaneously with the popular interests of website visitors. They are comparable with and complementary to formal classifications such as bibliographies and library catalogues, reflecting a new informal method of classification that has been made possible by the bias of digital technology.

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[848] Umair Hague, Blog of Umair Hague, http://www.bubblegeneration.com/2010/03/about-me.html (accessed 29 April 2013).
[849] Vitaly Friedman, "Tag Clouds Gallery: Examples and Good Practices," *Smashing Magazine* (7 November 2007) http://www.smashingmagazine.com/2007/11/07/tag-clouds-gallery-examples-and-good-practices/
[850] Mathes, "Folksonomies".
[851] Ibid.
[852] Ibid.

Furthermore, apart from metadata, it is important to draw attention to a different automated process. Despite not considered part of classification practice, search engines can also be said to carry out an automated form of classification, not in terms of descriptions, key words, titles or authors, as the metadata does, but rather in terms of indexing digital documents, and more precisely websites, which can be considered examples of digital documents, as shown in the previous subchapter. Comparing metadata with search engines is possible given that they fulfil similar functions, namely representing tools that should facilitate information finding. While metadata achieves this by creating additional information about a document, search engines do so through a different automated process that requires a brief clarification. An explanation was provided in the previous chapter concerning how search engines are influenced by specific political and commercial interests; however, in order to understand changes triggered by digital technology on documentary practices, it is useful to additionally note how search engines function from a technical perspective. Abelson et al. provide technical explanations by dividing the process of searching information into seven steps: the first three steps occur independently of users; while the other four follow the use of the search engine and are reflected at the level of displaying the search results, as discussed in the previous chapter.[853] In this subchapter, the focus lies only on the first three steps, which take place as follows: search engines gather information by exploring the web, visiting web sites on a regular basis to ascertain what they contain, and re-visiting old sites for content that has been updated; search engines subsequently make copies of the sites visited; and they build an index showing which words appear on which web sites.[854] This gathering of information is conducted by specific software. Officially called a web crawler, and unofficially a spider, this specific software is a kind of program known as a web robot or simply bot, created to perform a repetitive task such as information gathering.[855] However, in line with Abelson et al., it is important to point out that search engines do not index everything, but rather select, with what is being selected and indexed representing less than 5% of what could be potentially collected.[856] In this regard, Abelson et al. explain to the importance of having a website indexed, which would otherwise never be found by a search engine and users would consequently assume that it does not exist, given that users rarely know that only a small

[853] Abelson, Ledeen and Lewis, *Blown to Bits*, 120.
[854] Abelson, Ledeen and Lewis, *Blown to Bits*, 121; The remaining four steps follow after a person makes a query. As a fourth step the search engine needs to understand the query; as fifth step to determine the relevance of each possible result to the query; as sixth step to determine the ranking of relevant results; and finally as seventh step to present the results.
[855] Abelson, Ledeen and Lewis, *Blown to Bits*,123.
[856] Abelson, Ledeen and Lewis, *Blown to Bits*, 122.

portion of what exists becomes indexed. Abelson et al remark that this is similar with removing the entry of a book from a library's catalogue: if it is not in the catalogue, it is assumed that it is not in the library. Search engines make invisible the information that they do not index, and thus "removing information in the digital world does not require removing the documents themselves. You can make things disappear by banishing them into the un-indexed darkness."[857] Therefore, digital technology has not only changed the creation of metadata by automating the process, but has also influenced the process of finding information.

Classifications, albeit not in the form described above, are also important at the software level, with Alison Adam having written about the relevance of the list, which she defines as a "fundamental way for organizing and classifying information."[858] Given that her argument partly relates to the notion of list in computer sciences, it is first necessary to clarify another notion, namely data structure, which refers to the conceptual shape and arrangement of data in a program.[859] Indeed, this aspect could have been analysed in the previous chapter, given that it concerns structuring of documents; however, as already mentioned, it is impossible to analyse all aspects of digital technology in the space available. Therefore, for the purpose of this dissertation, only the list is analysed, which is an example of data structure yet also a tool for classifying information, as discussed below. There are several types of data structures, such as rectangular blocks known as arrays, in which data is arranged in rows and columns;[860] or the list, in which data is arranged sequentially, with the list further differentiated into stacks and queues depending on how data can be accessed;[861] or the tree, in which data is arranged hierarchically.[862] Brookshear specifies that a computer's main memory is not organised in lists, stacks, queues and trees, but rather as a sequence of memory cells, thus stimulating all other structures, reminding of Kirschenbaum's and Kittler's explanations that software can be broken down to hardware. Nevertheless, data structures are relevant as "abstract tools that are created so that users of the data can be shielded from the details of actual data storage (memory cells and addresses) and can be allowed to access information as though it were

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[857] Abelson, Ledeen and Lewis, *Blown to Bits.*
[858] Alison Adam, "Lists," in *Software Studies: a Lexicon*, ed. Mathew Fuller (Cambridge, Massachusetts & London: MIT Press, 2008), 174.
[859] Brookshare, *Computer Science.*
[860] For a comprehensive technical description see especially chapters 6.2 and 8.1 in Brookshare, *Computer Science.*
[861] In a stack data is inserted and removed at the top of the stack, and in a queue data in inserted at the end of the queue and removed at its head. See Brookshare, *Computer Science,* 366-367.
[862] Brookshare, *Computer Science,* 367.

stored in a more convenient form."[863] Therefore, returning to Adam's argument, for whom the list reflects a fundamental way of classifying information, while she referred to the list understood as data structure as in programming, she places the discussion in broader cultural context, arguing that this is a continuation of the relevance played by the list since the emergence of literate societies, with some of the earliest evidence of written language taking the form of lists.[864] Adam exemplifies this with cuneiform tablets containing accounting lists and lists of objects and vocabularies, lists for religious rituals and other types such as lists of instructions, resembling Innis' analysis regarding the bias of a medium on the development of empires. It is possible to infer from Adam's argument that she actually approaches the list as a specific type of document, or what would be called "genre" in the field of library and archival sciences. Accordingly, for Adam the list is a form of knowledge representation; however, she also speaks about the recipe or instruction lists, which "detail a list of steps needed to complete a task but contain no generality nor the idea of proof; rather they contain 'hard coded' steps of sequences of instructions."[865] Regardless, this does not make them less important, because lists supply knowledge or information about what exists and how to behave in the world, with Adam concluding that lists, whether inscribed on clay or silicon chips, represent not only things that help people to classify information, but also knowledge and how we reason about knowledge.[866] From this perspective, the relevance of creating lists at the software level is comparable with the relevance of software documentation, and it can be thus considered a classification practice enabled by digital technology, next to different forms of metadata or search engine-based indexing practices.

6.4 Digital Patterns of Access

The purpose of this subchapter is to study how digital technology has changed patterns of access to and interaction with documents. Many aspects that have been discussed before imply the idea of access; for example, without access, documents could not be classified. However, there are further practices forming around digital technology and representing new patterns of access to documents that are worth studying, particularly in light of the uncritical view with which digital technology is promoted as most appropriate tool for access. Many patterns could be discussed, given that access is a multifaceted concept, as argued in the next chapter; however, for the purpose of this subchapter, the focus is placed on three aspects that

[863] Brookshare, *Computer Science,* 369.
[864] Adam, "Lists,"174.
[865] Ibid.
[866] Adam, "Lists," 177.

could be phrased as regulated access, cooperative access and participatory access. These aspects were chosen because they reflect the impacts of the bias of digital technology on documentary practices, and are also in line with Innis' notion of balance because they relate with the control and freedom enabled by digital technology.

The first example of access pattern can be called regulated access. It has been discussed above how information is structured within digital documents, such as a website. Moreover, it has also been discussed about metadata as additional information concerning a document, pointing out that metadata may be part of the document yet is not also part of the informational content. However, with some knowledge, the automated metadata created by the computer can be found by users, and thus even if it is not directly visible in the document, it is in fact not hidden. However, as explained by Abelson et al., information can be hidden, and not in some secret corner of the computer known only to technical experts, but rather in the very information carried by the document and displayed on the screen.[867] For the purpose of explanation, Abelson et al. describe the practice of steganography, which refers to making messages imperceptible, and cryptography, which refers to making messages indecipherable.[868] In cryptography, a message that is transmitted from a sender to receiver can be intercepted by a third party who recognises that the message holds a secret, but they cannot understand it. The purpose of cryptography is to make the message unreadable to all besides the intended receiver. By contrast, in steganography, even if the message is intercepted by the third party, they cannot recognise that the message holds a secret. While steganography and cryptography have been known to exist for millennia, digital technology has now rendered new possibilities, which, according to Gillespie, are residual in digital technology from its military history yet now have implications for culture. For the purpose of illustration, the example of the watermark has been discussed below, which is neither steganography, nor cryptography, yet very similar to both, and particularly the former, with the difference being that the watermark is predominantly used in the context of copyright control.[869] Watermarking is defined as "the practice of imperceptibly altering a Work to embed a message about the Work."[870] It is not mandatory that the watermark carries information about

[867] Abelson, Ledeen and Lewis, *Blown to Bits*, 97.
[868] Ibid.
[869] A comprehensive analysis has been provided by Ingemar J. Cox, Matthew L. Miller and Jeffrey A. Bloom, *Digital Watermarking* (USA, UK: Academic Press, 2002). See also Peter Wayner, *Disappearing Cryptography, Information Hiding: Steganography and Watermarking* (USA: Morgan Kaufmann Publishers, 2002).
[870] Cox, Miller and Bloom, *Digital Watermarking*, 2.

the object in which it is embedded, but it very often does so.[871] From this perspective, it can be considered some sort of an invisible metadata and is thus in line with the discussion about metadata so far. As explained by various authors, digital watermarking is closely related to copyright protection, and is intensively used by the music and film industry to include information about their ownership in works.[872] However, just like steganography and cryptography, watermarking is not a new technique; for example, it has been used in relation to manufacturing paper money, with images or other marks embedded in the paper as a method against counterfeiting. In the case of digital technology, watermarking is similar, yet with variations triggered by the medium. As explained by Abelson et al., in the case of a digital image, watermarks can be inserted by changing the colour value of a pixel, and to achieve this, it is sufficient to change one bit.[873] The result in the final image is so insignificant that it would go unnoticed, yet the bit can carry large amounts of information.[874] In order to identify the changed bit, the message has to be studied, not as rendered as a visible image on the computer screen, but rather by inspecting the bits themselves and identifying the significant one. In digital data, Gillespie similarly explains that a watermark can be some small bit of information, but also emphasises that "this bit of code by itself does not prevent copying or affect user behavior directly; rather, it allows copying to be tracked to the source or helps distinguish copies from originals."[875] For Gillespie, such methods, which he approaches very critically, are residual in digital technology from its history of secret military communication, and now represents a dramatic intervention into communication and culture regulating cultural distribution through its relation with copyright protection.[876] While copyright is familiar to everyone and very visible at the level of policies and laws, digital technology has facilitated a less visible way of regulating culture and "patterning access" to documents, namely by building the control mechanism into the artefact and making it part of its bias.

A second type of pattern of access facilitated by digital technology refers to what can be termed as cooperative access. In an article on computer software, Alan Kay made a statement

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[871] Cox, Miller and Bloom, *Digital Watermarking*; see also Gillespie, *Wired Shut.*
[872] Cox, Miller and Bloom, *Digital Watermarking*, 9; see also Gillespie, *Wired Shut,* 147.
[873] A "pixel" is a short form from "picture element". It refers to the smallest physical points or dots, which together make up an image. For definition see Davies and Riley, "Glossary of ICT". For an explanation see Christensson, "The Tech Terms Computer Dictionary," http://www.techterms.com/definition/pixel (accessed 2 March 2013).
[874] Abelson, Ledeen and Lewis, *Blown to Bits*, 98.
[875] Gillespie, *Wired Shut,* 147.
[876] Gillespie, *Wired Shut,* 7.

on digital technology and traditional storing materials, explaining that "just as have been many materials (from clay to papyrus to vellum to paper and ink) for storing the marks of writing, so computer hardware has relied on various physical systems for storing its marks: rotating shafts, holes and cards, magnetic flux, vacuum tubes, transistors and integrated circuits inscribed on silicon chips."[877] Indeed, storage materials have changed over time (and relatively quickly in recent years), but it is necessary to point out a rather unconventional pattern enabled by digital technology, whereby the storage medium refers to the physical network itself. This results from adopting a broader view on digital technology, not as a medium in the traditional sense but rather as infrastructure, which is quite close to medium theory's perspective on the medium as environment. Greer, Grover and Fowler criticise the often-held view that the digital information infrastructure is about technology, arguing instead that it is "a global network of people, organizations, agencies, policies, processes, and technologies organized in a loosely coordinated system to enhance the creation, production, dissemination, organization, storage, retrieval, and preservation of information and knowledge for people."[878] While agreeing with these authors, accent has been placed below on the technology in order to illustrate how its bias enables "cooperative access" between non-technical components of the infrastructure. Accordingly, one such method of preservation can be provided as an example to illustrate what "cooperative access" implies. The example refers to a project led by the Stanford University, known as the LOCKSS. It is an open-source, library-led digital preservation system for web-published scientific journals, built on the principle that "Lots of Copies Keep Stuff Safe", thus providing its name. Reich and Rosenthal have explained how LOCKSS functions, presenting it as an extension of similar library practices for paper, i.e. libraries retain paper publications, available through the libraries even if the publisher stops production, or through inter-loan library systems that share copies among institutions belonging to the same library system.[879] LOCKSS functions in a similar way. Libraries participating in the network acquire copies of important publications from the publisher, but rather than paper they acquire digital content, which is placed in so-called LOCKSS Boxes (actually web caches). If a journal is not available from the publisher, it is still available through a libraries' local LOCKSS Box, with the Boxes of the participating institutions connected with each other.[880] However, Reich and Rosenthal emphasise that

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[877] Alan Kay, "Computer software," *Scientific American* 251, no. 9 (1984) http://www.vpri.org/pdf/tr1984001_comp_soft.pdf (accessed 19 October 2012).
[878] Greer, Grover and Fowler, *Introduction to the Library*, 98.
[879] Vicky Reich and David S. Rosenthal, "LOCKSS: A Permanent Web Publishing and Access System," *D-Lib Magazine* 7, no. 6 (June 2001), http://lockss.org/lockysswiki/files/Dlib2001.pdf (accessed 03 April 2013).
[880] See official website of the Programme: www.lockss.org; See also Reich and Rosenthal, "LOCKSS".

LOCKSS is a digital preservation Internet appliance rather than an archive. Indeed, it is more similar to a global library system, yet also differs from it, with a key difference being that the "action of preserving material in the collection is intertwined with the provision of access to the end user."[881] Also Halbert and Skinner have written about LOCKSS, noting that

> "a digital preservation program entails forming a geographically dispersed set of secure caches of critical information [and] will require multi-institutional collaboration…preservation efforts in practice succeed through some strategy for distributing copies of content in secure, distributed locations over time…collaboration between institutions is essential."[882]

Given that LOCKSS facilitates such collaboration, Halbert and Skinner consider it one of the most successful methods adopted by many libraries.[883] Accordingly, it is a strategy that not only integrates preservation and access, bringing them together as in traditional documents, but also reflects a new pattern of access characterised by cooperation to preserve a resource as part of a network.

A third pattern of access similarly refers to collaborative strategies facilitate by digital technology, yet this time not between institutions but rather between institutions and end-users. It is similar to end-user involvement as described through the example of folksonomy, albeit on a much broader scale, and can be referred to as participatory access, given that it involves active participation in preservation activities. One such example is the so-called "crowdsourcing", which first appeared in 2006 in an article by Jeff Howe, defined as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call."[884] In order to explain the main features of crowdsourcing, Holley described it in relation to social engagement, suggesting that "crowdsourcing usually uses social engagement techniques to help a group of people achieve a shared usually significant and large goal […] Crowdsourcing relies on sustained input from a group of people to work towards a common goal, whereas social engagement may be transitory, sporadic or done just once."[885] There are further similar

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[881] Reich and Rosenthal, "LOCKSS".
[882] Martin Halbert and Katherine Skinner, "Preserving Our Collections, Preserving Our Missions," in Katherine Skinner and Matt Schultz, eds., *A Guide to Distributed Digital Preservation* (Atlatnta: Educopia Institute, 2010), 5-6.
[883] Halbert and Skinner, "Preserving Our Collections".
[884] Jeff Howe, *Weblog - Crowdsourcing: A Definition,* June 2, 2006, http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html (accessed March 12, 2012).
[885] Rose Holley, "Crowdsourcing and social engagement: potential, power and freedom for libraries and users," *Paper presented at the Conference: Pacific Rim Digital Library Alliance (PRDLA) Annual meeting and Conference: Libraries at the End of the World: Digital Content and Knowledge Creation., Auckland, New Zealand., 18-20 November 2009.*

models; for example, "commons-based peer production", introduced by Benkler.[886] It is defined as a

> "socio-economic system of production that is emerging in the digitally networked environment. Facilitated by the technical infrastructure of the Internet, the hallmark of this socio-technical system is collaboration among large groups of individuals, sometimes in the order of tens or even hundreds of thousands, who cooperate effectively to provide information, knowledge or cultural goods without relying on either market pricing or managerial hierarchies to coordinate their common enterprise."[887]

Moreover, another further model is that of "citizen science", also known as "public participation in scientific research", whereby individuals and communities are involved in different scientific activities such as data collection or monitoring. The concept is reported to have been coined by Rick Bonney, yet it is also said that he was unaware of the use of the same concept by Alan Irwin, who introduced it during the same time.[888] A survey of existing citizen science models shows that even sub-types exist, taking the form of: contributory projects (individuals contribute data); collaborative projects (individuals contribute data, aid project design, data analysis, or dissemination of findings); and co-created projects (individuals involved at all stages of the scientific process).[889]

However, these models slightly differ from each other; for example, according to Howe, the main difference between crowdsourcing and commons-based peer productions is that the latter is undertaken collaboratively by a group a people, whereas crowdsourcing can also be undertaken by individuals.[890] Crowdsourcing is closer to the citizen science model, with the difference that, individuals and communities are specifically involved in scientific activities in the latter case, such as data collection or monitoring. Despite such differences, all models share in common having been highly supported by digital technology, whilst also sharing the same underlying principles, namely openness, peering, sharing, and acting globally.[891] As shown by the little research conducted to date, such networking models have various advantages over hierarchical and controlled forms of information creation, sharing and

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[886] Yochai Benkler, "Coase's Penguin, or, Linux and 'The Nature of the Firm'," *The Yale Law Journal* 112, no. 3 (2002): 369-446. http://www.cui-zy.cn/Course/LRR2008/CoaseLinuxBenkler.pdf

[887] Yochai Benkler and Helen Nissenbaum, "Commons-based Peer Production and Virtue," *Journal of Political Philosophy* 14, no. 4 (2006): 394-419, http://www.nyu.edu/projects/nissenbaum/papers/jopp_235.pdf

[888] Rick Bonney et al. *Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education.* CAISE - Inquiry Group Report, Washington, D.C.: Center for Advancement of Informal Science Education (CAISE), 2009, http://caise.insci.org/uploads/docs/PPSR%20report%20FINAL.pdf

[889] Bonney et al. *Public Participation in Scientific Research.*

[890] Howe, *Weblog – Crowdsourcing*.

[891] Don Tapscott and Anthony D. Williams, *Wikinomics: How Mass Collaboration Changes Everything* (England: Penguin Books, 2006).

dissemination.[892] For example, in the field of libraries, Holley reports the experience of crowdsourcing in eight case studies, all of which were reported as successful.[893] She provides examples of crowdsourcing activities in libraries:

> "getting users to mark the errors in our catalogues; rating the reliability of information/records; adding information to records; verifying name authority files; adding user created content to collections; creating e-books; correcting full text; transcribing handwritten records; and most especially describing items that we have not made accessible because they are not catalogued/described yet."[894]

While Holley cites various reasons for people engaging in crowdsourcing; for the purpose of this dissertation, it is relevant to only mention that "volunteers are much more likely to help non-profit making organisations than commercial companies, because they do not want to feel that their work can be commercially exploited."[895] There is some criticism because models such as crowdsourcing may allow companies to use individuals as cheap labour force for the company's advantage, rather than for the sake of harnessing the benefits of involving individuals and communities in activities but in fields related to libraries and archives, such criticism has not been raised. To the contrary, as argued by Holley and others, participatory approaches in the field of libraries and archives are necessary for building community; or to use Innis' words, for challenging the space-bias of digital technology and enabling its development into a time-biased medium.

7. Bias in Conceptions of Practices with Digital Documents

This chapter addresses the third specific objective of this dissertation, and thus studies how digital technology has changed conceptions related to practices with digital documents. Similarly to the previous chapter, where only a small selection was chosen from the large number of potential documentary practices that could be studied, also here attention is only paid to a small selection of conceptions, chosen based on their relation to the discussion in chapters two and three and their relevance for the present dissertation. The argument was presented in chapter three that it is necessary to understand documentary practices to understand documents and information. While agreeing with this statement, the conceptual framework suggested in this dissertation necessitates extending a further step and arguing that

[892] Holley, "Crowdsourcing and social engagement". See also Benkler and Nissenbaum, "Commons-based Peer Production"; See also Tapscott and Williams, *Wikinomics*.
[893] Holley, "Crowdsourcing and social engagement".
[894] Ibid.
[895] Ibid.

the way in which practices are carried out, discussed in the previous chapter, is also influenced by how practices are conceptualised and valued. Indeed, conceptualisations themselves are influenced by the medium, which, as explained in chapter four, emerge around it to support its bias; however, all of these can be said to be influenced by how digital technology itself is conceptualised in the first place. A certain view regarding digital technology has been noted within the field of library and archival sciences, promoting an instrumental perspective and certain neutrality of digital technology, as evident in the view that digital technology is a most appropriate tool for access, regardless of the context. This view has been said to result from the influence exercised by computer sciences, and such an argument can be supported by the research of other scholars. For example, a study by Eskelinen and Tedre summarises conceptualisations of digital technology in terms of dogmas found to be present in most practices regarding digital technology. Moreover, similar arguments were implicit in the analysis provided in chapter five, yet since conceptualisations of digital technology underlie other conceptual changes, it is important to be explicit about them. Nevertheless, it should be highlighted that the discussion in this chapter does not focus on conceptualisations that precede the creation of digital technology, as discussed in chapter five, but rather on those resulting from its appropriation into specific documentary practices. Therefore, the first subchapter below is dedicated to a discussion concerning how digital technology has been conceptualised in terms of its relevance to specific practices, with the analysis revealing the predominance of a techno-centric perspective. This has an influence on different concepts, three of which are closely analysed in the subsequent subchapters. One such concept is that of access. Libraries and archives acknowledge that conceptualisations of preservation have changed, arguing that digital documents require a different preservation paradigm that can also be called sustainable access.[896] However, such research does not consider that also conceptualisations of access have changed, especially regarding its purpose. Another relevant concept is that of information. Libraries and archives pay attention to changes in the conceptualisation of the document, arguing that it has been reduced to information. Yet, also conceptualisations of information have changed, especially concerning its relevance today, and thus it is necessary to also study this aspect. Finally, the last concept is that of humanity. Research from libraries and archives that emphasises the social aspects of documents, highlights that technology helps to form and maintain communities and social groups. While this is the case, at the same time digital technology changes conceptions of community and society, which has a further impact on how humanity is understood.

[896] See subchapter 3.3.1 in this dissertation.

Therefore, given that humanity is a central concept in this present dissertation, the changes that it undergoes have also been studied.

7.1 Utopian Assumptions of Digital Technology

The purpose of this subchapter is to study conceptualisations of digital technology that underlie its deployment in specific practices and are related to other concepts such as information and access. Eskelinen and Tedre argue that just as each scientific field has its own dogmatic assumptions, so do also computer sciences, and they describe how three dogmas have come to dominate conceptualisations of digital technology, namely universality, progress and liberation.[897] While the analysis provided by Eskelinen and Tedre refers to the presence of these dogmas in development projects, they argue that the dogmas can be generally found in areas related to digital technology. Their argument appears to be confirmed by the similarities between their aspects described, and also several arguments presented thus far within this dissertation. Accordingly, a first dogma is universality or the belief that theories of computing as well as computing technologies are value-free, culturally neutral and universal. Eskelinen and Tedre argue that computing is driven at a theoretical level by the assumption that "abstract ideas are separated from their social surroundings, they are derived using a neutral form of inference, and that they are culturally neutral […] The popular outlook goes that also the artifacts that the applied side of computing disciplines produces are neutral and value-free."[898] The contradiction to this was exemplified in chapter five with the research conducted by Maja van der Velden in a Maasai community, showing that digital technology is appropriated differently in different cultural contexts, and thus not being universal. However, beyond that, criticism of the universality of computers and computing lies at the core of an emerging sub-field known as Ethno-Computing, which studies the limits of computers in different social and cultural contexts by bringing together culture and technology.[899] In this regard, authors from the field of ethno-computing argue that the history of computer science reflects an extension of the Western system of knowledge: "computers are cultural artifacts

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[897] Teppo Eskelinen and Matti Tedre, "Three Dogmas of ICT-Driven Development: Philosophical Investigations of ICT-Driven Projects in the Developing World," *East African Journal of Research* 2, no. 1 (2010): 64-88.; Also Borgmann argues that technology is often seen as neutral in its relations to cultural values but he speaks about technology in general, not computer technology in particular. See Albert Borgmann, *Technology and the Character of Contemporary Life, A Philosophical Inquiry* (Chicago and London: The University of Chicago Press, 1984), 35.

[898] Eskelinen and Tedre, "Three Dogmas".

[899] Matti Tedre and Ron Eglash, "Ethnocomputing," in *Software Studies: a Lexicon*, ed. Mathew Fuller (Cambridge, London: The MIT Press, 2008), 92-101. See also Matti Tedre et al. "Is Universal Usability Universal Only to Us?," *Paper presented at ACM Conference CUU,* (*Vancouver BC, Canada, November 10.-11. 2003*, http://cs.joensuu.fi/~ethno/articles/ethnocomputing_CUU2003.pdf

that are designed to meet and inherently exhibit the Western understanding of logic, inference, quantification, comparison, representation, measuring, and concepts of time and space, for example."[900] The examples of internationalisation and localisation software have been briefly mentioned above as examples of software that allows the adaptation of digital technology to local conventions, customs, languages or time zones.[901] To be more specific, these two concepts are defined as follows within computer sciences: internationalisation is "the process of designing and implementing a software product so that it can be easily localized, with few if any structural changes";[902] while localisation refers to "the process of adapting a software product to use the languages and conventions suitable for a local market, such as adapting an English US software product to work in Spanish for Argentina."[903] In the field of computing, internationalisation and localisation taken together are sometimes referred to as globalisation, although a distinction is drawn between globalisation in relation to software products and in the context of economics.[904]

From an Innisian perspective, the globalisation of software is highly related with economic globalisation at least through the fact that they represent conceptions supporting an interest in space or geographical expansion. One such argument supporting this view can be borrowed from Mackenzie's analysis, who argues based on a few examples of software that internationalisation and local adaptations "weave software into the techno-economic realities of globalization."[905] Indeed, this is confirmed by the fact that although digital technology is said to ensure the free flow of information in theory, its components are owned and controlled by political and economic bodies. In this regard, another aspect becomes important, as also emphasised by other authors, namely that what is being extended across space is the Western system of knowledge underlying how digital technology works.[906] One could argue that internalisation and localisation software represent a measure towards making computers relevant to non-Western contexts; that they are necessary for achieving universal access. Nonetheless, Mackenzie argues that believing in the universality of internationalisation software is wrong, because despite being adaptable in certain regards, code and software

[900] Tedre et al. "Is Universal Usability Universal".
[901] See subchapter 5.1.2 in this dissertation.
[902] Unicode Consortium, *Glossary of Unicode Terms (updated for Unicode version 6.2),* 2012, http://www.unicode.org/glossary/ (accessed December 07, 2012).
[903] Unicode Consortium, *Glossary*. Ideally, an internationalized software product can be localized simply by translating messages and other text displayed to a user, and by adapting icons and other visual elements.
[904] Unicode Consortium, *Glossary*.
[905] Adrian Mackenzie, "Internationalization," in *Software Studies: a Lexicon*, ed. Mathew Fuller (Cambridge & London: The MIT Press, 2008), 159.
[906] Tedre et al. "Is Universal Usability Universal".

themselves are presumed to be universal as text and practice.[907] However, this is contradicted by the fact that software, composed of arrays, lists, or trees, as mentioned above,[908] relies on practices of numbering, enumerating and sorting, which, as shown by anthropological studies of mathematics, are not universal; e.g. Western numbering practices are in base 10, whereas Yoruba numbering practices include base 5, 10 and 20.[909] In a similar manner, Tedre et al. argue against the notion of "universal usability", explaining that while the term is associated with an egalitarian opportunity to use digital technology, in essence it ignores cultural differences. Relying on studies from the field of education, Tedre et al. maintain that non-Western students encounter more difficulties when learning how to use or build computers, not because they are incapable or less intelligent but rather because they must first learn a very different worldview and philosophy. As Tedre et al. state, "this Western philosophy may be directly at odds with their perceptions of time and space, society, logic, values, problem solving methods, or even what problems are considered legitimate. Usability is often built on such metaphors and analogies that may not exist outside Western world."[910] Accordingly, in line with these authors, it is possible to conclude that whereas digital technology is not universal in practice, a certain understanding of universality is embodied in its conceptualisation, supporting its space-bias and further geographical spread.

A second dogma discussed by Eskelinen and Tedre is progress, which they argue to reflect a core concept of technological disciplines, holding that technology progresses in the course of time; that progress is inevitable, and that it has a direction.[911] As a way of thinking about historical evolution, progress has a long tradition in Western history, and is generally perceived as something natural and unavoidable.[912] However, as stated by Eskelinen and Tedre, progress is also seen as essentially good and thus desirable. A very similar argument has also been raised by other authors, for example Slack and Wise, who state that technology is equated with progress, at least in US culture.[913] It is generally agreed that progress implies the idea of moving forward towards a specific goal, which, according to Slack and Wise, usually refers to material or moral betterment. However, progress is usually measured in

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[907] Mackenzie, "Internationalization," 156.
[908] See subchapter 6.3 in this dissertation.
[909] Mackenzie, "Internationalization," 158.
[910] Tedre et al. "Is Universal Usability Universal".
[911] Eskelinen and Tedre, "Three Dogmas".; See also Jennifer D Slack and Macgregor J. Wise, *Culture and Technology: A Primer* (New York: Peter Lang Publishing, 2005).
[912] See Eskelinen and Tedre, "Three Dogmas". See also Slack and Wise, *Culture and Technology*. See also Gillespie, *Wired Shut.*
[913] Slack and Wise, *Culture and Technology*, 10.

material betterment because it is much easier to count tangible things; thus, having more has come to mean progress. According to Slack and Wise, the problem with this view is that it reduces progress to those things that can be counted, ignoring the qualitative aspects or moral dimensions of progress, and assuming that more is automatically better. Eskelinen and Tedre appear to share this view, arguing that relating the idea of good or morality with progress and technology is problematic. They explain that in relation to digital technology, progress refers to speed and efficiency (processing time of certain tasks) or complexity (the number of features).[914] However, what exactly is good, and thus desirable, about these becomes less clear upon closer inspection, given that digital technology has enabled both more intensive communication and also the development of weapons.[915] Indeed, while both represent examples of progress in technical terms, it is debatable whether the development of weapons should be labelled as good or desirable.

The above-described notion of progress resembles what Hamelink referred to as techno-centric perspective related to digital technology. According to Hamelink, there is an assumption that "there will be more effective health care, better education, more information and diversity of culture…more choice for people in education, shopping, entertainment, news media and travel…the technological process is accepted as inevitable. For the protagonists of the 'digital revolution' it is not conceivable that people would decide not to adopt these innovations."[916] Hamelink sees a serious problem in this perspective, because it is based on the notion of technological discontinuity, reflected in expressions such as "the digital revolution."[917] Digital technology is approached as something completely new rather than something that continues the tradition started by earlier technological developments. However, the analysis provided above in chapters five and six has shown that digital technology is more of an evolution than a revolution. The main problem arising from here, according to Hamelink, is that digital technology is seen as originating in a socio-economic vacuum, which thus ignores the interests behind digital technology. Furthermore, this argument appears to be supported by the analysis provided above within this dissertation, showing that digital technology is typically judged according to technological criteria rather than contextual factors. In his critique of the "Western paradigm" of technology as a progressive force and of history as a tale of progress, Gillespie explains that such a discourse

[914] See Eskelinen and Tedre, "Three Dogmas".
[915] Ibid.
[916] Hamelink, "New Information and Communication Technologies", 23.
[917] Ibid.

is rather "suited to the interests of capital, which must convince consumers that, despite the quality, durability, and initial appeal of the old commodity, the new product is an urgent improvement rather than a frivolous luxury."[918] Therefore, in line with the authors introduced above, it is possible to conclude that although digital technology may not lead to material or moral betterment in practice, the idea of progress is embodied in its conceptualisation, which, just like the previous dogma, supports the space-bias of digital technology and its geographical spread, as well as the view that people need technology in order to lead a better life.

The third dogma presented by Eskelinen and Tedre is liberation, or the view that access to technology will free people from cultural oppression, poverty or other social ills.[919] When technology is considered as a liberating force, whether it solves problems or creates new ones is not the issue; rather, having it becomes the issue.[920] The literature reviewed in chapter three shows that a similar assumption exists in the fields of libraries and archives, based upon the concern how to overcome problems hindering digital access rather than questioning whether digital access should be ensured at all. However, even stating this sounds inappropriate, or as argued by Slack and Wise regarding their questioning of the equation between technology and progress, it is seen as a heresy.[921] In fact, the dogma of progress and liberation are interrelated, as illustrated by a similar yet different understanding of liberation provided by Gillespie, who constructs on an analysis by Paul Duguid to argue that, since an old technology imposes constraints, improving the technology leads to liberation from these constrains.[922] Such an understanding of liberation is inherent in the universal access discourse constructed on the idea that digital technology helps remove the constraints imposed by previous media, at least in terms of the spatial dissemination of information. However, Gillespie also shares Eskelinen and Tedre's broad understanding of liberation, explaining how beliefs in the possibilities of the Internet have spread to various areas: as human knowledge becomes instantly accessible, education would become universal; as citizens go online to debate political issues, democracy would flourish; as people could work from rural areas, there would be no more environmentally destructive urban agglomerations; as people experience virtual identities, there would be no more barriers of race, class and gender; and as everybody

[918] Gillespie, *Wired Shut,* 3.
[919] Eskelinen and Tedre, "Three Dogmas".
[920] See discussions by Eskelinen and Tedre, "Three Dogmas". The same argument has been sustained by Gillespie, *Wired Shut.*
[921] Slack and Wise, *Culture and Technology*.
[922] Gillespie, *Wired Shut,* 3.

could speak freely, censorship would fail.[923] However, Gillespie is critical of such views - which are also not supported by the analysis provided in the chapters above - and he does not fail to acknowledge the other side of the coin, namely concerns regarding the loss of privacy or other aforementioned challenges as reasons behind Internet filtering or the emergence of free software.[924] Hamelink similarly distinguishes between two perspectives, termed as utopian and dystopian. The utopian view is reflected in concepts such as "information revolution", "new civilization" and "knowledge society", and associates digital technology with positive developments, with the development of new social values and relationships, as well as widespread access to crucial resources (i.e. information).[925] However, the dystopian view holds that digital technology will reinforce existing trends toward socio-economic disparities, inequality in political power, knowledge gaps, capitalist mode of production, cultural homogenisation or fragmentation.[926] While a review of existing literature inspired by concrete projects shows that the utopian perspective is dominant, this can also reflect that less has been written on dystopian aspects in the context of project implementation, regardless of the area. As Eskelinen and Tedre state, it is typical of political and intellectual fashion to praise successful projects, which receive much attention at the expense of unsuccessful projects, which are rarely mentioned, if at all.[927] However, this does not necessarily mean that less successful projects don't exist, which disproves the notion that technology leads to liberation, regardless of its sort. Accordingly, the experience of a digitisation project from South Africa can be provided as an example.

Narrating this experience, Pickover seems to argue from a strongly dystopian perspective, as reflected in her statement that "at a first uncritical glance the notion of so-called 'global' access to information is appealing and positive and seems to imply societal advancement", but "the digital frontier is not value free, it reflects power relations and it creates an information aristocracy."[928] Her perspective is determined by the experience of a project called Digital Innovation South Africa (DISA), a South African collaborative initiative that developed a digital resource on South Africa's struggle for democracy, funded by a US-based organisation. In short, Pickover explains that the funding organisation started to alter the

[923] Gillespie, *Wired Shut*, 4.
[924] See subchapter 5.2.1 in this dissertation.
[925] Hamelink, "New Information and Communication Technologies". These concepts have been discussed in subchapter 7.3 in this dissertation.
[926] Hamelink, "New Information and Communication Technologies", 27-28.
[927] Eskelinen and Tedre, "Three Dogmas".
[928] Pickover, "The DISA project," 5.

initial focus of DISA whilst the project was developing. In particular, it started interfering with the strategy that DISA should use, including content selection, which gradually started to match the interests of the funding organisation rather than those of South Africa. Moreover, the narrative was suited to an American audience of undergraduate level, as opposed to South African scholars and researchers. Furthermore, Pickover argues that maintenance of digital resources is an expensive activity, not just in South Africa but also Africa generally; consequently, it has to be relocated to countries where preservation is possible, which thus get to hold and condition the distribution of information about Africa.[929] In light of the experience of DISA, Pickover concludes that the "structural changes that are taking place in knowledge production and dissemination in the digital age are not only perpetuating an uneven South-North information flow but are also ensuring hegemony by the North in the South."[930] Despite the fact that DISA was an unsuccessful project, at least from Pickover's perspective, this experience should not be generalised as valid for all cooperative projects between the global North and global South. However, this example is relevant given that it highlights that the consequences of a technology - whether liberation or something else - depend on the technology in context. Beyond contexts where digital technology is part of everyday life for the majority of people, digital technology can be perceived in less positive terms, as marked by Pickover and Peters in another article, namely as a form of cultural imperialism: "English is largely the language employed on the Web ...; orality is being displaced; and American culture on the Net is an overwhelming influence…Furthermore, the lure of financial aid has spawned a new form of imperialism…as countries in the North loot the intellectual property of an African heritage in the name of preservation."[931] Moreover, further authors have also questioned the results that digital technology would trigger: "if African documentary heritage is digitized, how many Africans will be able to benefit? [...] Are libraries in Africa able to acquire the digitized material? Is the digitized text freely available to African scholars?"[932] DISA is one case where digital technology has perhaps not led to "liberation". However, this is not to deny the existence of best practices, but rather to confirm and enforce a paradox identified by Eskelinen and Tedre as being inherent in the dogma of liberation: if technology enables liberation, it results that liberation will be accompanied by dependence on technology,

[929] Pickover, "The DISA project".
[930] Ibid.
[931] Michele Pickover and Dale Peters. "DISA: an African perspective on digital technology." *Innovation* 4 (2002): 14-20, quoted in Britz and Lor, "A Moral Reflection," 216.
[932] Britz and Lor, "A Moral Reflection," 217.

which is the opposite of liberation.[933] Therefore, just as with the previous two dogmas digital technology does not necessarily lead in practice to liberation from the constrains of access - to remain close to the topic of the present dissertation - but also such a conceptualisation seems to be inherent in digital technology. The subsequent analysis shows the presence of the aforementioned conceptions in practices with digital technology by emphasising their influence on three concepts, each analysed in a separate subchapter: access, information and humanity.

7.2 The Ideology of Present-Mindedness

The purpose of this subchapter is to study the bias of digital technology's influence on how access is conceptualised. Access has become a key term and basic principle that lies at the core of not only library and archival activities, but also of the national and international political agenda.[934] It is perhaps not even an exaggeration to state that contemporary societies, at least in European and North American countries, are characterised by the ideology of access, which has not started with digital technology yet has been highly intensified by it. As several authors have pointed out, the hopes that people hold about digital technology are the same hopes that they also had about other media, perhaps starting with the telegraph.[935] The literature review provided in this present dissertation shows that access is usually approached in technical terms in the field of libraries and archives, referring to either direct physical access or digital access to documents, with the latter having become predominant. However, access is a multifaceted concept with different kinds of meanings ranging far beyond narrow technical understandings. Indeed, the literature covering this topic is quite vast, supporting that access has become a key interest; however, for the purpose of this subchapter, focus has been placed on a study by van Dijk, who not only comments but also structures access according to four stages. He contextualises the discussion on access in the discourse on the digital divide, with his study based on surveys mainly from Europe. Nevertheless, his types or rather degrees of access mentioned are also relevant for understanding access issues in the context of documentary practices at large.[936]

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[933] Examples of best practices exist on the Australian continent or in Canada, where indigenous people have been involved. See discussion in subchapter 8.2.3 in this dissertation.

[934] Too many to note but for a closer study of the notion of access, its political aspects and their influence on libraries and archives see Hand, *Making Digital Cultures.*

[935] Hamelink, "New Information and Communication Technologies". See also Sabadello, "ICTs for a Global Culture of Peace". See also Alfred M. Ronchi, *ECulture: cultural content in the digital age* (Berlin, Heidelberg: Springer-Verlag, 2009).

[936] The enumeration has been summarized from Jan van Dijk, *The Network Society: Social Aspects of New Media, 2nd ed (*London, California, New Dehli: Sage Publications, 2006); Also Jan van Dijk, "One Europe,

Van Dijk starts with motivational access, which reflects the first step in appropriating digital technology.[937] Acquiring the motivation to use a computer is a pre-condition, given that, as Dutton has also remarked, even if the technology is physically available, it does not mean that it will be used, or what kind of outcomes will emerge.[938] A large scale European survey indicates various reasons why people refuse to use the Internet: no need; no time; no liking; technophobe perceptions regarding the Internet and computer games as being dangerous, etc.[939] However, these are social, cultural or psychological reasons, and have nothing to do with the availability of the technology, which van Dijk lists as second.[940] Accordingly, he calls this second stage material access, which refers to having the physical infrastructure, computers and Internet connection and services. When the digital divide is discussed, examples often refer to differences between European and African countries; however, van Dijk also remarks upon important variations in material access within Europe. For example, surveys show that countries in Northern and Western Europe use more intensively digital technology than those in Southern and especially Eastern Europe. Furthermore, there are variations within countries depending on age, gender, income and cost of the technology, level of democracy and freedom of expression existing at the political level, cultural factors, lifestyles, and other variables.[941] Skills access is a third step, because even if the motivation and physical infrastructure exist, one also needs the know-how. Van Dijk speaks about "digital skills", which he defines as "the collection of skills needed to operate computers and their networks, to search and select information in them, and to use them for one's own purposes."[942] Following this definition, he distinguishes between three types of skills, namely: operational skills, referring to the capacity to work with hardware and software; information skills, referring to knowledge about how to search, select and process information, which is further differentiated into formal information skills, referring to the ability to work with the formal characteristics of computers, and substantial information skills, referring to the ability to find, select, process and evaluate information; and strategic skills, referring to the capacity to use computers as the means to particular goals. The fourth stage of access is usage access, which van Dijk states is the final goal of the appropriation of any new technology and refers

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Digitally Divided," in *Handbook of Internet Politics*, eds. Andrew Chadwick and Philip Howard (London: Routledge, 2009), 288-304.

[937] van Dijk, *The Network Society*, 179-82.

[938] William H. Dutton, *Social Transformation in an Information Society: Rethinking Access to You and the World* (Paris: UNESCO, 2004).

[939] van Dijk, "One Europe, Digitally Divided".

[940] Ibid.

[941] Ibid.

[942] van Dijk, *The Network Society*, 181.

to its actual use, such as usage time, number and diversity of applications, and the degree of active and creative, as opposed to passive, use.[943]

According to van Dijk, ignoring the aforementioned stages of access may lead to false perceptions about the digital divide, and this same statement is also relevant in the context of libraries and archives. Here, material access is also often equated with usage access, leading to false perceptions concerning the relevance of digital technology for access to documents. While libraries and archives digitise documents on the grounds that this is what users demand, research exists that contradicts this argument. A project was carried out in the United States at various higher education institutions in order to study the impact of the Internet on students' private and academic life, including questionnaires and also observation of how students work in the library. The results of observation showed that

> "email use, instant messaging and Web-surfing dominated students computer activity in the library. Almost every student that was observed checked his or her email while in the computer labs, but very few were observed surfing university-based or library Web sites. Those students who were using the computer lab to do academic-related work made use of commercial search engines rather than university and library Web sites."[944][*sic*]

However, it is necessary to be careful about generalisations, as the research described above is a case study of college students' use of digital technology in the US, and thus may not apply to different contexts or groups. Nevertheless, the research confirms van Dijk's argument that there are stages of access, and enforces the need to be careful about equating material access with usage access. Despite this, the affordance of digital technology for wide and instant spatial dissemination of messages or its space-bias has led to the predominance of a narrow conceptualisation of access in technical terms, and even to a reduction of preservation to short-term access, reflected in the view that forever means only a few years. To some extent, the field of preservation, which can be considered a time-biased ideology, does not have much choice in adapting to digital technology, given that the process of obsolescence makes it necessary to be concerned with the now. As explained in chapter three, the preservation of digital documents requires active intervention rather than benign neglect. However, the bias of digital technology has prompted an ideology of present-mindedness reflected in the obsession with access, with the way in which it is presently employed supporting this

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[943] van Dijk, *The Network Society*, 182.

[944] Steve Jones, "The Internet Goes to College: How students are living in the future with today's technology," The Pew Internet & American Life Project, (Washington, 2002) 13. http://www.pewinternet.org/~/media/Files/Reports/2002/PIP_College_Report.pdf.pdf (accessed 08 January 2013). This case has been discussed also by Blanchard, *The Digital Challenge for Libraries*, 6-7.

ideology. Digitisation is an example illustrating this notion, because despite the acknowledgement that digitisation is not preservation, important resources are still invested in order to ensure access now.

As with access, digitisation is most commonly approached in technical terms; however, by following Briet's discussion on documentation and the analysis informed by an Innisian approach, it results that digitisation is rather a cultural technique. In this regard, it is worth mentioning a report by the Netherlands Council of Culture that presents digitisation as technological yet also social development. As stated in the report:

> "the true relevance of digitalisation lies in the way new media and information technology are practically incorporated and utilised in society. In a recent study on 'cultural change in the age of digitalisation', conducted by the Netherlands Advisory Council for Science and Technology Policy (AWT), digitalisation was aptly defined as 'the ongoing integration of information and communication technology into society'."[945]

Indeed, digitisation can be considered not only a means for access but also a method by which digital technology is accommodated by society. Nevertheless, digitisation is essentially about making copies and disseminating them as widely as possible. Therefore, hidden behind the notion of "digitisation for access", through its bias digital technology supports the wide spatial dissemination of specific cultural techniques and conceptualisations that have developed around it. Accordingly, the notion of copy can be discussed to illustrate this point. Prior to the invention of the printing press, scribes and copyists were a much respected social group playing various roles: they worked for governors and royal courts; they were attached to temples, the textile industry, ship-building, pottery, agriculture; and they worked in the field of law.[946] However, their work has been gradually replaced as copying technologies have developed. With the invention of the printing press, photography, film and the computer, which has facilitated the process of mass-producing texts, the relevance of the copy has changed, prompting Parikka to state that the process of copying is a cultural technique of modernity, with the modern media themselves being products of a culture of the copy.[947] Parikka argues that the copy is inseparably related with mass distribution today, and he turns to Walter Benjamin's analysis of the link between copying and film to support this statement.[948] Indeed, Benjamin wrote reflections on the influence of technology - by then

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[945] Netherlands Council for Culture, "From ICT to E-culture".
[946] Robinson, *Writing and Script*, 125.
[947] Jussi Parikka, "Copy," in *Software Studies: a Lexicon*, ed. Mathew Fuller (Cambridge, London: MIT Press, 2008), 70.
[948] Parikka, "Copy," 70.

photography and film - on artworks already in 1936, explaining how the 'aura' of the artwork, its authenticity and uniqueness are destroyed through mechanical reproduction.[949] Drawing on this argument, Jeff Malpas agrees that one key feature of contemporary technologies is their drive towards standardisation and commodification, which destroy an object's aura; however, he also remarks that, for Benjamin, the destruction of the aura also meant the bringing of things closer "spatially and humanly".[950] As Malpas states, while copying destroys the aura of the artwork, this is exactly what enables universal access to it.[951] Nevertheless, copying practices for mass distribution turn objects into commodities whose accessibility becomes determined by economic principles.

Indeed, Chesher emphasised this point: "the proliferation of computers has been sustained by the globalization of production and the mass consumption of microelectronic components and programming. The diversity of cultural forms associated with digitisation draws on this pattern of trade as much as the material and informational complexity of the devices themselves."[952] Furthermore, Parikka aligns to these views, comparing "earlier forms of preserving and reproducing cultural memory" and contemporary forms of copy, arguing that the latter are "intimately tied to the consumer market and the commercial milieu of the digital culture (especially the internet), whereas the work done by monks was part of the theological networks where God, in theory, played the key mediator (and the final guarantor of mimesis) instead of, for example, Sony BMG or Microsoft."[953] Therefore, as Parikka writes, "theological issues defined the importance of what was copied and preserved, whereas nowadays the right to copy and to reproduce culture is to a large extent owned by global media companies."[954] Indeed, while the influence of the commercial sector has been mentioned above, the distinction drawn between original and copy is also relevant. John Frow is one author to have discussed these notions, explaining how the relationships between them have been conceptualised. The word copy derives from the Latin "copia", and meant abundance or plenty in its original sense, yet later acquired the sense of derivativeness. Therefore, its understanding moved from emphasising the sense of having something in

[949] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Media and Cultural Studies: Keyworks*, ed. Meenakshi G. Durham and Douglas M. Kellner, 2nd ed. (UK: Blackwell, 1969), 18-40.
[950] Jeff Malpas, "Cultural heritage in the age of new media," in *New Heritage: new media and cultural heritage*, ed.Yehuda E. Kalay et al., (USA/Canada: Routledge, 2008), 21; See also Benjamin, "The Work of Art".
[951] Malpas, "Cultural Heritage," 21.
[952] Chesher, "Binding Time," 24.
[953] Parikka, "Copy," 73-74.
[954] Ibid.

plenty to emphasising the scarcity of the original.[955] Frow further argues that as something secondary that draws value from its derivative relation to an original, the copy relates to both Western philosophy and the development of intellectual property rights.[956] Despite some authors arguing that the development of copying technologies has undermined the value of an "auratic" original work in the sense implied by Benjamin, Frow holds this as questionable, given that intellectual property regimes seem to have become stronger than ever. The watermark was provided as an example in the previous chapter, and it confirms Frow's argument that intellectual property rights are not necessarily getting weaker, despite their enforcement having been "technologized". Apart from this aspect, Frow also observes the revival of the old conceptualisation of copy as abundance, which is part of popular consciousness, as illustrated by the widespread practice of downloading music from the Internet.[957] The two conceptualisations mentioned by Frow resemble the aforementioned difference between proprietary and free software, one oriented towards protecting the original and emphasising its scarcity, the other towards emphasising its abundance. However, by constructing on the previous chapter, where a distinction was drawn between writing texts and writing programs, it is also important to differentiate in this chapter not only between different stages of access, but also between access to the content displayed on the computer screen and access to the software code. Accordingly, this prompts need to discuss two further conceptualisations: copy-the-product and copy-the-instruction.

This distinction has been drawn by Susan Blackmore, who, constructing on Richard Dawkins's concept of the meme - the cultural equivalent of gene - introduces an evolutionary theory of culture, or what she calls memetic theory.[958] In short, Dawkins, an ethologist and evolutionary biologist, popularised the theory that evolution is determined by competition between genes. He introduced the concept of the "selfish gene" to suggest that genes' only intention is to replicate, and that they act only for themselves. He clarifies that "we must not think of genes as conscious, purposeful agents. Blind natural selection, however, makes them behave rather as if they were purposeful, and it has been convenient, as a shorthand, to refer to genes in the language of purpose."[959] In this context, purpose is simply a metaphor. Dawkins also argues that genes are not the only replicators that explain human evolution, and

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[955] John Frow, "Copy," in *New Keywords: A Revised Vocabulary of Culture and Society*, ed. Tony Bennett et al. (UK: Blackwell Publishing Ltd., 2005), 59.
[956] Frow, "Copy," 59-60.
[957] Frow, 2005, 61.
[958] Susan Blackmore, *The Meme Machine* (Oxford: University Press, 1999).
[959] Richard Dawkins, *The Selfish Gene*, 3rd ed. (Oxford: Oxford University Press, 2006), 196.

stretching his evolutionary theory to incorporate cultural transmission, he also sustains that there is something similar to the gene in this field, "a unit of imitation", which he termed as "meme".[960] He also provides some examples of memes: "tunes, ideas, catch-phrases, clothes, fashions, ways of making pots or of building arches,"[961] and further explains, "just as genes propagate themselves in the gene pool by leaping from body to body…so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation."[962] Unfortunately, Dawkins' arguments cannot be presented in the context of this subchapter, despite being very substantial and rich in meaning; however, it is necessary to return to the above-named distinction by Blackmore, who constructed on Dawkins.

Blackmore speaks about a replication machinery that includes human culture, human artefacts and a human-made copying system, to some extent resembling Innis' broad understanding of medium by which cultural values are extended across space and time. However, for the purpose of the present dissertation, it is important to emphasise Blackmore's argument that digital copying systems serve as machines for increasing the fidelity of memes and thus their replication. In this regard, she introduces the distinction between copy-the-product and copy-the-instruction, illustrated through the banal but revealing example of a soup. As Blackmore explains, whereas it would be possible for another cook to taste the soup and copy it, the copy is likely to be better if the cook works from a recipe. By copying copies, errors accumulate and the initial characteristics become lost, and thus it is better to work from instructions.[963] Computer programs are instructions, as explained in the previous chapter and, according to Blackmore digital technology works on the basis of copy-the-instruction rather than copy-the product, which has highly increased the fidelity of memes and their replication. From this perspective, and as implied by her arguments, technological obsolescence can be seen as competition between replicators, forcing "the invention of better and better systems for copying those replicators."[964] The analysis in this subchapter has shown the meme of access to have been strengthened by digital technology, which, together with the ideology of present-mindedness that it encourages, is now being spread across space.

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[960] Dawkins, *The Selfish Gene*, 192.
[961] Ibid.
[962] Dawkins, *The Selfish Gene*, 192.
[963] Blackmore, *The Meme Machine*, 214.
[964] Blackmore, *The Meme Machine*, 215.

7.3 Information as Commodity – Information as Reality

> "…a tradition of values for information has been established and has been, rather uncritically and ahistorically, promulgated as a 'good' not only for Western culture but, more troubling, for, and as, 'the global'".[965]
>
> Ronald Day

The purpose of this subchapter is to study changes triggered by digital technology on the conceptualisation of information. The argument comprised in the citation above by Ronald Day captures the essence of this subchapter very well, as shown by the analysis below. As with access, the notion of information is also pervasive in literature, and given that it is not possible to discuss all aspects, focus has been placed on two conceptualizations: information as commodity and information as reality. Whatever the nature of the practice that people engage in, information is said to be at their core; it is now simply everywhere.[966] While information has replaced the notion of document in the context of libraries and archives, Ronald Day remarks that information "is a central term of ideology because it determines and patrols its own meaning over a vast expanse of social and cultural spaces."[967] He argues that "from the trope of information, other tropes are generated, forming a discourse of information", reflected in terms such as information society, information super-highway, information designers, information architects, information planners and ontologists (formerly known as cataloguers).[968] In light of this information discourse, Day holds that "vocabularies for the future are included or excluded, shaping history in a way that is fit for information and for little else."[969] In this instance, technology is perceived as simply a mechanism for gaining information, and despite associating technology with progress or liberation, this is founded upon the belief that what people need is information. Critical views are suspended, overlooking that not everything is achievable with information. As Eskelinen and Tedre emphasise, digital technology allows small farmers to search online for the local market price of crops, yet that does not add anything to their harvest.[970] Nonetheless, information is uncritically held in high esteem today, as if something that present societies have and former ones did not.

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[965] Day, *Modern Invention of Information*, 117.
[966] Information has always played a key role in human societies but it has never been such a central concept as is the case today.
[967] Day, *Modern Invention of Information*, 117.
[968] Day, *Modern Invention of Information*, 116.
[969] Day, *Modern Invention of Information*, 117.
[970] Eskelinen and Tedre, "Three Dogmas".

In fact, notions such as "free flow of information" or "universal access to knowledge" are as old as UNESCO, representing core elements of its mandate. Whereas these principles are as relevant today as they were when UNESCO was established, the measures for achieving them have constantly changed and adapted to the changing conditions of the world's political, economic and technological landscape. Many of today's actions have their roots in older activities, with one such example the movement known as the New World Information and Communication Order (NWICO), culminating in the so-called MacBride report entitled Many Voices, One World. [971] The report outlined challenges that the world was facing as a result of technological developments in communications in the 1980s, referring to commercialisation and market dominance, imbalance in information flow, a lack of means to collect and disseminate information, as well as linguistic, economic and social constraints, which are still relevant today. A more recent initiative addressing similar problems is the World Summit on the Information Society (WSIS), a worldwide undertaking initiated within the UN for establishing the foundations of an information society for all, for example by devising political, technical and financial measures to bridge the "digital divide". This digital divide refers to inequalities between and within countries in terms of their capabilities to access and use information mainly by means of digital technologies.[972] Concepts such as "information society" or "knowledge society" already emerged in academic circle in the second half of the twentieth century to reflect the changes that the economy of developed countries was undergoing. For instance, one author theorising the knowledge society concept explains that:

> "The changes in the structure of the economy and its dynamics are increasingly a reflection of the fact that knowledge becomes the leading dimension in the productive process, the primary condition for its expansion and for a change in the limits to economic growth in the developed world. In the knowledge society, most of the wealth…is increasingly embodied in its creativity and information."[973]

Although WSIS incorporates "information society" in its title, UNESCO expressed its preference to "promote the concept of knowledge societies rather than that of global information society since enhancing information flows alone is not sufficient […]."[974] Accordingly, knowledge societies are "about capabilities to identify, produce, process,

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[971] UNESCO, *Many Voices, One World: Towards a More Just and More Efficient World Information and Communication Order*, Report by the International Commission for the Study of Communication Problems, (Paris/ London/New York: UNESCO/Kogan Page/Unipub, 1980).

[972] United Nations, *Declaration of Principles, Building the Information Society: A Global Challenge in the New Millennium, adopted on the Information Society, Document: WSIS-03/GENEVA/DOC/4-E*. 2003, http://www.itu.int/wsis/docs/geneva/official/dop.html

[973] Nico Stehr, *Knowledge Societies*, (London: Sage Publications, 1994).

[974] UNESCO, *UNESCO's Contribution to the World Summit on the Information Society, Geneva 2003 and Tunis 2005, UNESCO no.* Executive Board Meeting, 166th session, 3 March 2003, Item 3.5.1 of the provisional agenda, Paris: UNESCO, http://unesdoc.unesco.org/ulis/cgi-bin/ulis.pl?catno=129531

transform, disseminate and use information to build and apply knowledge for human development."[975]

Despite conceptual differences, the notions are most typically used interchangeably, with both conceptualisations sharing an underlying view that information or knowledge are commodities.[976] Van der Velden sustains this argument, explaining how it is framed in relation with the digital divide metaphor, which "implies a conceptualisation of knowledge as commodity, something which can be extracted and transported from one place to another."[977] It resembles the transportation view of communication, referring back to the aforementioned concepts of James Carey.[978] While Van der Velden argues against such a view, to understand her position it is useful to briefly recall Olick's distinction between collective memory as a product and process, mentioned in chapter two.[979] Van der Velden makes a similar distinction concerning the notion of knowledge in order to set some limits to what can and should be digitised. From her perspective, products can be digitised, whereas social processes cannot, and knowledge is not a product but rather a process.[980] Treating knowledge as a commodity is problematic, particularly in communities of indigenous peoples where oral traditions are prominent and knowledge is passed through interpersonal relations.[981] Knowledge as a commodity is passed on through political and economic relations, as emphasized by Dan Schiller, arguing that views of information as a commodity, which in essence bring together information theory with political economy, have reached overtly into other areas, including library and information science, sociology, law and literary criticism.[982] Schiller argues that information as a concept has a sense of objectivity abstracted from social life and in order to

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[975] UNESCO, *Towards Knowledge Societies* (Paris: UNESCO, 2005), 27.
[976] There are important conceptual differences between words such as data, information and knowledge, with the difference between them often ignored. This aspect could not be discussed in the space of this present dissertation but for a brief discussion on their differences see Frank Webster, "Information," In *New Keywords: A Revised Vocabulary of Culture and Society*, eds. Tony Bennett, Lawrence Grossberg and Meaghan Morris (Malden, Oxford, Victoria: Blackwell Publishing, 2005), 186-89.
[977] Maja.van der Velden, "Invisibility and the Ethics of Digitalization: Designing so as not to Hurt Others," (University of Bergen, Norway. 2005) http://www.cdu.edu.au/centres/ik/pdf/MvdV_paper1.pdf
[978] See subchapter 4.2.1 in this dissertation.
[979] See Olick, "From Collective Memory", that has been discussed in subchapter 2.2.1 in this dissertation
[980] Maja.van der Velden, "Invisibility and the Ethics of Digitalization".
[981] This has been discussed by Sahlfeld in a study about the use of digital technology in indigenous communities, who states that "not all languages are traditionally written and read and therefore cannot easily be represented in text format on the computer[…] Fixation in a written form could even hinder the weaving of personal experience into the narratives." See Miriam Sahlfeld, "Commercializing cultural heritage? Criteria for a balanced instrumentalization of traditional cultural expressions for development in a globalized digital environment," in *Intellectual property and traditional cultural expressions in a digital environment*, eds. Christoph B. Graber and Mira Burri-Nenova (UK: Edward Elgar Publishing Limited, 2008), 278-279.
[982] Dan Schiller, "From culture to information and back again: Commoditization as a route to knowledge," *Critical Studies in Mass Communication* 11, no. 1 (1994): 93–115.

link them again he approaches it as a commodity, which allows reintroducing historical, social and political aspects in discussions concerning information.[983] Whether tangible like a physical product or intangible such as a service, by definition a commodity implies links to capitalist modes of production and to market exchange. Schiller sustains that the commoditisation of information, which is nevertheless a route to knowledge, as emphasised by the title of his article, is also evident in the cultural sector, for instance in cultural industries and also in public libraries, which "now give way to commercial cultural productions and marketed information services."[984]

In this regard, it is worth noting a remark by Blanchard, who, writing about how libraries adapt to the demands of digital technology, states that the information economy dominates the service economy (at least in the US), and that the "future of wealth accumulation is information services."[985] As the traditional providers of "information services", libraries are currently experiencing a decline of utilisation and are in danger of being marginalised by transformations of both technology and popular culture.[986] Consequently, being aware of the challenge, libraries "are mobilizing to respond. Almost everybody has some sort of 'initiative' underway, most with the word 'digital' or 'electronic' prominently featured."[987] For Innis, the library was also a place that reflected commoditisation processes, even though he wrote several decades ago. He states that "the library catalogue reflects an obsession of commercialism with special topics, events, periods, and individuals."[988] Innis paid attention to political-economic aspects and saw information as a commodity, which was exactly what prompted him to worry that the interest in tradition or time was being lost, leading to human relationships based on political and economic rather than social and community criteria. However, in contrast to libraries, which adapt by adopting the technology with its ideological baggage, Innis suggested turning attention to other media that display opposed characteristics. According to Blanchard, the development of an information economy resulted from three developments: the recognition that information holds value; the possibilities triggered by the Internet in terms of distribution and access to information; and the transformation in "popular information culture".[989] Indeed, as shown thus far, the Internet has played a crucial role in the

[983] Schiller, "From culture to information," 98.
[984] Schiller, "From culture to information," 100.
[985] Blanchard, *The Digital Challenge for Libraries*, 15.
[986] Blanchard, *The Digital Challenge for Libraries*, 7.
[987] Ibid.
[988] Innis, *Bias*, 77.
[989] Blanchard, *The Digital Challenge for Libraries*, 15-16.

changes that have been taking place; however, by following an Innisian approach it results that the conceptualisation of information as having economic value as well as the emergence of a popular information culture have been triggered by the medium. An interest in information could only develop after technology made it ubiquitous and changed its character, as discussed below in relation to the second view described in this subchapter, namely information as reality.

Borgmann distinguishes between three different types of information as follows. First there is natural information or "information about reality", which we take from the surrounding environment. In this respect, Borgmann exemplifies that "an expanse of smooth gravel is a sign that you are close to a river. Cottonwoods tell you where the river bank is. An assembly of twigs in the tree points to ospreys. The presence of ospreys shows that there are trout in the river […]."[990] Second, there is cultural information or "information for reality", which allows us to transform reality, and includes recipes, instructions for making wine and bread, plans, musical scores, constitutions, information for erecting buildings, amongst others.[991] Cultural information is made of conventional signs that stand out of nature, are detached from their environment and mobile, enriching the realm of natural information. At this point, it should be clarified that for Borgmann natural information was not in fact reduced to natural signs, despite his example provided. He considered that the paradigm for natural information was the record and report; whereas the recipe was the paradigm for cultural information. However, this distinction may not be sufficiently clear, especially in light of an anthropological understanding of culture, given that both reports and recipes are cultural objects. Furthermore, we would not recognize natural signs without being taught how to interpret them, and thus it can be said that the natural signs we see are in fact cultural, given that culture determines what we see. However, what Borgmann intends to say is that natural information describes, tells us what things exist; whereas cultural information instructs, tells us how to use or do things. Third, there is technological information or "information as reality", which is carried neither by natural objects nor cultural texts, but rather by "a technological device, a stream of electrons conveying bits of information."[992] Borgmann sustains that information steps forward as rival of reality through the power of technology. As he explains, cultural information has enhanced natural information and added something new; while technological information has

[990] Albert Borgmann, *Holding on to Reality: The Nature of Information at the Turn of the Millennium* (Chicago, London: University of Chicago Press, 1999), 1.
[991] Ibid.
[992] Borgmann, *Holding on to Reality*, 2.

enhanced the other two types and similarly added something new; but "technological information is the most prominent layer of the contemporary cultural landscape, and increasingly it is more of a flood than a layer, a deluge that threatens to erode, suspend, and dissolve its predecessors."[993] Natural information makes reality perspicuous and visible; whereas cultural information makes it surveyable; and technological information makes it transparent.[994] Borgmann explains that the geographical information systems (GIS) are the paradigm of technological information, revealing things otherwise invisible on, above and beneath the earth.[995] Borgmann's further views concerning technological information resemble preservation problems of digital documents in libraries and archives. For example, he explains that technological information is very robust because it is based on the binary system, which is irreducible and sufficient to express anything that can be rendered in any other notation, which is an opinion shared by many other authors.[996] However, he also acknowledges that technological information is very fragile, because while cultural information is intelligible to people, technological information depends on technological devices that are physically and socially fragile. They are physically fragile because the media on which they are inscribed are also fragile; and socially fragile because we rush for ever-more powerful technologies.[997] While both aspects have been mentioned in the present dissertation,[998] Borgmann adds two further notions. For instance, he also speaks about structural fragility, given that technological information is becoming increasingly complex, rendering it increasingly difficult to comprehend how the system functions. Consequently, they are not designed perfectly, leading to flaws in programs, which may further cause errors, or even the collapse of the systems it sustains.[999] According to Borgmann, it is also possible to speak of cultural fragility, because technological information actually draws its existence from traditional culture, as revealed by what we see on the monitor, namely familiar things like calendars, note pads or clocks.[1000] While this exact subject has been discussed above in chapter five, the arguments raised by Borgmann resemble conclusions drawn so far from an Innisian analysis, thus enforcing it. Nevertheless, the purpose of this subchapter was to emphasise that digital technology encourages two different conceptualisations of information as commodity and reality, these ideas being reflected again in the next subchapter.

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[993] Borgmann, *Holding on to Reality*, 2.
[994] Borgmann, *Holding on to Reality*, 170.
[995] Borgmann, *Holding on to Reality*, 171-172.
[996] Borgmann, *Holding on to Reality*, 130; Ibid, 193.; See also Floridi, *Philosophy and Computing.*
[997] Borgmann, *Holding on to Reality*, 195-196.
[998] See especially chapters 3 and 5 in this dissertation.
[999] Borgmann, *Holding on to Reality*, 196.
[1000] Borgmann, *Holding on to Reality*.

7.4 Humanity as Reflection of Technopoly

The purpose of this subchapter is to study how digital technology has changed conceptions of humanity. The centrality of information discussed above is said to have been reflected in further concepts such as information society and knowledge societies, which extend beyond the centrality of information as commodity. Despite no clear-cut distinction between "information society" and "information economy", as Schiller remarks,[1001] they connect information (or knowledge) with society, thus emphasising the emergence of new forms and conceptualisations of society. Graham notes that one main conclusion drawn by research critically assessing the social impacts of digital technology is that it destroys the traditional family unit.[1002] For example, according to Graham, digital technology has highly increased labour mobility, leading to the breaking of the family and other social ties by geographic dispersal, thus rendering people freer from the communal ties that once bound them.[1003] One recognises in this statement Innis' concern that extreme spatial expansion leads to the dissolution of human societies. However, at the same time, the bias of digital technology influences conceptualisations of society that are now perceived through the concept of information; in these accounts, information is what makes human societies. According to medium theorists, civilisations can be divided according to the mainstream communication media available to societies across the history of humanity, into: orality, literacy, printing, electronic, and more recently, digital.[1004] Finnemann makes a similar distinction by situating the Internet within the general history of media, although for him these represent the five main types of information society.[1005] According to Finnemann, it is inappropriate to suggest that industrial societies have turned into information societies, given that information has always been central, albeit treated differently.[1006] Oral cultures are a first type of information society based on speech, with information referring to images found in caves, smoke signals, drums, whistling, bodily movements and others.[1007] Literate cultures reflect a second type of information society based on speech and writing; followed by print cultures, which are a third type based on speech, writing and also print.[1008] A fourth type of information society refers to

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[1001] Schiller, "From culture to information," 97.
[1002] Gordon Graham, *The Internet: A Philosophical Inquiry* (London and New York: Routledge, 1999), 128.
[1003] Graham, *The Internet*.
[1004] Meyrowitz, "Medium Theory."; Also Meyrowitz, "Medium Theory: An Alternative,".
[1005] Finnemann, *The Internet*.
[1006] Finnemann, *The Internet*. This is acknowledged also in UNESCO's reports. For an example see UNESCO, *Towards Knowledge Societies*.
[1007] Finnemann, *The Internet*, 6.
[1008] Finnemann, *The Internet*, 6-7.

mass-media cultures based on speech, writing, print, plus analogue electronic media.[1009] Finally, the fifth type refers to today's information societies, which Finnemann terms as second-order alphabetic cultures, based on all forms of information available in the previous four types of information societies, plus additionally digital media.[1010]

This distinction somehow reflects the idea of progress described above, with an evolution towards more "efficient" forms of communication. This can be inferred from the text of Finnemann, who explains that his scheme depicts a history of evolution "in accordance with the general Darwinist scheme of biological evolution, from lower to higher and more complex organs and organisms."[1011] He does so from the understanding that the history of media is open-ended and indefinite, and constantly evolves, leading to the impossibility of predicting future media development.[1012] Although the distinction between oral, literate, print and electronic cultures can also be found in Innis' writings, for him history did not progress in the sense implied above. Instead, for Innis, "history tends to repeat itself but in the changing accents of the period in which it is written."[1013] Moreover, Innis suggests that "the linear concept of time was made effective as a result of humanistic studies in the Renaissance"; however, from his perspective, "time proceeds by cycles and is round."[1014] In accordance with his concepts of space and time, for Innis, humanity does not evolve through the succession of media but rather through dialectical relationships between space- and time-biased media, interacting with each other, and moving towards and away from balance. Nevertheless, it is necessary to highlight that, despite Innis recognising the existence of different concepts of time and attitudes towards it, he mainly studied the relationship between the concepts of space and time. However, these notions have changed profoundly owing to the use of digital technology, and given that space and time represent fundamental coordinates within which human life takes place, it is necessary to briefly consider how they have changed.[1015]

[1009] Finnemann, *The Internet*, 8.
[1010] Finnemann, *The Internet*, 8; The notion of "second-order alphabetic cultures" has been explained in subchapter 6.1 in this dissertation.
[1011] Finnemann, *The Internet*, 12.
[1012] Ibid.
[1013] Innis, *Bias*, 61.
[1014] Innis, *Bias*, 62.
[1015] Writings on the concepts of space and time exist at least from the times of ancient philosophers such as Aristotle, and exist in different disciplines ranging from physical to human sciences. It is impossible to mention them here. Moreover, they are not directly related to the argument advanced in this present dissertation, where the interest is to simply illustrate some changes reflecting the influence of digital technology.

Van Dijk analyses this aspect, and relies on other authors, for example Giddens' concept of "time-space distantiation", to state that there is a typical perception that the notions of space and time widen and dissolve, making us feel as if in a "global village";[1016] real time communication and (almost) instant transmission make distance and duration insignificant; "barriers of time are broken by the spread of customs or traditions…Barriers of space are broken by the increasing reach of communication and transportation."[1017] However, Van Dijk argues that these ideas are partly wrong, given that space and time are also compressed and do not become irrelevant; rather, their meaning has been radicalised, with people giving greater value to bridging the distances of space and time.[1018] As van Dijk argues, there are plenty of examples in support of this argument, and indeed this is the case, thinking of the above-mentioned internationalization software, or instant messaging, webcams, video-based conference systems, instant search, and many others.[1019] However, following an Innisian perspective, it results that we are dealing neither with a bridging of space and time nor with their distantiation, but rather with a total "spatialization of time". For Innis, being a space-biased feature, speed had nothing to do with time as duration; therefore, we are assisting to a total monopolization of time by space, whereby time disappears, and with it also the possibilities of balance. In this regard, it is important to once again highlight Cox's interpretation of Innis' space and time concepts as reflecting two orientations of the human mind, because digital technology does not in fact annihilate the coordinates within which life takes place. Indeed, people still live in space or in place, and time. However, by approaching the notions of space and time as mindsets, it is possible to clarify that what disappears is an interest in time, a loss of the symbols that sustain an interest in time, as well as the nature of community, in which an interest in time is developed and nurtured. It is in this respect that an annihilation of time by space occurs, through the emergence of those interests, symbols and communities that sustain the space-bias of digital technology. Since each medium was an environment in itself, the space-bias of digital technology has enabled a specific type of society, subsuming all the others, including information or knowledge societies. This new type is reflected by the concept of technopoly.

This concept was introduced in 1992 by Neil Postman, in his book "Technopoly: The Surrender of Culture to Technology". Understood as a form of society, the centrality of both

[1016] Concept introduced by Marshall McLuhan. It has been mentioned in subchapter 4.3 in this dissertation.
[1017] He discusses Anthony Giddens' concept of "space-time distantiation", Francis Cairncross' concept "death of distance" and Manuel Castells' concept of "timeless time". See van Dijk, *The Network Society*, 157.
[1018] van Dijk, *The Network Society*, 158.
[1019] van Dijk, *The Network Society*, 160.

technology and information looms large in technopoly. To explain the concept, Postman writes as follows:

> "Technopoly is a state of culture. It is also a state of mind. It consists in the deification of technology, which means that the culture seeks its authorization in technology, finds its satisfaction in technology, and takes its orders from technology…information is an unmixed blessing, which through its continued and uncontrolled production and dissemination offers increased freedom, creativity, and peace of mind."[1020]

As Postman further explains, critical thinking is suspended in this kind of society because "the fact that information does none of these things-but quite the opposite-seems to change few opinions, for such unwavering beliefs are an inevitable product of the structure of Technopoly. In particular, Technopoly flourishes when the defenses against information break down."[1021] Innis' concept of bias emphasises neither positive nor negative characteristics, rather simply a set of features that make a medium more suitable for certain purposes than others. In a similar manner, Postman states that each technology is both a burden and blessing, in that one tool is no better or worse than another. Indeed, they are simply different, thus triggering different conceptualisations and views of the world. As Postman writes, "to a man with a pencil, everything looks like a list. To a man with a camera, everything looks like an image. To a man with a computer, everything looks like data."[1022] In technopoly, people see the world through technology and cannot imagine it in its absence. Despite information and knowledge societies emphasising the concepts of information and knowledge through their names, they strongly rely on technology, which brings about these societies in the first place. Here, the notion of information society is understood as an information economy facilitated and sustained by digital technology, and not the five types through which Finnemann has reinterpreted humanity as information society. Accordingly, those types of information and knowledge societies that treat information and knowledge as commodities represent forms of technopoly.

Postman is a medium theorist. He partly relies on Innis within his study on technopoly, and thus his arguments are very similar to those discussed thus far in this present dissertation, which supports the arguments advanced. To exemplify, Postman argued that each tool incorporated "an ideological bias, a predisposition to construct the world as one thing rather than another, to value one thing over another, to amplify one sense or skill or attitude more

[1020] Postman, *Technopoly*, 71.
[1021] Postman, *Technopoly*, 71.
[1022] Postman, *Technopoly*, 15.

loudly than another."[1023] The database and hypertext represented examples of how the world can be constructed with digital technology. Internationalisation software or preservation understood as the constant migration of content reflected examples of how one thing, i.e. space, becomes valued over another, i.e. time. Hypertext was said to decrease comprehension and analytical thinking and encourage decision making, which are examples of how certain skills are amplified more than others. Even Finnemann's argument that humanity is information society can be interpreted as a conceptual change triggered by digital technology. According to Postman, the fact that each technology incorporates an ideology explains why "new technologies compete with old ones—for time, for attention, for money, for prestige, but mostly for dominance of their world-view […] When media make war against each other, it is a case of world-views in collision."[1024] While this reminds of the competition between memes, the view of competition between media leads to observing that digital technology has won if we do not understand the competition in global terms. Digital technology is perhaps not the most widespread communication medium on a global scale, at least not yet. However, if we consider developed countries, which seem to have turned into technopolies, digital technology seems to be close to winning the war, if it has not yet done so.[1025] In this context, there is an underlying belief that the technology is needed, that this is the "normal" way that things happen, and this view was also said to exist in libraries and archives. However, seen through the concept of technopoly, these arguments emerge to support technopolies when defences against it have been broken down. As shown throughout this dissertation, the ideology of digital technology has already penetrated concepts, practices and community, and even humanity. Each of the conceptual changes that have emerged would deserve closer attention, and many, many more concepts could have been added. However, providing a comprehensive analysis was not the purpose, and would have been impossible within the space of this work. By contrast, the purpose was to incorporate research by other authors that may support the arguments arising from the conceptual framework proposed and inspired by the research of Harold Innis. Indeed, this has offered guidance for what has been analysed, with both the practices and concepts presented chosen based upon their relation with the topic of documentary heritage preservation and the influence of digital technology on it. While the impacts on documentary practices and concept have been discussed, what remains to be

[1023] Postman, *Technopoly*, 13.
[1024] Postman, *Technopoly*, 16.
[1025] Martin Hand argues that rather than pushing aside other media, digital technology increases the use of other media. See Hand, *Making Digital Cultures*, 1-2.

undertaken is to connect this analysis with the Memory of the World towards addressing the main aim of this dissertation. Accordingly, the next chapter has been dedicated to this aim.

8. The Digital "Memory of the World"

The main aim of this present dissertation is to critically analyse the relevance of digital technology in the context of the UNESCO Memory of the World Programme. The background of this aim lies in the observation of some contradictions between MoW's overall philosophy and the conceptual and practical developments triggered by digital technology in its context. Accordingly, three main problems have been noted. First, the heritage value of the digital carrier seems to be denied on the grounds that it cannot be preserved. However, the argument advanced in this dissertation maintains that this is a contradiction, given that the heritage value of any carrier has never been determined by the possibilities to preserve it, but rather by people who give it value. Second, while a document is defined through the unity between a carrier and the content, in the case of digital documents, and retrospectively in the case of all machine-readable documents, a document is mainly defined through its content. However, this dissertation has advanced the argument that this leads to the existence of two contradictory philosophies within the context of MoW; one holding that documents are valuable as unity between content and carrier, the other that they are valuable as content. Third, digital technology seems to be considered a most appropriate tool for short-term access, despite uncertainties raised by technological obsolescence concerning long-term access. However, the argument advanced in this dissertation suggests that such a choice is contradictory with the argument implying the necessity of a balance between long- and short-term access. Observing the existence of these three problems, the main hypothesis of this present dissertation is that the relevance of digital technology has to be assessed against the overall philosophy of the Memory of the World Programme. This referred to its capacity to exercise a comprehensive and objective global perspective of documentary heritage that is independent of time and place, and with this promoting the adoption of universal principles and positive change in global consciousness regarding the relevance of documentary heritage.[1026] The analysis in this chapter has been divided into three parts in order to bring together the findings from the analysis of digital technology with MoW and address the main aim of this dissertation. The first part connects the findings from the analysis of the bias of

[1026] UNESCO, *Report of the First Meeting of the Bureau of the International Advisory Committee*, 1998.

digital technology with the Memory of the World, showing that the changes triggered by digital technology in its context, as highlighted in chapter two, can be seen as reflection of the bias of digital technology. In light of these findings, within the second part solutions are sought for integrating digital technology in the context of MoW according to its overall philosophy, paying attention to three possibilities: acknowledging the heritage value of the digital carrier; stretching the technical understanding of access to encompass cultural access; and approaching preservation as participation. In the third part, the discussion moves from studying the relevance of digital technology in MoW to discussing the relevance of MoW in a world changed by digital technology, and to this end MoW being presented as a potential reflection of balance.

8.1 The "Memory of the World" as Reflection of Bias

The purpose of this subchapter is to show that the changes observed in MoW can be considered a reflection of the bias of digital technology, as discussed in chapters five, six and seven. After presenting the changes observed in MoW in chapter two, the dissertation has proceeded on the assumption that they reflect the changes triggered by digital technology in libraries and archives, which inform MoW. This assumption has been confirmed already by the literature review provided in chapter three, where similar concepts and practices were showed to change in libraries and archives, with the accent being placed on: the treatment of the digital carrier as a (neutral) instrument for transferring information; the tendency to replace the notion of document with information; and the increased attention given to short-term access, despite uncertainties regarding long-term access. Furthermore, the literature review has also showed that the history of professional preservation practices is intertwined with that of computer sciences and the development of mass-communication technologies, with that the latter having exercised an influence on the former. In addition to the purpose of libraries and archives being a practical one, this was said to hinder the development and adoption of a critical approach to the limits of digital technology in the context of documentary heritage preservation. In this regard, the medium theory of Harold Innis was introduced in chapter four, with his concepts used as framework to critically analyse the conceptual and practical implications of digital technology. Seen through this framework, the changes observed in MoW (and also in libraries and archives) can be more accurately said to reflect the bias of digital technology. In order to illustrate this argument, it is useful to start by studying paragraphs from the central implementation instrument of MoW, i.e. the 2002

General Guidelines, which refer to limits of digital technology, yet also, and perhaps to a greater extent, reflect its potential.

As can be inferred from the Guidelines, MoW acknowledges that access (broadly understood not just in terms of digital access) may have limits. For example, it recognises legal limits of access: "where access has implications for custodians, these are respected…Private property rights are guaranteed in law."[1027] Moreover, it even recognises that "copyright owners have a legal right to control the exploitation of their assets and may choose, often for commercial reasons, to limit access to documentary heritage that is in their physical or intellectual property."[1028] The General Guidelines also acknowledges cultural limits of access: "cultural sensitivities, including indigenous communities' custodianship of their materials, and their guardianship of access, will be honoured";[1029] or religious limits of access: "religious and cultural mores may confine access to particular audiences or groups."[1030] Furthermore, it recognises that digital technology has financial and technical limits; for example, connectivity costs, bandwidth, firewalls and other aspects, stating that "Internet and digitized access does not meet all needs, however, and certain physical, technical and financial limitations may always be a reality."[1031] However, these statements highlighting awareness of the limits of digital technology are intertwined with others reflecting its capabilities, and mainly the space-bias aspects discussed above. Indeed, the Guidelines states: "as it develops, the Internet will be an increasingly powerful tool for access to documentary heritage which overcomes the tyranny of distance. Around the world, both public and private collections are being progressively digitised and many are freely available to all who can avail themselves of a terminal and the means of connection."[1032] This paragraph reflects the narrow understanding of access in technical terms, or what van Dijk has termed material access. Whether people want to digitally access documentary heritage, whether they have the skills and know-how needed are implied as secondary, since, as stated in the paragraph, the simple availability of a terminal and means of connection already render the Internet a powerful access tool. However, freedom of access still may not result even if the technology is physically available and motivation, skills and usage access also exist, because, as shown in chapters five and six, digital technology can be controlled by design and through its technical components.

[1027] Edmondson, *Memory of the World: General Guidelines*, 3.
[1028] Edmondson, *Memory of the World: General Guidelines*, 16.
[1029] Edmondson, *Memory of the World: General Guidelines*, 3.
[1030] Edmondson, *Memory of the World: General Guidelines*, 10.
[1031] Edmondson, *Memory of the World: General Guidelines*, 15-16.
[1032] Edmondson, *Memory of the World: General Guidelines*, 15.

Moreover, in this specific paragraph the benefits of digital technology seem to be judged based on technical criteria rather than context, given that it is said to overcome the tyranny of distance, which leads to praising digital technology for its space-bias. This further encourages digitisation for access, on the grounds that "digitization of content is proving an effective access strategy for many purposes: it can be relative cheap, it is often provided free to the user via the internet or CD ROM, and can also be related to on-line finding aids, navigation tools or catalogue records."[1033] These arguments run counter to those previously mentioned, whereby connectivity costs or commercial interests were listed as potential barriers to access. Furthermore, these arguments are not necessarily supported by the analysis provided in previous chapters. Search engines are built to classify information in specific ways and thus having a website and access to the Internet does not guarantee that the search engine will also find the information. As explained in chapter six, the CD-ROM presents information as database, yet also represents a certain vision of what things mean, how they can be structured and how they relate to each other. Both the website and database represent specific world visions, underlined by the constraints of digital technology, the knowledge and beliefs of the designer, and the political and economic, social and cultural realities in which digital technology arises or is used, and thus what results is access according to a specific logic embodied in the structure of the tool chosen, as opposed to universal access as hoped. In terms of conceptual implications, these arguments, together with the contradictions between the philosophy of MoW and changes triggered by digital technology, reflect the discussion in chapter seven, and particularly utopian and instrumental views of digital technology as a universal tool for access, which is understood in technical terms.

The presence of similar arguments in favour of digital technology can also be observed in other MoW documents such as meeting protocols, which are subsequent to the Guidelines; however, again these are intertwined with statements about limits of digital technology. For example, there are statements recognising that CDs and DVDs have proven not be suitable for medium or long-term access;[1034] that the field of preservation does not have the practical support of storage media manufactures;[1035] that cooperation with information technology specialists was difficult because they have different agendas than preservationists;[1036] that preserving digitally is not cheaper because costs rise exponentially, which consequently only

[1033] Ibid..
[1034] UNESCO, *Final Report on Sixth Meeting of the International Advisory Committee of the "Memory of the World" Programme, Gdansk, Poland, 28-30 August 2003,* (no: CI/INF/2003…), Paris, 2003.
[1035] UNESCO, *Report of the Seventh Meeting of the Sub-Committee on Technology*, 2004.
[1036] UNESCO, *Report of the Sixth Meeting of the Sub-Committee on Technology*, 2002.

larger institutions can afford;[1037] that digital preservation may distract attention from classical preservation;[1038] or that the World Wide Web does not reach everybody, raising the need for non-digital publications.[1039] These arguments can be said to properly reflect awareness concerning the limits of digital technology. However, in practical terms, this message does not really seem to get across. By contrast, digital technology is seen as a positive tool, and MoW even tends to be misunderstood. Asked at a SCoT meeting whether digitization was emphasised too much at the expense of other technologies, SCoT replied that this was not the intention, given that MoW is a programme that employs the technologies that serve best to achieve the aims of preservation and access.[1040] However, SCoT also admitted that accent was placed on digitisation at the beginning of MoW, since it had to be tested, yet that this "had resulted in the Programme being wrongly viewed as a programme for digitisation by many people."[1041] Furthermore, as already noted above in the Introduction, MoW is often not even known. Promotion of MoW was considered the most important item at the 9th IAC meeting in 2009, given that its existence depended on promotion; however, despite this, it has received limited publicity.[1042] Indeed, a survey on global familiarity with MoW conducted in 2009 supports this statement.[1043] Out of 378 respondents (comprising libraries, archives and museums) who replied to the web-based questionnaire, 38.1% were not even aware of the existence of MoW.[1044] Asked what they think should be done to raise awareness of MoW, only 5 out of 110 respondents said that what was already being done was sufficient, with the other respondents providing suggestions in this regard. While some referred to press releases, speeches and presentations at conferences and meetings of professional organisations, most of them suggested using websites, emails, social media such as Facebook, and encouraging more digitisation and access.[1045] As stated in the report, presenting the results of the questionnaire,

> "UNESCO hopes to use the feedback from the survey to make the Memory of the World Programme more effective. The findings of this survey document the actual awareness of library, archival and museum professionals regarding UNESCO's Memory of the World Programme and their opinions on its effectiveness in reaching those communities which it aims to target."[1046]

[1037] UNESCO, *Final Report of the Eighth Meeting of the International Advisory Committee*, 2007.
[1038] UNESCO, *Report of the Seventh Meeting of the Sub-Committee on Technology*, 2004.
[1039] UNESCO, *Report of the Sixth Meeting of the Sub-Committee on Technology*, 2002.
[1040] UNESCO, *Report of the Sixth Meeting of the Sub-Committee on Technology*, 2002; See also UNESCO, *Report of the Seventh Meeting of the Sub-Committee on Technology*, 2004.
[1041] UNESCO, *Report of the Sixth Meeting of the Sub-Committee on Technology*, 2002.
[1042] UNESCO, *Final Report of the Ninth Meeting of the International Advisory Committee for the "Memory of the World" Programme, Christ Church, Barbados, 29-31 July 2009*, Paris, 2009.
[1043] Duranti, *Survey*.
[1044] Ibid.
[1045] Ibid.
[1046] Ibid.

Indeed, a study of the responses received may lead to the conclusion that digital technology is a suitable tool that increases the visibility of MoW and supports its aims, and thus it should be further promoted. However, this conclusion should be approached with caution, and it is important to explain this perspective. As the suggestions of the respondents imply, digital technology is not the only tool recommended for promoting MoW, yet it is the main one suggested. However, it should be mentioned that the questionnaire was web-based, which could have triggered a "bias" in responses in favour of digital technology. A further "bias" might derive from the fact that the majority of respondents (in total 384) were from developed countries where the availability of digital technology, skills and wants do not represent a barrier: Australia (27 respondents), Canada (85 respondents), Italy (33 respondents) and the United States (87). Since there was a total of 59 countries plus a very small number of regional offices, it results that the remaining 152 responses were from 55 countries spread across all continents. The large number of responses especially from Canada and the United States can be perhaps further explained through the survey having been developed and administrated by a university in Canada. In light of these aspects, and with the awareness that digital technology has a bias, the representativity of the results of the survey is not only questionable, but apparently, conceptualising and using digital technology as is currently done, does not bring about the expected results. In theory, MoW reflects the awareness that digital technology has a bias; that it has potential yet also limits, which is very much compatible with its philosophy of balance. However, this philosophy is not entirely followed in practice. Awareness concerning the existence of MoW increases much too slowly, and its key message does not get through to others. In light of the bias of digital technology identified in chapters five, six and seven, it is possible to observe three main influences of bias on MoW.

A first aspect refers to an increasingly instrumental perspective on digital technology, similar to that in libraries and archives and computer sciences. This could be explained by SCoT having always been the most active sub-committee of MoW, playing an important influence on how the programme developed.[1047] As a technical committee, it has to focus on technical aspects in order to make recommendations about preservation methods and techniques, and since it has been the most active committee, its views perhaps predominate in MoW. Moreover, an increasingly instrumental perspective can also be explained through the influence of libraries and archives in MoW, or, according to the analysis in chapters five, six

[1047] UNESCO, *Report of the Ninth Meeting of the Sub-Committee on Technology*, 2006.

and seven, as result of the medium bias. However, regardless of the reasons behind an instrumental perspective, it advances the view that digital technology is merely a tool, and one suitable for universal access. As stated in the General Guidelines, migration of content from one carrier to another should be approached with caution, given that "it often involves the loss of information and the closing off of future options."[1048] However, despite this, the Guidelines also states that MoW encourages digitisation as a means of providing universal access.[1049] Nonetheless, an instrumental view of digital technology leads to ignoring its potential heritage value as stated in the introduction, and, resulting from the analysis in previous chapters, also leads to overlooking its potential impact in specific contexts. Regardless of the digital technology's technical potential, as discussed in chapter five, a medium is only what it is in context, with the same technology being understood and used differently in different contexts. Furthermore, as explained in chapter two, MoW cannot be reduced to the aims of preservation and access, with its key attribute being a different one. For this reason, even preservation and access must be considered in relation with its key attribute and thus as tools that would help MoW to promote a global perspective on documentary heritage and positively change mindsets about its relevance and need for preservation. Therefore, in the context of MoW and in light of its overall philosophy, the question is not so much whether digital technology ensures universal access, and not even how to overcome the barriers to digital access, which is now the key concern of libraries and archives, but rather what challenges could result if digital access has been ensured, and what its impacts in context would be.

A second aspect, and related to the first, is that the main means by which MoW intends to attract visibility is through the use of digital technology, despite recognising that it does not reach everyone. It has been mentioned above that MoW has somehow not managed to attract enough visibility and be known as the heritage conventions of UNESCO, with its profile and scope sometimes misunderstood.[1050] However, seen through the conceptual framework suggested in this dissertation, MoW chooses the wrong tool, or rather not enough tools, given that it strongly relies on promotion through websites, which owing to the medium bias can

[1048] Edmondson, *Memory of the World: General Guidelines*, 13.
[1049] Ibid.
[1050] The results of the above-mentioned survey also support this argument. For example, asked if they were planning to nominate for the MoW Register, 69.6% of respondents said that they didn't. This was a closed question and there was no possibility to elaborate the reasons but the survey included the possibility to make additional remarks. One respondent stated that they weren't sure about the importance of nominating. Another responded, who had inscribed documents on the MoW Register, explained that it wasn't clear for them how the fact that they had nominated helped them with preservation and they also asked whether they needed to do anything about it, like sending a report, or information about their finding. See Duranti, *Survey*.

only reach a limit group of people, and only in specific ways. Accordingly, it is questionable whether websites are a good tool for MoW to achieve its aim; an argument that can also be further supported. For example, in the context of the aforementioned survey on global familiarity with MoW, one respondent remarked that "many of the links on the Memory of the World site do not work. This site seem geared to the largest organizations, holding the most predominant material. I would like to see a more inclusive feel brought into the site and more prompts to encourage smaller institutions."[1051] Furthermore, in an article on MoW, Robertson-von Trotha and Hauser have discussed the Register and the use of digital technology in its context, criticising the MoW portal where items inscribed on the MoW Register are presented, on the basis of: the lack of digital versions of inscribed items; the lack of translations; or the lack of contextual information, which hinders people from understanding the significance of documentary heritage.[1052] Nevertheless, the tendency to rely on digital technology for promoting MoW seems to have increased. According to the final report of an IAC meeting in 2009, "the development of social communicating media like Facebook and Twitter for MoW should also be built into the promotional plan to expand the visibility of MoW on the web."[1053] At its meeting in 2011, the IAC recommended further strengthening the use of digital technology by reinforcing its relation with the World Digital Library (WDL), a joint web-based initiative between the Library of Congress and UNESCO.[1054] Its purpose is to make available online digitised versions of analogue documents, with the WDL currently also displaying a few items inscribed on the MoW Register.[1055] Moreover, according to the final report of the 10th IAC meeting, "it was decided that applicants submitting new items for a MoW register would also be required to propose them, subject to rights and other authorizations, for inclusion in the WDL, based on WDL selection criteria."[1056] As this paragraph indicates, MoW would be incorporated for promotion under a different initiative, which could in fact diminish its visibility. While WDL could make a few items of documentary heritage digitally accessible, given that its website features thousands of other documents, this could also obscure the philosophy underlying the documentary heritage inscribed on MoW by incorporating it among other documents that do

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[1051] Duranti, *Survey*.
[1052] Robertson von Trotha and Hauser, "UNESCO and Digitalized Heritage";
[1053] UNESCO, *Final Report of the Ninth Meeting of the International Advisory Committee*, 2009.
[1054] UNESCO, *Final Report of the Tenth Meeting of the International Advisory Committee*, 2011; See also UNESCO and Library of Congress, "World Digital Library - Memorandum of Understanding between UNESCO and the Library of Congress," October 2007, http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/strategy_doc_mou_world_digital_library.pdf (accessed 24 April 2013).
[1055] For examples see World Digital Library, *Official Website* http://www.wdl.org/en/
[1056] UNESCO, *Final Report of the Tenth Meeting of the International Advisory Committee*, 2011.

not share the same status. Additionally, as the recommendation of the IAC indicates, digitisation seems to shift from being an option for access to being a requirement. However, approaching this problematic through the conceptual framework suggested in this dissertation, the question is not whether digital technology can be used more intensively to increase visibility of MoW, but rather if and how it can be used to achieve its goal, i.e. to promote a global perspective on documentary heritage and positively change mindsets about its relevance and need for preservation.

A third aspect refers to the fact that MoW is increasingly promoted and presented as a contribution to information or knowledge societies. As mentioned in chapter two, MoW is positioned within the structure of UNESCO in the Communication and Information Sector under the Knowledge Societies Division, which could play an influence accordingly. At a general level, there are similarities between the principles of knowledge societies and the objectives of MoW, in the case of the later these being: to facilitate preservation, assist universal access and increase awareness.[1057] Knowledge societies are based on four fundamental principles: cultural diversity; equal access to education; universal access to information (in the public domain); and freedom of expression.[1058] MoW is considered to contribute to two of these principles, namely universal access and cultural diversity.[1059] The first aspect has been discussed above, and MoW can be considered to bring a contribution to knowledge societies, given that the aim of universal access is also encompassed within MoW. Concerning the second aspect, MoW is promoted as reflection of the diversity of people, cultures and languages. In the concept of knowledge societies as defined by UNESCO, "societies" is intentionally used in the plural in order to emphasise that it is not about one particular model of development but rather the coexistence of various knowledge systems.[1060] As documentary heritage is considered to be limited neither by time nor geography, the preservation of various types of documents, and thus also of knowledge systems, in various languages and various media, can be considered a contribution to the promotion of the diversity of cultures. Nevertheless, such a position may be questioned if considering, for example, that the variety of media and formats all turn into digital information, become digital heritage and are preserved digitally for accessibility purposes, which consequently changes

[1057] Edmondson, *Memory of the World: General Guidelines*.
[1058] UNESCO, *UNESCO's Contribution to the World Summit on the Information Society*.
[1059] Souter, *Towards Inclusive Knowledge Societies*.
[1060] This is a terminology employed by UNESCO, in other contexts being usually used in the singular. For the purpose of illustration compare any European Union documents, where the discussion is usually about a European Knowledge Society in the singular with UNESCO, *Towards Knowledge Societies*.

their character and function. Perhaps even more problematic is the fact that MoW tends to be increasingly seen as a programme dealing with information. As mentioned in chapter two, during a SCoT meeting in 2006 a member suggested that MoW's underlying idea is preservation of information, in response to the question of why MoW was part of the Information Society Division,[1061] rather than the Culture Sector, together with the other heritage programmes.[1062] However, this dissertation does not share this view, which seems to have an impact on how MoW is implemented, with its relationships with other information programmes intensifying at the expense of those for heritage. For example, UNESCO carries out the Information for All Programme (IFAP), which, as explained on its website, is an intergovernmental programme created because "governments of the world have pledged to harness the new opportunities of the information age to create equitable societies through better access to information", a statement very similar to the above-discussed ideology of information and access, a reflection of technopoly.[1063] However, at the 10th SCoT meeting, one member said that within UNESCO, IFAP was being positioned as an umbrella programme for information management.[1064] As part of its strategy, IFAP also set up five working groups, including a Working Group on Information Preservation, which was duplicating the activities of SCoT. In order to avoid this problem, SCoT has become the core group of preservation experts that formed the Working Group on Information Preservation of IFAP.[1065] During the same SCoT meeting, it was also stated that MoW nevertheless remains independent and that "IFAP is kept informed of the work of the various Memory of the World bodies as a courtesy not a right."[1066] Even if this is the case, it still raises concerns regarding the possibilities of MoW to achieve visibility and raise understanding of the documentary heritage of humanity (not of information), and thus achieve its core mission. Accordingly, the question is not whether and how MoW contributes to knowledge societies, information societies or other labels, but rather how its philosophy of balance, reflected in its view that documentary heritage is a heritage of humanity, can be translated into practice to facilitate intra-generational and intergenerational equitable, cooperative and sustainable relationships. In light of the above-describe findings, it is possible to conclude that digital technology

[1061] This was the former name of the Knowledge Societies Division.
[1062] He also suggested that the idea of preservation of information needs increased support today. UNESCO, *Report of the Ninth Meeting of the Sub-Committee on Technology*, 2006.
[1063] UNESCO, *Official Website of the Information for all Programme* http://www.unesco.org/new/en/communication-and-information/intergovernmental-programmes/information-for-all-programme-ifap/about-ifap/ (accessed 14 April 2013).
[1064] UNESCO, *Report of the Tenth Meeting of the Sub-Committee on Technology*, 2008.
[1065] Ibid.
[1066] Ibid.

should not be recommended in the context of MoW. However, just like any other technology, digital technology has and will always have a bias. Therefore, by following the conceptual framework suggested in this dissertation rather than rejecting digital technology on the grounds mentioned above, it becomes necessary to find practical ways by which it can be integrated in MoW, in a way that considers both its bias and the overall philosophy of MoW.

8.2 Overcoming Bias in the "Memory of the World"

The purpose of this subchapter is to propose ways to integrate digital technology in the context of MoW more faithfully to its overall philosophy. The suggestions provided below arise from the same conceptual framework and analysis that has helped to identify bias in previous chapters. Authors agree that "at no time in recent history have novel forms of media replaced the old media. With the advent of radio, the demise of the book was predicted; film was expected to replace radio; and television was expected to replace film. But all these media still exist, and they will continue to coexist in the digital age, although their interrelationships will change."[1067] Indeed, such an argument is also strongly supported by Innis' theories, yet this stresses the importance of trying to integrate digital technology in a way that does not exclude other media or diminish their relevance or attention received. Furthermore, it has to be integrated by following the philosophy of MoW, and not by including exceptions in its philosophy, as currently seems to be the case, for example, concerning the potential heritage value of the digital carrier. The understanding of documentary heritage and its relevance are not supposed to change with the medium; rather, regardless of their type, the media have to fit under the concept of documentary heritage and the evaluation criteria of MoW. If they do not, they are rejected; although this initially requires being sufficiently open to embrace digital technology as it is, with its bias, understood neither in positive nor negative terms, but rather in Innisian terms as key characteristics of the technology. On the one hand, MoW is too critical of digital technology, given that it does not try to observe that digital technology has not only affected preservation and access but has also given rise to new practices and types of documents that would require recognition. On the other hand, MoW is not critical enough about digital technology, since it seems to be increasingly blinded by its possibilities for achieving universal access, understood mainly in technical terms.

[1067] Netherlands Council for Culture, "From ICT to E-culture," 13. See also Hand, *Making Digital Cultures*.

Three suggestions aiming to address this problematic are discussed in the subchapters below. A first suggestion refers to treating digital technology like any other medium with potential heritage value, which requires first understanding what could be unique or outstanding about it. In particular, the discussion in chapter six, whereby digital technology was said to lead to new documentary practices, is used in support of this point. Accordingly, some of these practices result in documents that potentially represent new types of documentary heritage enabled by digital technology, such as software documentation or computer programs. Moreover, they should also be assessed against the MoW criteria and the criterion on intrinsic value, which was said to be possessed by those objects that hold value as originals, rather than due to their content. A second suggestion refers to approaching the potential of digital technology in terms of cultural rather than technical access. As mentioned in the final report of one of the aforementioned SCoT meetings, where one member said that MoW was about preserving information, it was also suggested that moving MoW to "the Culture Sector of UNESCO would reduce the programme to aesthetical issues."[1068] However, since the 1982 Mexico City Declaration, UNESCO has advanced an anthropological definition of culture, as discussed in chapter two, to be one not reduced to culture as art and thus aesthetical issues. As emphasised by Innis' concepts and theories that have offered guidance in this dissertation, there is a complex relationship between media and culture in anthropological terms, prompting the necessity to understand the possibilities of digital technology particularly from such a perspective. A third suggestion refers to also embracing aspects of digital technology that are currently not considered, namely the participatory potential of digital technology. In chapter three, a few authors have been discussed, who suggested that preservation should also capture the dynamic aspects of documents or that their preservation was closer to that of intangible cultural heritage. While these statements bring fruitful views, they essentially refer to embracing possibilities of digital technology in terms of participation, beyond those for preservation and access, which are currently the focus in libraries and archives.

8.2.1 The Heritage Value of the Digital Carrier

According to the final report of the Register Sub-Committee meeting in 2005, the following remark was made during the session: "Digital materials, in particular, were continuing to be problematic. The existing criteria did not address the specific difficulties and new criteria needed to be discussed and established in order to be able to manage the growing number of

[1068] UNESCO, *Report of the Ninth Meeting of the Sub-Committee on Technology*, 2006.

digital collections that were being nominated."[1069] By studying further meeting protocols of the leading bodies of MoW, another remark can be identified in an IAC report from 2007, when during that session a member

> "…raised the issue of large digital databases nominated to the Register. The IAC has consistently turned down large databases that have been nominated, for example, a major database on AIDS; over three rounds the nominator addressed all issues but the IAC still needed more time to consider. There is a need to set guidelines as to how these should be handled."[1070]

From these paragraphs, we find out that MoW already had to deal with documentary heritage in digital form, but found it difficult to deal with them because they do not fit existing criteria, and consequently new criteria needed to be developed. Indeed, it does seem that they have difficulties in this regard. However, these problems are not highlighted in the current MoW Companion, which is complementary to the Guidelines, as mentioned above. In the MoW Companion, digital documents are discussed relatively briefly in a separate section related with paragraph 4.3 from the Guidelines, entitled "Nominating for the Memory of the World Register". It is explained here that a digital document is defined by its content, original file format and resolution; it further explains which digital version shall be called an original and which a copy, and concludes by suggesting that "in explaining how the document(s) meet the criteria for inscription, the nominator may wish to cite research or professional literature on digital records and their preservation in support."[1071] However, this cannot truly be considered criteria, thus emphasising that these are yet to be developed. Nevertheless, in a previous draft of the MoW Companion available online for a very short period before being replaced with the current version, a section addressing the same paragraph from the Guidelines mentions that "the selection criteria for MOW registers apply equally to born-analogue and born-digital documents."[1072] As shown by the analysis below, indeed it does. We further read that:

> "In the MOW context, the nature of digital documents raises questions about the concept of an identified "original", assurance of authenticity and survivability, and the link between carrier and content. Some forms of digital information - such as data bases, proprietary programs, metadata and websites - raise further complex issues of stability, finite extent, definition, preservation and access."[1073]

This paragraph indicates that MoW has given some thought to the heritage value of new forms of documents and documentary practices such as those discussed in chapter six;

[1069] UNESCO, *Report of the Third Meeting of the Register Sub-Committee of the International Advisory Committee of the "Memory of the World" Programme, Paris, 21 March 2005*, Paris, 2005.
[1070] UNESCO, *Final Report of the Eighth Meeting of the International Advisory Committee*, 2007.
[1071] UNESCO, "Memory of the World Register Companion".
[1072] UNESCO, *Memory of the World Companion, A Work in Progress*, Paper discussed at the 9th meeting of the International Advisory Committee of the Memory of the World Programme, Christ Church, Barbados, 29-31 July 2009, Paris: UNESCO.
[1073] UNESCO, *Memory of the World Companion, A Work in Progress*.

however, it is explained in the above-cited report of the IAC that at least digital databases have been consistently turned down. However, the fact that several nominations of documentary heritage in digital form have already been submitted only becomes evident by studying meeting protocols of MoW bodies. Indeed, at the time of writing there are 245 examples of documentary heritage inscribed on the MoW Register, yet only two of them, both inscribed in 2011, seem to represent documentary heritage in digital form. One of them is the "Landsat Program Records (Multispectral Scanner)" submitted by the United States, a collection of images of the Earth's land surface, coastlines and reefs.[1074] However, the significance of this documentary heritage mainly lies in the images, which are unique since no other images of the Earth were taken at the time Landsat did, and thus its relevance relates to the content. The other such nomination is the "First Byurakan Survey (FBS or Markarian survey) submitted by Armenia, which is an astronomical survey including plates made of glass covered by photographic emulsion of images of celestial bodies.[1075] However, since these are fragile, the nomination includes the digitised version of this collection of plates, but this nomination, just as with the previous one, is not really related to the value of the carrier. However, it is necessary to also briefly consider those nominations of digital documentary heritage that have been rejected to find out why this happened, especially to observe whether the reasons for rejection related to the carrier.

The aforementioned 2007 IAC report speaks about a certain database on AIDS, which was rejected. In short, this nomination refers to a digital archive considered the largest collection of HIV/AIDS specific information; according to the nomination file, it is a "living archive", and incomplete because the cure has not yet been found.[1076] This nomination, entitled "The AIDS Education Global Information System – HIV/AIDS Archive", was already mentioned in older meeting protocols of the MoW bodies. For example, according to the records of the 2nd Bureau meeting, "this nomination was already proposed to the IAC in Vienna 1999 and deferred to the Bureau for further action. The revised nomination is considered to meet the

[1074] UNESCO, "Landsat Program records (Multispectral Scanner)": Nomination form submitted by USA to the International Memory of the World Register, (REF N° 2010-49), http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/mow/nomination_forms/USA%20Landsat.pdf (accessed 20 April 2013).
[1075] UNESCO, "First Byurakan Survey (FBS or Markarian survey)": Nomination form submitted by Armenia to the International Memory of the World Register, (REF N° 2010-53), http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/mow/nomination_forms/armenia_first_byurakan_survey_en.pdf (accessed 20 April 2013).
[1076] UNESCO, "The AEGIS millennium collection": Nomination form submitted by USA to the International Memory of the World Register. http://portal.unesco.org/ci/en/files/5963/10354525110usa_aids.pdf/usa_aids.pdf (accessed 13 April 2013).

selection criteria, provided the requirement for a collection of fixed size is met: for example, defining the data base as it stands on a specific date."[1077] Considering how the value of this nomination was set against the MoW criteria, it results that its value does not lie so much in the documents, which are not unique, but rather in the archive itself, being the largest collection of data about HIV/AIDS ever compiled in one single location.[1078] However, the nomination was rejected because it is a living archive, and thus it misses the fixity of documents discussed in chapter three. A similar problem was encountered in the case of a different nomination, entitled the PANDORA Australia's Web Archive and submitted by Australia.[1079] PANDORA is a collection of copies of significant Australian online publications and websites built to ensure long-term access to significant Australian documentary heritage published online.[1080] As stated in the nomination form, it "is proposed for the *Memory of the World* Register to highlight that information in digital formats is as important as any other to our cultural and documentary history and needs to be preserved."[1081] While this nomination was inscribed on the Australia National MoW Register in 2004, prior to being nominated for the International MoW Register, it has not also been accepted on the latter.[1082] As we can infer from the final report of the 3rd meeting of the Register Sub-Committee in 2005, one of the reasons for rejection was unrelated with the nomination itself:

> "At this stage there are no digital documents inscribed on the International Register, and as with previous digital nominations the Register Sub-Committee found it difficult to assess Pandora against the criteria as they currently stand…There are presently no detailed guidelines for digital heritage and the Register Sub-Committee does not feel confident in proceeding with an assessment until such guidelines have been prepared and adopted."[1083]

However, there were also reasons for rejection related with the nomination: "most of the content is not unique. The case of inscription on the International Register rests largely on the claim that *Pandora* is the first example in the world of a public, globally accessible archive of fully functional websites. The nomination is apparently also in conflict with paragraph 4.5.2 of the *General Guidelines to Safeguard Documentary Heritage.*"[1084] Paragraph 4.5.2 of the

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[1077] UNESCO, *Report of the Second Meeting of the Bureau of the International Advisory Committee*, 2000.
[1078] UNESCO, "The AEGIS millennium collection": Nomination form.; Here the reference is to archive as collection of documents not institution.
[1079] UNESCO, "PANDORA, Australia's Web Archive": Nomination form submitted by Australia to the International Memory of the World Register, (REF N° 2004-28), http://portal.unesco.org/ci/en//ev.php-URL_ID=18001&URL_DO=DO_TOPIC&URL_SECTION=201.html (accessed 7 November 2012); The reference here is to archive as collection of documents not as institution.
[1080] UNESCO, "PANDORA, Australia's Web Archive": Nomination form.
[1081] Ibid.
[1082] According to the General Guidelines, one item of documentary heritage can exist simultaneously on all registers. See Edmondson, *Memory of the World: General Guidelines*, 20.
[1083] UNESCO, *Report of the Third Meeting of the Register Sub-Committee*, 2005.
[1084] Ibid.

Guidelines explains that "the documentary heritage nominated must be finite and precisely defined; broad, general or open-ended nominations will not be accepted [...] Typical acceptable examples are a discrete document or collection, a data base of fixed size and content, a closed and defined archival fond."[1085] Accordingly, as with the other nomination, one key problem in this case was the fact that they were open-ended nominations, and constantly changing. Nevertheless, since PANDORA has been inscribed on the Australian MoW Register, it is worth pointing out that there are arguments in its statement of significance that extend beyond its relevance in terms of content.

According to the nomination form, PANDORA was created three years after the emergence of the Wold Wide Web; for this reason, it is considered to provide "a record of the early years of this new and revolutionary publication and communication medium."[1086] As indicated by this statement, the relevance here does not lie so much in what was written in the documents, but rather in the fact that they resulted from and provide evidence of a new type of writing and speaking enabled by a new medium. Another important consideration is that "PANDORA has aesthetic significance, given that it preserves the appearance and functionality (the 'look and feel') of publications and websites, as well as their intellectual content, in addition to the evolution in presentation and format of items mounted on the Web."[1087] This paragraph clearly refers to the medium rather than the content, and indicates that PANDORA has intrinsic value that would be lost if the content was transferred from carrier to carrier. Emulation has been discussed in chapter three as a method by which the original functionality and "look and feel" of a document are preserved, which is undertaken when the combination of hardware and software are part of the significance of documentary heritage. A third nomination that places value on the digital carrier yet has been similarly rejected relates to free software. It is entitled "Worldwide – Free Software", and was submitted by Free Software Foundation Europe.[1088] As argued in the nomination form:

> "Free software vehicles ethics: freedom, equality, fraternity, transparency. Freedom to copy, to study, to modify and to redistribute software or documentation. Equality, the same rights for every user, without any discrimination. Fraternity, because it deals with sharing and mutual assistance. Transparency, because it's deeply rooted in the Free Software development model [...] Free software has also social implications. It's

[1085] Edmondson, *Memory of the World: General Guidelines*, 25.
[1086] UNESCO, "PANDORA, Australia's Web Archive": Nomination form.
[1087] UNESCO, "PANDORA, Australia's Web Archive": Nomination form.
[1088] In the context of MoW Programme nominations can be submitted by anyone, even by individuals can or organizations. Edmondson, *Memory of the World: General Guidelines*, 23.

> about mutual help and knowledge sharing, and it provides tools available to everybody."[1089]

The nomination did not refer to one specific software but rather the idea of free software itself, and thus, as stated in the nomination form concerning what it includes, it asserts that "the inventory is huge and difficult, since there are tens of thousands of free software projects."[1090] However, the IAC also rejected this nomination on the grounds that "the collection needs to be defined since the nomination is a huge, amorphous array and constantly changing ... The nominator is requested to propose specific pieces of software which have had wide influence."[1091]

These examples indicate that digital documents do in fact fit the MoW criteria, yet they do not fit traditional definitions of document, highlighting the difficulties discussed in chapter three concerning what exactly a digital document is and how it differs from a traditional one. Changes triggered by digital technology remain very new, with librarians and archivists attempting to come to terms with them; however, it is open to question whether MoW should put aside digital documents until it succeeds in properly understanding them. In light of the process of technological obsolescence, MoW itself admits that tomorrow may be too late, as indicated by the Charter drafted to raise awareness of this matter. Therefore, it may be more appropriate to use what exists, although it does not entirely fit current understandings of documents. For example, Adam Mathes, who does not write in relation with MoW at all, discusses the case of interactive fiction - a genre of computer games - which he believes could be considered under the domain of "special collections", in libraries and archives this referring to documents that are very rare, extremely valuable or fragile. Indeed, digital documents are rare, valuable and fragile at least for the reason that the software and hardware that produced them have become obsolete. Exactly the same type of document cannot be produced again, and consequently they hold relevance as discussed above in the case of the PANDORA archive. In his discussion about the value of computer games, Mathes notes that "although not commercially popular today, the genre may be of great scholarly and historical importance as interactive electronic games grow both in general popularity and as subjects

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[1089] UNESCO, "Worldwide: Free Software": Nomination form submitted by Free Software Foundation Europe to the International Memory of the World Register, http://portal.unesco.org/ci/en/files/7550/10443548740free_software.rtf/free+software.rtf (accessed 29 November 2012).
[1090] Ibid.
[1091] UNESCO, *Final Report on Sixth Meeting of the International Advisory Committee*, 2003.

worthy of academic study."[1092] He acknowledges that it is not an easy matter to fit digital documents under existing categories, yet argues that this is possible:

> "With the current commercial nature of video games, it may be hard to conceive of computer programs as artifacts belonging in a special collection. However, there are a number of good reasons for such a collection [...] Much like rare books, older computer programs are in need of conservation if their intellectual material is going to be accessible today and in the future."[1093]

It is also worth considering that in fact only the software and hardware exist in the case of digital documents, which consist in three layers. The conceptual level, the content of a document, which receives so much attention today, only exists as interaction of hardware and software. It is to some extent possible to understand why hardware itself has received little attention, given that this usually means a hard drive, CD, computer box, and any other "hard" elements of digital technology. Indeed, people rarely think about these items, beyond the fact that they should technically function. However, surprisingly, software, which includes software documentation as explained above, and can be considered not just a new type of document but also a necessary component of preservation, has not received attention as heritage. In the case of the aforementioned nomination form on free software, value was placed on the idea of free software rather than specific software. However, why not consider that the software itself could be significant; for example, literate programs could be significant due to their simplicity or elegance in mathematical terms? In his discussion of the notion of elegance regarding programming, Mathew Fuller explains that programmers might sometimes even need to be "concerned with conserving elegance against other imperatives, such as the cutting of costs", yet even if this is not needed, "elegance remains a set of parameters against which a program can be measured."[1094] Clearly, such an understanding of elegance is unusual in the field of documentary heritage preservation; however, software documentation can not only fit the definitions and conditions imposed by MoW concerning what counts as a document, but also represent a new type of document enabled by digital technology and characterised (why not) by a different type of elegance. Despite being considered the "intangible" part of digital technology, software does have materiality in that it is always written on something. It resembles the understanding of information as thing because the physical base is implied as part of it, given that it is written with a physical base

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[1092] Adam Mathes, "Collecting and Preserving Infocom Interactive Fiction," *Website of Mathes, Adam*, 2004, http://www.adammathes.com/academic/rbsc/infocom.pdf (accessed December 3, 2012).
[1093] Ibid.
[1094] Fuller, "Elegance," 88.

in mind, even for a certain physical base.[1095] This physical base is preservable, or at least as much so as any other medium on which information has been inscribed, and this is definitely not a "living" materiality, as required by MoW. Moreover, software documentation consist in signs and codes; it is definitely movable; moreover, it is also migratable and reproducible, at least free software. It even suits the condition that it should result from a deliberate documenting process. As for the criteria of significance, the previous nominations have highlighted that software documentation would certainly fit at least one of them, as required. Naturally, this is now a hypothetical discussion, given that the relevance of any document is determined on a case-by-case basis, regardless of medium. Furthermore, it would also require a different approach because one would need to preserve the dynamism of digital technology, as proposed by authors such as de Lusenet, Urrichio or Owen discussed in chapter three, rather than accommodating digital technology to the fixity of traditional documents. Without changing current definitions of MoW, this could be achieved by placing the heritage value on the dynamic aspect of digital documents rather than their content, at a certain point in space and time, which does not reassemble the understanding of documents in the digital age. Accordingly, pursuing a different direction of inquiry that places the bias of digital technology at its centre, including its dynamism, would not only be worth pursuing but might even be necessary in order to integrate digital technology in MoW in light of its overall philosophy.

8.2.2 Digital Access as Cultural Access

The notion of access has already been discussed in detail, and thus these points should not be reiterated here. The same arguments also hold true for the Memory of the World, because here the space-bias of digital technology and its potential technical universal reach also triggers the vision that all people of the world will finally have access, resulting in the over-reliance on digitisation. However, this vision obscures the cultural challenges that could result from digital access, which requires some elaboration. As discussed in previous chapters, through digitisation, at least in a technical sense, all digital documents are the same, regardless of their content. While MoW claims to represent the diversity of people, cultures and languages, if digital technology reduces the diversity of documentary heritage to a binary language, what is left besides diversity of content? As one author has stated regarding the digitisation of photographs, it "destroys the photographic image as evidence of anything except the process

[1095] Mac OS is for Apple computers, Windows is for Microsoft computers, etc; This has been discussed in subchapter 3.1 in this dissertation.

of digitalization."[1096] Alternatively, to use Borgmann's concepts, it turns natural and cultural information into technological information. In fact, the statement that digital technology provides access to documentary heritage is mistaken. Suggesting this is only appropriate in the case of born-digital documentary heritage because digital technology provides, at best, access to digital copies. Moreover, it is appropriate to say at best, because everything can be ultimately reduced not to binary language but rather signal processing, as discussed in chapter six. However, leaving aside this latter aspect, it would be more appropriate to say that digital technology provides access either to copies of documentary heritage or information about it, but not to documentary heritage as literally understood. It has been mentioned above that from a technical perspective digital technology is praised for having reduced computational noise to almost zero.[1097] However, as understood within Shannon's communication theory, noise represents some sort of bias understood as in Innis' communication theory. From the perspective of bias, digital technology has perhaps eliminated some types of noise, yet it has simultaneously introduced new ones. This point has been emphasised in other words by Manovich, who has discussed new media objects - this including digitised documents - comprising two layers: a cultural and computer layer. According to him, given that digital objects are handled with the computer, "we may expect that the computer layer will affect the cultural layer. The ways in which computer models the world, represents data and allows us to operate on it; the key operations behind all computer programs…influence the cultural layer of new media: its organization, its emerging genres, its contents."[1098] The analysis in previous chapters has showed that the computer layer indeed has an influence on the cultural layer. Nevertheless, following an Innisian analysis requires further emphasising that the computer is not simply a technology affecting culture but also being affected by it. Therefore, it results that the influence of the computer layer on the cultural layer is in fact the influence of another cultural layer embodied in digital technology. While this has been pointed out in the discussion of how users are "engineered", it leads to the need to acknowledge that digital access is always cultural access. In order to discuss implications for MoW, it is possible to

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[1096] Brian Winston, *Claiming the Real: The Documentary Film Revisited* (London: British Film Institute, 1995), 259, quoted in Frank Kessler, "What you Get is What you See: Digital Images and the Claim on the Real," in *Digital Material, Tracing New Media in Everyday Life and Technology*, eds. Marianne van den Boomen et al. (Amsterdam: Amsterdam University Press, 2009), 188.

[1097] This was mentioned in subchapter 3.1 in this dissertation. See also discussion on packet-switching in subchapter 5.1.1 The phrase "computational noise" was made by John von Neumann, and has been discussed by Kittler. See Friedrich A. Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford: Stanford University Press, 1999), 249.

[1098] Manovich, *The Language of New Media*, 63.

start by further pursuing the above-raised question of what diversity is in the context of digital access.

MoW asserts that it represents the diversity of the people, cultures and languages and intends to show this through the MoW Register. However, a few authors have criticised the global relevance of the international MoW Register. The criteria for inscription of World Heritage Sites have offered a basis for the criteria for inscription in MoW, with the central concept of this selection being that of significance.[1099] However, such authors have considered that the same criteria that functions in the case of built heritage or the museum sector are not similarly appropriate in the context of MoW. The notion of significance is politically very loaded, because significance is determined by the collecting institutions or a very small number of people that select the items and thus shape memory.[1100] One subsequent result is that the values of minority cultures and their memory tend not to be represented and, just like the World Heritage List, the MoW Register is also Eurocentric, thus calling its global relevance into question[1101]. As Charlesworth suggests, MoW has strong human rights foundations,[1102] yet implementing such an approach would inevitably require asking questions about how representative and supportive MoW is of minority cultures.[1103] At this moment, the international MoW Register perhaps cannot be said to represent the diversity of the world, as also admitted in the General Guidelines: "In the early years of the Programme a bias towards older materials, especially manuscripts, and against "modern media", has been apparent. There has also been a tendency to favour items created in western countries…The Programme will need to achieve both geographic and temporal balance over time."[1104] Therefore, the MoW Register is perhaps not balanced in terms of the diversity of contents and carriers, although becoming balanced is an intention.

The notion of cultural diversity was initially also explicitly mentioned in relation to the Charter for Preserving Digital Heritage, yet was related here with the 2001 UNESCO

[1099] For a discussion on the notion of significance in the context of documentary heritage preservation, including discussion of some documentary heritage inscribed on MoW see Roslyn Russell and Kylie Winkworth, *Significance 2.0. A Guide to assessing the significance of collections,* 2nd ed. (Australia: Collections Council of Australia, 2009).
[1100] Lloyd, "Guarding against collective amnesia".
[1101] Harvey, "UNESCO's Memory of the World Programme".
[1102] The relation to human rights is even spelled out in the General Guidelines. See Edmondson, *Memory of the World: General Guidelines*, 15: "This is consistent with the UN Universal Declaration of Human Rights (1948) and UN Convention on Civil and Political Rights (1966). Everyone has the right to an identity, and therefore the right of access to their documentary heritage. This includes the right to know it exists, and where to find it."
[1103] Charlesworth, "Human right and the UNESCO Memory of the World Programme".
[1104] Edmondson, *Memory of the World: General Guidelines*, 23, footnote 23.

Universal Declaration on Cultural Diversity, which states that "culture takes diverse forms across time and space. This diversity is embodied in the uniqueness and plurality of the identities of the groups and societies making up humankind."[1105] This Declaration represents an important milestone in discussions of cultural diversity within UNESCO in terms of affirming the equal worth and uniqueness of cultures, and also the link between their diversity, human rights and human development, although these aspects cannot be mentioned here.[1106] Nevertheless, this example is provided owing to its relation with the Charter on digital heritage, which arose out of MoW. The title of an article in a preliminary draft of the Charter from 2002 was "Cultural Diversity and Pluralism".[1107] In a later draft from March 2003 an explicit reference to the 2001 Universal Declaration on Cultural Diversity was incorporated in the preamble of the Charter and the title of article 9 was "Promoting Cultural Diversity".[1108] While this draft appears today in the Guidelines for the Preservation of Digital Heritage, the reference to cultural diversity is absent in the Charter adopted by the General Conference of UNESCO later in October 2003, neither appearing as part of the preamble nor as the title of article 9, which had changed to "Preserving Cultural Heritage".[1109] Why this happened cannot accurately be inferred from the drafting documents and discussions available for consultation, but for the purpose of this subchapter this is not of importance. What is important is that the idea does not seem to have been abandoned, and is still reflected in article 9 of the adopted Charter, which reads: "The digital heritage of all regions, countries and communities should be preserved and made accessible, so as to assure over time representation of all peoples, nations, cultures and languages."[1110]

[1105] UNESCO, 2001, *Universal Declaration on Cultural Diversity*.

[1106] For a compact study of the evolution of the concept of cultural diversity in UNESCO see Katerina Stenou, *The Issue of Cultural Diversity, Review and Strategy, 1946-2004, Revised Version* (UNESCO Division of Cultural Policies and Intercultural Dialogue, Paris: 2004), http://www.unesco.org/culture/culturaldiversity/docs_pre_2007/unesco_diversity_review_strategy_1946_2004_en.pdf (accessed 6 April 2009).

[1107] See Art. 3 in UNESCO, *Preliminary Draft Charter on the Preservation of the Digital Heritage, Doc. CL/3643, 26 November 2002*, http://unesdoc.unesco.org/images/0015/001534/153486e.pdf (Accessed 28 April 2013).

[1108] See National Library of Australia, *Guidelines for the Preservation of Digital Heritage*, 12-16.

[1109] Compare UNESCO, 2003, *Charter on the Preservation of Digital Heritage*, with National Library of Australia, *Guidelines for the Preservation of Digital Heritage*, 14, which incorporates a different version of the Charter. This is the result of the fact that the drafting of the Charter and the preparation of Guidelines took place in parallel, but the Guidelines were released in March 2003, whereas the Charter underwent some revision until October 2003 when it was adopted.

[1110] UNESCO, 2003, *Charter on the Preservation of Digital Heritage*.

Some considerations of diversity exist in relation with digitisation for access. For example, in terms of the fact that English is the mainstream language on the Internet, some authors have argued based upon the example of Finland, that

> "…for smaller countries representing smaller language groups the dilemma is that the general public, academic institutions, researchers and business might turn to using the English collections on the Web as their main source. This could in the long run diminish the knowledge, research and interest in the national culture as part of Europe's cultural richness as a whole."[1111]

The authors suggest that "the selection of material for the Finnish collections should support the technical solutions for the multilingual use of European collections."[1112] Multilingualism is a suitable solution for addressing the needs of non-English speakers and the World Digital Library can be stated as an example of an international initiative following such a policy. In libraries and archives, diversity also addresses the subjects or types of documents preserved, not just the languages. Maintaining the example from Finland, the authors also suggest that an example of diversity

> "…would be digitization of the nineteenth century, which consists of many genres of material such as newspapers, journals, manuscripts, maps, photographs, art and so on. These are the items and genres forming the core collections, in such disciplines as science, history, mathematics, geography, ways of life, education, culture and so on. Each institution is contributing to this pattern, which in the end forms a patchwork of the cultural heritage and extends to other centuries and to international cooperation."[1113]

Despite addressing diversity in certain regards, these examples actually speak about diversity of content; however, by following an Innisian analysis, addressing diversity means something else. On the one hand, it requires also thinking about the diversity of carriers, because content diversity is not media diversity. In MoW, this is acknowledged better than in discussions over digital heritage; namely, through the intentions of MoW to also achieve balance of the carriers on the International MoW Register. However, transferring this into digitised documentary heritage results in something else, as from a medium theory perspective, the same content in different media triggers different types of access, as well as different understandings and ways of engaging with a document, etc. Therefore, on the other hand, from an Innisian perspective, it is insufficient to think about diversity of carriers, because for Innis the medium was not simply matter, and its bias or essential characteristics were not determined by the medium alone but also how the medium was understood and used. This requires placing the medium in

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[1111] Majlis Bremer-Laamanen and Jani Stenvall, "Selection for Digital Preservation: dilemmas and issues," in *Managing Preservation for Libraries and Archives: Current Practice and Future Developments*, ed. John Feather (England, USA: Ashgate, 2004), 54.
[1112] Bremer-Laamanen and Stenvall, "Selection for Digital Preservation," 54.
[1113] Bremer-Laamanen and Stenvall, "Selection for Digital Preservation," 64.

context, asking questions of whether people have the skills, know-how, motivation and possibility to use digital technology. However, it essentially leads from thinking about technology to thinking about people. In fact, libraries and archives do think about people when they have the community of users in mind, which informs selection of materials. It is even recommended that they start from considerations of community, an example in this regard being the Open Archival Information System Reference Model (OAIS), initially developed by the Consultative Committee for Space Data Systems (CCSDS) but which has developed into a formal standard that has been taken up by many libraries and archives worldwide.[1114] OAIS is a set of recommended practices for the archiving and long-term preservation of digital information, one of whose key purpose is to preserve information for a "designated community" defined as "an identified group of potential consumers who should be able to understand a particular set of information."[1115]

While this used to be a smaller community, usually the community in which the institutions were physically located, digital technology exceeding physical borders has enlarged the user community, rendering its definition very difficult. Indeed, this becomes even more difficult if considering that user communities are not static but rather constantly changing.[1116] Furthermore, it becomes even more difficult if the purpose is to serve cultural diversity, considering that the continuous dissemination of computers leads to a more diversified user community, including people from less developed countries, women, elders and other minority groups that have thus not been well represented in the digital environment. Accordingly, it is important to not only consider diversity of contents or carriers, but also the development of interface as culture discussed in chapter five. It is generally suggested that the end purpose of preservation is access, and indeed, preservation does not make sense without some sort of access. However, it is important to also acknowledge that access represents just a means rather than the end purpose of preservation, which prompts questions about the ends of digital access as means. While the many parts that compose a computer are perhaps produced in countries around the world, the way in which computers work is based on practices of enumerating and sorting, on certain models of ordering things and on logical inferences, all of which display a specific style of thinking. By digitising the documentary heritage, bringing it in a digital environment and placing it in databases, we separate it from a context and embody

[1114] Consultative Committee for Space Data Systems (CCSDS), "Reference Model for an Open Archival Information System, CCSDS 650.0-M-2." (CCSDS Secretariat, Washington, D.C. 2012) http://public.ccsds.org/publications/archive/650x0m2.pdf
[1115] CCSDS, "Reference Model for an Open Archival Information System".
[1116] Ibid.

it in a different one. Intended as tool for universal access, this new digital context is based on a world view that may not match others. Rather than leading to a representation of cultural diversity it could lead to its erosion, because, it would be filtered through digital technology and rendered again visible only as diversity of content, for the sake of universal access. Digital access is never culturally or politically neutral, and thus in order to achieve universal access it might be more appropriate to focus on culturally meaningful access and by so doing decide which media is appropriate in different cultural contexts, as opposed to opting for the instrumental worldwide use of digital technology. Therefore, approaching digital access as cultural access appears to reflect a necessary step for integrating the access possibilities of digital technology in MoW in light of its overall philosophy.

8.2.3 Preservation as Participation

The notions of space and time were said to refer to mindsets or predispositions towards expansion and control, and continuity and community, respectively. However, the discussion of the space- and time-biased aspects of digital technology presented in chapter five has emphasised that the communities triggered by digital technology are not necessarily based on continuity, despite being based on principles of community such as sharing or acting for the common good. Digital technology, even in the case of free software, was said to encourage constant change, which in Innisian terms meant impermanence. This is somehow reflected in the Charter on the Preservation of Digital Heritage, which raises the problem that attitudinal change regarding preservation needs has fallen behind technological change, with the threats not having yet been fully grasped.[1117] As explained in previous chapters, for Innis, the space- or time-bias of a medium did not only refer to the medium per se but also to the entire apparatus that it triggers, including attitudes; however, given the strong space-bias of digital technology, it is open to question whether the attitude that MoW expects - to positively change mindsets about the preservation of documentary heritage - would emerge at all, given the need for a time-biased attitude, so to speak. Had Innis lived today, he would have certainly been concerned that the space-bias of digital technology has destroyed balance within Western cultures, thus jeopardising cultural flourishing. Indeed, this may also become a concern for other parts of the world where digital technology is not presently ubiquitous, because disguised as "bridging the digital divide", the space-bias of digital technology makes it reach out even into indigenous communities, albeit at a low rate. An active approach is perhaps required for a time-biased attitude, considering people not as simply the intended

[1117] UNESCO, *Charter on the Preservation of Digital Heritage*, Art. 3.

audience of preservation but rather as active participants in preservation or transmission to future generations. The notion of participation or community involvement has recently become a key concept in the field of heritage protection, regarding world heritage sites and intangible heritage. However, despite the possibilities offered by digital technology, participatory approaches have rarely been considered in the context of libraries and archives, with few presently existing examples.[1118] Nonetheless, the notion of participation would also be worth considering in MoW, because from an Innisian perspective this would be necessary to enable conditions for the continuity of documentary heritage of a non-technical nature, such as attitudes or practices.

While Worcman has remarked that digital division is cultural exclusion, she has also raised the question of whether digital inclusion is cultural inclusion.[1119] Phrased in other words, she asks how suitable digital technology is from a cultural perspective. A study of existing cases of digital technology use in indigenous communities shows that this question could be answered positively, provided people are already involved at the design level. This idea has been emphasised in chapter five through the example of van der Velden's research in the Maasai culture, where the local volunteer did not want to make additions to the program for archiving local knowledge given that he had not participated in its design. Moreover, there are further and different examples. In September 2012, UNESCO organised a conference entitled "The Memory of the World in the Digital Age: Digitization and Preservation", which brought together almost six hundred participants to discuss various topics of concern. At this conference, one presenter from Barbados explained, or rather kindly drew the attention of those undertaking digitisation projects, that when digitising traditional music recorded on decaying carriers the background sounds should not be interpreted as "noise" and thus removed; rather, they are part and parcel of the music and its understanding.[1120] With Innis' words, they are bias. She explained that such mistakes have already occurred, mainly for the reason that the people whose music was being digitised did not participate. Further studies could also be mentioned here, but one can also observe that discussions regarding the use of digital technology in indigenous communities are, in fact, contradictory.

[1118] See subchapter 6.4 in this present dissertation.
[1119] Worcman, Karen "Digital Division is Cultural Exclusion. But is Digital Inclusion Cultural Exclusion?" *D-Lib Magazine* 8, no. 3 (March 2002), http://www.dlib.org/dlib/march02/worcman/03worcman.html (accessed 28 August 2012).
[1120] Oral presentation of Elizabeth F. Watson, attended by the author at the UNESCO Conference, The Memory of the World in the Digital Age: Digitization and Preservation, Vancouver Canada, 26-28 September 2012.

Dyson argues against commonly-held views that the ideology embodied in digital technology would lead to the erosion of indigenous communities, and instead argues for the presence of overwhelming enthusiasm, at least among indigenous Australians on whom she bases the research.[1121] She suggests that the use of digital technology is not rejected due its ideological "bias"; rather, its use is only limited by cost, isolation, poor telecommunications infrastructure, low computer literacy and a lack of awareness. Moreover, Dyson even argues that attributes of digital technology "such as its flexibility, interactivity, its non-judgmental and non-hierarchical nature, and its use of graphics mitigate any potentially negative effects and allow indigenous Australians to achieve their own goals while avoiding Western enculturation."[1122] An argument contradicting Dyson's has been invoked by Michael Christie, who explains that while indigenous communities might adopt digital technology, they do so out of necessity rather than enthusiasm.[1123] According to Christie, who similarly speaks about the experience of indigenous peoples in Australia, they are very aware that "indigenous knowledge lives in country, and in doing things together in country – not in computers."[1124] However, they suggest that the younger generation is not interested in learning from the elders, and consequently they need to find a way to preserve some of the knowledge of old people before it is too late.[1125] To this end, they use computer databases to store texts, photos, videos, maps, lists and other artefacts, which they deem sufficiently important for their children to need to learn about. Following this matter, Christie has studied the compatibilities between the ways in which computer databases can be used to produce knowledge and the methods of indigenous communities.

His discussion is based on the case of an aboriginal community, i.e. the Yolngu, and likens the database with "garma", a publicly recognised site for ceremonies and celebrations, where individuals work together as groups to collaboratively produce knowledge. According to Christie, one similarity between the database and garma is that they do not contain knowledge but are used to produce knowledge. However, "while western scientific knowledge may be valued for its objectivity, Yolngu knowledge is valued for its connectivity and sustainability.

[1121] Laurel E. Dyson, "Indigenous Australians in the Information Age: Exploring Issues of Neutrality in Information Technology," in *Proceedings of the 11th European Conference on Information Systems, ECIS 2003, Naples, Italy 16-21 June 200*, eds. Claudio U. Ciborra et al. (Sidney: University of Technology, 2007), http://is2.lse.ac.uk/asp/aspecis/20030043.pdf.
[1122] Dyson, "Indigenous Australians in the Information Age".
[1123] Michael Christie, "Computer Databases and Aboriginal Knowledge – Learning Communities," *International Journal of Learning in Social Contexts*, vol.1 (2004): 4-12.
[1124] Christie, "Computer Databases and Aboriginal Knowledge".
[1125] Christie, "Computer Databases and Aboriginal Knowledge".

This connectedness of Yolngu knowledge needs to be enabled and enhanced by the database if it is to serve the community which owns it."[1126] As Christie argues, "an indigenous database" cannot simply contain representations of Aboriginal knowledge, pre-defined by someone else and not collaboratively constructed by the community. The database architecture, its structure, search processes, interfaces, ownership and uses must reflect indigenous ways of being and knowing. Explaining why the database is not neutral, he states that "the coding which makes up the software of the database reflects a theory of knowledge which is well hidden and carries the cultural bias of its designer"; an argument that has also been sustained in this dissertation.[1127] One example that Christie provides in this regard is the metadata, which he perceives as a kind of naming and explains that by naming things, it is possible to locate them physically and conceptually, which is also the beginning of structuring of knowledge. However, the database reflects western logic and presents an already structured world, whereas indigenous communities focus on the creative use of language to actively produce possible new worlds. From this perspective, the structure of metadata may represent a barrier because it does not enable the type of connections that the Yolngu make to produce knowledge. With this, Christie has not argued that databases should not be considered at all, but rather that the construction of indigenous databases is technically possible, provided they are involved in its construction. As he suggests, computer technology can be used by aboriginal elders to teach their children by learning together to "read" the database as a way of producing knowledge; however, they learn to read databases for their own purposes as they learn to write them. Such an argument seems to be supported by research of Bell, Budka and Fiser on the successful use of a computer network, i.e. MyKnet.org, by forty indigenous communities from Canada.[1128] Accordingly, their research revealed several aspects that determined the significance of this network, with some crucial aspects referring to its character as being community-driven, community-based and community-focused. As the authors further argue, while mainstream online social networks have seen increasing amounts of marketing and advertising on their pages - as the analysis in chapter five has also shown - this has not been the case with the MyKnet.org., owing to its non-commercial nature. These remarks are important from an Innisian perspective because they point to the harnessing of the time-biased aspects of digital technology. They do not emphasise the dissemination of local knowledge around the world as with the utopian perspectives on digital technology simply

[1126] Christie, "Computer Databases and Aboriginal Knowledge," 3.
[1127] See subchapter 5.2.2 in this dissertation.
[1128] Brandi L. Bell, Philipp Budka and Adam Fiser, "'We were on the outside looking in': MyKnet.org - A First Nations online social environment in northern Ontario," in *Connecting Canadians: Investigations in Community Informatics*, eds. Andrew Clement et al. (Edmonton: Athabasca University Press, 2012), 237-254.

because this is technically possible, but rather point towards the use of digital technology for holding together and continuity of a local rather than virtual community.

The aforementioned examples reveal that digital technology could be significant in the temporal transmission of documentary heritage, not in terms of the transmission view focusing on how technology ensures preservation, but rather in terms of the ritual view, focusing on how it can be used to enable community and its role in preservation. The difference between preservation through computer database and preservation through interaction as described by Christie is acknowledged in MoW, and has also been described in chapter two in terms of the notions of memory as product and process. Furthermore, it has also been stated that MoW deals with products, not with processes, and when it comes to products it properly acknowledges cultural differences in preservation. Indeed, this is emphasised by the following paragraph in the Guidelines:

> "Many cultures have traditional and effective means of preserving their own forms of documentary heritage, which reflect their own ethos and customs. Conversely, modern methods have often developed from a scientific understanding of the nature of materials and the mechanisms of deterioration, and come from a "western" tradition. In individual countries, finding an accommodation between these two approaches may be important in developing management plans. Both areas of knowledge are essential if collections are to be adequately maintained."[1129]

As for processes, these were said not to count in the context of MoW. Despite acknowledging that "some cultures are more 'document oriented' than others", leading to not all cultures being equally represented within the global documentary heritage, MoW states the "intangible and oral heritage, for example, is the province of other UNESCO Programmes."[1130] Nevertheless, what Christie and also Bell, Budka and Fiser suggest is to consider the product as part of a process of community building and knowledge transmission, a perspective which implies participation in the product, from its making to successful intergenerational transmission. From this perspective, MoW would still be required to deal with products and thus with documentary not intangible heritage. However, it would need to more properly reflect that digitally transmitting documentary heritage to future generations does not depend on keeping it technically accessible within libraries and archives, but rather on the appropriation and integration of digital technology within local processes of knowledge, memory or cultural transmission. Without such an appropriation, the possibilities to maintain it known across generations become doubtful, regardless what amount of documentary

[1129] Edmondson, *Memory of the World: General Guidelines*, 14.
[1130] Edmondson, *Memory of the World: General Guidelines*, 8.

heritage is technically preserved in digital form. This results from an Innisian analysis, indicating that digital technology jeopardizes balance due to its strong space-bias, unless it is integrated locally in a way that does not disturb the conditions needed for cultural continuity. This is not at odds with MoW, which apart from Registers also comprises projects, activities and other events that could change mindsets about the documentary heritage of humanity, as well as its local and global relevance. By so doing, even if it deals with products, MoW implies that achieving its aim does not depend solely on making sure that products are preserved, but rather on how these products are maintained within and between communities. Therefore, integrating digital technology in MoW in light of its overall philosophy requires always considering preservation as participation and never simply as accessibility of information.

8.3 The "Memory of the World" as Reflection of Balance

This subchapter holds the purpose of considering how MoW could become a reflection of balance. If the analysis has thus far concentrated on the relevance of digital technology in the context of MoW, in order to conclude the analysis the discussion has moved in this subchapter to the relevance of MoW in a world changed by digital technology. Although the aim of this present dissertation was to critically analyse the role of digital technology in MoW, it is also necessary to study the role of MoW, given that its conceptualisation seems to have changed under the bias of the medium. By so doing, the analysis once again enforces the argument that the integration of digital technology in MoW should be conducted in light of its overall philosophy. The following was stated about the MoW Register at an IAC meeting in 1997: "a compendium of documents, manuscripts, oral traditions, audio-visual materials, library and archive holdings of universal value, will be a significant document in itself, as well as an inspiration to nations and regions to identify, list and preserve their documentary heritage."[1131] The intention of MoW to ensure a spatial and temporal balance in the representation of documentary heritage on its international Register has been discussed above, and while this would encourage some sort of balance, it would not lead to MoW representing a reflection of balance for the simple fact that MoW is not the Register. In order to become a reflection of balance, MoW has to be seen through its key philosophy rather than being reduced to specific activities such as preservation, access and the registers, which are only

[1131] Abdelaziz Abid, "Memory of the World – Preserving our Documentary Heritage, Progress Report." *In Final Report of the Third Meeting of the International Advisory Committee of the "Memory of the World" Programme, Tashkent, 29 September - 1st October 1997*. Paris, 1997.

tools supporting its philosophy. It has been mentioned in chapter two that MoW can be approached as a contribution to knowledge societies, and it has also been discussed that it is increasingly seen in relation with information programmes, perhaps also due to the positioning of MoW under the UNESCO Information and Communication Sector. However, the analysis of the bias of digital technology has highlighted that this reduces MoW to a programme for information preservation rather than emphasising the relevance of documentary heritage beyond its informational content. It has been discussed that information and knowledge are seen as commodities in concepts such as "information society", "knowledge society" or "digital divide". Moreover, it has been discussed that UNESCO has a different understanding of knowledge societies. However, this is simply UNESCO's understanding, because within such discourses the interest is commonly not in enabling measures for people to apply knowledge for human development but rather economic issues, since information is seen as the motor of the economy.

While commoditisation reflects a route to knowledge, as discussed in chapter seven, this is not the intention of MoW, as revealed in an early evaluation report of MoW, which reads:

> "There is concern in UNESCO that, although the growth of cyberspace offered unlimited access to information, there was increasingly a trend to provide this at a financial cost to the user. Within the context of the Memory of the World Programme, the key issue is the right of access. UNESCO is striving for this right of access to as many fonds and collections as possible. In this way it is promoting a strong 'public domain', accessible on-line and off-line, and the concept that libraries and archives should be part of a 'global information commons'."[1132]

The concept of the commons is the complete opposite of commodity, and has gained again prominence in recent years. The commons represents "a generic term for describing all those things that we inherit from nature and civil society, which we are duty-bound to pass along, undiminished, to future generations."[1133] As Cavanagh and Mander argue, while the concept emerged in European societies and is unknown in many non-European societies, "the concept of shared community use and protection of common resources are basic, endemic, understood,

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[1132] Petherbridge, Kitching and de Wolf, *"Memory of the World" Programme External Evaluation*, 33; The same idea has been expressed in: World Commission on Culture and Development, *Our Creative Diversity, Report of the World Commission for Culture and Development* (Paris: UNESCO, 1995), 190, which reads: "From initial inventories to museum exhibits or scientific publications, archival efforts need to be conceived as part of larger concerted heritage policies. This is one of the purposes of UNESCO's 'Memory of the World' programme launched in 1992, which has set out guidelines to help safeguard manuscript collections and archival holdings throughout the world."

[1133] David Bollier "Imagining A New Politics of the Commons," *Renewal Magazine* (December 17, 2007), http://bollier.org/new-politics-commons-renewal-journal-2007

and respected by entire societies."[1134] Today, the employment of the commons concept is related to a variety of movements and organisations driven by the idea that commons resources should not be turned into market commodities. David Bollier has offered several examples of the contemporary commons movement such as communities trying to prevent the privatisation of water or citizens defending common public spaces against intrusive commercialism. Furthermore, Bollier's examples also include references to scientists building shared databases of research, artists and scientists using Creative Commons licenses to enable sharing and re-use of their work,[1135] and creators of Internet free software and open source programs.[1136]

The emergence of free software as a reaction against rules embodied in proprietary software has been discussed above. In short, advocates of the commons argue against the privatisation of certain resources that they believe are so important for people and their well-being that they should not be only used for the benefit of few, namely private corporations. Within the commons theory, this aspect is defined as "enclosure".[1137] As "commoners" argue, "market enclosure of the commons shifts ownership and control of resources from a given community or the public at large, to private companies. This in turn changes the management and character of the resource, because a market […] dictates a different set of social relationships in our dealings with each other and a given resource […]."[1138] This argument exemplifies that by turning a resource into a commodity, the social relationships in dealing with that resource are changed. The commons implies a social form, in which the relationships among people belonging to a community are based on their common use and management of a certain resource. As explained by Bollier, people have a personal and moral connection with a commons, given that the very existence of the commons is based on their cooperation, participation and responsibility. This argument is very strongly supported by Innis' concept of

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[1134] John Cavanagh and Jerry Mander, *Alternatives to Economic Globalization: A Better World is Possible, International Forum on Globalization,* 2nd ed. (San Francisco: Berrett-Koehler Publishers, 2004).
[1135] Creative Commons is a non profit corporation which provides licenses in the field of creative works. See Creative Commons, *Official Website*. http://creativecommons.org/
[1136] Bollier, "Imagining A New Politics of the Commons".
[1137] According to Bollier "enclosure is the term used to describe the aristocratic seizure of common forests and meadows in England during medieval times and especially in the eighteenth century." What had previously been shared in common, seized to do so when land and natural resources were privatized and exploited for the marketplace. "Such enclosures introduced new market productivity, but they also deprived the commoners of what was rightfully theirs and created vast inequalities of wealth". See David Bollier, "Rediscovering Our Common Wealth," *Oregon Humanities* (2006): 4-7.
http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/4980/Oregon_Article.pdf?sequence=1.
[1138] David Bollier, "Global Markets, Culture and the Commons," *Remarks at the Conference: "Globalization and Diversity, UNESCO and Cultural Policymaking: Imperatives for US Arts and Culture Practitioners and Organizations"*, (Smithsonian Institution, Washington DC, January 10-11 2005).

space and time triggering predispositions towards control or community. Indeed, the intention of MoW, which considers documentary heritage as part of the global commons, aims towards community. By narrowing MoW down to information, with its current understanding as commodity, the risk emerges that MoW becomes a replicator of the meme of technopoly, to use some concepts introduced above. Therefore, contextualising MoW in the philosophy of the heritage of humanity may be necessary, because this concept emphasises the idea of the commons. It is a resource that should be used equitably and sustainably by people, thus resembling the discussion on the principles underlying the heritage of humanity presented in chapter two: equity, solidarity and cooperation, precaution, common yet differentiated responsibility, and sustainability. In this respect, MoW would build on its own strengths rather than relying on information programmes for visibility, since the heritage of humanity is the basis upon which the vision on documentary heritage in MoW rests.

As early as in 1998, an external evaluation of MoW remarked that "the purpose of the Programme is still not clearly understood by many practitioners in the fields of culture, libraries, archives, education and information."[1139] However, the fact that MoW is still seen as the Register by some, as digitisation programme, or as preservation of information by others, suggests that MoW is perhaps still seeking to make its own profile clear. Moreover, it is even possible to go as far as suggesting that its profile is not clear because its key philosophy, based on the heritage of humanity, is not also followed into practice, which reveals an over-emphasis of digitisation, access and information. However, whereas the apparent narrowing down of MoW to information has been a gradual development triggered by digital technology, the view that it belongs to the heritage of humanity has always been its core. Linking it in practice with other programmes for heritage has similarly been suggested on many occasions from its inception to the present day. In 1998, an external evaluation report suggested that the website for MoW "should also be linked to other relevant cultural heritage and related web sites and to that for the World Heritage Programme to increase the consciousness of the affinity in objectives."[1140] Furthermore, at an IAC meeting in 2001 it was remarked that "The Memory of the World Programme should create links with other UNESCO heritage",[1141] while in 2008, a so-called "common heritage methodology" was

[1139] Petherbridge, Kitching and de Wolf, "*Memory of the World" Programme External Evaluation*.
[1140] Petherbridge, Kitching and de Wolf, "*Memory of the World" Programme External Evaluation*, 5.
[1141] UNESCO, *Final Report of the Fifth Meeting of the International Advisory Committee of the "Memory of the World" Programme, Cheongju City, Republic of Korea, 27-29 June 2001*, (no: CI-2001/CONF.504/CLD.1) Paris, 2001.

proposed by the UNESCO Bangkok Office to promote the programme.[1142] Resulting from the need to strengthen MoW, a survey was conducted in 2012 concerning how MoW is implemented at a national level.[1143] Several respondents pointed out the need to establish closer links between the UNESCO cultural heritage programmes, with the survey concluding that an "issue which was clearly identified was the need for a continued and enhanced cooperation and solid links between the international, regional and national levels of the Programme and other UNESCO heritage programs."[1144] Under the bias of digital technology, MoW seems to develop towards strengthening its links with information. In the name of access, rather than representing the mirror of the world and its memory, it would risk representing a cybernetic mirror of it. However, the analysis carried out in this dissertation leads to the conclusion that it would be rather necessary for MoW to construct further on its heritage of humanity philosophy, consequently becoming a reflection of balance for a world changed by digital technology.

9. Conclusions

This present dissertation has offered an exploration of documentary practices in the age of digital technology, focusing on the Memory of the World and its increasingly digital facet. This research has been give impetus by statements found in the key documents of MoW that were deemed as not entirely compatible with its overall philosophy, prompting the need to gain deeper insights into the influence of digital technology in its context. To this end, the research has pursued the aim of providing a critical analysis of the relevance of digital technology in the context of MoW, facilitated by a conceptual framework anchored in the medium theory of Harold Innis. Supporting the study of digital technology, its bias, tendencies in terms of space and time, as well as its consequences for balance, his concepts have acted as lenses to closely study selected aspects of digital technology, showing that it is not simply an instrument that facilitates the access and preservation of documentary heritage but also one that has changed all related concepts and practices. Consequently, after gaining

[1142] UNESCO, *A Common Heritage Methodology*; See also Engelhardt and Omager, "Progress report on the development of a methodology for complementing the three UNESCO programmes.
[1143] UNESCO, *Evaluation of the Memory of the World Programme, res. 36C/COM CI/DR.2, adopted by General Conference, on 10 November 2011, at its 36th session, Paris, 25 October – 10 November 2011*. Paris. 2011; See also UNESCO, "Evaluation of the Memory of the World Programme (res. 36C/COM CI/DR.2) Survey Results".
[1144] UNESCO, "Evaluation of the Memory of the World Programme (res. 36C/COM CI/DR.2) Survey Results".

awareness of the bias of digital technology and its conceptual and practical implications, the study moved to relating these aspects with the overall philosophy of MoW.

This has revealed that MoW is well aware of the limits of digital technology, as shown by certain statements from its documents outlining this matter; however, these are overshadowed by those emphasising its possibilities for access. Furthermore, MoW is also well aware that also the digital carrier could have value, yet its focus on content obscures this matter. Moreover, the challenges raised by digital technology are predominantly reflected in documents reporting on the meetings of the leading bodies of MoW. However, these are documents suitable for the researcher or those closely interested in MoW rather than a broader public who should be sensitized about the existence and relevance of documentary heritage, including that in digital form; and one exceeding the relevance of the content. The analysis has also exposed that MoW faces difficulties in defining digital documents and developing criteria that would suit their relevance. However, if approached through the above-applied conceptual framework, all of these show that under the influence of digital technology, MoW is in the grip of its space-bias. This is revealed in the constant appeal to the concepts of access and information, at times sounding like arguments in favour of technopoly, and leading to the narrowing down of MoW to a programme in the service of information, apparently towards achieving the visibility that MoW deserves yet has not managed to achieve. Reasons invoked suggest that MoW has not had the necessary human and financial resources to develop, and while this is quite unfortunate, it essentially seems to emphasise that MoW has not accomplished the task of convincing of its relevance and consequently attract the necessary resources. Indeed, how could MoW convince of its relevance when it is gradually subsumed to information-related initiatives, when its aims have been stated differently across time, when it means different things to different people who should promote it as one! While MoW seems to have forgotten about its own philosophy in the grip of the space-bias of digital technology and the fight against digital amnesia, the analysis provided in this present dissertation has brought it up again to argue that MoW needs to return to its core.

In a world under the influence of digital technology, which has come to be dominated by a concern for present-mindedness - to stay close to the vocabulary of the scholar whose theory and concepts guiding the analysis have led to this conclusion - the Memory of the World has a special role to play today by counteracting space-biased tendencies with the idea of continuity and permanence. Above all, MoW holds relevance through its potential to act as a reflection

of balance by approaching the documentary heritage as heritage of humanity and illustrating the need to equitably share it among the present and future generations – the philosophy lying at its core. Balance, which places the entire discussion on a moral level of analysis, entails the requirement that documentary heritage is kept accessible; not in a technical sense but rather in the minds of people, who are the true carriers of the documentary heritage. With this, we do not need to move to a different UNESCO programme concerned with the intangible cultural heritage; instead, we need to return to the human scale, bringing the documentary heritage to the communities where the time-biased conditions needed to pass it on develop, rather than relying on space-biased technologies to ensure its transmission. While the space-bias of digital technology has been said to jeopardise the flourishing of cultures, this has not been done to suggest its rejection from the context of documentary heritage, because some type of bias belongs to all technologies. Thousand years old clay tablets have reached across the generations, yet knowledge about them would have remained confined to physical access and oral communication without a space-biased technology to carry their message or image across space. Time-biased technologies are not meant to reach across space, just as space-biased technologies are not meant to last across time; however, this is exactly what makes it necessary to be aware of their bias, their essential characteristics, and what we can and cannot achieve with them. Therefore, digital technology has been approached with a critical eye not to deny but rather to maximize its potential, which, by following the notions of bias and balance, does not imply intensifying its use or rendering it more efficient in a technical sense, but rather always considering its compatibility with the context of use, and thus with a view to balance.

While it has been argued that MoW currently plays a special relevance, this cannot be fulfilled unless MoW in turn integrates digital technology with a view to its stated philosophy, rather than giving in to space-bias. Consequently, three recommendations for how this could be achieved have been elaborated upon with the help of the same conceptual framework that has facilitated the identification of bias. First, the suggestion has been advanced to acknowledge that the digital carrier may also have value. Failed nominations of documentary heritage were discussed to explain that the dynamic elements are exactly what characterize digital documents, prompting the need to consider them as potential sources of heritage. Moreover, the argument was advanced that computer programs should be approached as documents, whereas their elegance understood in mathematical terms as a new understanding of heritage significance. While this statement was perhaps controversial, it was also one that

was meant to at least invite some critical reflection based on an informed understanding of digital documents being unlike traditional documents composed of three layers, with the logical layer adding a new heritage dimension. Second, the suggestion has been advanced to approach digital access as cultural access, given that digital technology is not a neutral instrument but rather the product of a socio-cultural and political-economic environment, which conditions its design and application, in turn conditioned by the affordances of the medium. Since MoW embodies claims about reflecting diversity, the analysis has invited reflection about what happens with the diversity of documentary heritage when it is transferred into a digital environment. In this respect, reflections have led to the claim of the need to move beyond diversity of contents and carriers to cultural diversity in its broadest anthropological sense, prompting the need to prioritise cultural access over considering the technical possibilities of access. Third, the suggestion was advanced to approach preservation as participation, which has been presented as a necessary measure to ensure the continuity of documentary heritage, holding that technical access is not sufficient. The successful transmission of documentary heritage to future generations does not occur solely through keeping it accessible in a technical form, but also though the socio-cultural and political-economic conditions that together form a more-or-less proper environment. This has led to the observation that it is necessary to ensure the broad participation of people in the preservation of documentary heritage, as a basic requirement for its temporal transmission.

Elaborating these recommendations was possible through fruitfully juxtaposing the concepts of Harold Innis with those existing in MoW, being similar yet different, which also provided the possibility to gain new insights into the relevance of digital technology in MoW. Their similarity lies in both Innis and MoW being concerned with documents and their carriers that have survived transmission across space and time. Their difference lies in that, for Innis, the notions of space and time did not refer so much to the materiality of the carrier, although this played an important role, but rather to the mindsets triggered by medium and favouring dissemination or duration. This understanding could be juxtaposed with the objectives of MoW regarding universal and permanent access. Accordingly, the view that digital technology was a tool for universal access has been replaced with the view that it was a space-biased medium. Given that space and time exist in relation, it arose that universal access should not take precedence over permanent access but should rather complement it, if the application of digital technology in the context of documentary heritage were to be successful, with balance reflecting a measure in this regard.

This present dissertation has advanced the hypothesis that digital technology has to be integrated in MoW in accordance with its overall philosophy rather than only with specific objectives, in this regard providing glimpses of what it would mean for MoW to construct on its approach to documentary heritage as heritage of humanity. By so doing this dissertation has suggested an ethical framework for the implementation of MoW, directing attention from documentary heritage itself to its relevance in today's world. This represents an alternative approach to MoW, not as an information-related initiative, but rather one concerned with a comprehensive and global perspective on documentary heritage and driven by the principles of equity, cooperation and solidarity, common but differentiate responsibility, precaution and sustainability, surrounding any "heritage of humanity" resource. While, in theory, all of the necessary mechanisms are in place, there is also the need to comply with them in practice. Furthermore, by following the theory and concepts of Harold Innis, this dissertation has also offered a methodological framework suitable to not only reflecting upon the limits and possibilities of digital technology, but also of any medium. The medium theory followed in this dissertation arises from the study of thousands of years of media history, leading to very general statements that seem to apply to any medium. Indeed, stating that a medium possesses characteristics that render it different from other media and that these influence culture holds true for both clay tablets and digital technology. In the context of MoW, this leads to the observation that reaching many people is only possible by using all available mechanisms, prompting the need to make recourse to non-digital mechanisms for access, preservation and promotion existing in MoW. In this respect, the conceptual and methodological framework provided by Innis can be appropriated to at least reflect upon the implications of a medium in respect of documentary heritage, before promoting its suitability to a context.

Digital technology has influenced all areas related to heritage, yet the intention of this present dissertation to focus on the Memory of the World has been twofold. On the one hand, as discussed directly above, there is the conviction that MoW could play an important role today; however, on the other hand, and as stated in the Introduction, there is a lack of attention received by MoW in heritage-related scientific research. Indeed, while some such attempts exist, these are at best modest in comparison to literature concerning other heritage initiatives. In a report of a meeting of the MSC in 2009 university researchers were listed as the main target audience for promotional activities regarding MoW.[1145] As a consequence at an IAC

[1145] UNESCO, *Report of the Third Meeting of the Marketing Sub-Committee of the International Advisory Committee of the "Memory of the World" Programme, Paris, 16-17 March 2009*, Paris, 2009.

meeting in 2011, a proposal was launched to set up Memory of the World Studies around the world, arguing for the need to integrate it in the academic world. Underlying this proposal is the argument that the UNESCO programmes for heritage, aiming at an audience of the most extensive kind - no less than humankind - represent a new and very specific phenomenon, which "requires a deepened knowledge and understanding and, seen from the practical side, the development of scholarly and scientific means to strengthen these programmes."[1146] Indeed, in line with this proposal, it is worth emphasising that the academic world could greatly strengthen the Memory of the World, with the opposite also being true, given that MoW itself represents a rich source of knowledge. The MoW Register alone can already be considered a rich source of knowledge, with several authors noting its potential educational role, as "access to cultural memory and specifically to the documentary heritage of other cultures opens up new perspectives and opportunities for intercultural education."[1147] Nevertheless, this present dissertation has brought the Memory of the World into the academic world for yet another reason, namely as a contribution to the field of Heritage Studies, which cannot uphold its claim to centre on a holistic concept of heritage without incorporating the documentary heritage among its concepts. There are many research needs in respect of MoW, and while this present dissertation does not claim to have filled the gap, it has aimed to offer a basis upon which future research could proceed. The little attention received by MoW has left the path relatively open, and consequently researchers are free to choose the path they find appropriate. However, despite this freedom, it is important not to forget that the documentary heritage under discussion is a heritage of humanity.

[1146] UNESCO, "Memory of the World and the Academic World: A Proposal to Introduce Memory of the World Studies," *10th meeting of the International Advisory Committee for the Memory of the World Programme, Manchester, United Kingdom, 22-25 May 2011, Item 9*, Paris: UNESCO.
[1147] Robertson von Trotha and Hauser, "UNESCO and Digitalized Heritage"; Also Bond, "Digitizing our Common Memory".

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