

Interfacing Digitized Art Museum Collections Through the Notion of Performative Materiality

The ArtBot Guide Case Study

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Abstract

The interest and need of exploring the possibilities of Digital Humanities tools within the framework of this Master's thesis stems from the awareness that significant changes are taking place within the landscape of institutionalized art museums. Most significantly, the fact that most art museums in Western societies have digitized and made available their collections online. Yet, despite the potentials, the collections being online is the point where meaningful interactions usually halt.

The first Part of this Master's thesis is centered around three concepts relevant for these developments – the interface, digitized art museum collections and performative materiality. In researching the history, meanings and doings of these terms, a mini-glossary is compiled for the process of art museum collection digitization and the potentials that it entails.

Part II of this Master's thesis, informed by the findings of Part I, offers a Digital Humanities design thinking and critical making speculative solution. Building on the work of the PolyCube model cultural collection interactive visualization tool and the possibilities of Linked Data, the author of this thesis and Master's level Artificial Intelligence student at the Utrecht University, Simon Dirks, have ideated the ArtBot Guide. The smartphone application aims to make a visitor's journey to an exhibition a more engaging endeavor. Firstly, in allowing for the hidden structures of the exhibition collection to appear through the PolyCube model tool, visualizing the metadata of the digitized collection objects to perform as a "hyperobject". Secondly, in exploring the Linked Data possibilities in a chatbot application, where an artwork or an artist's name can become a node of discovery for further related information to be called upon by wish.

The ArtBot Guide has been designed for a specific case study exhibition, "Tears of Eros: Moesman, Surrealism and the Sexes" at the *Utrecht Centraal Museum*. A comparison is being made between visiting the exhibition with and without the ArtBot Guide. In applying the concepts of interface, digitized collections and performative materiality to the speculative experience comparison, the innovative aspects of the ArtBot Guide are made most visible.

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On a personal note, I wish to say a million thanks to Benjamin – for everything. And to my family – Edīte, Kaspars, Miķelis, Jana, Aija, Verners, Jānis - for the love and support I have been so, so privileged to feel behind my back at all times. As well as to our house cats - Boris and Kate - for generously providing much-needed mood lifts along the way.

Introduction

As everyday lives of people living in Western civilization are increasingly permeated by digital technologies, fields of specialist knowledge have been profoundly and steadily drifting into the digitized modes of being too. Traditional scientific studies do not stress the use of digital technologies in their working titles¹ but nevertheless rely on computers for processing data. The Humanities, as Stanford University explains (Stanford Humanities Center), is the study of how people process and document the human experience, traditionally categorized into study fields of philosophy, literature, religion, art, music, history and language. These modes of expression have seemingly always been analogue, just as most of the work done within the respective scholarly fields. Parallel to the ongoing and meaningful analogue modes of humanistic explorations, a field stressing the aspects of the computational in its working title, has been taking ground. The umbrella term of Digital Humanities stands in for computational method use within the traditionally humanistic fields of study in the form of Distant Reading, Digital Art History, Cultural Analytics, Distant Viewing, Computational Ethnomusicology, Digital History and many others that are hard to box in a specific category. Digital Humanities can be still seen as a new and emerging field (Klein and Gold, 2016), whose projects are mostly conceived and carried out in universities and specialized research centers. As with most innovations, both skeptical and welcoming reactions are taking ground. While enthusiastic audiences have been frequenting the annual festival - like Digital Humanities conferences since 1989², others believe that it is just a buzz word to be successfully used in university research grant applications with no truly relevant scholarly value or use in real life situations (Bishop 2018). Even though there surely are more and less successful projects within the new field, I believe that the methodology of Digital Humanities, usually involving critical and interdisciplinary making, can offer new and meaningful reflections and possibilities of engagement within the traditionally analogue fields of the Humanities.

The interest and need of exploring the possibilities of Digital Humanities tools within the framework of this Master's thesis stems from the awareness that significant changes are taking place within the landscape of institutionalized art museums that are also related to digital technologies. Within leading institutions pushing the boundaries of museology, the digital is no longer a separate but rather an all permeating strategy. In paying close attention to and analyzing these processes, Ross Parry has called the new state of being the "postdigital

¹ For example, the "Digital" in Biology is omitted.

² <http://adho.org/conference>

art museum”³ (Parry 2013). One of the biggest and most profound recent trends within the postdigital art museum has been the digitization of their collections. The first step of digitization has been done and the collection databases have become widely - accessible via the museums web pages. The next critical Digital Humanities work is to find innovative ways of engagement with this incredible source of knowledge made accessible online. The digital mode of being offers great possibilities for art historical material to come alive in the medium of the 21st century that are yet to be fully explored.

In the framework of this Master’s thesis, a Digital Humanities tool, the ArtBot Guide, will be ideated in order to explore the possibilities of digitized collections in an exhibition setting. Based on an interactive information visualization tool, the PolyCube model (Windhager et al. 2018), and the possibilities of Linked Data in the format of a web-based chatbot smartphone application, The ArtBot Guide aims to alleviate and make more meaningful museum exhibition visitor experiences. The ArtBot Guide is designed on the basis of a case study, the “Tears of Eros: Moesman, Surrealism and the Sexes” exhibition on view in the *Utrecht Centraal Museum* from February 15th until August 16th, 2020. It is an experimental critical making project ideated in the specific constellation by the author of this thesis and Simon Dirks, Artificial Intelligence Masters student at the University of Utrecht. Simon Dirks has and continues to do the creative development and implementation of the ArtBot Guide.

In order to test and illuminate the innovative aspects of such a hand-held Digital Humanities tool, it will be explored in the context of the aforementioned exhibition. Two critical concepts will be confronted and applied to the analysis, the interface (Hookway 2014; Galloway, 2012) and performative materiality (Drucker 2013). I will claim that the exhibition, as currently on view in the museum, is a boundary – pushing and cognitively challenging experience. I will claim that the hand-held ArtBot Guide has the potential to make the interfacing with a museum, and the case study exhibition in particular, a more meaningfully engaging endeavor for an interested visitor. Firstly, in allowing for the hidden structures of the exhibition collection to appear through the PolyCube model tool, visualizing the metadata of the digitized collection objects to perform as a “hyperobject”. Secondly, in exploring the Linked Data possibilities in a chatbot application, where an artwork or an artist’s name can become a node of discovery for further related information to be called upon by wish.

³ Similarly, David M. Berry (2017) opting to no longer stick with the term archive, instead talking about the post-archival constellation, revealing that larger tectonic changes are happening within all three traditional Humanities institutions – the archive, the museum and the library.

Research question and sub-questions

Main research question: *Does the ArtBot Guide provide new ways of interfacing with cultural (exhibition) collections in a digital setting through the notion of performative materiality? If so, what kinds?*

Research sub-questions:

- 1) What is an interface? How can the concept of interface be used in relation to visitor engagement with art museum collections and exhibitions?
- 2) What are cultural collections? How have the institutions housing cultural collections changed in the recent past? What are the opportunities that can be found within these changes?
- 3) What is digital materiality? How can performative materiality be helpful in thinking about digital materiality and the potential for digitized objects?
- 4) How does the museum function as an interface to the exhibition “Tears of Eros”?
- 5) How does the ArtBot Guide function as an interface to the exhibition “Tears of Eros”?
- 6) What are the innovative aspects of the ArtBot Guide when the two previous approaches are compared?

Methodology

Part I

The thesis departs and builds on a recent real-world problem situation - the fact that most forward-thinking art museums in Western societies have digitized and made available their collections online. Yet, despite the potentials, the collections being online is the point where meaningful interactions usually halt. In order to contribute to the discussions around the possibilities of digitized collections, it has been of utter importance to understand the broader meaning of cultural collections, their histories and the changes happening with the collections and the institutions that house them. After preliminary research work, it became clear that three concepts are central in thinking about computational technologies within art museums. The interface, the way we experience computational technologies in museum spaces. The digitized collections, as the core of museum work undergoing massive changes. And lastly,

performative materiality as a concept to think about the innovative possibilities the digitized collections can offer.

All three are, what cultural theorist Mieke Bal calls, traveling concepts that “offer miniature theories, and in that guise, help in the analysis of objects situations, states, and other theories,” (2002, 22). In analyzing the real-world situation that I have described above, the concepts of interface, digitized collections and performative materiality indeed question and deepen the complex and interdisciplinary field of thinking. Therefore, in the spirit of compiling critical term glossaries for complex theoretical positions⁴, Part I of this Master’s thesis can be seen as a mini-glossary devoted to museums and the process of digitization of their collections. I aim to provide a critical historical analysis and map the use of the three concepts in different knowledge fields, investigating the concepts separately and in relation to one another. This is done in order to understand where the fields stand on their own, where they overlap, and which research and design gaps can be filled in order to think of meaningful ways of moving forward with computational technologies in general, and the digitized collections in particular, within art museum spaces. At the end of each concept chapter, I reflect on how the concept has provoked critical thinking behind the ArtBot Guide smartphone application tool.

Part II

Within Digital Humanities, design thinking and critical making has been an important way of producing new academic knowledge. In order to critically think through and provide new perspectives for museums and their digitized collections, one such tool is ideated in Part II of this Master’s thesis. Namely, the ArtBot Guide. Originating from the engineering community, design thinking aims to solve problems in a creative and playful team-based setting. “Design thinking is not new, although in the last 20 years it has been embraced by a wide variety of disciplines,” (#dariahTeach) including computer science, education, business management and others. Its main characteristic is designing for user-centeredness. In other words, the person using the design solution should be benefiting from it in meaningful ways. Critical making has been coined as a concept by Matt Ratto around 2008. It aims “to describe the combination of critical thinking with hands-on making — a kind of pedagogical practice that uses material engagements with technologies to open up and extend critical social reflection,” (Hertz, 2018). Ratto was imagining how the term could act as a glue between criticality, usually thought of as a linguistic endeavor and making, usually associated with pure craftsmanship. Digital

⁴ For example: Braidotti R., Hlavajova M., eds. 2018. *Posthuman Glossary (Theory in the New Humanities)*. London: Bloomsbury Academic.

Humanities projects often strive for using both approaches, the doing resulting in a critically grounded making, in response to a research-specific complex problem. The theoretically grounded solution then being beneficial to a larger prospective public.

The author of this thesis and AI Master's student at the University of Utrecht, Simon Dirks, have worked on the ArtBot Guide in repeated sessions, starting with identifying the real world problem, then ideating, prototyping, evaluating and improving (#dariahTeach) it through multiple working sessions in the time frame of about three consecutive months.

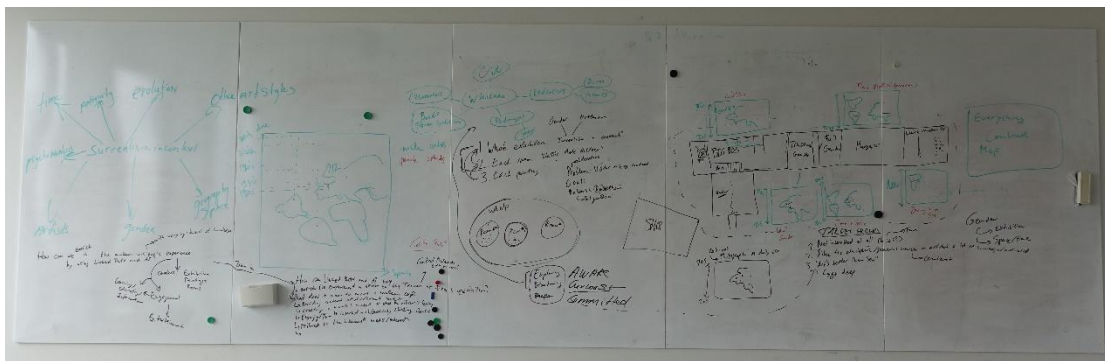


Figure 1. The ideation process.

The ArtBot Guide makes heavy use of the findings of the mini-theories of interface, digitized collections and performative materiality, resulting in a critical making and design thinking tool in the spirit of larger Digital Humanities endeavors. The ArtBot Guide cannot yet be described as a ready consumer product to be disseminated to museums for public use. In its current work-in-progress state, it is rather a cognitive provocation, a speculative design tool that aims to function as a starting point in thinking about the possibilities of engaging with widely available digitized collections in museum spaces.

When thinking about concept use in critical theory and beyond, Bal reminds that “[..] concepts can only do this work, the methodological work that disciplinary traditions used to do, on one condition: that they are kept under scrutiny through a confrontation with, not application to, the cultural objects being examined,” (Bal 2002, 24). In aiming to pinpoint and analyze more concretely the innovative aspects of the ArtBot Guide, I plan to bring together the previously scrutinized notions of interface, digitized cultural collections and performative materiality to confront and apply them to a specific case study analysis wherein objects from a traditional museum space have taken up a double life in the ArtBot Guide smartphone application. Such an approach will not provide an all-encompassing theory of museum object collections in the digital age. It will rather aim to provide a tool to think with, a possible solution to the real-life problems in the developing field of postdigital museology.

Post scriptum.

The research work done within this Master's thesis has been an ambitious and interdisciplinary project from the outlook. In Part I, I have taken an overarching media studies theoretical approach in thinking about the material structures where interaction between a visitor and a museum knowledge sphere happens. Yet, the mini-theories of the concepts touch upon many more disciplinary fields of their own. Meaning, when discussing the history and use of the concept of interface, computer engineering, user-centered design, cognitive psychology, critical cultural theory, literary studies, digital humanities practices and information visualization theories have been evoked. In discussing the history of collections, the history of museology, the history of archives, media philosophy about the current changes in archives, contemporary museology practices and design thinking has been brought up. In discussing performative materiality, digital humanities projects, hardware and software engineering, literary studies, information studies, but also linguistics, cultural theory, philosophy, gender studies and posthumanism have been evoked. When designing the ArtBot Guide, we have touched upon all these theoretical underpinnings, as well as critical making and design thinking methodologies, while applying the working Simon Dirk's IT skills to the prototype. I am aware that I have not made justice to all the fields previously mentioned in going into deeply nuanced conversations around them. In order to not be overly enthusiastic and non-critical about the speculative tool we have designed, I have also collected the potential advantages and disadvantages for the use of the ArtBot Guide in its current version.

All in all, I hope that the strength of the ArtBot Guide idea lies specifically within the open-endedness and further mutability, as well as located-ness within the crossroads of all fields of knowledge mentioned above, and combined in constellations as described throughout this Master's thesis.

Structure of argumentation and theoretical framework

The Master's thesis has been divided into two Parts. Part I functions as a glossary of terms for the problem of museums making their digitized collections widely accessible in online spaces.

Chapter One is dedicated to the interface. The contemporary use of the term is most associated with computational technologies. Therefore, I firstly sketch out the computational background of the interface. I start with Vannevar Bush ([1945] 2003) who, only 80 years ago,

was speculatively dreaming about a device that would have the possibilities of significantly extending our memories. In the 1960's Douglas Engelbart ([1962] 2003) defined the computer characteristics still of importance today, while Ivan Sutherland ([1963] 2003) made the computer screens interactive. Since then the computer has become an incredibly compact and user-friendly device. With the shortly sketched history of the computational interface, I hope to accentuate the fact that a smartphone application tool like the ArtBot Guide, is only possible because of a long line of work done within computer engineering. I then move on to media studies contemporary definitions of the term as described by Florian Cramer and Matthew Fuller (2008) and the broader theoretical account as to what an interface is, as described by Branden Hookway (2014). Lastly, I inspect how the term interface has been used in contemporary theory as a tool to think with in Galloway (2012) and in museology studies by Smith and Tinio (2008) in particular. I then turn to the creative and theoretical work done within Digital Humanities, through the field – wide thinking of Johanna Drucker (2011) and Mitchell Whitelaw (2015) in terms of museums and digitized museum collections.

Chapter Two, a glossary entry for digitized (art museum) collections ambitiously turns to the cultural history of collecting as narrated by cultural theorist Krzysztof Pomian (1990). I inspect how the collected has been institutionalized in three Modernist Europe institutions through the work of archival scholar Alexandra Walsham (2016) and what changes these institutions have undergone in recent past, as described by media and Digital Humanities scholar David Berry (2017). I then turn to the art museum, in order to inspect more closely how the digitization of collections has happened thus far and what are the general trends in the field through the work of media and museum scholar Ross Parry (2013). In analyzing the trend of museum collection digitization, I rely on the work of G. Wayne Clough (2013), the ex-Secretary of the Smithsonian Museum Group, one of the first institutions engaging with the endeavor already in the late 1970's.

Chapter Three, Performative Materiality, aims to provide a mini-theory for thinking about digital materiality in general, with the focus on Johanna Drucker's (2013) addition to the discussion, emphasizing the performativity in particular. Up until recently, the main narratives around digital technologies have been their cloud-like immateriality. Museum scholar Fiona Cameron (2007), literary studies scholar Matthew Kirschenbaum (2008), Information systems scholar Jean – François Blanchette (2011) and Digital Humanities scholar Johanna Drucker have been since arguing for their very real, lived and traceable materialities. Drucker's (2013) addition has been to stress the fact that all levels of materialities, lastly, perform in the mind of

the onlooker. Therefore, the reading of digital objects can be seen as real and material as any analogue Humanities objects of interest.

Inspired by the findings of part I, Part II offers a critical making and design thinking tool, the ArtBot Guide. The introductory Chapter Four aims to explain in more depth how the concepts have informed the ideation of the ArtBot Guide in more detail.

Chapter Five introduces the case study exhibition “Tears of Eros: Moesman, Surrealism and the Sexes”. Since the smartphone application is built on the specific case study, it was of importance to trace the general ideas and a museum visitors experience walking through the exhibition galleries. Lastly, the concept of interface here is applied to the notion of museum, in order to analyze an interested museum visitor's experience within the exhibition.

Chapter Six introduces the ArtBot Guide. Since it is heavily based on the interactive information visualization tool for digitized collections, the PolyCube model (Windhager et al. 2018), it is introduced first. It is then explained how the PolyCube model would be incorporated into a chatbot application, in aiming to design a most meaningful tool to enliven the digitized collection in a museum setting. Then, lastly, an analysis is made as to how exactly interfacing with the digitized collection through the notion of performative materiality in the museum can be helpful in making the museum visit experience more meaningful for an interested visitor. At the same time, the analysis aims to build on postdigital museological thinking about engagement with digitized collections in widening the discussions to also include the physical museum visitor’s exhibition experiences.

Chapter Seven makes a comparison between the museum exhibition visitor experience with and without the ArtBot Guide, distilling the main innovative aspects of making use of the digitized information in a museum visit context.

In Post Scriptum, the possible advantages and disadvantages of using the ArtBot guide in its current state are raised in question.

PART I

A Glossary of Terms for Thinking about Digitized Art Museum Collections

Chapter One: Interface

The most-widely known contemporary use of the term interface is related to computational technologies. People in Western societies take for granted the way personal computers, laptops, tablets and smartphones afford interaction with their operating systems. The clicking on icons, the typing on a keyboard, the zooming in on pictures all count on the long and rich history of computational technologies, of people working on design choices at the graphical user interface. We also seem to take for granted the term “interface” as if it was always there to describe human-computer interactions. Media studies scholars have been instrumental in showing that the interface has a long history in computational thinking but also goes well beyond it, in meanings both past and present. It is and has been a traveling concept (Bal 2002). The tasks of this Chapter are fourfold. Firstly, it is of importance to be aware of the computational history of the interface. Secondly, it is of importance to look into the history and the meaning of the term interface itself, as well as to be aware of the theoretical ways the term has been used up to date. Lastly, I will aim to ground my uses of the term within Part II of this Masters’ thesis, in relation to critical Digital Humanities work done within the sphere of museums.

History of computational interfaces

In the textbook media studies “The New Media Reader” (2003), edited by Noah Wardrip-Fruin and Nick Montfort, tracing “the complex, the changing, the indeterminate” history of computing technologies within the first chapter, three computer engineers – Vannevar Bush, Douglas Engelbart and Ivan Sutherland – are mentioned as relevant to the history of the computer interface design. In computing histories Vannevar Bush ([1945] 2003) is well known for his far – reaching vision on what a personal desktop computer could be at a time when a single computer was occupying a rather large room. Douglas Engelbart ([1962]2003) is known for in large part defining the modern personal computer interfaces, including the mouse, the window and the word processor, drawing his ideas strongly from Bushes’ “Memex” from fifteen years before. While Ivan Sutherland ([1963] 2003) notably made the screen interactive. The three research papers republished in “The New Media Reader” in the history of interfaces are therefore necessary to be looked up in more detail. Another important actant, the *Xerox Palo Alto Research Center*, will be looked at in relation to the developments closer to what

computers look like today. The work examined here is not in any way an attempt in mapping the whole of computer history, but rather mapping the moment when the notion of human – computer interface as we still know it today came into being, illuminating the thinking behind the potential of digital technologies.⁵

In the opening paragraphs of the 1945 article “As We May Think”, Vannevar Bush reflects on society wide innovations that scientists working on and around the second world war have achieved. He himself was an early calculator designer and one of President Franklin D. Roosevelt’s science advisors throughout the war. Yet, the “As We May Think” article is an attempt to make a vision of the uses of information technology for something other than military number – crunching, as used daily throughout the war.

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. It consists of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which he works. On the top are slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, sets of buttons and levers. Otherwise it looks like an ordinary desk, (Bush [1945] 2003, 45).

All the information would be saved on indexed microfilm. On the desktop there would be two translucent viewing screens magnifying the stored microfilm and hence making it legible. Furthermore, one of the transparent screens could be used to write commentary and notes on the reference material on the other screen. After inserting a proper code, it would be tied to the reference material, after the notes would be photographed on microfilm. Even though contemporary personal computers technically operate rather differently than the interface Bush imagined, much of the characteristics, like storing information and communications that can be consulted at great speed and flexibility, are there to be found.

Douglas Engelbart is known for actually creating one of the first prototypes that has the main characteristics of a contemporary day personal computer. The model was called NLS (oN-Line System) and “was unique in several respects. It used CRT [cathode ray tube] displays when most computers used teletypes. It was interactive (i.e., online) when almost all computing was batch [operated by punch cards]. It was full-screen-oriented when the few

⁵ For a more comprehensive Human – Computer Interaction history see: Baecker R.M, Grudin J., Baxton W.A.S., Greenberg S. 1995. *Human-Computer Interaction: Toward the Year 2000*. San Francisco, Calif.L Morgan Kaufmann Publishers.

systems that were interactive were line-oriented. It used a mouse when all other graphic interactive systems used cursor keys, light pens, joysticks, or digitizing tablets. Finally, it was the first system to organize textual and graphical information in trees and networks. Today, it would be called an "idea processor" or a "hypertext system," (Johnson et al. [1989] 1995). Engelbart was bringing Bushes' "Memex" ideas closer to reality than ever before.

In the 1962 article "Augmenting Human Intellect: A Conceptual Framework", Douglas Engelbart explains the efforts of the computing center endeavors. He theorizes that the world humans inhabit has grown increasingly complex, demanding for an increased human capability of dealing with the processes, explaining that "[...] increased capability in this respect is taken to mean a mixture of the following: more rapid comprehension, better comprehension, the possibility of gaining a useful degree of comprehension in situation that previously was too complex, speedier solutions, better solutions, and the possibility of finding solutions to problems that before seemed insoluble," (Engelbart [1962] 2003, 95). Further in the text he continues to explain how a computer and its programming can contribute to the problem. Even though the article itself does not prominently feature the term "interface", it does take an important place in the illustration accompanying the text. The circuit diagram like drawing delineates two subjects – the human and the machine. Interestingly, the cube "human processes" and the cube "artifact processes" are both divided with a line, explicitly showing the "matching processes" parts within both cubes. It clearly is aimed at showing how only a part of the capabilities of a human or a computer interact at the interface, building up the "outside world" reality from the intersecting qualities of the human and the artifact at a concrete given circumstance. Building on the ideas of Vannevar Bush, Douglas Engelbart created one of the first human-computer interfaces and theorized how they affect each other when in use.

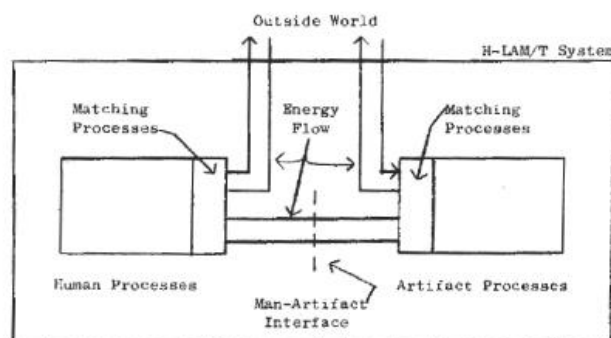


Figure 2. Engelbart [1962] 2003. Portrayal of the two active domains within the H-LAM/T System.

Described by Ivan Sutherland in “Sketchpad: A Man – Machine Graphical Communication System” from 1963, is a system that, for the first time in computer history, let people draw on a computer display. Therefore, the text in large part is aiming to explain in great detail how drawing on a screen is a very different procedure from drawing on a piece of paper and what are the advantages of doing so. The editors of “The New Media Reader”, Wardrip and Montfort, describe the Sketchpad to be “the graphical ancestor of today’s human – computer interaction and computer graphics, and much of new media in general,” (2003, 109) and also note that this was the first direct-manipulation interface in computing history. Sutherland and his team were not the only ones researching possible human – computer interactions through graphical means but the work did introduce a lot of powerful ideas and concepts and was therefore very influential at the time. Even though it took many years to come to develop the tools necessary for the ideas to be applied.

1970’s saw more and more non – programmers using computers. Therefore, the improvement of human-computer interaction became an increasingly present research topic. The first computer designed to support an operating system on a graphical user interface was introduced in 1973 and went by the name Xerox Alto by *Xerox Palo Alto Research Center (PARC)*, intended for use by one single individual. In tradition with Engelbart's NLS, it featured a display, a keyboard and a mouse. “Xerox pioneered the development of congenial graphical interfaces to systems and to the applications that ran on them, such as text editing, creation of illustrations, document creation, and electronic mail. These interfaces incorporated windows, menus, scroll bars, mouse control and selection mechanisms, and views of abstract structures, all presented and integrated in a consistent manner,” (Baecker et al. 1995, 42). By today’s standards only a rather small number of Xerox Alto computers were actually produced, and they were used mostly in highly advanced research and development laboratories and universities. The Xerox Star was a simplified Alto version of a personal computer, made publicly available for individual purchase in 1983. The *PARC* also envisioned a computer so small that you could fit in an overcoat pocket, the Dynabook by Alan Kay, that can be seen as a prototype vision for personal laptop computers, tablets and our increasingly powerful smartphones (Ibid.).

Building on the work of Bush, Engelbart, Sutherland, the *PARC* group and many, many other researchers in the field that are not mentioned in textbook historical studies, the year 2020 provides a highly advanced human – computer interface landscape in many innovative formats that I do not aim to name in the framework of this Master’s thesis. Nevertheless, as imagined by Vannevar Bush, they have the capabilities to extend our memories. As imagined

by Engelbart, they have become tools for dealing with the complexity of the world, keeping in mind that the operations happen at the interface of the machine and the human being. As imagined by Sutherland in direct feedback – graphic drawings, a whole new research field that is based on representing complex information in visual ways has taken ground and goes by the name of interactive information visualization, tackling ways of seeing that could have never been possible with ink on paper. And lastly, as imagined by the *Xerox Palo Alto Research Center*, graphical interfaces have become widely intuitive to use and fit our back pockets.

What can an interface be

One of the first uses of the term “interface” in relation to information technologies, to the best of my knowledge, is to be found on the circuit diagram drawing by Douglas Engelbart (Figure 2). Since then a considerable amount of time has been devoted in trying to define what exactly does the elusive term of interface mean, also in the context beyond computational technologies. In the framework of media studies, an early account and a concise description of what an interface is can be found in the “Software Studies: A Lexicon”, published by MIT in 2008. There Florian Cramer and Matthew Fuller make a functional distinction between five different types of interfaces, written in part to make a clearer division between the way the term is used in computer engineering and media studies. The five different types, according to Cramer and Fuller are as follows.

1. hardware that connects users to hardware; typically input / output devices such as keyboards or sensors, and feedback devices such as screens or loudspeakers;
2. hardware that connects hardware to hardware; such as network interconnection points and bus systems;
3. software, or hardware- embedded logic, that connects hardware to software; the instruction set of a processor or device drivers, for example;
4. specifications and protocols that determine relations between software and software, that is, application programming interfaces (APIs);
5. symbolic handles, which, in conjunction with (a), make software accessible to users; that is, “user interfaces,” often mistaken in media studies for “interface” as a whole, (2008, 149).

All five types of the interface are of crucial importance to computer engineers when designing digital technologies. As well, all five aspects stress the relational aspects of the term – the connection - between hardware and users, hardware and hardware, hardware and software, the relations between software and software and, lastly, the accessibility of the interface to

their users. Within media studies, Branden Hookway's PhD thesis on Interfaces (2014) has been most influential on the subject. While his focus lies on the human-computer interface, the user interface, he takes the first chapter of the book to step back from computing and media history, in order to explore the original context the term stems from. As it turns out, "interfaces" have already been present in the 19th century, but admittedly in a very different context.

The word interface was coined in the nineteenth century by the engineer James Thomson in his influential work on fluid dynamics. It denoted a dynamic boundary condition describing fluidity according to its separation of one distinct fluid body from another. The interface would define and separate areas of unequal energy distribution within a fluid in motion, whether this difference is given in terms of velocity, viscosity, directionality of flow, kinetic form, pressure, density, temperature, or any combination of these, (Hookway 2014, 59).

James Thomson was a former student and a later Chair in the University of Glasgow and became "best known for his work on the improvement of water wheels, pumps and turbines and his research into the effect of pressure on the freezing point of water," (University of Glasgow). Even though he coined and initially used the concept in relation to fluid bodies, the notion of a dynamic boundary condition itself is a very telling idea that remains intact also in the context of user interfaces.

In order to approach the elusive meanings of the interface, Branden Hookway also closely inspects the etymology of the words that make up the term. "Face is derived from the Latin *facies*, meaning like the English face a visage or countenance, as well as an appearance, character, form, or figure; *facies* in turn is derived from the verb *facere*, meaning to act, make, form, do, cause or bring about. A face, then, is the aspect of a thing by which it presents itself. From *facere*, this is an active making of a presence, or a presencing," (Ibid., 8). He comments on the fact that the concept expresses an inward motion, while the origins of the word face points toward an outward motion, exteriority. He follows by explaining the more commonly known term of *inter* as something in-between and comments of the joint meaning of the two terms as follows. "The combining of inter and face makes of the interface the embodiment of a contradiction, which may be seen in two possible readings of the term. First, as "between faces," interface would suggest activities within a circumscribed field or an enclosure. Second, as "a facing between," interface would suggest a boundary or zone of encounter that actively extends into and conditions that which it separates," (Ibid. 9). In combining the historical use of interfaces in relation to dynamic boundaries and the etymology of the active sense of doing, making and forming, Hookway defines interfaces as follows.

The interface is the threshold through which each of the elements, classes, or behaviors it separates can also encounter the other, and through which each acts as a measure of the other. Intelligence, then, is a quality of both encounter and measure. The human-machine interface is neither fully human nor fully machine; rather, it separates human and machine while defining the terms of their encounter. In this way the interface becomes the means by which a human user may encounter its technological other, not directly or in a pure form distinct from human use, but rather through a mediation that already carries with it the conditions of its human use, (Ibid, 44).

Hookway defines the intelligence of an interface as far as to how the human – machine interface can measure themselves against one another upon encounter and further elaborates that within and throughout the interaction, the human and the computer are influenced far beyond only the enclosed field of activities. By clicking on a screen, both the computer and human are altered in many ways, on the computer engineering level leaving permanent marks of interaction on its hardware. On the human level, possibly gaining new ideas to work with, but also continuously altering our bodies - the neural circuits of our brains (Hayles 2012).

Florian Cramer's and Matthew Fuller's clear and instrumental breaking – down of the concept within the framework of media studies is useful for being reflexive as to which type of interface is at the center of discussion. Even though Branden Hookway's voice is prominent at the current moment regarding the philosophical workings of "interface", it has to be mentioned that the term could also be seen as part of a larger tradition, as a continuation of thinking about device – human interaction already in the 20th century. For example, Vilém Flusser reflecting on the apparatus – in the line of thought of Michel Foucault's *dispositif* – as a very complex machine that forms and is being formed when interacting with a human being. "With apparatus there is an intricately co-relation of functions: the apparatus does what man wants it to do, and men can only want to do what the apparatus can do. In fact: apparatus and man form a single functional unit," (Flusser [1986] 2018). The *dispositif* and the apparatus might be said to take in consideration the environmental area of the more stationary unit, for example, the living room with a television set at its center. The human – computer interface happens on a more localized and portable scale, reminiscent of Douglas Engelbart's illustration showing how a human intellect could be augmented with the help of a calculating universal machine.

What can an interface do

Moving forward from a historical, epistemological and media studies perspective as to what an interface is, the next step is to explore what an interface can do and what does it do in different

domains of critical humanities work. Two approaches follow. Firstly, the interface has emerged as a method to think with about the allowances of a specific cultural phenomenon. Secondly, the interface, in the fifth sense of Cramer and Fuller as a user interface, affords new and creative possibilities for engaging with information within the work of Digital Humanities.

Alexander Galloway's book "Interface Effect" (2012) does not go much into detail on historical physical interfaces or the etymology of the term. Instead, he uses the concept as a method for thinking about the current cultural moment we inhabit. "The theory of the interface is a theory of culture. If culture is an enacted reconciliation of human beings with the social, biological, material, techno - logical, and other realms, the interface describes a cultural moment as much as it does a specific relationship between human user and technological artifact," (Galloway 2012, 6). Galloway uses the term "interface effects" to talk about the graphical user interface as a place of power, ideologies, representation and all the ensuing complexities that arise from there. He goes beyond the notion of interfaces as doors or windows to argue that the digital interface, in fact, controls much of what can be done and how in our current media – permeated culture.

Building on the work by Galloway, literary scholar Lori Emerson examines the different ways literature has and can be written, in relation as to what it is written on, from a media-archeological perspective. "I settle on an even more expansive definition so that interface is a technology – whether it is a fascicle, a typewriter, a command line, or a GUI – that mediates between reader and the surface – level, human-authored writing, as well as, in the case of digital devices, the machine-based writing taking place below the gloss of the surface," (Emerson 2014, x). Within the book "Reading writing interfaces: from the digital to the bookbound", Emerson aims to show how contemporary technology has aimed at making interfaces ubiquitous, escaping the eye for closer inspection, as well as to reveal these very hidden workings.

Within the research for this Masters' thesis, I have come upon only one instance where the physical museum itself has been described as an interface, in the wider sense as a zone of encounter and a working method to think with. The book called "Digital Technologies and the Museum Experience. Handheld Guides and Other Media" published in 2008, investigates recent histories in augmented visitor approaches to museums. In an article by Jeffrey K. Smith and Pablo P.L. Tinio "Audibly Engaged: Talking the Walk" (2008), the scholars ground theoretically and survey anthropologically the museum visitors' experience in going to a museum with or without an audio guide. In the theoretical introduction, the reflection on the museum and the visitor encountering as characterized by an interface is most telling.

Once inside the museum, the visitor encounters the museum's decisions as to how to present its collection and how to afford the visitor a variety of options and restrictions in viewing the collection. The museum may choose to present the works in a very linear fashion, with limited options for entry or exit, or it may have multiple entry points and minimal information about the works. It is at this *interface* between visitor and museum that a certain tension exists that dictates the outcome of the museum experience. On one side there are visitor expectations regarding the visit, informational needs, learning outcomes, and general aesthetic reactions. On the other side are the museum's approach and response to the interpretive dilemma, physical layout of the artworks, and other presentational decisions intended to affect the aesthetic experience. It is along these two sides of the museum experience that a tension exists between freedom and structure for the visitors. Visitors want the freedom to interpret art as they will, but at the same time they desire the structure of some organizing schematic information provided by the museum, (Ibid. 64).

Even though Smith and Tinio do not reference Alexander Galloway, they use the term of interface as a method of thinking about encounters. Lori Emerson illuminates the fact that every writerly device and its software interface (for example, a Word Document) has a specific layout and affords specific behaviors. The analogue encounter of a museum, too, has a specific layout and the museum, too has specific affordances to the visitor. In this space of encounter, similarly to the one described by Emerson, the tension lies between what has been afforded and what are the wishes and needs of the very different visitors that enter through the museum doors.

Johanna Drucker, in an article called "Humanities Approaches to Interface Theory" (2011), thinks about user interfaces in the terms of the new field of Digital Humanities. She acknowledges the innovative work done by computer engineers Engelbart and Sutherland at the early stages of computer engineering and the fact that the term in the context has only been around for about fifty years at the time of her writing. Yet, she also reflects on the fact that user interfaces have since then been designed for mass market purposes, aimed to be task-oriented and efficiency driven. She insists that interfaces must be reflected on and reworked for Digital Humanities endeavors moving into these new working environments.

[..] the linear, finite conventions of print media can be changed for the constellationary, distributed, multi-faceted modes of digital media. The capabilities of networked environments and computational tools have supported the aggregation of geographically distributed materials in a virtual space, social networking in real and asynchronous time, data mining, GIS and mapping, and visualization aids to analysis and argument more than the development of a digital paratextual apparatus. As this process develops, a

challenge for humanists is to reflect on and articulate the theory of interface that underlies the design of our working environments, (Ibid.).

The user interface is a space for meaning making, full of possibilities rather different from the linear and finite constraints of print media. Revisiting the more philosophical general question as to what an interface is, Drucker also settles on the more expansive definition of an interface, reflecting that, “a book is an interface, so is a newspaper page, a bathroom faucet, a car dashboard, an ATM machine,” (Ibid.). According to Drucker, the interface is not a passive between space, it is rather a zone of encounter, similarly as to the thinking of Branden Hookway. According to Drucker, since an interface is a zone of encounter, it works as a method of thinking about engagement with information. “Interface is what we read and how we read combined through engagement. Interface is a provocation to cognitive experience,” (Ibid.). For her, the interface very much is *what it does*. While Galloway and Emerson deconstruct and critically work through the effects of what an interface does within their respective fields, Drucker calls for action. For reworking the market – driven and task-oriented graphical user interfaces to show the complexities, the ambiguities, the multi-perspectives of Digital Humanities oriented work.

Mitchell Whitelaw, building on the work of Johanna Drucker, has been working on Digital Humanities projects, developing user interfaces for digital heritage and digital cultural collection web pages for well over a decade. In the authoritative paper “Generous Interfaces for Digital Cultural Collections” from 2015, he starts with reflecting on the fact that in the past decade museums around the globe have digitized their collections, making them widely available online. His critique of cultural collections appearing on web page interfaces begins with the search box, arguing that this approach does not support exploration of the collection if you don’t know it well and previously do not exactly know what it is that you are looking for. Instead of the task-driven search-box approach, as criticized by Drucker, Whitelaw is building interfaces that do allow for visitor engagement, calling them “generous interfaces”. “A more generous interface would do more to represent the scale and richness of it’s collection. [...] In revealing the complexity of digital collections, a generous interface would also enrich interpretation by revealing relationships and structures within a collection,” (Whitelaw 2015). In his work, Whitelaw explores the possibilities of providing topic overviews, time sliders, keywords, comparisons and other working methods for the boundary of encounter of a digitized collection on a web page and its visitor would be more generous than a simple search box. These generous interfaces tend to reveal the inner structures of a collection that might not have been visible before, when stored on paper-based catalogues. Additionally, these

generous interfaces have the potential to indeed aid in grounding a scholarly argument, as it allows for the research material to be seen in new and complimentary ways, interacting with Drucker's call for creating user interfaces for Digital Humanities endeavors.

Conclusions for the ArtBot Guide

In Part II of this Masters' thesis, I will use the term of interface in two ways. Firstly, as a theoretical method to think with about the postdigital museum (see Chapter Two) and its' visitor interactions, in the sense of Alexander Galloway⁶. I will explore the boundary of encounter in the framework of a case study museum exhibition. Secondly, I will use the term interface when introducing a critical making project in the format of a user interface for a smartphone application. I will describe how this hand-held user interface allows to augment the boundary of encounter in a museum exhibition in significant ways, providing ever more possibilities of intelligent interaction. In comparing interfacing with the museum without and with the smartphone application, I will aim to analyze how these boundaries of encounter between a museum and a visitor are different to one another and how the latter could tackle the complexities of the experience of being in the space of a museum exhibition.

While keeping in mind the problematic aspects of power relations within the zone of encounter, as referred to by Alexander Galloway and Lori Emerson, I will not be doing the deconstructivism work within the framework of this Masters' thesis. Instead, I will aim to build on the critical work of Johanna Drucker and Mitchell Whitelaw in thinking about the possibilities of generous graphical user interfaces within postdigital museum spaces, adding to the linear and finite printed texts on their walls.

⁶ As well as Emerson, Smith and Tinio, and Drucker.

Chapter Two: Digitized Art Museum Collections

Digitized Collections, as a concept, needs a mapping of history and meaning. Historically speaking, it was collections that came first (Pomian 1990). Cultural collections were then organized in museums (Grau, Coones, and Rühse 2017) and other knowledge – guarding institutions like the archive and the library (Walsham 2016). Recently, most of the knowledge keeping institutions have undergone a transformative process of digitization (Parry 2013). In order to understand the processes of change that museums are currently undergoing and to be able to pinpoint the possibilities of these changes, the goals of this Chapter are four-fold. Firstly, in investigating more generally what are cultural collections, how the institutions that hold them were formed and how they have changed since digitization is taking ground. Secondly, in investigating how, specifically, the operations of art museums have changed since the recent digitization processes, namely as the postdigital museum. Thirdly, in mapping a trend in the postdigital museum mode of operation – the digitization of museum collections. And lastly, in reflecting on the work done so far in the framework of digitized museum collections and zooming into the possibilities that the databases still offer.

Collections and Collecting Institutions

In a seminal work of the history of collecting, “Collectors and Curiosities”, philosopher and cultural historian Krzysztof Pomian defines a collection as “a set of natural or artificial objects, kept temporarily or permanently out of the economic circuit, afforded special protection in enclosed places adapted specifically for that purpose and put on display,” (Pomian 1990, 9). In tracing the reasons for what makes us want to collect, keep and guard objects, Pomian takes a closer look at the pre-museum constellation of rather different collections in the first chapter of his book, called “The Collection: Between the Visible and the Invisible”. He begins with the fact that funeral objects, placed alongside the deceased in graves, is a tradition observed in many places around the globe and can be seen as the earliest known surviving collections of objects in human history. Within European history, he mentions offerings. Offerings were objects sacrificed to Gods, that were amassed and displayed in Greek and Roman temples and regarded as sacred. Yet another type of early collections is those of gifts and booty, a common phenomenon to be found in temples but also within secular seats of power. Further on, relics and sacred objects were kept not only in Greece and Rome but also in Medieval monasteries.

Lastly, objects slowly accumulating in residencies of those in power, the Royal treasures, could house all of the previously mentioned types of objects in a single collection. While they could seem like a very dispersed set of objects, they have a specific unifying quality, that Pomian hints towards already in the chapter title. “This homogeneity sprang from their involvement in the exchange process which took place between the visible and invisible worlds,” (Ibid, 23). The objects serve as the go-between between the person looking and the “invisible” from where they came. In further inspecting the traits of the invisible dimension of an object in a collection, Pomian mentions that they usually are spatially and temporally distant. Possibly beyond all physical space and time or in a space structured completely differently than the accustomed human one.

Pomian then goes on to sketch the more recent history of people acquiring objects for possession, slowly building collections that are known up until today. Sixteenth and seventeenth centuries saw the appearance of printed catalogues of objects and specific markets for exchanging objects mostly accessible to the wealthy of the society. “[.] the men at the top of the power hierarchy were required to manifest their artistic tastes, possibly even their interest in the sciences, whether they were genuine or not. They too founded collections, therefore, or else ordered their servants to do so in their stead, these collections being a mark of their superiority and of their prominent position in the domain of meaning,” (Ibid, 38). The seventeenth century also saw the first personal collections opened to a public. In 1683, the Ashmolean Museum was one of the first museums to open its doors to the wider public, as Elias Ashmole had donated his collection to the Oxford University six years prior. It was a purpose-built museum, housing a painting collection on the first floor of the building, with other floors dedicated to natural history and a chemistry laboratory.

The Modern museum historiography usually starts with the Wunderkammer, a curiosity cabinet from the late Renaissance and Baroque periods like the Ashmolean Museum. The Wunderkammers, the private collections of wealthy owners, were places where an array of *naturalia* and *artificialia* objects were displayed in order to recreate a microcosm (Grau, Coones, and Rühse 2017, 11). Wunderkammers have been described as a space of play, learning in comparing and recombining the objects at possession, as no classificatory system was yet developed. “The later foundation of the British Museum (1759), the Prado (1785) or most evidently the Louvre, opened as the first public museum (the Museum of the Republic) during the French Revolution in 1793, allowed free access for the first time to everyone into the former royal collections,” (Ibid., 10). The first of the big public libraries was also

inaugurated in Oxford already in 1602 and open to all university members. Meanwhile, the third public institution of the kind, the archive, only appeared in France in 1794 (Ibid., 42).

Seventeenth, eighteenth and nineteenth centuries saw the creation and institutionalization of three public knowledge spaces – the library, the museum and the archive – as we have known them to exist up until recently, before technological developments started to blur the boundaries between them. The three institutions used to be physical museums, physical libraries, physical archives with physical collections, guarding the invisible within. In 1987 Howard Besser, scholar of digital archives and founder of NYU Moving Image Archiving and Preservation Program, provides rather clear definitions in trying to make explicit the differences between a library, a museum and an archive. He notes that in many ways the institutions may look similar but nevertheless there are fundamental differences to be found “in what is collected, in how works are organized, and in how the institution relates to its users,” (Besser, 1987). Firstly, he notes that libraries gather individual but non-unique items, museums are collecting specific objects and providing them with a curatorial context, while the main function of archives is to collect unique objects, “manage groups of works and focus on maintaining a particular context for the overall collection,” (Ibid). Further differences can be seen in the different institutional relationships to the public. The library is a place where the visitor can roam freely to eventually discover on their own the whole collection if wished so, while the museum content has been pre-selected by a curator, providing a smaller and contextualized visitor engagement with the collection. In the classical sense archives “[..] tend to be research driven. They are accessible, often by appointment, in non-public spaces. The archivist has identified an area of the collection a researcher might be interested in, but s/he must go through it physically, item by item, to find out more information,” (Ibid.). At the end of the research paper, however, prof. Besser does acknowledge that, in the face of new computational technologies, the realities are (and are further going to) changing and the boundaries between the three collecting institutions will continue to blur.

As a consequence of most libraries, museums and archives in Western societies making their collections available in online spaces, the definitions of the respective institutions indeed no longer hold true. The library, the museum and the archives can be searched thoroughly twenty-four hours a day, seven days a week, from the comfort of our homes. Whereas the nineteenth century saw a sharp division between knowledge repositories, the digitization processes, as well as scholarship within the respective knowledge repository histories, has provoked a rethinking of the overall sharp definitions. In the introduction of a book called “The Social History of the Archive: Record-Keeping in Early Modern Europe”, the editor and archive

scholar Alexandra Walsham explains that the book aims to look more closely at the practices of public and private documentation between 1500 and 1800 Europe, in order to illuminate the complexities and to provide alternative narratives for archival history. It is also an attempt to highlight the dangers of projecting back onto past anachronistic models of the archive that are in fact the creations of the time the archive was institutionalized in its modern form.

Enshrined in the separation of the Archives Nationales and the Bibliotheque Nationale effected by the French Revolution and replicated in Britain in the guise of the Public Record Office and the British Museum, the sharp distinction between an archive and a library — between places for keeping items relevant to government and those relevant to scholarship and heritage — does not capture the organic and dynamic character of record-keeping between the sixteenth and eighteenth centuries, (Walsham 2016, 15).

Meaning, the sharp division between the three collecting institutions is a working of Modern European history. The library, the museum and the archive are institutions created in a certain time and place, not a stable and permanent state of being. In analyzing early modern European history, Walsham now talks about a spectrum of knowledge places. Currently, these institutions are moving into a new phase and place on the spectrum, as the nineteenth century definitions have loosened, and extended versions appeared. In illuminating the changes that have happened in these institutions more clearly, the archive, the most discussed phenomenon of the three in philosophy throughout the 20th century⁷ will be taken up as a case study example.

The recent changes within the archive have been most discussed. Media and digital humanities scholar David M. Berry has called the current digitally saturated moment to be characterized as “the post-archival constellation”. “[..] Archives still tend to preserve the physical record of their production but increasingly the notion of the archive has expanded to include metadata, catalogues, scholarly editions, databases, interfaces, and digital tools,” (Berry, 2017, 104). According to him, the digital edition of a classical archive has slowly become more of a network of events around a phenomenon, that operates within the framework of the digital workflow, where “old” and “new” take up equal parts. The characteristics of a workflow of a digital archive has been described by media scholar Julia Noordgraaf as follows,

⁷ See - Foucault, Michel. 1972 [1969]. *The Archeology of Knowledge*. New York: Tavistock Publications Limited;
Lyotard, Jean – François. 1984. *The Postmodern Condition: A Report on Knowledge*. Minneapolis, Minnesota: University Of Minnesota Press;
Derrida, Jacques. 1996. *Archive Fever: A Freudian Impression. Religion and Postmodernism*. Chicago: University of Chicago Press.

[..] materials and the accompanying information are no longer ordered in a linear process, but circulate within the network to be stored, distributed, consulted, re-used and mutated. The total of content and metadata forms a virtual collection of media objects: separate video and audio files, intermediates, texts, photos sit side by side with complete episodes of programmes and series. As a consequence, the reality of the audiovisual archive becomes extremely dynamic, (2010, 8).

The access to the object in the respective knowledge places has changed. Further on, professor Wolfgang Ernst, known for his reflections on the media archeological aspects of specific mediums and archives alike, gives an important insight as to the fundamental material changes that the archive has undergone within the digital mode of being, starting from the smallest building blocks. "The intrinsic value of the documents yields to their mediatechnological nature, consisting of alphanumeric and hardware. Logocentrism is replaced by the alphanumeric. Archival script thus becomes more universal than ever, as every image and software component shows, transmitted in BinHex or gzip mode or read as code," (Ernst 2013, 88). Whether documents, images or moving images, the materials in the new digital archive are essentially made up of the same medium. Furthermore, these materials are no longer permanently there, they have become algorithmic. As Ernst explains, "Algorithmic objects are objects that always come into being anew and processually; they do not exist as fixed data blocks," (Ibid., 82). The archival collection online has become a database (Berry 2017)

People have always collected knowledge objects that reach towards the invisible in telling larger-than-ones-single-life stories. For the most part of European history, there seems to not have been a strict distinction between the categories of these objects. It is only in European Modern history, that knowledge objects were assigned specific institutional spaces within specific standardized workflows, meaning, within the library, the museum and the archive. All three knowledge spaces are currently moving away from these Modern European modes of existence. The large – scale digitization of these knowledge object collections have, in one mode of being, turned them into alphanumeric and hardware, that no longer follow the Modern logic of strict separation and categorization, rather form a database with a dynamic workflow.

Postdigital art museum and its mode of operation

In a contribution to progressive museological thinking, “Postcritical Museology. Theory and Practice in the Art Museum”, museum scholars Dewdney, Dibosa and Walsh dedicate the third part of the book to analyzing digital media practices within art museums. They reflect that digital technologies are a means to expand the reach of collections and the physical space of the museum, mostly in order to communicate to existing and developing new audiences. But they also note a more fundamental underlying change in the state of the art. Meaning, they note the shift within museums from the management of knowledge, organizing and communicating through paper-based technologies, to the management of information, where internal and external operations related to programming and content generation are based on digital technologies (2013, 177).

Museum scholar Ross Parry takes a closer analytical look of museums adopting digital strategies on their web pages and institutions more generally, to reflect on the fact that the new normal is the postdigital museum (2013). Similarly to the changes that have been happening within archives, that Parry calls the post-archival constellation, museums have recently undergone major transformations too. The digital is no longer a separate but rather an all permeating – strategy. To illustrate the claim, he provides a detailed account of *the British Museum’s* annual reports. The museums’ review of 2004-2006 only gave a short passage (part of one paragraph within a seventy – eight-page document) to the challenge of turning the website “into a public space of multifaceted cross-cultural enquiry, to make it not merely a source of information about the collection and the Museum, but a natural extension of its core purpose to be a laboratory of comparative cultural investigation,” (British Museum in Parry, 28). He then notes that in the next years’ review, the digital took up a whole paragraph entitled “Website”. In 2008, the digital self-reflection had grown to a whole section. In 2010 “engagement online” and “Apps and downloads” received separate reports, while since 2012 the digital has become present across the reviews. Head of *Tate Online* at the time, John Stack, reflects that “the digital is becoming a dimension of everything that happens,” (Stack in Parry, 29).

As suggested by Smith and Tinio, a museum and its visitors already meet at the interface. Thinking back to Engelhardt’s schematic representation of the interface between a digital technology and a human being, the same drawing could be applied to the constellation of a museum and a visitor, using the interface as a method for thinking. Both have their capacities, both have their specializations, both have their limitations. With the museum, that

has now become postdigital, I mean the 19th century institution with a physical building as described by prof. Howard Besser, but, at the same time, the museum in the landscape of the 21st century world wide web. The physical museum still houses physical collections, it is still curated, it is still accessible at certain times of the week. The museum on the internet landscape has developed its own web – page, where traditional pamphlet – like visitor information is made available, but also more experimental forms of web visitor engagement appear. For example, in aiming to engage the web page visitor with their physical collection, a highlight story appears. In the case of the *Rijksmuseum*, it is the update on “Operation: Night Watch”, the largest conservation project to be ever conducted for the hit of their collection, Rembrandts’ “Night Watch”, for the first time publishing online the most detailed photograph of the painting in history. “The Rijksmuseum’s imaging team led by data scientist Robert Erdmann made this photograph of “The Night Watch” from a total of 528 exposures. The 24 rows of 22 pictures were stitched together digitally with the aid of neural networks. The final image is made up of 44.8 gigapixels (44,804,687,500 pixels), and the distance between each pixel is 20 micrometres (0.02 mm). This enables the scientists to study the painting in detail remotely. The image will also be used to accurately track any future ageing processes taking place in the painting,” (Rijksmuseum 2020). The Rijksmuseum as well continues to permanently offer the possibility to explore and download the digitized collection in its full, 24 hours a day. Other museums choose to include additional educational content. For example, the *Metropolitan Museum in New York* has devoted a part of their web page to a timeline of art history, made up of their own collection pieces⁸. Additionally, a museum nowadays is most likely as well operating a Twitter, a Facebook and an Instagram account, making themselves available for visitors on all social media platforms.

A contemporary visit to, an interfacing with, a museum most likely starts, is accompanied and reflected upon through at least some of the postdigital museum constellations described above. The notion of the postdigital art museum illuminates the fact that it has become rather a mode of being. Theatre, media and performance scholar Sarah Bay – Cheng introduces the concept of “the mode of being” while describing a recent visit to a theater play. Rather than an isolated one-evening occurrence, the visit becomes a prolonged series of events including reading newsletters, seeing posts on social media platforms, as well as additional information on web pages, reading media reviews of the premiere, as well as consulting a (digitized) library to check the original 17th century text that the play was based on (Bay-Cheng 2012). Through the processes of change as described above, it is also helpful to

⁸ <https://www.metmuseum.org/toah/>

think about the postdigital museum as a web of modes of being. It is no longer just an autonomous building, it is a web of interactions spanning many different mediums, centered around the museum's collection objects, in the format of stored, permanent or temporary exhibition objects alike. A contemporary museum visitor is interfacing with many, if not all, modes of being of this postdigital museum constellation. In the framework of this Master's thesis, a more specific boundary of interaction is drawn.

The focus of this Master's thesis will lie on the most underlying trend of art museums in the digital mode, meaning the digitization of their collections. Individual collection objects might be taken up as part of an essay-like story telling or a basis for an educational video material. Yet, as hinted upon in relation to the work of Mitchell Whitelaw, in most current cases, the digitized collections, as a whole, are simply there, operating similarly to a paper-based catalogue, just transferred onto museums' web pages. Additionally, in the research I have done within the field, I have not yet seen museums using digitized collections as a whole in engaging with the visitors in innovative ways within physical museum spaces. The art museum's collection is at the very core of the institution's work. Within the field of the digitized museum collections, new ways of thinking about visitor engagement with collections as a whole, are still to be developed. Therefore, firstly, a closer look at the historical digitization processes is needed. Secondly, it must be investigated as to what has been done within the field thus far, in order to understand the meaningful opportunities and possibilities of moving forward.

Digitized art museum collections as databases

In the last year of his post as Secretary of *Smithsonian Museums*, G. Wayne Clough, published an ebook called "Best of Both Worlds. Museums, Libraries and Archives in a Digital Age" (Clough 2013). He starts the book with a general reflection on the ubiquitous state of digital technologies on our everyday lives, to then zoom in the changes that the three institutions have undergone paying special attention to museums in general, and the Smithsonian Institution, a group of museums and research centers, administered by the United States Government, in particular.

He noted that *the Smithsonian* was one of the very early adopters of digital technology⁹. *The Smithsonian* started to digitize their collections already in late 1960's and in 1970 "the Botany Department of the National Museum of Natural History took steps to create the world's first database for natural history collections, and the Smithsonian American Art Museum (SAAM) developed the first searchable database about American art. [...] In 1976, SAAM published its digital catalog as the "Inventory of American Paintings," based on public and private collections in the United States and abroad. The catalog, which is still available to the public through the Smithsonian Institution Research Information System, is an early example of the potential of digital technology," (Ibid., 48).

Clough then follows with a brief overview of institutions in the United States that have committed to digitizing their collections and placing them online, along with accompanying media objects on the side, for example, a video channel providing documentaries about art. *Indianapolis Museum of Art* and the *Dallas Museum of Art*, both at the time led by Robert Stein, since 2016 Executive Vice President and Chief Program Officer of American Alliance of Museums, are named as fellow forerunners. *The National Gallery of Art*, *the Los Angeles County Museum of Art* and the *Getty Museum* have each put high resolution images from their collections online too. In Europe, Clough accentuates the Rijksmuseum that started digitizing its collection in 2006. Currently, through the *Rijksstudio*, Clough explains, users can download the museums' images for free, create their own gallery, and make customized souvenirs. He also stressed the number of images downloaded in a relatively short time. "In just seven and a half months online nearly 100,000 *Rijksstudio* accounts were created and nearly 300,000 images have been downloaded," (Ibid., 47). In the United Kingdom, Clough accentuates the fact that the *Tate* made their collection available online in 2012, while *The Victoria and Albert Museum* already at the time having 300,000 images available on their web page. He notes that the latter museum's five-year strategic plan cites digital access to the collection as a priority (Ibid., 48).

In the current museum scene, most museums present their digitized collections as databases, or online collections. In the case of *The British Museum*, putting an equation mark between the two terms. "The Museum's collection online offers everyone unparalleled access to objects in the collection. This innovative database is one of the earliest and most extensive online museum search platforms in the world," (The British Museum 2019) reads their current web page. Berlins' joint museum organization, the *Staatliche Museen zu Berlin*, offers to

⁹ For a comprehensive history of museums and digital technologies see: Parry, Ross. 2007. *Recoding the Museum: Digital Heritage and the Technologies of Change*. 1st ed. Routledge

explore an online collections database (SMB 2020), whereas *Rijksmuseums' Rijksstudio* (Rijksstudio 2020) offers to dive into the collection.

Building on each single institutions' digitization efforts, bigger frameworks for art museum collections online have also been taking ground. In the same year that dr. Clough reflected on the Smithsonian Institutions' digital endeavors, *TEDX* knowledge-sharing platform uploaded a talk by Amit Sood, at the time director of *Google's Cultural Institute and Art Project*, presenting Google's efforts in collecting and organizing numerous prominent art museum collections under a single framework. Sood stresses the newfound accessibility of virtual museums, the possibility to zoom in the tiniest details of the paintings and, lastly, the possibility to take them "home" (Sood 2016). Going beyond art – museum online collection framework, another large-scale development has been taking ground in Europe since 2005, known publicly as *Europeana* since 2009. Sponsored by the European Union, *Europeana* is an endeavor that aims to bring all of Europe's cultural heritage into the digital realm, moving all together beyond the library, museum and archive distinction not only conceptually but physically. It "includes a large collection of digital books and library resources, but it also has a strong focus on museum collections, demonstrating that traditional institutional boundaries break down in the digital world," (Clough 2013, 47). Indeed, in unifying library, museum and archival digitized collections under the umbrella term of "digital heritage", a new post-institutional-collection constellation appears, that allows to put the traditionally three separate institutions rather close on the spectrum of knowledge places.

In seeing that the distinctions between the archive, the library and the museum in the digital realm have loosened, the characteristics of the changing archive can be also attributed to the digitized museum collections. Once digitized, the artworks in museum collections are no longer static, enclosed and owned by the institution. Appearing on web pages they are made up of alphanumeric and hardware, enmeshed in a digital workflow that might show their current place of exhibition, as well as their histories in text, or accompanied by a video analysis with art historian voices in the background. Like the archival collections, art museum collections too have become a database (Berry 2017; Battles and Maizels 2016).

Postdigital art museum and its' digitized collection databases

The large-scale digitization of museum collections can be thought of being part of a bigger institutional development, where all fields of museum action are becoming postdigital. Since

the digitization of collection is an expensive endeavor, additionally demanding a whole new infrastructure to be taken care of, there must be great benefits to be found in the process. As noted by Amid Sood and museum scholars alike, the first aspect is accessibility and outreach to existing and new audiences. The second benefit Sood notes is the possibility to explore the artworks in detail that would never be possible within the physical art museum, for example, zooming in on a Van Gogh painting to see up-close a brushstroke and the cracks within. The third, making the artworks one's own (with the possibility of making individualized souvenirs out of them), have been most criticized within the academic community (*Rijksstudio* case study in Rühse 2017). Upon closer inspection it seems that all three named benefits are workings on the very surface level of the digitized object collection. There is a possibility to see, to zoom – in the surface, and to download the surface of the picture to put it on, for example, a morning coffee mug. The engagement with the surface level of digitized collections also assumes interactivity – not explicitly named by Sood but permeating all three of the potential advantages. In “New Museum Theory and Practice”, museum scholar Lianne McTavish reflects on this assumed interactivity through the work of Lev Manovich. “According to media expert Lev Manovich, such descriptions are not unusual. He argues that the rhetoric of computer interactivity emphasizes the physical interaction between user and media object, rather than psychological engagement. In this discourse, pressing a button or choosing a link is often equated with mental processes. As a result, Manovich continues, individualized intellectual operations, such as remembering, identifying, and problem solving, are not encouraged by “interactive” computer software. Do virtual reality galleries promote the same kind of interactivity, supporting physical rather than intellectual endeavors?” (2008, 232).

In the recent years, there has been a notable interest in going beyond the surface – level approach to artworks in online collections, while offering more substantial intellectual interactivity. Some attempts are experimenting with revealing the hidden structures of the collections in collection visualizations in a similar vein as to the work done by Mitchell Whitelaw (Glinka and Dörk, 2018.; Glinka 2018; Windhager et al. 2019; 2018), becoming a part of the digital workflow of databases, making the “invisible” more visible. The other notable trend is to build tools that would allow us to engage with individual digitized artworks in the context of their own collections and going well beyond.

The next quantum leap for collaboratives is emerging through cloud technology, which enables digital collections to be connected to an infinite variety of information sources that provide context for them. The Smithsonian American Art Museum is a leader in exploring this model under the rubric of the Linked Data cloud. The American Art Museum is working with computer scientists from the

University of Southern California and a group of likeminded institutions, including the Metropolitan Museum of Art in New York, the Indianapolis Museum of Art, the Dallas Museum of Art, and the new Crystal Bridges Museum of American Art to create the tools needed to lift collection-based materials into the cloud and connect them to resources like the New York Times archives and Wikipedia. A user interested in a particular artist would not only be able to call up digital collections by the artist from the various museums, but also simultaneously be directed to biographical information about the artist from other archival sources. This powerful concept will change the fundamentals of accessing information not only about art, but about all other fields, (Clough 2013, 51).

Both of these trends contribute in moving away from the surface – level of seeing artworks as purely aesthetic objects sitting neatly in their collections to be cut up or owned upon wish, to seeing their dynamic collection contexts and deeper historical, cultural and social meanings that they carry, going beyond the walls of a single institution. This shift in attention brings us back to Pomian, who is certain that what can be seen in such an institution as a museum is only significant because it offers a glimpse of what cannot be seen. Pomian defines such objects as semiophores (1990) – objects that are valued because of their capacity to produce meaning, rather than being particularly useful. Currently, every aspect noted by Sood is the visible and there are no traces as the invisible meanings they carry. But to a serious museum goer, seeing the invisible is where the value lies, and a strand of promising research is going in the yet fully unexplored direction.

Conclusions for the ArtBot Guide

The three knowledge collecting and guarding institutions, the museum, the archive and the library, that formed and took ground in Western societies throughout Modern history, are currently undergoing changes. Most notably, blurring their strict boundaries in the realm of the digital. The cultural collections of all three of these institutions have been going through the process of digitization, taking up a new life as databases that allow for the creation of dynamic workflows. It is only rather recently that the dynamic workflows of digitized cultural collections have become a part of the postdigital art museum mode of operations. In Part II of this Master's thesis, a speculative smartphone application will be introduced, that aims to engage visitors with the digitized art museum collection in innovative ways, aiming to go beyond the surface level engagement.

Chapter Three: Digital Materiality

If digitized museum collections are a database with a dynamic workflow, what are the digitized artworks in the collections? In trying to answer the question, with the help of museum scholar Fiona Cameron's early commentary on the topic, I will try to move beyond the notion of the digitized object being a menacing replicant (Cameron 2007). I will then ground the digitized object in materiality, as elaborated by Matthew Kirschenbaum (2008), Jean – François Blanchette (2011) and Johanna Drucker (2013), focusing on the latter's concept of performative materiality and its grounding in contemporary cultural theories. Lastly, I will describe how the notion of performative materiality can be helpful in thinking about the potential of digitized cultural heritage objects that constitute the digitized museum collections.

Theorizing digitized cultural objects

In "Beyond the Cult of the Replicant: Museums and Historical Digital Objects—Traditional Concerns, New Discourses" from 2007, Fiona Cameron takes on the task to examine the ongoing academic debates around the original-material / virtual copy-immaterial divide, with the aim to map new meanings for digital collections. Cameron begins by reflecting on almost a century long discussion of a copy as a threat to the original authentic material object - the loss of the aura in Benjamin and simulacra and information taking over the "real" in Baudrillard. She argues that both of these views have their roots in nineteenth-century empirical ways of thinking and that it is time to move onwards. In pursuing the argument about the aura – original/copy dichotomy, she firstly turns our attention to the recent developments in critical theory.

The influences that have potentially liberated historical objects from the strict limitations of a materialist epistemology take the form of social and new history, products of the cultural turn in critical theory—the advent of poststructuralism and postmodernism and the rise of identity politics and social movements in the 1960s and 1970s. Theoretically speaking, historian Alun Munslow (2001) terms this new position as "epistemic relativism," one that views knowledge of the "real" as derived through our ideas and concepts, including linguistic, spatial, cultural, and ideological compulsions, (Cameron 2007, 53).

Cameron firstly emphasizes the fact that, therefore, the interpretive potential of digital objects has to be accepted, lifting the strict impositions of the divide between the real and the virtual,

the original and the copy. Objects in digital heritage collections are received, perceived, given meaning, language and significance. Additionally, she further references Lev Manovich, in characterizing the contemporary moment as a post-media constellation, concerned more with user behavior and data organization rather than the medium per se. "Digital historical objects can potentially be seen as objects in their own right, can play to notions of polysemy, the experiential, and the sensual. The denigration of vision as an objective interpretive tool, along with an interest in the haptic and interaction also enables a different relationship between subject and object to emerge, thus enabling greater democratized access to collections," (Ibid, 54). In tackling the authenticity of the object – in the material and immaterial dichotomies, Cameron asserts the fact that the objects are made of digital code. In order to illustrate the digital materiality of code and the meaning it can produce, she looks at a digitized version of Michelangelo's David at the *Galleria dell' Accademia* in Florence. The statue is made of marble, therefore a subject to grinding, chipping and polishing, in order to take its shape. The digital historical representation is scanned by a laser, in order to take its shape and surface characteristics in 1's and 0's.

They are both the result of human creativity, exist in real time, can be touched, can be looked at from many angles, and are the target for feelings and actions. Moreover, both the materiality of marble and the digital David are unstable and subject to change, the latter due to mutations of data. Whereas the marble David as a physical object is fixed, the digital David is no longer semantically and aesthetically discrete, can exist in potentially infinite versions, and be distributed in space and time due to its numerical coding and modular structure. The analog and digital contain similar values of interactivity involving both imaginative and conceptual engagement, although in the digital world interactivity refers to technologically orientated concepts due to its inherent programmable materiality, (Ibid. 66).

In the concluding paragraphs of the essay, Cameron emphasizes the fact that because the "real" and the "virtual" are material, they both have history, origins, authenticity and aura.

The materiality of the digital has since 2007 been a growing topic in the field of cultural theory and the expanding discipline of Digital Humanities. In the latest edition of handbooks in the Digital Humanities, "A New Companion to Digital Humanities", Sydney J. Shep from the Victoria University of Wellington dedicates a chapter to the topic, reflecting on the state-of-the-art theory, as well as trying to write it in a bigger cultural theoretic narrative. She begins by asking a similar question as to Michelangelo's marble and digital laser scan of David, except, within the framework of literary studies. What are the material differences between a paperback and a digital edition of a book? Through the work of book historian Alan Galey, she

goes right beyond the distinction of physical - material and digital – virtual distinction, answering the detailed differences of their materialities, along the way stressing that the digital is as much material as the paperback book. She then stresses the recent work on the material in hardware and software studies in general, referencing the work of Wolfgang Ernst, in order to go deeper into the debates around materiality in digitality (Shep 2016). Three scholars are central in formulating the working definitions of four types of digital materialities, namely, Matthew G. Kirschenbaum, Jean – François Blanchette and Johanna Drucker. In the essay dedicated to the latest concept of materiality, the performative, Johanna Drucker celebrates, firstly, Matthew G. Kirschenbaum already in the late 1990’s for rescuing the “discussions of digital media from a major misconception rampant in then popular characterizations of electronic technology as immaterial. By calling attention to the material substrates of computing — its drives, tracks, disks, and fundamental physical supports — he made an argument for materiality as essential to the operation and identity of digital media,” (Drucker 2013).

Forensic, formal and distributed materialities

A comprehensive study on the topic by Matthew G. Kirschenbaum was published in a book called “Mechanisms: New Media and Forensic Imagination” in only 2008, going profoundly deep in providing minute explanations of materiality in working with digital media. For example, how a word document is being created, where it is stored and in how many versions, locally and on the remote servers of big technology companies, how it is forwarded around to take up yet different formats on devices, working with different kinds of hardware and software alike. In working out a methodical approach on how to describe all of these materialities, he coins the terms forensic and formal materiality.

Forensic materiality consists of the physical evidence of production, distribution, reception, and preservation which can be detected through the identification and analysis of various traces, residues, marks, and inscriptions visible to human sight or accessible through instrumentation. On the one hand, chips, touch screens, terminals, cables, keyboards, and mice are all capable of recording human and machine interactions. On the other hand, nanotechnology’s magnetic-force microscopy can reveal the bit pattern cut into a computer disk and expose recoverable areas of corruption whether through chemical degradation of the physical substrate or multiple overwritings, (Shep 2016, 324).

Formal materiality engages with the organizational, architectural and symbolic forms of digital media – the software, the layout, the design, fonts, relations of pictures to texts, and so on. While forensic materiality focuses on attributes, the formal focuses on the structures of the environment. Kirschenbaum warns that, while it might be “tempting to associate forensic and formal materiality with hardware and software respectively, those associations should not be granted without question, not least because the lines between hardware and software are themselves increasingly blurred, as is manifest in so-called firmware, or programmable hardware [..],” (Kirschenbaum 2008, 13).

Building on the work of Matthew Kirschenbaum, Jean – François Blanchette, Associate Professor of Informatics and Chair of the Department of Information Studies at University of California, Los Angeles, provides the third complimentary concept, distributed materiality. From the somewhat localized aspects of formal and forensic materialities, he shifts the focus to the elaborate systems and their modular components. “Information systems can be divided into three major types of components: *applications* that provide services to *users*, usually according to some task model or metaphor (e.g., “the desktop,” “word processing,” “show slides”); *infrastructure software* that mediate applications’ access to shared *computing resources*, i.e., the physical devices that provide processing power, storage, networking,” (Blanchette 2011). Before providing a historical and conceptual account of these systems, he shortly accentuates the fact that we should not overlook the extraordinary engineering achievement that they are.

Performative materiality

Before introducing her own complimentary concept of digital materiality, Drucker looks back at Kirschenbaum’s and Blanchette’s work and reflects that both of the approaches try to describe and give the identity of digital materiality as to what they are. The descriptions are profoundly necessary. Yet, even the fullest and most detailed description of the physical features will only provide a partial framework for understanding how digital materiality works, either between technologies themselves or with a human being in the loop. Distributed materiality, she continues, “though still focused on entities and their relations, edges towards an event-based model, with its roots in systems theory and suggestive connections to new materialisms,” (Drucker 2013)

In furthering her idea of entities as events (Ibid.), Drucker introduces digital object performative materiality. She invites to turn the focus away from trying to get at the tiniest details as to what they are, in order to think of what they do. In grounding the concept, Drucker draws on “studies in cognition, perception, reader-response, textual hermeneutics, interface design”, supported by structuralist, post-structuralist, deconstructionist, code, software and platform studies, “including radical constructivist approaches to knowledge”, therefore baring phenomenology, embodied-ness and psychoanalytical insights in mind.

The many dimensions of performative materiality, then, touch on each layer of digital media — in an analysis of the co-dependencies and contingencies of the material substrate, in a description of the production of display from code through processing as a performative act, in the engagement of users with the generative experience of viewing, and in the mutability and reinscribability of files in the mutable substrate of digital technology, (Ibid.).

Unpacking the heavy terminology, it means emphasizing the production of a work as an interpretive event. It means that the materiality, as described in Kirschenbaum and Blanchette, is entangled with a human being encountering and at the same performing the work, producing a very situated, experience, drive, disposition and capacity formed meaning. In addition, these events are always in flux, from the nanotechnological aspects of digital technologies up to the interpreters’ mental and bodily dispositions.

“The notion of performativity has a distinguished career in philosophy,” (Barad 2003) writes Karen Barad in a paper called “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter” from 2003. She recounts the traditional trajectory that is initiated by British philosopher J.L. Austin interests in speech acts, updated by poststructuralist ideas by Jacques Derrida. Further on, Judith Butler reworks the notion of performativity in relation to identity through Foucault’s productive effects of regulatory power, saying that gender is not something with inherent essence, it is rather a doing. Barad then goes on to explain her addition to the discussion, namely, the idea of posthumanist performativity.

All bodies, not merely “human” bodies, come to matter through the world’s iterative intra-activity—its performativity. This is true not only of the surface or contours of the body but also of the body in the fullness of its physicality, including the very “atoms” of its being. Bodies are not objects with inherent boundaries and properties; they are material-discursive phenomena. “Human” bodies are not inherently different from “nonhuman” ones. What constitutes the “human” (and the “nonhuman”) is not a fixed or pregiven notion, but nor is it a free-floating ideality, (Ibid., 823).

I would suggest viewing Johanna Drucker's notion of performative materiality in a similar vein, just aligned to specifically describe what happens with digital objects and our viewing of them. Yes, the marble David sculpture and the paperback book have specific materialities, so the performance of the digital versions of both objects will differ. But the intra – activity happens, the consequences of which will be explored more in depth in Part II of this Master's thesis.

Conclusions for the ArtBot Guide

In 2007, when Fiona Cameron was trying to reconceptualize digital heritage objects, their immateriality was still the overarching narrative. Both strands she touched upon, the materiality and the meaning that it produces, have been since worked out in depth in the four complementary explanations. Forensic, formal and distributed materiality describe as to what digital materiality is, while performative materiality describes their possible meaning - makings. In Part II of this Master's thesis, one possible solution for digitized art museum collections searching for new interfaces within the postdigital museum constellation will be ideated, meaning, the ArtBot Guide. The ArtBot Guide aims to engage a museum visitor with the museum's collection with the help of a user interface. Therefore, the concept of performative materiality can best illuminate the power of digital materialities within the physical museum space from the perspective of a museum visitor.

PART II

A Critical Making and Design Thinking solution for Thinking about Digitized Art
Museum Collections

Chapter Four: Interfacing digitized art museum collections through the notion of performative materiality. The ArtBot Guide.

Part II of this Master's thesis will be bringing together all the concepts explored in depth within the framework of the theoretical Part I. The aim of Part II of this Masters' thesis is to explore how interfacing¹⁰ with digitized collections through the notion of performativity in a museum setting can make a visit to an exhibition a more engaging experience. Instead of thinking about the museum as an information provider about their collections and the visitor as a passive information receiver that function as separate entities, the focus will lie in the boundary of encounter. The boundary of encounter will be inspected as full of potential, exploring ways of tackling the complexities of an experience of being in the space of a museum exhibition and aiming to define what is necessary for the encounter to be a meaningful and an intelligent one. As argued in Part I, it has been only recently that the technology is there to support interactive engagement on devices the size of our pockets. It has also been only recently since the process of large-scale digitization of museum collections has been happening, allowing for artworks to take up double lives within digital technologies. It has also been only recently since the conceptual thinking about the artworks taking up double lives as alphanumeric within databases with dynamic workflows have been taken as seriously, "as real" and "as performative", as their oil-on canvas counterparts.

In order to illuminate the potentials of interfacing with digitized collections through the notion of performative materiality, a comparison will be made. The comparison will be made between interfacing with a collection of exhibition artworks in a museum space as currently on display, using the term interface as a method for thinking in the sense of Alexander Galloway. As well as between interfacing the same exhibition with an additional speculative smartphone chatbot application, engaging a visitor with the dynamic workflow of the digitized collection through a user interface, the fifth aspect of an interface as described by Cramer and Fuller. The notion of performative materiality grounds the digitized collection objects within the speculative smartphone application as real and potentially as inspiring for meaningful intellectual interaction as the oil – on canvas painting on the museum wall, going beyond the ideas of an original and its' menacing replica. These concepts, to the best of my knowledge, have not yet been brought together in this specific constellation in order to analyze and ground the innovative aspects of digital tools in traditional museum spaces. In building on the work

¹⁰ Interface as a boundary "of encounter that actively extends into and conditions that which it separates", as defined by Branden Hookway (2014).

done by the many scholars in relation to these concepts, I am hopeful that a new framework for thinking about these processes can emerge.

A case study will illustrate how interfacing a workflow of a digitized museum collection through the notion of performative materiality could happen in a real-life setting. An applaudably curated temporary exhibition opened on the premises of the *Utrecht Centraal Museum* in February 2020, “The Tears of Eros: Moesman, Surrealism and the Sexes”, currently extended on view until August 16th, 2020. After careful considerations, including access to behind-the-scenes information and the relevance of the topic, it was decided to choose the exhibition as a basis for the speculative smartphone application, the ArtBot Guide¹¹.

In Chapter 5 I will firstly introduce the main ideas of the exhibition and will then follow in describing an interested museum visitor's experience through the physical space, reflecting on the boundary of encounter, an interface as a method, with exhibition as currently seen at the museum. In Chapter 6 I will propose a speculative user interface, a digital smartphone application, the ArtBot Guide, that would accompany the visitor through the exhibition. The application is based heavily on the PolyCube model (Windhager et al. 2018; Windhager, forthcoming), that, with the kind permission of the developing team, has been adapted, contextualized and worked into a smartphone application as ideated by the author of this thesis and Master's level Artificial Intelligence student at the Utrecht University, Simon Dirks. Simon Dirks has further worked on the design and technical solutions for the prototypes as explained and shown in the illustrations. I will firstly introduce the ArtBot Guide idea, then the PolyCube model for complex cultural collections and our approach at presenting the Polycube model through the chatbot smartphone application, linked to Linked Data knowledge bases. I will then describe an interested museum visitor's experience with the application in hand, interfacing a digitized cultural collection (of the exhibition) through the notion of performative materiality. Finally, in Chapter 7, a comparison of the two approaches will follow, in order to ground and draw conclusions as to why such Digital Humanities tools are a valuable addition to making the invisible of cultural collections become more visible.

¹¹ The idea being that the application serves as a tool with set framework characteristics, the PolyCube model within a chatbot. The case - specific information can be easily adapted to other exhibitions.

Chapter Five: “The Tears of Eros: Moesman, Surrealism and the Sexes”

The exhibition, running from the 15th of February to August 16, 2020 at the *Utrecht Centraal Museum*, departs from the work of Surrealist painter Johannes Moesman (1909 – 1988) and is curated by Nina Folkersma, Marja Bosma and Maia Kenney. The accompanying publication does sketch out the wider themes of the exhibition but has been written in the format of a monograph, dedicated to the artist, born and based in Utrecht for most of his creative life. Marja Bosma, the museums’ curator of modern art and an expert on the work of Moesman, begins the opening paragraphs of the book with introducing the fact that “surrealism has never really gained a foothold in the Netherlands, a country whose visual culture is rooted in Calvinism. It was not until late in his life that Joop Moesman, the only Dutch first-generation Surrealist, received even a modicum of recognition. Even after Andre Breton, the godfather of Surrealism, gave Moesman his official seal of approval in 1961, there was no audience for his work. It would be several more years before his work attracted any interest, but Moesman would never enjoy a warm reception,” (Bosma 2020, 134). Johannes Moesman, employed by the Dutch Railways, was not dependent on the sales of his works and remained a complicated figure in the Dutch art scene until his last days, that he chose to spend in Houten, a small village outside of Utrecht, away from the menaces of city life and cultural institutions. The Centraal Museum now hosts 113 items related to his name in their (digital) collection.

Before the centenary of Andre Breton's 1924 Manifesto of Surrealism, *Utrecht Centraal Museum* has decided to explore the work of Johannes Moesman empathetically and in new, contemporary conceptual constellations. As explained by Marja Bosma, Moesman was never dearly celebrated in his own times and the museum visitors’ contemporary lens might not offer much redemption, as his works are largely depicting women’s bodies subjected, sometimes violently and unapologetically, to the male gaze. In traditional art historical discourses, Surrealism has been narrated as a modernist art movement beginning in the 1920’s Paris, liberating the human mind from the constraints of the strict morals presiding at the time. Sex, fetishisms and taboos were the most prominent themes of interest in the all-male Surrealist group at the time. The group was largely influenced by Sigmund Freud’s writing on the unconscious, lifting the direct moral responsibility of individuals painting the controversial pictures.

The aims of the exhibition could be held as two – fold. Firstly, contextualizing Johannes Moesman in an international setting, showing his work in a larger framework in the contemporary processes at the time, as, up to date, his work had only been exhibited in the

local Dutch context. Secondly, in broadening the scope of the notion of Surrealism considerably. Departing from the works of traditionally accepted surrealist artists, the exhibition further aims to illuminate the work done within the field by female and non – binary artists, as well as digging deeper into the historical roots of the movement. The exhibition also offers a contemporary perspective on the themes explored in the 1920's Paris, artists engaging with the topic of power – relations between men, women and people that do not identify with either of the sexes, as well as such complex current social issues as the #MeToo movement, gender nonconformity, and reproductive rights. As the exhibition was closed due to the COVID-19 pandemic, a virtual tour to the four main rooms of the exhibition was created by Simon Dirks and assistant-curator Maia Kenney that can currently be accessed online.¹²

Exhibition visitor experience

As shortly introduced above, the exhibition departs from the work of Johannes Moesman in the traditional male – only Surrealist context but turns into a much wider and complex constellation of geographic places, times, themes and genders, unfolding through four main exhibition rooms. All rooms have an introductory curatorial statement. Some of the paintings have short annotations and, additionally, snippets of a conversation between Dutch journalist Philip Freriks and PhD candidate at the Utrecht University, Rosa Wevers, from the departments of media, culture and gender studies, are stationed within every room as they move through the exhibition, providing an insight as to how the works could be read from two personal but specialized perspectives. In narrating a potential visitors experience walking through the exhibition, I will firstly provide the curatorial statements at the entrance of every room and then recount the artists that can be seen in the respective rooms.

The introductory room, “The Tears of Eros: Moesman, Surrealism and the Sexes”, explains the red thread of the exhibition.

The main character in The Tears of Eros is the Utrecht-born artist Joop Moesman (1909-1988), the only officially recognised Dutch Surrealist. He was a controversial artist, whose sexually charged paintings often caused a scandal. In this exhibition, we present his oeuvre in the context of his international Surrealist contemporaries. Surrealism is known as a movement of male artists, in which women were primarily assigned the role of muse. Their bodies became objects for the Surrealists' sexual and often violent fantasies. Moesman's art is exemplary in

¹² <https://poly.google.com/u/0/view/6gdNYN9FHmh>

this respect. Few of the women in his paintings have an identity: their faces are omitted, masked and, in one case, even stripped of flesh. Moesman's work is still unsettling today. That is why in *The Tears of Eros* we deliberately dive into the Surrealist world of sex, gender, fetishism and taboos. For this reason, we are also showing – for the first time in the Netherlands – many works by female Surrealists. How did they view these themes? And how did they depict their own identity and sexuality? (Bosma, Folkersma and Kenney 2020, 4).

The main visual focus there is on Max Ernst's painting "A Friends Reunion" from 1922, here installed as a wall – sized reproduction photograph. It depicts his friends in Paris on the eve of the birth of Surrealism – Jean Arp, Giorgio de Chirico, Paul Eluard and his wife Gala (the only woman depicted), Max Ernst himself and Andre Breton. Jacoba Haas' painting acts as the Dutch counterpart to the traditional group of surrealists, "The Last Supper" from 1994. Also exhibited are two contemporary artist positions. Two artworks, "Lady Marina" and "A Basic Instinct", by a young Danish feminist artist Anna Aagaard Jensen and a recently commissioned video artwork "The Rower" by local Joroen Kooijmans, showing poetic Surrealism – like dreamworlds as an ongoing topic of artistic exploration.

The first of the four main rooms is called "Exploration of sexuality". The aim is to introduce the movement of Surrealism, as well as Johannes Moesman's encounter with it. Alongside his works, the works of classical Surrealist artists are exhibited, such as Salvador Dalí, René Magritte, Max Ernst, Oscar Dominguez, Félix Labisse, Raoul Ubac, Man Ray and Moesman's friend Gerrit van 't Net. The introduction to the room reads:

Surrealism began in 1924 in France, which was recovering from the Horrors of the First World War. Led by the writer and poet Andre Breton, a group of young Surrealists opposed the conformism and rationalism of the time. Their most important weapons were poetry, love and eroticism. For the Surrealists, sexual fantasies and dreams were a key to liberating one's own mind. In the Calvinist atmosphere of the Netherlands in the 1930's, Surrealism did not get much of a foothold. With one exception: in Utrecht a small group of artists discovered the movement through foreign magazines. One of these young men stood out: Johannes Moesman. For Moesman, Surrealism was a revelation. Through the Surrealist imagination, he was able to explore taboo subjects, in particular his sexual desires, (Ibid., 8).

An artwork that stands out in the context of the first room is Gerard Byrnes 2012 video "A Man and A Woman Make Love". Eighty-five years after the Surrealist groups' twelve meeting sessions dedicated to exploring their sexuality, Byrnes has re-enacted the later published texts in a 19 - minute video loop with contemporary actors playing the roles of the Surrealist artists. The video, at the very entrance of the room, providing an additional atmospheric feel of life in the 1920's. An additional collection element in the room is a vitrine that houses a couple of

memorials. Moesmans letter to the *Rijksmuseum* in Amsterdam, clarifying his position in the art world; a photograph of Dalí's "The Melting Clock" from 1931; *Variétés* lifestyle magazine issue from 1929 dedicated to Surrealism; The Surrealist Group catalogue of paintings for sale; The covers of André Bretons Second manifest of Surrealism, as well as his and Paul Eluard's "L'immaculée conception", both from 1930; Salvador Dalí's "La Femme Invisible" engraving; "The Surrealist Books" edition and, lastly, a memorandum to Moesman from a bookshop that a full volume of a Surrealist magazine is now available. While oil on canvas paintings are still center stage of the room, the video and the extra materials give a sense of context and feel for the time.

Between the first and the second room is Entresol 1, an interlude with a more direct focus on Moesman, his childhood and growing interest in art, called "Moesman and Utrecht".

Moesman grew up above his father's lithography workshop on the Neude, a large square in the centre of Utrecht. He displayed creative talent at an early age, which his father nurtured. He received drawing lessons and attended classes at the School for the Graphic Arts. From 1925 until his retirement, he worked as a technical draughtsman for the Dutch railways. He discovered Surrealism in 1929 and never abandoned the movement. Erotic desire was a fundamental motivation for the Surrealists, and it became the principal theme of Moesman's work. This gallery features paintings and drawings by Moesman and his circle of friends from Utrecht. Claas Hille's film *Moesman's Women* provides an insight into Moesman's personality and his view of women, (Ibid., 18).

As can be read in the introduction, here are exhibited works by Moesman, Claas Hille, Willem van Leusden, Gerrit van 't Net and Willem Wagenaar.

The second main room "Woman as fetish" directly engages with the more problematic aspects of the all-male Surrealist group at the time. Moesman's works are exhibited alongside Hans Bellmer, Jacques-André Boiffard, Victor Brauner, Marcel Duchamp, Man Ray, Lee Miller, Emiel van Moerkerken, Gerrit van 't Net, Jindrich Štyrský, Clovis Trouille, Willem Wagenaar and, lastly, Meret Oppenheim, whose Surrealist designs of jewelry, designed in 1934, were only put to production in 2003.

Surrealism is a paradoxical movement. On the one hand, Surrealists identified as a group of revolutionaries who opposed patriarchal society and its conventions. On the other hand, they had no regard for the unequal position of women within their own movement. They placed women on a pedestal in their artworks, regarding them as objects of desire and treating them as fetishes. Rarely, however, did they recognize them as independent, creative individuals. This had a lasting impact on the reception of female Surrealists: until well into the 1970s their work was generally excluded from the records of art history. In this gallery, we invite you to

discover the varied paths of Surrealism's obsession women, from the glorifying to the transgressive, (Ibid., 24).

Here woman's bodies are shown dissected, reassembled, subjected, left lying on the ground as reduced to flesh. Indeed, the male Surrealists might have broken social norms in terms of talking openly about their own sexuality, but the conversation only seemed to happen within an elitist environment, far from including the subjects in question or other forms of sexuality into the discussion.

A second interlude – the Transit Hall – houses new works by Dutch contemporary artists Paul Kooiker and Viviane Sassen, made especially for the exhibition.

Paul Kooiker never takes a single photograph: it is the series that interests him. He uses his fascination for voyeurism, shame and fetishism to create series of images full of references to Surrealism. Here the central motif is the donkey, an important motif in the work of Surrealists such as Dalí and Buñuel. The title of Kooiker's new photo series is a nod to Moesman's famous painting *The Rumour*, which is missing from this exhibition. Viviane Sassen's visual language is deeply rooted in the domain of the subconscious mind. Bodies float in the darkness like loose limbs or are so intertwined that they form new beings. These new collages stem from the technique of the "cadavre exquis", a creative game that was popular among the Surrealists. Sassen's surreal, hybrid, animalistic beings appear as symbols of metamorphosis and transformation, towards new models of female identity, (Ibid., 40).

The third of the main rooms is called "The Women of Surrealism", housing works by Surrealist artists that never made into the official movement and traditional art historical narrative, yet, were always working with similar themes in mind. In this room, people not included in the traditional Surrealist conversation gain the deserved attention. In this room Moesman accompanies such artists as Rachel Baes, Claude Cahun, Leonora Carrington, Leonor Fini, Jane Graverol, Sanam Khatibi, Sarah Lucas, Man Ray, Pierre Molinier, Kay Sage, Dorothea Tanning, Toyen, Pierre Louÿs, Gillian Wearing and Unica Zürn.

One of the misconceptions about Surrealism is that it was an exclusively male affair. Like most other art movements at the time, the first official Surrealist group was indeed made up only of men, but women did participate in Surrealist meetings and exhibitions from the outset. More and more women joined the movement after 1930 and contributed actively to it. Indeed, without Claude Cahun, Leonora Carrington, Leonor Fini, Lee Miller, Meret Oppenheim and Dorothea Tanning, Surrealism would have not become what it was. What was it like to be a women artist in an avant-garde movement obsessed with the female body? And how did the female Surrealists express their own sexuality and search identity and personal liberation – as women and as artists? In this gallery, we present artworks by female

and gender non-conforming artists who used Surrealism to discover and emancipate themselves, (Ibid., 44).

The room explores the sexuality of women and non-binary identifications of gender, as well as providing additional contemporary perspectives on the topic.

The third interlude, Entresol 2 called “Kunstliefde (Love of Art)” focuses on Joop Moesman’s social sphere in Utrecht. The works displayed here include Moesman, Janneke Berendsen, Anthony Everhardus Grolman, Willem van den Heuvel, Jozef Hoevenaar, Jan van Kleef, Willem van Leusden, Gerrit van ‘t Net, Anthon Gerard Alexander van Rappard, Wilhelm Ritterbach, Pieter Stortenbeker, Louis Wijmans and Johannes Anthonius Moesman

Moesman came into contact with the Utrecht artists’ society Kunstliefde (Love of Art) early in his career. His father designed the society’s printed matter, and Moesman regularly took his father’s place during the evening life-drawing sessions. In 1929, following a period of mismanagement, Kunstliefde’s activities came to a halt and the society was even threatened with dissolution. Several artists, including Moesman, took things into their own hands. Led by Willem van Leusden, a group of progressive artists set up their own life drawing evenings. Their drawing club was of great importance because it provided an opportunity to share ideas and experiment together. It even created a breeding ground for a new art movement: Utrecht Surrealism. The group also ensured that Kunstliefde resumed its members’ exhibitions, giving Moesman and his friends an opportunity to show their radically new art in public for the first time. Kunstliefde still organises members’ exhibitions and organises life drawing sessions every Monday evening, (Ibid.,68).

The final and fourth main room “The Cult of the Divine Marquis” aims to look into the influence of Marquis de Sade, as referenced in many Surrealist artists throughout time, place, gender. Here can be seen works by Moesman, Hans Bellmer, Dinos & Jake Chapman, Leonor Fini, Julio González, Man Ray, Roberto Matta, William Seabrook, Cindy Sherman, Clovis Trouille as well as Marquis de Sade.

Marquis de Sade (1740 – 1814), the aristocratic writer known for his libertine novels, was described by the poet Guillaume Apollinaire as the “freest spirit who ever lived”. He gave his name to the word “sadism”: deriving sexual pleasure from the pain, humiliation or suffering of others, whether or not they consent to it. Sade was many things: an atheist, philosopher, self-proclaimed revolutionary, sadist and the man with the greatest literary influence on Surrealism. Many Surrealist artists, including Hans Bellmer, Leonor Fini and Moesman, eagerly played with sadistic imagery, including bondage, flogging, leather masks and other fetishes. Sade represented the freedom to break rules in conformist twentieth-century society. Some images in this room are problematic from the current #MeToo perspective. In Sade’s time, consent was a non-issue. Today we are more vigilant about abuses

of power in relation to sex. We invite you to be critical as you explore the world of Sadean Surrealism, (Ibid., 72).

Sade, as one of the earliest known examples of unapologetically unleashing one's fantasies in European Modern history, truly seems to have become a father – like figure, under his influence unifying the traditional all – male Surrealist group, the women and non-binary artists working at the same time, as well as contemporary artists exploring the topics of the unconscious and its' desires.

The fifth and last room “The Annex: Jon Rafman” presents a most recent work of the Canadian artist Jon Rafman, giving yet another nod to the fact that the themes of the unconscious and its desires are not unique to the 1920s' Paris.

This presentation is part of The Annex, a programme of exhibitions in the last gallery in The Stables. In The Annex, we present works of art that offer a special and surprising view of the themes raised in the exhibition. For The Tears of Eros, we have invited Canadian artist Jon Rafman to add a new chapter to his Dream Journal (2016-19). In this ongoing video project, Rafman uses his own dreams and the Surrealist technique of automatic writing. He makes a note of his dreams on a daily basis and shares them with an anonymous video animator, who converts them into moving images with the help of inexpensive CGI techniques. When Rafman visited the Centraal Museum last year, he was immediately impressed by the Surrealist paintings of Joop Moesman in our displays of the permanent collection and decided to take Moesman's work as the starting point for the new chapter of his Dream Journal. The result is a fragmented, delirious story in which memories, sexual fantasies and associations from the unconscious are strung together. You can watch the film by taking a seat on one of the sculptural chairs that Rafman made specially for this presentation and that he based on the iconic Rietveld chairs from the museum's collection, (Ibid. 90).

In order to exit the exhibition, one has to go back through all the galleries previously described, hence, providing the visitor with – most likely – an unplanned possibility of recapping what has been seen. The exhibition strikes as a well thought out departure from the traditional art historical narratives as to the borders of Surrealism, exploring the complexities of its themes, genders, places and times.

Interfacing the exhibition collection in the physical museum setting, an analysis

Here, the term interface will be used as a method of thinking about a visitor's journey to a museum. During a museum visit, including the exhibition described above, an interested museum visitor must rely on the information provided by the exhibition curators and their own

knowledge on the topic. The team of curators had around one and a half years of preparation time to conceptualize, curate and implement the exhibition, living with the topic at hand for an extended period of time. The visitor comes into the exhibition gallery possibly having interfaced with one of the modes of the postdigital museum. For example, reading the essay like introduction¹³, as well as practical visitor information on the museum's webpage, therefore having only a general idea of what is to be expected. Conceptually, the visitor is presented with a lot of new ideas, theoretical and art historical. If the visitor is coming to the museum for the very first time, also the architectural space in general, and the specific exhibition space in particular, are absolutely new. The approximately one-and-a-half-hour-long journey takes the visitor through a carefully curated path, both sensory architectural and conceptually intellectual.

In the case of this exhibition, the curation of the space was truly welcoming. Every exhibition room had an introductory curatorial statement and was color coded, giving very clear signals to a visitor when a new topic is being addressed. The textual information, the introductory statements, as well as artwork labels and additional short curatorial commentary on some of the artworks were clearly legible, adhering to the suggestions of museum exhibition production specialist Stephen Bitgood (2013). When thinking about the interface between a museum and their visitors, the boundary of encounter, the spatial and organizational aspects are somewhat easier to monitor, regulate and standardize. A one-size-fits all is possible when designing regulating behaviors and walking paths.

Conceptually, the narrative of the exhibition unfolds in a linear fashion, revealing the topics one by one, room by room. The viewing of the artworks unfolds in a linear fashion, one by one, wall by wall. The materiality of the artworks, mostly oil on canvas, presents itself on the surface of the artworks one by one, painting by painting. Other than the short curator comments next to some of the artworks, the surface level symbolism remains silent. The boundary of encounter, from the side of the museum, are the curatorial statements and the artworks themselves. The visitor can extend into the reading of the exhibition as far as their knowledge of the statements used by the curators or general art historical knowledge allow.

On the conceptual level, profound differences in visitor's experiences within the boundary of encounter are possible. Upon entering the first exhibition room, one is confronted with a lot of Western European general cultural history. To name a few examples – World War One, life after World War One, Paris and life in Paris in the 1920's, the surrealism term, its' literary and cultural background, the unconscious and Freud's work on the topic in the long

¹³ <https://www.centraalmuseum.nl/en/exhibitions/the-tears-of-eros>

19th century, the societal norms of the time, as well as the general art historical aesthetics of the time. Not to mention the minute details and personal symbolic cues in every single artwork placed on the museum walls. The symbolic and encoded meanings within a specific materiality are what make up the invisible (Pomian 1990), the invisible being the reason the artworks are gathered in the exhibition rooms in the first place, yet most of the surfaces remaining silent.

In order not to massively overload a visitor with all the information surrounding the curated exhibition, all of it simply cannot be included in a written text on an exhibition wall. In a private conversation assistant-curator Maia Kenney expressed her feelings of regret that, in fact, most of the information gathered within the long period of research never makes it into the exhibition (Kenney 2020). Even though the research information is what makes up the meaning, why the artworks have been collected in the specific place in the first place, taking us on a journey through time and space and telling a larger-than-life story. For the boundary of encounter with an exhibition for the very different profiles of visitors entering through the museum door to be in the highest sense meaningful and intelligent, revealing the invisibles, who should be deciding what kind of information should be printed on the museum walls and what should be left out? In thinking about Brandon Hookway's definition of interfacing as "of encounter that actively extends into and conditions that which it separates" (2014), how much does a visitor get to extend into and condition the exhibition, according to their own mental and physical alignments? Currently, the curator is forced to make one-size-fits-all conceptual choices because of the medium the information in an exhibition is handed down on. Printed text on a museum wall demands authorship and linearity. The exhibition objects do up to a certain degree talk for themselves, aesthetically. Which can undeniably be enjoyable and an aspect to be appreciated on its own. Nevertheless, this allows for only a fraction of the invisible symbolic meanings of artworks and the surrounding contexts to be seen.

Chapter Six: The ArtBot Guide

As described in Chapter Two, museums within Western cultural sphere have been digitizing their collections since the 1970s' and the trend is still growing, both in terms of the number of museums making their collections available online, as well as the increasing ambition of the digitized collection quality, a recent example being *Rijksmuseum's* "Operation: Night Watch". As described in the same chapter, most digitized art museum collections have been created and still function as a database with a generic task-oriented search box, not allowing much space for serendipitous discovery, the revealing of the inner workings of these collections or collection object contextualization. Recently, there have been two general trends in engaging with the digitized collections in a more generous way. There have been attempts to make the interfaces on museum webpages more generous, experimenting with different collection visualization approaches, allowing to see the collection from a birds-eye view, in order to discover their inner structures (Windhager et al. 2019; Whitelaw 2015; Glinka and Dörk, 2018). The second trend is the ambition to connect these collections with information sources that would provide general context for them (Clough 2013). The ArtBot Guide designed for the exhibition "Tears of Eros"¹⁴, aims to unite these two trends in a smartphone chatbot application and use them in the physical museum setting, leaning heavily on the work done by the PolyCube model team and the power of Linked Data¹⁵.

The PolyCube Model

All of Moesman's paintings, drawings and letters, as well as the other artist works exhibited in the exhibition "Tears of Eros: Moesman, Surrealism and the Sexes" are available in a digitized version. The Museum's web page hosts a short narrative story about the exhibition, alongside paintings appearing in it but, in terms of engaging with the digitized object collection, this is where the interaction halts. In theorizing why new ways of engaging with cultural collections are necessary, the Polycube team begins by a general reflection. "[...] Aside from

¹⁴ Disclaimer – The ArtBot Guide is a speculative and ongoing collaborative critical making research project. In the light of the COVID-19 lockdown and the deadline of submission for this Masters' thesis, The ArtBot Guide could not be tested in a real-life situation with visitor feedback. Therefore, the reflections are based on my personal visit to the exhibition, my colleague Simon Dirks and the conversation with Maia Kenney, assistant-curator of the exhibition. Nevertheless, Simon Dirks will continue the work on this project in the framework of his Master's thesis and plans to test the application if/when the circumstances allow to do so.

¹⁵ Linked Data is a method of structuring information, so that a computer is able to more easily find links/relations between entities (objects, people, places, etc.).

their well-known marvelous and inspiring aspects, it is rarely made explicit that CCCs require considerable support from a perception and cognition perspective. Learning about collections—i.e. building up a mental model (Vandenbosch & Higgins, 1996)—can be strenuous and challenging.” (Windhager et al. 2018) Indeed, museum collections, permanent or temporary gathered for exhibitions alike, are full of invisible meanings (Pomian 1990). The invisible meanings are the reason the GLAM (galleries, libraries, archives and museums) institutions have collected the objects in the first place. From the perspective of an interested museum goer, it is an incredibly intellectually demanding task to decipher those meanings. Upon walking into a GLAM institution, a museum in particular, a visitor is presented with and has to analyze many individual objects in great detail. Classical approaches provide learning opportunities through textual displays, audio guides or collection catalogues. The understanding of how these objects have come into and where they stand in the bigger narrative of a museum, or art history in general, is usually not specifically addressed. Apart from rough floor plans with museum highlight-superstar-objects, rarely a comprehensive overview is provided of what can be found in the many exhibition rooms ahead. The intellectually demanding tasks of orienting in a building, comprehending and learning individual object stories, as well as grasping the bigger framework that they operate in, have led to coining such concepts as “museum fatigue” already in the early 20th century (Gilman 1916). They have been expanded on and studied in length ever since (Robinson 1928).

As work on alleviating the experience of a museum visitor continues, new ways of organizing spaces and new ways of visitor engagement have been developed. Rigorous studies have been published on visitor attention, aiming to equip museum and exhibition organizers with the tools necessary in order to organize an exhibition space in the most beneficial way possible. A recent manual of the kind includes descriptions ranging from best practices for placing objects within exhibition spaces up to best ways of communicating conceptual, navigational and behavioral information to the visitor (Bitgood 2013). A set of methods for engaging with the cultural collection objects both within the physical museum and in the online landscape have also been developed. Before introducing the PolyCube model approach, the team reflect.

Prominent methods include storytelling (Bedford, 2001; Boyd Davis, Vane & Kräutli, 2016), audio guides (Kuflik et al., 2011), gamification (Champion, 2014; Rowe, Lobene, Mott, & Lester, 2014), personalization and customization (Huang, Liu, Lee & Huang, 2012), participation (Ridge, 2013), and making curatorial concepts and arrangement principles transparent (e.g. onboarding techniques or

‘advance organizers’, as described by Anderson & Lucas, 1997). (Windhager et al. 2018, 4)

The aforementioned methods facilitate the apprehension of the sometimes-complicated physical space encountered, seek to engage the visitor with the details of the invisible objects or to provide a connective narrative. Yet they seldom address the collection as a whole. Here, a comparison of an exhibition to a city¹⁶ becomes useful in illustrating the complexities. While taking part of a guided tour, one can hear a story from the city’s general history, a specific story about a neighborhood and their inhabitants throughout times or one can be thrown in the minute details of a scholarly research publication dedicated to just a single outstanding building. Yet, without a map of the city, the stories heard, and images presented would have nowhere to write themselves into. They would all be hanging in the air. Similarly, in a museum gallery setting, one can learn specific details about a single artwork or the whole collection but there is a fundamental gap for points of reference, a ground missing. Most likely, the details learned about a single artwork in a collection soon become forgotten, as there is no bigger framework, a visual mental model, to tie them into.

Theoreticians in the field of Information visualization stress the fact that there are hundreds of years of history of visualizing seemingly abstract information in many different print-based formats (Ferster 2013), for example, the city map. Yet with the appearance of computer graphics and the internet, a new field has been growing by the name of interactive visualization, presenting new possibilities of engagement with the data presented.

Interactive visualization is a subset of a larger field known as information visualization, which is also sometimes referred to as informatics, that crosses the disciplinary boundaries of computer science, design, statistics, psychology, cognition, neuroscience, and the basic sciences. The early researchers Stuart Card, Jock Mackinlay, and Ben Shneiderman’s definition of information visualization is the most often cited description of this nascent field: The use of computer-supported, interactive, visual representations of abstract data to amplify cognition, (Ibid., 4).

Interactive visualizations can reduce time of searching, allow for pattern recognition, letting the user interact with the information to construct their own understandings, as well as providing a birds-eye-view of all the information elements involved. In explaining the thinking behind the interactive information visualization tool, the Polycube model, the team reference the work of cognitive scientist Amos Tversky who calls mixed up or partial information

¹⁶ I have borrowed and adapted this comparison from the PolyCube team, who talk about “assembling the elephant”.

internalized fragmentary as “cognitive collages”. In a museum context that would mean, for example, snippets of information learned about multiple collection objects in a room. Even though the information learned can be remembered and recalled, it is connected loosely, making more advanced problem solving and pattern recognition very difficult. In tackling the problematic aspects of “cognitive collages”, Tversky further offers the notion of “mental models” (Windhager et al. 2018, 10). Mental models aim to integrate the learned information in capturing categorical and/or spatial aspects of the objects represented, allowing to anchor the knowledge in already familiar information settings. In dealing with the complexities of cultural collections of many kinds, The PolyCube team offers to fill the gaps that arise between the cognitive collages of information gathered on individual objects, forming an integrative mental model that represents the whole collection. In a museum context, that would mean filling the gaps between the cognitive collages of a visitor, gathered in interfacing with individual objects, single exhibition rooms, thematic displays of a permanent museum collection or a temporary exhibition setting. In melting together the cognitive collages with the help of an interactive information visualization tool and the digitized version of the collection, a much-needed mental model of the permanent or temporary complex cultural collection as a whole appears.

The PolyCube—Towards Integrated Mental Models of Cultural Heritage Data (PolyCube, 2016; Windhager et al., 2016) provides an interface for complex cultural collections (CCC). The interface so far has two foreseen spaces of use – either as a web-based platform for collection visualization on museum web pages or as an interactive and screen-based object at the entrance of GLAM institutions.

The PolyCube emerges from the space-time cube representation (STC), first developed and utilized in human geography to support the visual analysis of human movement patterns and the spatial diffusion of innovation (Hägerstrand, 1970). The operating principle of this method is to orthogonally blend cross-sectional views (horizontal plane) and temporal view (vertical axis) together, allowing the mapping of the spatiotemporal origins of objects. Every event distribution in space and time thus translates into the unique shape of a point cloud, disclosing further spatiotemporal patterns to the gestalt perception of CCC visitors and analysts, (Windhager et al. 2018, 12).

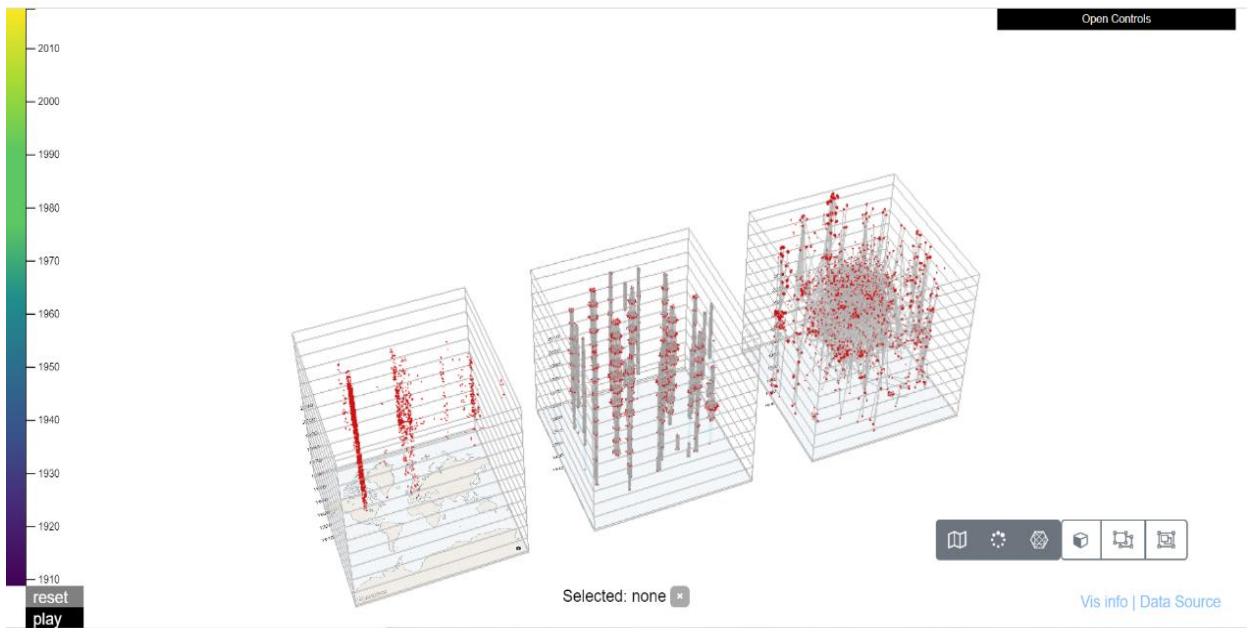


Figure 3. A screenshot from *The PolyCube Model*. Use Case: *IMDB Data*.

Currently, there are three possible ways of engaging with a CCC on the PolyCube. The first one features a geographical map on the horizontal plane, and on the vertical axis time. This allows for individual objects to be represented as a data point, to be assigned a specific altitude on the map. The second way of engagement allows to organize the data point clouds into categories on the horizontal plane, for example, showing separately photographs or sculptures of a museum collection, the vertical axis still representing time. In the third way of engagement, the relations between different objects within a collection become visible. For example, a single artist's work could be color coded to show his work in relation to others at the time.

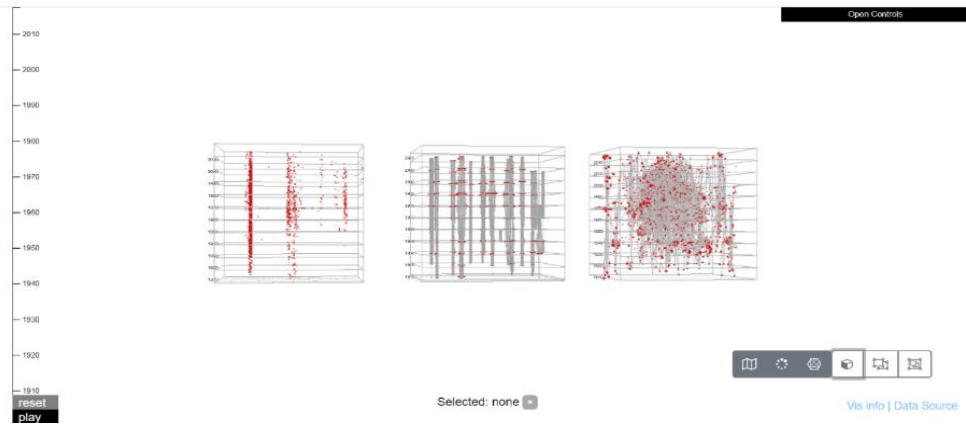


Figure 4. A screenshot from *The PolyCube Model* in “Time Chunks” view. Use Case: IMDB Data.

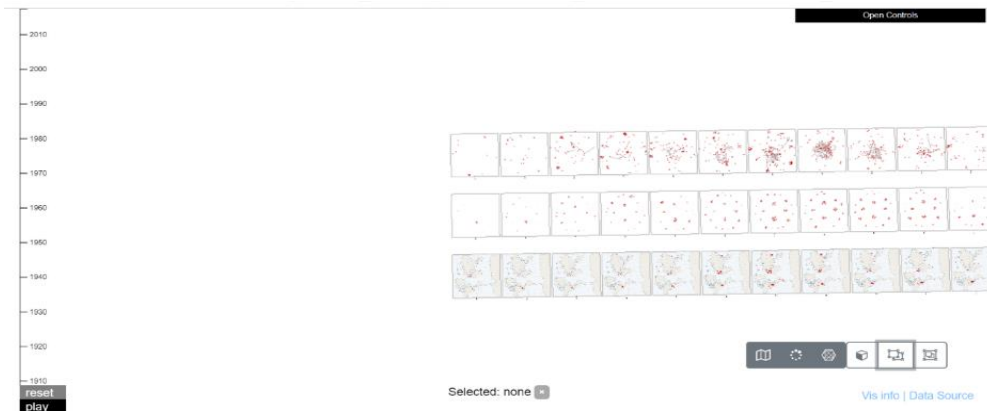


Figure 5. A screenshot from *The PolyCube Model* juxtaposed view. Use Case: IMDB Data.

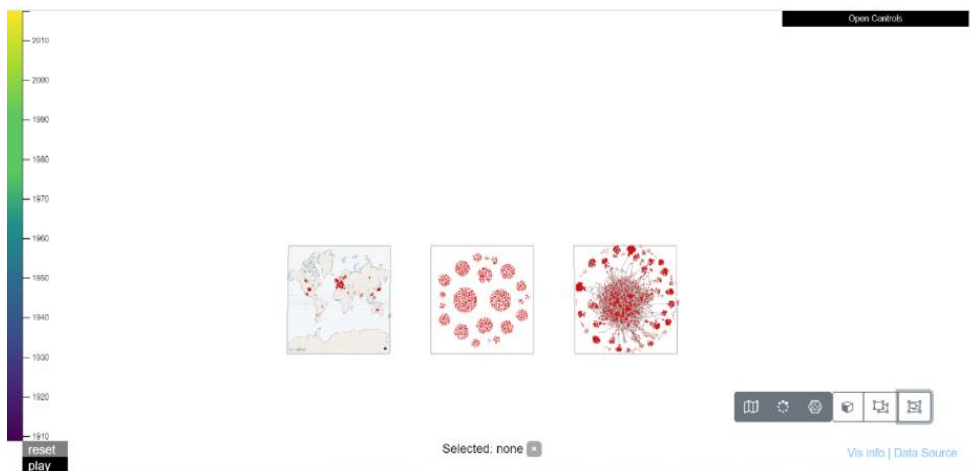


Figure 6. A screenshot from *The PolyCube Model* superimposed view. Use Case: IMDB Data.

These three ways of engagement further offer three different ways of display. It is possible to see these aspects cut in to separate “time chunks”, as well as juxtaposed or superimposed to one another. Additionally, they can be “played” as animations in time.

In tackling the complexity of interfacing museum collections both in online and offline spaces, the PolyCube team offers a multiple view interface. The different ways of engaging with the collection can be viewed all at once or separately. They can all be seen in a time and space cube or cut by “time chunks”, juxtaposed or superimposed on one another. This approach enables the “open-ended proliferation of partial views, rather than a single total or definitive representation” (Whitelaw, 2015), an approach which, as Drucker (2013) argues, better “match the open-ended dynamics of human interpretative processes.” The digitized collection, visualized in a PolyCube, becomes an object of its own, malleable to reveal the desired aspect of a collection.

Contemplated from a distance, this framework rearranges every corpus as a characteristically shaped ‘hyperobject’, which invites on-demand probing, zooming and close-up display. Further visual structures are sets which can delineate aggregations of objects, and links displaying relations between them. Together with possible alternative layouts for the data plane (like force-directed graphs, set diagrams or treemaps), the PolyCube approach can morph the corpora of large cultural collections into a wide range of expressive, data-driven shapes or patterns, with each constellation allowing different insights into a collection’s rich conceptual anatomy. [...] Styles or schools emerge in time, and either grow, split, or differentiate into multiple subcultures (left hand side). On the other side they can merge, de-differentiate, shrink, and cease to inspire collective reproduction or variation, (Windhager et al. 2018, 14).

This collection visualization approach moves beyond the generic search box that presupposes the visitors already acquired knowledge of a digitized cultural collection and its metadata. It also goes beyond the simple database, presenting the collection as a boundary object of its own, who’s materiality is able to perform upon demand.

The ideated ArtBot Guide - The PolyCube in a smartphone chatbot application

In explaining the ArtBot Guide idea, I will firstly introduce how we have decided to adapt the PolyCube model and then lay down a short history and the reasons for opting to combine it with a chatbot application. I will follow by explaining how exactly the PolyCube model would work in tandem with the chatbot in the “Tears of Eros” case study exhibition.

The Polycube team has initially offered two possible ways of making the PolyCube available to an interested audience. “The interface will work as a web-based platform for collection visualization, but could also be implemented as an (interactive, screen-based) data sculpture (Zhao & Van der More, 2008), which can serve as a three-dimensional ‘advance organizer’ (Ausubel, 1960; Anderson & Lucas, 1997) in the entrance hall of a gallery, library, archive, or museum,” (Ibid., 13). As previously addressed, the PolyCube model provides multiple ways of engagement with the collection – on a geographical map as well as in a more abstract time-space constellation, visualizing the different categorical aspects of the collection or the relationships between the collection data point objects. It also offers three different forms of seeing the ways of engagement – in a space-time cube, the “time chunks” juxtaposed or superimposed onto one another. Surely, the solution chosen for visualizing a complex cultural collection must be context driven. A large museum currently offering their collection as a database, could use the web-based platform in order to make the interfacing with the collection database more generous, using many, if not all, views offered by the PolyCube working team. Complementary or unrelated to the web-based version, at the museum entrance, the data sculpture would work equally well. It would show the collection as a “hyperobject”, a map as to the objects on display, their time-and-space origins, possible belonging to a movement or in relational constellations to one another.

The strength of the PolyCubes lies within its incredible flexibility and adaptability. Depending on the effect to be achieved, different possibilities arise. The data-sculpture approach would not be feasible for a single temporary exhibition that is highly cost-limited, like the case study example. Secondly, as the exhibition is highly curated and aims to embark the visitor on a discovery journey – the “hyperobject” could possibly give away too much information at once, both on the museum’s webpage and at the entrance of the museum. In the case study exhibition “The Tears of Eros”, an additional solution of display is suggested. As introduced in the previous chapter, the exhibition is centered around a single movement within the art world, Surrealism. Patiently and room by room the exhibition aims to build on the traditional narrative of what is Surrealism, adding aspects of complexity in time, space, gender

and themes explored. Therefore, in the framework of the specific exhibition, the Polycube would be best suited in moving along with the visitor. The PolyCube model becoming an integral part of a smartphone chatbot application. The metadata of artist names, genders, creation time and place exhibited in an exhibition room would be visualized in the PolyCube model upon entering the respective room. The cognitive collages of single artworks on the museum's walls would be assembled in a single interactive visualization and result in providing the visitor with a mental model of the exhibition room. Seeing the very different constellations of data points in different rooms throughout the visitor journey would aid in visualizing the main goal and narrative of the exhibition – differentiating and making more complex the traditional art historical narrative of Surrealism. The application is designed with the substantiated idea in mind that exhibition visitors, ideally, are provided with a mental model of the whole of the collection, the birds-eye view, as well as the possibility to learn details about the respective artworks in an engaging way. While the PolyCube would provide the birds-eye view, the chatbot option would engage the visitor with information customized to specifically their interests and knowledge levels.

The Chatbot, as an idea, has a long history that can be traced back all the way to the 18th century. The earliest efforts in creating such an apparatus was sought by the Hungarian researcher, who is best known for creating the “Mechanical Turk”, a chess playing apparatus, hiding a human, who is actually doing all the work from within (Gaia, Boiano, Borda 2019). Since the arrival of digital technologies, the handbook history usually starts with the chatbot “Eliza” (Baranovska and Höltingen 2018) in the 1960s’, created by computer scientist Joseph Weizenbaum. Later notable developments include A.L.I.C.E., IBM Watson, as well as the latest technology giants using speech recognition in Apple Siri, launched in 2010, Google Now in 2012, Amazon’s Alexa and Microsoft’s Cortana in 2015, and Google Assistant in 2016. “Social media platforms are similarly incorporating chatbot functionality. Facebook opened its Messenger platform and application programming interface to developers in 2017, providing a means to build a simple chatbot on Facebook. Twitter opened its direct messaging channel to chatbots in the previous year that began a hype cycle in “twitterbots” (Alarifi et al. 2016) and other messenger services are rapidly making open APIs more widely available (Hoy 2018; Mool 2018),” (Gaia, Boiano, Borda 2019, 313). Most analyzed examples of museums using chatbots up – until the contemporary moment include *The Anne Frank House* in Amsterdam, using Facebook Messenger. Secondly, *the Cooper-Hewitt Museum*, since 2013 offering “Object Phone”, that answers spoken questions about objects within the collection. As well as, thirdly, *the House of Milan*, a group of four historical home-museums in the city that offers a chatbot

game in exploring the physical surroundings, also operating on Facebook Messenger. In the latter example, 66% of engaged visitors identified the chatbot as a useful learning tool (Ibid., 320). The chatbot, linked to Linked Data knowledge bases, offers unprecedented opportunities in gathering and making accessible the knowledge of and surrounding the invisible meanings of exhibition objects and the collection as a whole. It is possible to link information from publicly available encyclopedia - like webpages, for example, Wikipedia, or specialized art institution resources, like the art history, created by the *Metropolitan Museum of New York*, or the art dictionary, created by authors from *the Tate museum* group. It is also possible to make available all the research gathered by the exhibition curators especially for the exhibition. All the information that otherwise remains in curator's heads or dusty cabinets, never made available to the art historian who would be interested in the smallest details of Moesman's work. The chatbot functions as a conversation partner that has information available on factual knowledge around the specific exhibition topic within the world-wide-web and the specialized research narrative work done for the exhibition by its curators. In addition, this information can be called up in detail, in real-time and on demand.

For the temporary exhibition "The Tears of Eros: Moesman, Surrealism and the Sexes" in the *Utrecht Centraal Museum*, the chatbot and the PolyCube would be a complementing duo working alongside each other within the ArtBot exhibition guide application. The PolyCube would provide a context, a birds-eye view for the single exhibition rooms as well as the whole of exhibition collection, while the large knowledge databases would provide context and additional information on an artwork, as well as general knowledge level. After seeing the zoomed-out perspectives on the exhibition collection in the PolyCube model (for example, general space-time orientation, as well as how the artworks relate to the theme of the specific room) it would then be possible to zoom-in the very minute details of, for example, a single artwork.

The ArtBot Guide smartphone application is envisioned to operate on a webpage, so that the visitor would not have to be bothered with using their smartphone memory space, time and energy for one-time use application downloads. Opened at the entrance to the exhibition, the ArtBot Guide would welcome the visitor to the first exhibition room.

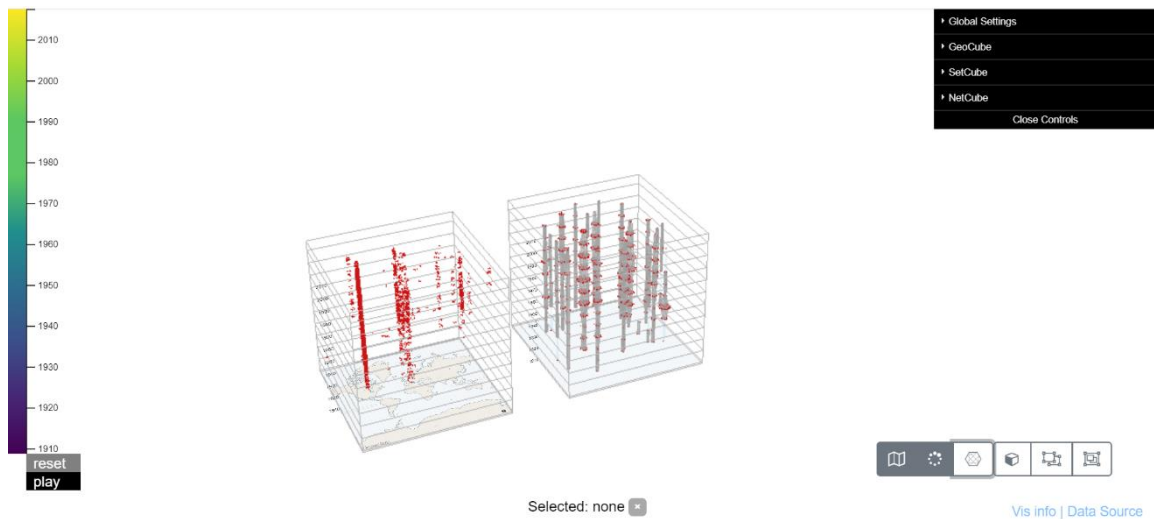


Figure 7. A screenshot of the two chosen PolyCube Model views for the ArtBot Guide. Use Case: IMDB Data.

The first message from the ArtBot would be a shortened version of the rooms respective introductory statement and the PolyCube model, representing the artworks on view as data points on a geographical map, visualized as a space-time cube snapshot. Upon clicking on the Polycube within the application, it would appear on the whole smartphone screen, becoming available for zooming in and probing on details. For example, in clicking on a data point, the respective painting would appear, along with a description. The second option available for the visitor would be to switch from the map onto the “category” way of engagement, arranging the works by the genders of the authors in an abstract space with a timeline next to it. The second viewing option would further substantiate the gendered aspects of the traditional art historical accounts of Surrealism. In designing the ArtBot Guide for this exhibition, only a fraction of the PolyCube’s possibilities are chosen and explored, cutting down on the complexity of the task and time of engagement with the PolyCube. The two view-options have been chosen to best illustrate what is of most importance for the specific exhibition, still keeping the visualizations open-ended (Whitelaw 2015). Visualizing the exhibited artworks from a specific room on a geographical map would allow the visitor to tie the works to a specific time and place. It is an information setting they are most likely already familiar with – a general historical timeline and the (albeit problematic) contemporary political world map. The “category” exploration would show an alternate Surrealist gender story. In this way, a bird’s eye – view of every room of the exhibition, as well as, at the end of tour, the whole of the exhibition data displayed in the PolyCube model, would result in a coherent mental model.

After presenting the visitor with a mental model of the artworks seen in the exhibition space, the other aspect that the ArtBot would tackle is engaging with the detailed knowledge of and around the exhibition object collection. As previously explained, to engage meaningfully with the case study exhibition, one already must be familiar with a lot of general Western European cultural knowledge, such as, what life was like after World War One. There are friendly introductory statements to be found at the entrance of every room, but the author-narrated text is simply not adaptable enough to the varied amounts of knowledge on the subject a visitor might have. Apart from general historical frameworks, the exhibition rooms are also full of minute but incredibly interesting details. For example, the meaning of the red poppy in Joop Moesman's painting "Self-portrait" from 1935, the promotional painting of the whole exhibition.



Figure 8. Johannes Moesman, *Self-portrait*, 1935, oil on canvas, 96,5 x 137,5, Utrecht Centraal Museum.

A visitor with an art historical background might already know a lot about the context of the artworks, building on to the knowledge previously acquired through rigorous reading on the topic and could be more interested in these minute details. While a casual interested museum visitor, eager to learn but with no prior knowledge about the art historical narratives around surrealism, might not be even familiar with the term. Here the ArtBot Guide chatbot option takes a central position in alleviating the visitors experience at the museum, to a high degree layering the information available. For the art professional, it could be interesting to learn the research details stored in a database that are left out of the introductory room walls, simply because of the sheer amount of information researched. For example, the poppy seed from

“Self-portrait” being a symbol for death and the end of Moesman’s relationship with the woman depicted in the painting.

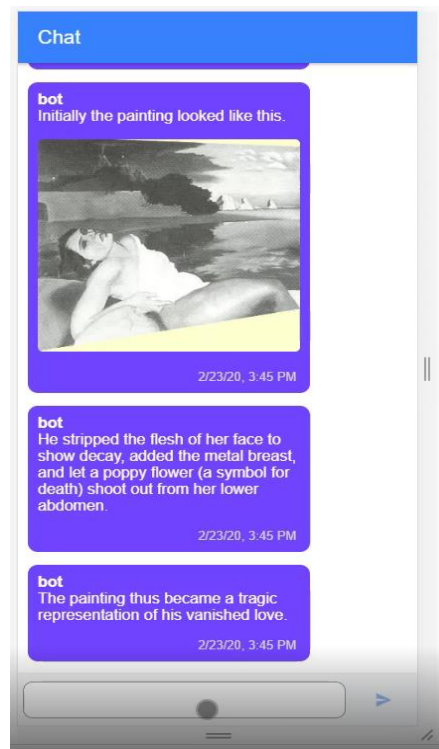


Figure 9. Curatorial information about Moesmans’ painting *Self-portrait* that could be made available upon interest.

While, the visitor with no prior knowledge and encounter with the term Surrealism, could be offered a snippet of the definition directly from a source of information, for example, a Wikipedia page. Further on, clicking on the underlined Wikipedia name would take the visitor to the respective Wikipedia page, providing the more basic aspects of cultural and art historical knowledge that did not make it onto the exhibition walls because of its boundary – pushing and complex nature. Jeffrey Smith and Pablo Tinio have already been mentioned when thinking about visitors at the interface of a museum. In addressing information customization in the framework of audio walks, the prevailing technology in 2008, the general reflection is as follows.

Visitors, [...], desire both freedom and structure. It is crucial that visitors find a comfort level in this tension, and the optimal amount and types of information made accessible to them are principal in this regard. The question of unique characteristics of individual visitors can be addressed by allowing some variability around the presented information and the means of accessing that information. It is in this area where audio augmentation could be at an advantage over textual information or person led tours, (Smith and Tinio 2008, 65).

The empirical study was done at the Metropolitan Museum of Art, the visitors divided into two research groups. The first one consisted of 163 people who had purchased the audio guide and the second one of 109 people who were given to use the audio guide for free. In evaluating the enhancement of the visit by the audio guide (on a scale from 1=poor, 10=excellent), the people who purchased the audio guide rated it with 8.4. The visitors who received the audio guide for free were further divided into two sub-groups. The visitors who had used an audio guide previously rated the guide with an 8.1., whereas first time users with a 7.7. (Ibid, 68). Overall, the trend clearly shows that interested visitors in museums are eager to learn more contextual information. The possibilities of information customization available to different types of visitors through digital technologies within museums outgrow the affordances of audio, person led tours or given textual information substantially. Currently, the research landscape is at the very beginnings of discovering those very possibilities.

To sum up, upon entering the first exhibition room, the ArtBot Guide would offer a short version of the introductory text from the museum wall together with the PolyCube model visualization of the respective exhibition room. The PolyCube visualization could be clicked on and investigated in detail within the options previously described. When the PolyCube window would be closed, it would be possible to ask questions of interest to the chatbot. It would also be possible to take a picture of an exhibition object, an artwork, to learn more about the specifics of the selected work. It would then be possible to choose to move to the next room, where, again, the short version of the introductory text would appear, alongside the PolyCube visualization. In comparison to traditional guided tours, also offering interactivity and the possibility to ask questions, the visitor would be very much in control of the information they would be receiving. There is the ultimate freedom to ask questions of interest or not ask anything at all. The journey becoming an absolutely self-paced learning experience. Whereas, the PolyCube moving along the visitor through the exhibition rooms would provide a structure, a framework for the artworks to be seen in a way that is not possible in linear storytelling. Instead of the creation dates and places of the artworks in question being narrated in a textual or oral way, they could all be seen together as a “hyperobject” within the PolyCube model. The “hyperobject” allows the visitor to grasp more clearly the narrative of the exhibition and the relationships between the exhibition rooms. Here, the “hyperobject” has become a Digital Humanities aid in the argumentation for the exhibition narrative within the physical museum space (Drucker 2011). We believe that the ArtBot Guide approach, combining the bird’s-eye mental model to a tool geared for deep variation to accessible information, has the potential to revolutionize customized museum guided tours.

The technical side of the ArtBot Guide

I will firstly reflect on the technical aspects and the interpretive choices made in the creation of the prototype, and then follow with possible advantages and disadvantages of engaging with the ArtBot Guide.

Since the ArtBot Guide is built to be web-based, it would work on both desktop computers and smartphones. The main technology for developing the ArtBot Guide is Angular, a TypeScript-based open-source web application framework, in combination with Ionic, an open-source software developing kit for mobile application development. “A custom web application is developed using the widely used, web-based Angular framework, combined with Ionic, a front-end framework. These frameworks make it easy to adhere to current standards and create an accessible user interface similar to what the average internet user is used to,” Dirks explains (forthcoming). All artwork-related information relevant for the chatbot option is stored in a structured Linked Data Knowledge Base (database), which makes it easy to do “semantic queries” that allow to also retrieve more associative and contextual information. Users get presented with a short introductory text, after which they can ask questions. E.g. “Who was Johannes Moesman”. The answers to the questions are retrieved from the Linked Database by using “SPARQL” queries. SPARQL is a semantic query language used to write these search queries in such a way that the computer understands what it needs to find. Work on the possible ways of allowing for the most meaningful interaction with the chatbot is still under way.

Within the current ArtBot Guide prototype, the working PolyCube model is not yet fully implemented within the chatbot application. Nevertheless, the PolyCube model team has recently shared the project code under GNU GPL license, version 3.0. The software can be used and adapted to one's needs freely, making it possible for the PolyCube to become fully functional within the application. Since the PolyCube has also been developed using Angular, the same web-based technology used for the chatbot development, future plans would be to “insert” their code into the chatbot application, making the fully functioning PolyCube appear on demand within the chatbot. In order to make the PolyCube function, one has to compile a database to create the respective database to be visualized. In the case of this exhibition, the input data was the name, the artwork title, the gender of the artist, as well as the time and place of creation of the artwork. The input data is then made into a 3D visualization.

In the article referred to in Part I, “Humanities Approaches to Interface Theory”, Johanna Drucker also urges everyone to remember that all data is “capta”. There is no objective

visualization of information to be found, it is always actively taken to be assembled in a certain way (2011). The PolyCube model data points for every “Tears of Eros” exhibition room are no exception, based on the input data described above. The artists' names, titles of works and gender were easy to pinpoint, as concrete information was provided by the exhibition curators. The year and the place of creation involved more active decision making on our part. The dilemma in relation to the place of creation was to either show the place the artists were born or to pinpoint the place where they were based at the time the specific artwork in the exhibition was created. For example, even though Leonor Fini was born in Argentina, she spent most of her active working life in Paris. Even though Sanam Khatibi was born in Teheran, Iran, she is currently living and working in Belgium. It would have been possible to show the birthplaces of the women, making the map seem more diverse, when arguing about the “exploding” narrative of Surrealism. Yet, the places the artists work in have a profound influence in their thinking and are most likely the reason for involvement with Surrealism in the first place. Therefore, the place of creation was assigned according to where the artist was at the time of the creation of the work part of the exhibition collection. The creation year can be problematic to pinpoint to a certain date in relation to a series of works that span many years of creation. In the case of Meret Oppenheim, the jewelry pieces exhibited were ideated in the 1930’s but only produced in the 2000’s, the dilemma being as to which point in time to choose as the representative one. In the framework of the PolyCube visualizations for this exhibition, we opted for the earliest date to indicate as a data point, at the same time reflecting that it would be great to be able to stretch the data point in time, to show the uncertainties and complexities around the specific creation dates.

Speculative exhibition visitor experience with the ArtBot Guide

Upon entering the first room of the exhibition “Exploration of Sexuality”, the visitor would be welcomed from the chatbot application and given a shortened version of the introductory text on the museum wall. Additionally, a PolyCube would appear right underneath the first message, substantiating the claim that Surrealism indeed evolved in Paris in the 1920s’ and 1930s’ and that all of the traditional members of the movement were male. From a “cognitive collage” of different artists, names and paintings, they would be assembled in a mental model on a geographical map, marking their space-time origins. Further on, the chatbot would offer to ask further questions about the movement in general – to people, who hear the name of

Surrealism for the very first time – or about specific questions regarding Moesman’s or other Surrealist painters lives and loves.

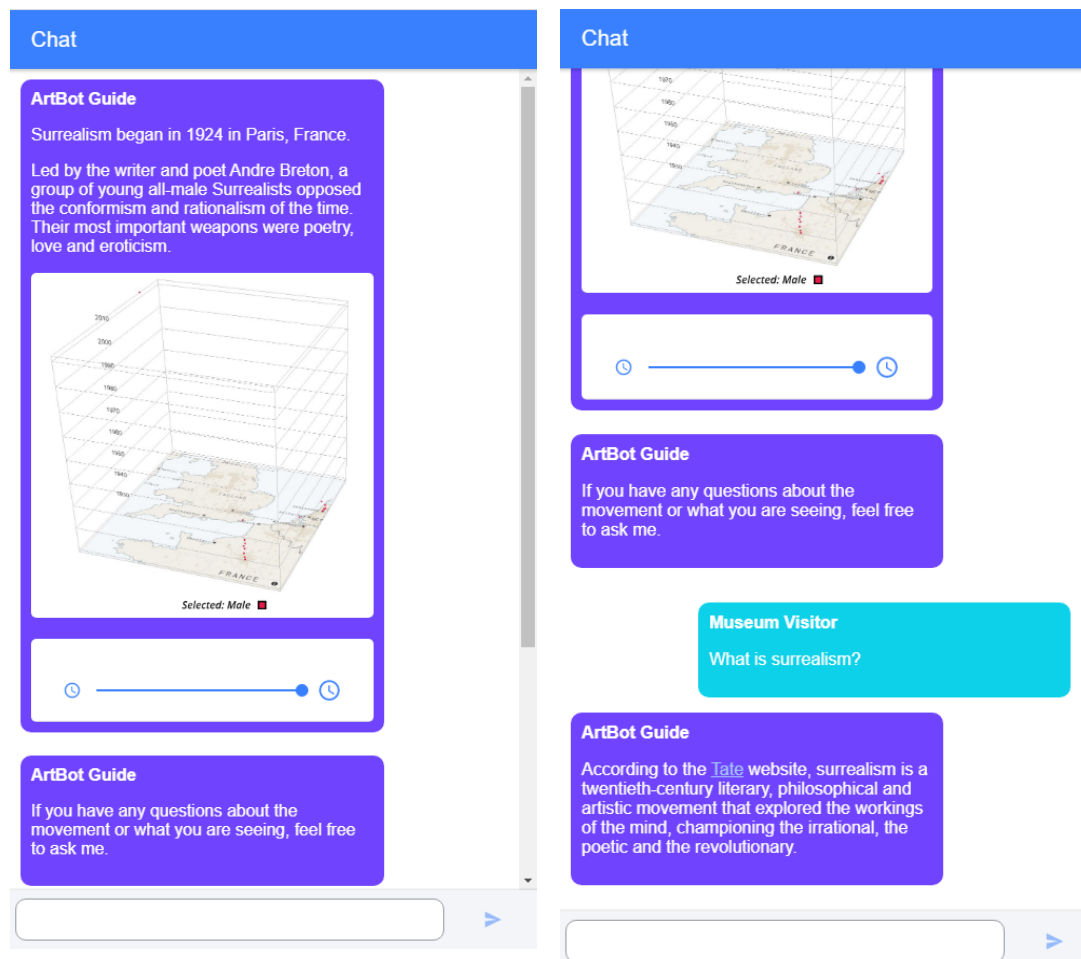


Figure 10. The ArtBot Guide in Room One.

Entering the second room “Women as Fetish”, again, a shortened version of the curator’s introduction would be displayed above the PolyCube visualization. This time the data points being scattered around wider Europe. The time slider moving between 1920’s and 2013, as that was the moment when the only well-known female Surrealist Meret Oppenheim’s works were manufactured after sketches being made in the 1930s. The PolyCube would also color code Oppenheim, being the only orange dot, a woman artist, on the map.

The third main room “The Women of Surrealism” would introduce the curatorial thinking behind the works exhibited above the interactive PolyCube visualization, showing a sudden orange and yellow dot explosion of works of art created by women and gender non-conforming artists respectively throughout times and geographic locations from North and South America and Europe. The ArtBot Guide would offer to ask any questions unclear as to the works seen in the room or the wider context of the time.

The final and fourth main room “The Cult of the Divine Marquis” would introduce Marquis de Sade as the red thread that unites many artists working with surrealist themes and would show the PolyCube visualizations time-slider going all the way to 1700s. It would also show the geographic locations of the works exhibited, covering North America and Europe. If one had never heard about Marquis de Sade before, a short information from a Wikipedia article could give the main information on his life and link specific works for closer inspection.

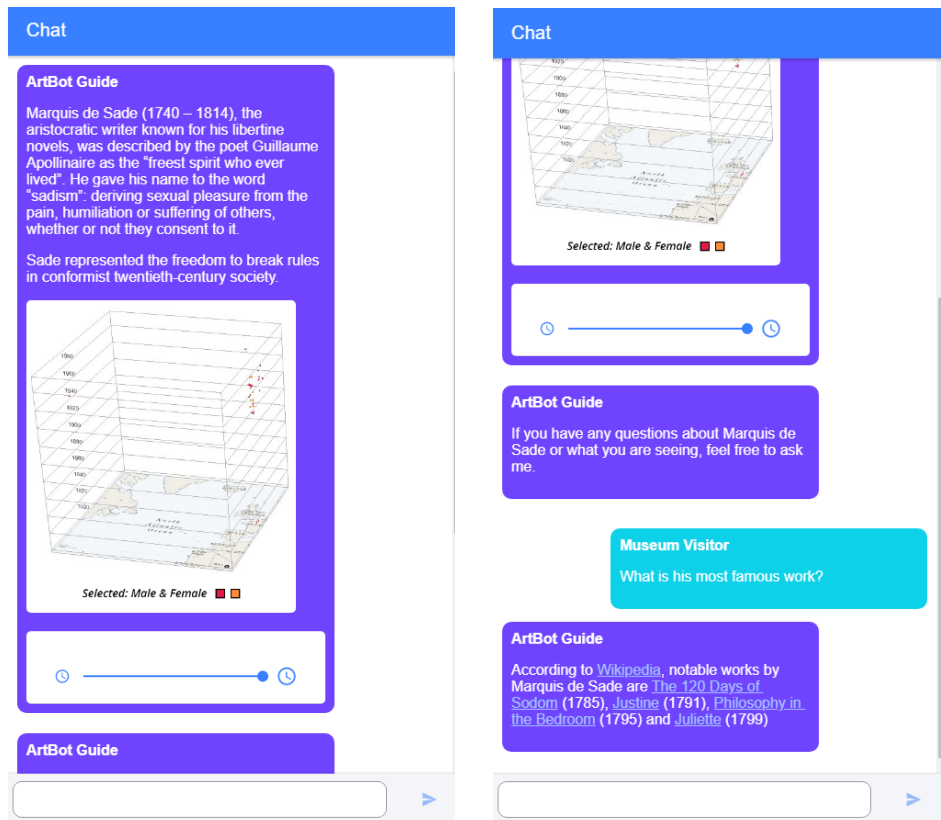


Figure 11. The ArtBot Guide in Room Four.

Before turning back to head for the exit of the exhibition, the ArtBot Guide would offer to see the digitized exhibition collection data in PolyCube as a whole. It would reveal the fact that there were men, women and non-binary artists working on the themes of Surrealism in the 1930s’ Paris and around the world ever since then. Furthermore, the very Paris and male-centered movement as recorded in traditional art histories would have exploded in not only space and gender but also in time, showing the themes present in Surrealism go back to at least the 1700s and are still discussed in the contemporary moment. From an all red-dot map centered around the 1930’s Paris to a map showing Europe and the Americas throughout the 20th century covered in red, orange women artist and yellow non-binary artists scattered around the space

Interfacing the digitized exhibition collection through the notion of performative materiality, an analysis

The physical arrangements of the exhibition in this setting remain as previously described. The additional ArtBot Guide smartphone application could be opened on a web – browser at the entrance of the exhibition, adding a medium through which the contextual information of the exhibition could be conveyed to a visitor. Contrary to the authoritative and linear format of one-size-fits-all written words on a surface, digital technologies offer the possibilities to cater to specific visitors' prior knowledge and interests. It is possible to easily regulate as to how in-depth and detailed information they would like to get. This complimentary boundary of encounter would then truly extend into and condition that which it separates, making up an intelligent interface.

Interfacing the curated exhibition collection through the ArtBot Guide would provide mental models of what can be seen in the exhibition rooms. Moving from cognitive collages to mental models, the PolyCube would visualize the narrative of the exhibition and substantiate the words with data. The digitized exhibition collection, the “hyperobject” of the data point clouds visualizing every room, would perform its materiality in grounding the knowledge in a widely agreed upon visualization of abstract data – the map and the time scale. In a private conversation, assistant curator Maia Kenney revealed that the idea of the exhibition indeed was to have Johannes Moesman as a starting point to the exhibition, the wish to write him into bigger international narratives of Surrealism and to push for the recognition of women and gender non-conforming artists (Kenney 2020). The idea was that the traditional narrative of surrealism would become more nebulous room by room. She further reflected that the curation of the exhibition was not done with the explicit thought in mind that the first room would represent male artists in the 1920's Paris (as illustrated by the PolyCube) and the last room would represent women and non-binary artists alongside male artists in a timeline spanning more than two hundred years (as illustrated by the Polycube), making the traditional Surrealist narrative explode in both time and space. Kenney noted that it could have been incredibly valuable to see the works exhibited in such an interactive visualization already at the time of conceptualizing the exhibition and its narrative unfolding through the rooms (Ibid.)¹⁷. The PolyCube interactive visualization allows the digitized objects to take up a second life, arranging themselves in data clouds. These data clouds showing the overarching narratives of the collected objects of the exhibition, that otherwise might be left unnoticed. With the

¹⁷ Indeed, the PolyCube model could also be used in the very planning of a visitors' journey.

PolyCube in hand, a visitor, asked to compare the first room of the exhibition with the last one, could easily see the difference of the narratives as to who was part of the Surrealist movement and when.

Vannevar Bush envisioned digital technologies to be an intimate supplement of memory. Douglas Engelbart was predicting digital technologies could alleviate the comprehension of complex situations and problems. While Ivan Sutherland had the vision of in-time interactivity with digital technologies. The powerful computers that are our smartphones integrate years of research done in Human Computer Interfaces. We currently almost take for granted the possibilities of mouse control, scrolling, zooming and selection mechanisms in real time. All of these aspects come together in the PolyCube to help the visitor remember what has been seen, see the bigger picture and therefore draw more comprehensive conclusions, interactively, as it has never before been possible.

The ArtBot Guide would as well provide entry into questions that would interest a specific exhibition visitor. The digitized images, turned to alphanumeric (Ernst 2013), perform their materiality in the sense of the forensic, the formal, the distributed and the performative. Taking up the digitized life in a smartphone application, the image becomes part of information networks that allow for new conceptual frameworks of their viewing emerge.

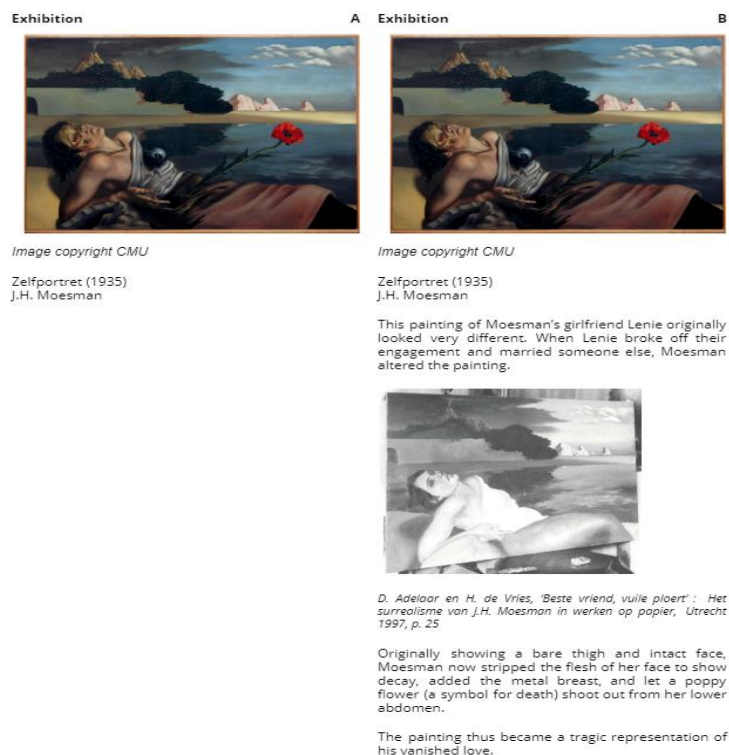


Figure 12. Moesman's *Self-portrait* as exhibited on the museum wall vs the information that could be made accessible via the ArtBot Guide for an interested visitor

On the museum wall the symbolic materiality is silent. In the digital realms, its symbolic aspects can be called up by clicking on the picture within the Polycube, taking a photograph of it or asking a question within the chatbot. The chatbot function could incorporate all the knowledge gathered throughout the research period by the curators, as well as link it to widely accessible information channels, such as the *Tate Modern* art dictionary, Wikipedia articles, Wikidata or RKD, *the Netherlands Institute for Art History*, database. The digitized exhibition collection becoming part of a larger digital workflow.

Chapter Seven: Comparison

The exhibition space in the physical setting is organized in a well thought out manner. Sensory and physically, the color codes of different rooms give good cues as to when a new topic begins, what to pay more detailed attention to. Conceptually, it is a heavy exhibition, demanding basic Western cultural historical knowledge of the 20th century, the more specialized art historical knowledge of and around the period of time, and knowledge of surrealist symbolism in particular. In terms of an exhibition that aims to talk about art historical narratives, this exhibition is particularly boundary – pushing, as it aims to deconstruct and reconstruct the traditional narratives of Surrealism.

Walking through the exhibition rooms, one can read artists birth places and the artwork creation years, but the information has nowhere to fix itself into. The separate artworks remain a collection of cognitive collages. Interfacing with the museum exhibition through printed text and the surface level oil on canvas materiality, an individual visitor that has none or partial knowledge about the complex topics discussed within the exhibition, leaves possibly having missed out a big part of the story. A museum visitor that knows everything about the topics at hand, on the other hand, and is more interested in the minute details of specific artworks, might leave longing for more.

Interfacing with the digitized exhibition through the ArtBot Guide, provides a mental model and an accompanying data visualization, that shows the inner logics of the digitized exhibition collection to both types of visitors. The digitized images finally take up a complimentary life within the PolyCube model performing as the exhibition “hyperobjects”, grounding the overarching narrative of what is Surrealism in a mental model. While the chatbot possibility allows us to reach within the digital materiality of the collection, calling up related information on demand for a specific artwork. The single artwork on the museum wall, in the digital landscape, becomes a node of possible connections, that are ready to perform to the interested visitor upon wish.

The ArtBot Guide does not disrupt the physical exhibition space. It rather builds upon it, making more engaging and visible the profound curatorial work, on the exhibition and individually gathered artwork level, that has gone into the ideation and realization of the exhibition. The ArtBot Guide serves as a helpful and insightful tool to help an interested visitor tackle the complexities of a cultural collection and reveal the hidden invisibilities behind the chosen artwork, both in ways not possible within printed media and only recently conceptualized within the all-permeating digital technologies.

Post Scriptum: Potential up and down sides of the ArtBot Guide

When reflecting on the up and downsides of such an application, a couple of important points must be noted. The upsides of the ArtBot Guide include, firstly, the fact that the application can but does not have to be used. People familiar with the museum, critical art history, Moesman's and other exhibited artists' works might not want to engage with the offer. As well, elderly visitors who are not accustomed to using digital technologies in their daily lives, might opt out of this option all together. The ArtBot Guide can be made present upon demand. Therefore, rather augmenting than disrupting the classical museum space. Secondly, the PolyCube allows for a mental model of the exhibition to appear. The PolyCube makes visible the origins of the artworks in concrete time and space, room by room, allowing to tie the newly acquired knowledge into already familiar information structures. In displaying the exhibition collection data room by room, it contributes to and illuminates the overarching exhibition narrative. Yet another upside is the fact that, through the chatbot function, the ArtBot Guide truly evokes intellectual interactivity. The visitor has to actively think along the unfolding exhibition narrative as to what questions they would like to ask. The fact that the exploration of the exhibition becomes truly self-guided and self-regulated also has to be stressed. A visitor can dig deep into and reveal single invisible artwork meanings or opt out of gaining further information altogether, if feeling close to reaching cognitive overload. Lastly, the sheer amount of information that the interested visitor could receive upon request, either from the research done by the exhibition curators or public information sources, is made available on a scale previously (e.g. in audio tours) unprecedented. The behind-the-scenes research information would not be possible to find anywhere else. More general information could be searched for, probably having to open at least twenty different web browser tabs in the one-and-a-half-hour-long journey time through the exhibition. Within the smartphone application, provided by the museum at the entrance to the exhibition, one would just have to ask the ArtBot Guide.

The potential downsides of the ArtBot Guide could be the fact that the interfacing is happening through a mobile screen, while a physical museum visit is seen as one of the last refuge places from the digital technologies permeating our lives. Yet, if digital technologies can be so helpful in tackling the complexities of the world, why should the museum space not use them wisely? It is most likely the case that people are spending time on their screens within the exhibition space anyhow. Why not make the screens help interface with the experience being lived directly? A second argument against the use of the ArtBot Guide might be the fact that the chatbot function could lead to information overload, making the visitor more confused

than meaningfully engaged. Yet, as previously explained, interested museum visitors are eager to learn more about the exhibition collections they visit. Especially in the case of the ArtBot Guide, if one would feel overwhelmed, it is simply possible to put the smartphone back into its pocket. A third argument against the ArtBot guide, in relation to the PolyCube, is that it might be confusing to read. It might be that additional information about the visualization tool has to be provided. As well, it might not be as easy to tap with a finger the pictures displayed as data points within the PolyCube model. This aspect is yet to be visitor tested. Additionally, if a visitor would like to gain information about a specific question, they could take a picture of it within the application, achieving similar results. Lastly, a disadvantage of the current use of the ArtBot Guide might be the fact that the visitor might not own a smartphone to access the application in the first place, possibly creating a digital divide (Norris 2001). Yet, it is of most likelihood that the people visiting the exhibition at the *Utrecht Centraal Museum* belong to the upper middle class, having wide access to smartphone technologies.

Last Conclusions and an Outlook

For me and Simon Dirks to be able to even imagine a speculative smartphone application like the ArtBot Guide many strands of technological and conceptual developments have had to come together in the places and time that we currently live in. The technology is there, the art museums have gone postdigital, the collections have been digitized, the theoretical thinking about the digitized collections has advanced to the point where the digital is a potential, rather than a threat.

In Part I of this Master's thesis, I have tried to compile a telling but non-exhaustive glossary of terms for the problem of postdigital museums and their digitized collections. In Part II, the theoretical research done has resulted in critical making and design thinking tool, engaging with the digitized museum collections in the physical museum setting. The PolyCube served as a great deal of inspiration and was combined with the chatbot function that has been a recently tested and developed idea in visitor engagement. Indeed, the innovation of the ArtBot Guide lies in the unique combination of the bird's – eye view and the possibilities to probe into details through linked data upon demand. The innovation of the conceptual analysis of the ArtBot Guide also lies in the unique combination of analytical lenses, comparing the two different visitors' journeys through the exhibition space, with and without the ArtBot Guide.

The ArtBot Guide does offer innovative ways of engaging with the digitized collection objects through the notion of performative materiality. In the case of the ArtBot Guide within the "Tears of Eros: Moesman, Surrealism and the Sexes" exhibition, The PolyCube model slowly builds a mental model of the exhibition at hand, in ways never possible before within linear storytelling, in oral or printed versions. It grounds the exhibition narrative in facts. For example, when the First Room of the exhibition "Exploration of Sexuality" talks introduces the fact that Surrealism was a predominantly male movement in 1920's Paris, the visualization tool shows clearly that all the artworks within the room come from the surroundings of Paris and the respective time frame. In addition, there truly is not a single woman's artwork to be found. The "hyperobject" of the exhibition data then performs like any other object, in aiding to ground the argument of the curators. As the exhibition narratives move on to more complex constellations, the "hyperobject" continues to argue for it in visual and intuitive ways. This form of visualizing exhibition collections would not be possible on a printed page. It would not be possible to zoom in and probe on the collection as a whole or the digitized versions of the artworks individually. On the individual artwork level, where oil – on canvas surface remains silent, the digitized version can communicate to databases near and far to tell the hidden

stories of their surfaces, performing its very specific digital materiality. Within the chatbot option, a visitor can ask questions, customizing to their own interest and knowledge levels. Here, an artwork becomes a node of information, the histories and contexts to which can be called up on demand.

Since 2008, when Smith and Tinio researched the impact of audio guides on museum visitor experiences, only 12 years have passed. Yet, meanwhile, firstly, in Western societies smartphones have become the norm of peoples' daily life. Secondly, museums have undergone structural changes in relation to digital technologies. Since many modes of the postdigital museum are based on computing technologies, it is very likely that exhibition designs and their handheld visitor supportive devices in the future will be more and more based on interactive, screen-based digital technologies. In this Master's thesis, keeping a pulse on the latest developments in the field, I have tried to illuminate the affordances that these digital technologies might offer in presenting a prototype, a practical tool that has a great potential of flexibility, in the current version adapted to the specific case study exhibition "Tears of Eros". Simon Dirks is planning to continue his work on the tool, so that it would become operational and could be tested by audiences by the end of this summer and the closing of the exhibition. I hope that, in combining the theoretical concepts for thinking about interfacing with digitized cultural collections through the notion of performative materiality, I have managed to argue for the need and the potential to further explore generous interfaces, also in an exhibition visit context. I hope that the idea to combine two promising developments within museum thinking, interactive collection visualization in the format of the PolyCube, and that of linked data to provide conceptual context and minute details for the collection, revealing the invisible, has been a cognitive provocation that could be taken up and adapted for further exploring the potentials of digital technologies within museums and the larger Digital Humanities landscape.

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Figure Credits

Figure 1. *The Ideation Process*. 2020. Photograph by Simon Dirks.

Figure 2. Engelbart, Douglas. *Portrayal of the two active domains within the H-LAM/T System*. [1962] 2003. In *The New Media Reader*, edited by Wardrip-Fruin, Noah and Montfort, Nick. Cambridge, Mass: MIT Press, 96.

Figure 3. *A screenshot from The PolyCube Model. Use Case: IMDB Data*. Authors screenshot.
Source: <https://danubevislab.github.io/>

Figure 4. *A screenshot from The PolyCube Model in "Time Chunks" view. Use Case: IMDB Data*.
Source: <https://danubevislab.github.io/>

Figure 5. *A screenshot from The PolyCube Model juxtaposed view. Use Case: IMDB Data*.
Source: <https://danubevislab.github.io/>

Figure 6. *A screenshot from The PolyCube Model superimposed view. Use Case: IMDB Data*.
Source: <https://danubevislab.github.io/>

Figure 7. *A screenshot of the two chosen PolyCube Model views for the ArtBot Guide. Use Case: IMDB Data*. Source: <https://danubevislab.github.io/>

Figure 8. Johannes Moesman. *Self-portrait*, 1935, oil on canvas, 96,5 x 137,5, Utrecht Centraal Museum.
Source: <https://www.centraalmuseum.nl/en/explore/collection/modern-and-contemporary-art/16473-zelfportret-j-h-moesman>

Figure 9. *A screenshot from the ArtBot Guide*. Curatorial information about Moesmans' painting *Self-portrait* that could be made available upon interest. Simon Dirk's screenshot.

Figure 10. *A screenshot from The ArtBot Guide in Room One*. Simon Dirk's screenshot.

Figure 11. *A screenshot from The ArtBot Guide in Room Four*. Simon Dirk's screenshot.

Figure 12. *Moesman's "Self-portrait" as exhibited on the museum wall VS the information that could be made accessible via the ArtBot Guide for an interested visitor*. Simon Dirks visualization.