

VILNIUS ACADEMY OF ARTS

Giorgio Ruggeri

**OPEN HISTORY:
DESIGNING THE POPULARIZATION OF
HISTORICAL KNOWLEDGE THROUGH THE WEB**

Project Supervisor: Audrius Klimas

Theoretical Supervisor: Gintautė Žemaitytė, PhD

Master's programme: Visual Communication Design

Vilnius, 2018

INTRODUCTION	3
Abstract and Keywords	3
Object of the Research	4
Aim and Tasks	6
Method	7
Outline	9
Premise	10
PART 1	
OPEN SOURCES: <i>FROM ACCESS TO USE</i>	11
1.1 Entering the history web	12
1.2 Large-scale data collections	15
1.3 The visual turn	18
1.4 Virtual tours	20
1.5 Online exhibitions	22
Sum Up	25
PART 2	
OPEN FORMS: <i>FROM REPRESENTATION TO INTERPRETATION</i>	27
2.1 Designing historical knowledge	28
2.2 Fluid agglomerates	30
2.3 Animated timelines	36
2.4 Temporal cartographies	39
Sum Up	43
PART 3	
OPEN MEANS: <i>FROM INTERACTION TO PARTICIPATION</i>	44
3.1 Interactive documentaries	45
3.3 Information time machines	50
3.4 Performative Access	54
Sum Up	59
CONCLUSIONS	61
APPENDIX	65
LIST OF LITERATURE	73

INTRODUCTION

Abstract

The thesis investigates emerging practices aimed at exploiting the World Wide Web as a space for popularizing historical knowledge. It questions the role of visual design in the communication of cultural heritage and historical information through online means, by addressing issues concerning data access, visualization, and interactive narration. A selection of cutting-edge history websites, ranging from online exhibitions to virtual museum tours, from temporal maps to interactive documentaries, illustrates how the online environment is expanding and challenging conventional historical scholarship. The critical analyses, conducted through the lens of graphic, web, and information design, suggest the need for enhanced collaborations between historians and designers.

Keywords

Digital History

Digital Humanities

Visual Communication Design

Web Design

Public History

Object of the research

The thesis investigates the main ways in which the Web is used for communicating cultural heritage and historical information to the wide public. In this work, history is intended as the study of the meanings that we as humans attribute to the past through the interpretation of its records—whether these are written, drawn, printed, or recorded through analog, electronic, or digital means. Thus, no theme, era, or geographic area has been preferred rather than others; since disciplinary boundaries tend to blur on the Web, no distinction has been made between subfields such as political history or art history. The popularization of historical knowledge through online means has been considered as a whole.

The Digital Revolution offered history scholars unprecedented conditions for experimenting with new ways of researching, sharing, and creating historical knowledge. The new opportunities and challenges emerged from this shift have been conceptualized and framed under the label Digital History, a branch of Digital Humanities—the area of work that combines the traditions of humanistic inquiry with digital forms of scholarship. Digital history work concerns primarily the use of the Web as a public space for gathering, preserving, and presenting the past, in order to engage broad audiences. These online practices are motivated by a strong commitment to the democratization of knowledge and are characterized by the central role of visual communication design.

In order to frame the state of the art of digital history, very recent online projects are presented and critically analyzed from the perspective of visual communication design. Given the vastness of such fragmented, transdisciplinary field that encompasses a plethora of diverse activities, projects, and approaches, this thesis focuses only on publications specially conceived for the Web. Works not presenting the unique elements of this medium—such as videos or texts in PDF format, both consultable also offline—have not been considered. In order to further narrow the scope of the research, the choice has been limited to websites that are not mainly based on linear writing. Thus, several other types of projects have been discarded: Blogs, forums, online books, journals and magazines, and so forth. On the other hand, platforms sharing historical sources or information around the Web for personal, aesthetic, or humorous purposes have been excluded too.

Since the focus of the research is not on teaching but rather on popularization of history, also all the web initiatives addressing only students such as online syllabi and interactive exercises have not been taken into account. Finally, the last narrowing was accomplished by excluding all those projects that take place only on social media, for instance in the form Facebook pages or Instagram accounts. In this way, the corpus of works to study has become easier to define: Original websites aiming at disseminating history materials or topics through innovative formats based on visual means. They range from multimedia archives to temporal cartographies, from online exhibitions to interactive documentaries. What unites them is the fact that they expand historical practice towards designerly ways of organizing, presenting, and creating knowledge. Each chapter introduces a brief overview on specific types of history websites, explaining the reasons behind such typology and the design characteristics defining it, including both its advantages and limits.

The title *Open History* has been chosen because of the multiple connotations that the word *open* brings with itself. This qualifier is wide enough to be suitable for suggesting the various ways through which the Web enriches and expands the scope of history:

1. ***Open as Accessible*** – The encounter between humanistic values and digital technology accelerates the democratization of the past, enhancing and facilitating open access to cultural heritage and historical information.

2. ***Open as Unfixed*** – In contrast to the (usually) fixed forms of books, museum exhibitions or documentary films, online publications are by default hybrid. Their fluid and unfinished status suggests understanding of history as open-ended, unstable, and expandable.

3. ***Open as Participatory*** – The World Wide Web offers unprecedented opportunities to disrupt top-down approaches for documenting, interpreting, and narrating the past. The diverse approaches, perspectives, and voices that characterize the fragmented digital landscape open history to an unprecedented plurality.

Furthermore, if we consider the term *open* not as an adjective but rather as a verb, the title of the thesis can suggest more meanings:

4. ***Open: History*** – a command, resembling programming language.

5. ***To Open History*** – The new action through which we have access to historical knowledge, that is, opening web pages; or a call to open the field even more than as it already is; a "manifesto" aiming at widening its audiences, expanding its practices, and enhancing its participatory consumption and production.

Aims and tasks

The aim is to demonstrate how visual communication design impacts the communication of history through the Web, defining accessibility, usability, and participation. Remedying the lack of updated literature about digital history, the ultimate goal is to frame the state of the art of this fragmented, transdisciplinary field by identifying typologies of history websites and their different relationship with issues concerning graphic, web, and information design. The main purpose of such challenge is to enhance the dialogue between public historians, communication designers, and users. In order to achieve such results, the work is based on the following tasks:

1. Overview and contextualization of the field of Digital History: A historical contextualization of digital history practices is provided the understanding of their development. Where possible, historical information about the whole field or single practices has been collected, while the gaps in literature have been filled through argumentation. In this work, digital history is not seen as an opponent to conventional historical scholarship, but rather as part of the long progression of the discipline from authoritarian perspectives to democratic ones, and from the predominance of linear text to use of graphic and multimedia formats.

2. Research of significant case studies: The ideas expressed in the thesis are based on the research of existing online projects. The research has been conducted mainly on the Web, through different channels such as: Specialized academic journals; dedicated articles and blogs; official websites of university institutions and digital humanities awards; social media.

3. Identification of the main types of history websites: Given the absence of established categories or guidelines for distinguishing and describing history websites, several interdisciplinary aspects must be analyzed (e.g. declared aims and effective results achieved, level of accessibility provided, or modes of contextualization, interpretation, narration, or participation employed), including issues that primarily concern visual communication design choices (e.g. layout, interface, visual identity, user experience, data visualization). In order to

identify different genres within them, particular attention is given to the relationship between the functions of websites and their form.

4. Critical analysis on design: Each case study presented is analyzed from the perspective of visual communication design. The examination concerns graphic design issues (e.g. typography, visual identity, layout, color, imagery), web design issues (e.g. interface, information hierarchy, interaction) and knowledge design questions (how forms, layouts, infographics, and data visualizations shape the knowledge they draft).

Method

1. Structure: Framing the discourse on a classification of history websites based solely on their content (the eras, themes, characters, or materials they deal with) could be interesting for users willing to find sources or information about a given topic; it would deserve a dedicated research also to trace quantitative data about the field, allowing the discovery of eventual trends and gaps among the work of digital historians. Yet, for the purposes of this scholarly investigation such method would be inappropriate: It would not reveal any information about how such websites are designed and how they work. The projects presented in this research present innovative, unique, or critical features in their forms or functions that allow to make comparisons, draft evaluations, and suggest further developments. Their interfaces are often fluid and can mix different types of visualizations, layouts, and structures on the same platform. The hybrid nature of online formats makes rigid classifications based on form rather hard to do. Thus, it has been chosen to evaluate three main aspects: The kind of accessibility they provide; the relationship between their form and the knowledge they convey; the level of participation they enable. Within these three sections, which form the parts in which the thesis is divided, each chapter focuses on a specific genre of online projects that reflects a particular approach towards at least one of the three aspects mentioned.

2. Case studies: The projects presented in the thesis have been chosen and analyzed through a qualitative approach that questions several design aspects. The main criteria used, whose centrality varies from one part of the thesis to another, are the following ones:

- **Meaning and consistency of the visual language used;**
- **clarity of the information architecture;**
- **functionality of the interface;**
- **effectiveness of the visualizations;**
- **level of interactivity provided.**

Of course, studying the forms of history websites without linking them to the information they convey would prevent any understanding the motivation behind of precise design choices, graphical formats, or narrative solutions. Thus, also the interpretation of visual systems through the perspective of humanistic inquiry has been put at the core of the research method. Where possible, the examination and comparison of the projects has been supported by comments and reviews previously made by other scholars.

Outline

The three main issues selected to frame the thesis' field of inquiry investigate the increased access and possible uses of primary and secondary historical sources; the expanded space for experimenting with quantitative and spatial forms of presentation, narration, and argumentation; and the new possibilities for democratizing the means of knowledge production.

The first part, called ***OPEN SOURCES: FROM ACCESS TO USE***, examines the world of digital libraries, museums, and archives committed to providing new forms of access to their collections.

The second part, ***OPEN FORMS: FROM REPRESENTATION TO INTERPRETATION*** explores spatial ways to present historical knowledge on the Web, wondering how different visualization solutions can be used as interpretative and argumentative tools.

The third and last part, ***OPEN MEANS: FROM INTERACTION TO PARTICIPATION***, examines the different levels of interaction provided by history websites, from the ones based on one-way communication to the most participatory ones, in which visitors are thought as active collaborators.

Premise

Digital History literature is characterized by the predominance of introductory and propositional texts, often too generic or speculative for examining existing projects. On the other hand, scholarly monographs about single case studies, often carried out by the authors themselves, are too specific to provide a big picture of the field's landscape. The speed at which digital interfaces change from novice to obsolescence, as well the hybridity of online formats and the fragmentary, ephemeral nature of the Web itself, all contribute to confusing ideas when we talk about Digital History.

Popularizing of history via websites occurs through a multitude of platforms, media, and formats that require not only to be mastered and used critically, but also to be designed. Design is therefore a key element in practicing history in the digital realm, where any content or interaction is mediated and modeled by visual frameworks: interfaces, layouts, mappings, visualizations, or even virtual spaces. Yet this centrality is often ignored. The lack of attention on the design of such websites further limits contact with professional designers and design students, who should instead become co-protagonists in creating digital history; and, above all, it does not allow digital historians to move beyond propositive claimings and manifestos and finally reach wider audiences. Thus, what is missing is a more direct link between theoretical framework and current practice: A comparative and interpretative space where to gather cutting-edge projects, and at the same to open novel inquiries and encourage innovations based on a critical understanding of previous experiences.

This text is therefore not conceived only for digital humanities scholars and practitioners. It addresses public historians interested in embracing the Web as a tool for disseminating knowledge, and designers eager to get involved in the challenge of rethinking the communication of history.

PART 1

OPEN SOURCES

FROM ACCESS TO USE

“Just as “open source” software has been the rallying cry of academic computer scientists, “open sources” should be the slogan of academic and popular historians.”⁰

1.1 ENTERING THE HISTORY WEB

“The era of ‘walled in’ knowledge is over.”¹

During the last three decades, the progressive migration of cultural heritage and historical information into networked environments has dramatically changed our relationship with history. The spread of computer networks, the ubiquity of digital devices, and the growing speed of Internet connection have encouraged levels of access, communication, and participation to sharing and producing historical knowledge that know no equals in previous times. The Digital Revolution generated a previously unexperienced interdependence between memory and technology—a shift that has been hailed by some as a **“cultural-historical transformation such as the shift from the scroll to the codex, the invention of moveable type, the encounter with the New World, and the Industrial Revolution.”²** This opening has brought greater possibilities in terms of quantity, diversity, and manipulability of available historical data, as well as new challenges concerning quality, reliability, durability, and usability issues that since then animate the eternal debates between enthusiastic and skeptic about digital technology among humanitists.

Regardless of such discussions, many independent scholars, archivists, curators, teachers, students, and history enthusiasts have been fervidly using the Web since the start. They tested new ways of research and sharing, developing new collaborative construction models and exploiting the instant diffusion it offers, along with free use of knowledge. Their experiments—concentrated especially on building websites and blogs to share historical knowledge with the public—constituted the primordial gene of the diverse practices that have been framed as Digital History. A key figure in the early stage of the field was social historian Roy Rosenzweig. He believed that all history scholars are responsible for documenting and preserving historical evidence in digital formats, suggesting that they should **“use digital media and computer technology to democratize history: to incorporate multiple voices, reach diverse audiences, and encourage popular participation in presenting and preserving the past.”³** In order to actively encourage such practices, in 1994 he found the Center for History and New Media, a research institution at the George Mason University in Fairfax, Virginia, that since then has created several softwares and history websites freely accessible to the public. The activity of the center

focused on experimental, online formats which mixed the display of digitized primary sources (usually very low-resolution images and text documents) with secondary sources such as narration and commentary. In general, the digital history projects published during this period were extremely basic in terms of form and interaction, presenting only linear text, small-size images, and hyperlinks. It is not a coincidence that in the book that Rosenzweig wrote together with historian Daniel J. Cohen, entitled *Digital History. A guide to Gathering, Preserving, and Presenting the Past on the Web*, the chapter about design suggests DIY solutions for creating online history projects. This 2006 book, which represents the first (and apparently the only one) introductory text and comprehensive report on the use of digital media to further historical study, provided the knowledge and practical skills necessary to deal with history in the digital realm at that time. According to the authors, initially not institutions, but rather **“Enthusiasts and amateurs have put the greatest energy into posting new forms of secondary literature online.”**⁴ They provided the crucial energy for the birth of the “history web”—that is, the inhomogeneous world of websites dedicated to history. Initially, they were amatorially designed by passionate scholars who had often no knowledge nor interest in visual communication, as if professional approaches on layout, typography, colors, and use of images were not fundamental for communicating history through the Web. Most of them relied on self-taught web design skills and the use of blog templates, producing web pages whose layouts and interfaces were not visually attractive nor functional. unclear information hierarchies and redundant menus made navigation difficult. In the best cases, random use of colors and typefaces gave the web projects an identity-free appearance, totally disconnected from their contents. Investigating the expressive and aesthetic qualities resulting from the use of digital media as a means of communication was clearly not the priority of early digital history historians.

The enthusiasm for the networked, collaborative nature of the Web and the ease to access information that it offers were rather digital historians’ main concerns. From libertarianism to Marxism, utopian attitudes committed to free the production and consumption of knowledge characterized the motivation of early historians venturing the Web, who aimed at using it **“to make the past more richly documented, more accessible, more diverse, more responsive to future researchers, and above all more democratic.”**⁵ Their founding principles were clearly a continuation of the Public History movement, emerged in American and Canadian universities during the 1970s. The technological

developments started in the mid-20th century had led to a growing divide between academic historians, whose activity is argument-driven and based on close reading, criticism, and hermeneutics, and the service-driven work of history-related professionals operating outside academic settings⁶—e.g. archival scientists, oral historians, or museum curators. The increasingly problematic distance between academia and industry favored the emergence of Public History as a new field of studies and practice. It aimed at filling the gap by finally addressing the public arena, confronting with different audiences, and systematically using mass media to make history.⁷ Public History courses started to spread among Western universities, with the purpose of creating professional profiles able to conceive the communication of history for diverse audiences. Despite the broad range of activities undertaken by different types of public historians—ranging from oral history to archival work, or from the making of documentary films to the management of memorial sites—three main characteristics define their approach: A major focus on popularization of historical knowledge; an emphasis on history's usefulness beyond academic purposes; and a particular attention to the voices and the histories of communities, minorities, and ordinary people.

It is quite easy then to draft a parallel between Public History's democratizing impulse and the early Web's democratizing promise to offer greater access to historical information and new flexible formats for presenting it, as suggested by digital historian Cameron Blevins.⁸ Professor of Digital Media and Design Tom Scheinfeldt has instead stressed that due of its modes of work highly based on media, archival activities, public engagement, and collaborative practices, Public History clearly represents a direct ancestor of Digital History.⁹ While all digital humanists use the Internet to disseminate and exchange materials with other scholars, the main purpose of popularizing material online and the following ability to reach and engage audiences that go far beyond the walls of the academy are some of the characteristics that most distinguish Digital History within Digital Humanities.¹⁰ Also for this reason, design has begun to play an increasingly fundamental role within these practices. But notwithstanding pioneering insights and public commitment, the amateurish work of early Web historians was limited not only by their often poor technological, aesthetic, and financial means, but also by their restricted access to historical collections. That explains why their independent activities concerned the narration and sharing of specific information about a given topic of local or national interest, supplemented by usually scarce visual material. On the contrary, as noticed by visual theorist, and cultural

critic Johanna Drucker, the first stage of digital activity of cultural heritage institutions has been characterized by mass digitization of primary sources and online repository building.¹¹

1.2 LARGE-SCALE DIGITAL COLLECTIONS

“almost overnight, it seems, the inventories of museums, libraries, galleries, and collections have been digitized”¹²

Since the mid-1990s, many collecting institutions around the globe have digitized their large-scale collections of *born-analog* content¹³, ranging from books and other printed materials to manuscripts, paintings and drawings, sculptures, notated music, maps and diagrams, photographs, audio recordings, films, and other objects. By building online repositories, they could publicly share quantities of items unthinkable in the physical settings of an exhibition, or extremely hard and time-consuming to browse in a conventional archive. Remote access makes us forgetting those times in which geographical distance could represent the impossibility e.g. to consulting a given ancient Roman inscription, discovering a collection of Chinese Song dynasty paintings, or exploring a 18th century map of the Ottoman Empire. Whether such availability can be taken for granted by many, there has been nothing such as a standardization in the ways cultural heritage is digitized and published on the Web.¹⁴ The level of access to sources provided by the websites of collecting institutions vary significantly, and in certain cases it can be very limited. The different methodologies and technologies used for scanning, photographing, or recording items determine the quality of the information available and preservable. In addition to that, different methods and solutions concerning the indexing, sorting, and organization of items severely impact the experience of browsing or searching within the archives. Furthermore, the diverse types of domain (from copyright to public domain, passing through fair use and Creative Commons) define their actual accessibility and usability. But whereas many platforms provide only very low-resolution pictures (or even just small thumbnails) of protected materials that sometimes can be also signed with watermarks, the last decade has shown a progressive increase of digital archives sharing historical artifacts free of copyrights, enabling users to download,

share, and freely use high-resolution reproductions of artifacts. The digital collections of the *Library of Congress* for instance, which has been one of the earliest institutions to run for the digitization of its assets and their dissemination through the Web, comprehend today around 17 million digital objects, including more than 2,5 million public domain items of various kind. The New York Public Library, whose online database *Digital Collections* contains more than 700,000 images with new materials added constantly¹⁵, has launched the *NYPL Public Domain*, a web page dedicated to its public domain images, amounting now over 180,000 artifacts. On the other side of the ocean, more than 3000 institutions from all across the European Union have contributed and still do keep assembling their collections on the platform *Europeana*. As suggested by cultural historian and academic librarian Robert Darnton, the project functions as **“an aggregator of aggregators”**¹⁶: Digital information, which is created, curated, and accumulated by single libraries, archives, museums, and galleries of the 28 countries, is made flowing into central databases by regional and national centers, to eventually end up entering the architecture of the website; the end-users cannot notice the data flows, because the search engine on the platform directs them straight to the digitized work they were looking for. Today over 51 million images, videos, and sounds almost half of which are under rights statements that allow some form of reuse, make *Europeana* the biggest online portal for reusable cultural heritage items.¹⁷

Apart from prominent platforms, the constellation online repositories of cultural heritage is nowadays extremely vast, diverse, and fragmented. The historical sources findable on the Web come from national, regional, local, private, and independent collecting institutions, as well as from the collections of private citizens. Thanks to this global effort, today we are **“able to avail ourselves of the great corpus of art historical, architectural, archaeological, and other cultural artifacts through a Google image search.”**¹⁸

Undoubtedly, this unprecedented ease to historical primary sources has the potential to democratize the past. But is all this material really seen, understood, and used by the public? Is it really accessible or just merely available? Publishing it on the Web does not necessarily mean that it will reach a wide audience. Nor it can be taken for granted that eventually, whether someone found it, it would be understandable, appreciable, or usable. Opening the doors of historical collections in the online environment cannot exhaust the concept of digital access to historical knowledge. In order to address the public at large, a digital history project must provide the means for contextualizing and interpreting the sources

it presents, going beyond the mere compilation of metadata (a set of data that describes other data—e.g. image credits). Digital libraries are rarely self-sufficient as a means for historical popularization purposes. Since the content of their collections is so quantitatively big and so qualitatively diverse, they require non-invasive visual identities and quite neutral, versatile layouts to match well with all their materials' different subjects, eras, media, formats, sizes, and aesthetics. In this regard, new media theoretician and digital humanities pioneer Lev Manovich has stressed the formal heterogeneity of digital collections of cultural heritage by claiming that **“If Instagram platform during 2010–2015 can be thought as the extreme example of visual constraints, with all image being the same size and format and belonging to one medium, a digital historical collection is the other extreme.”**¹⁹ But the aesthetic features of the spaces in which items are organized do not connote them with any meaning. This, together with the fact that nothing but categories and tags can create distinctions, groups, and paths among items produces also a side-effect: They do not help to contextualize and relate the objects. These are immersed in a non-sequential, non-hierarchical structure that can surely amuse a user in search of serendipity and curiosities to discover, as well as it can confuse and disappoint visitors willing to get deeper knowledge about a given specific aspect or a particular theme. That is why digital collections usually require the support of textual tools in order to tell the stories of their materials and provide a contextualization for interpreting them, as well as to describe the links and relationships between them. As a common practice, the content is divided in thematic sub-collections with descriptions or narrative commentary, as well as dedicated articles, short essays or blog posts are published to help understanding specific topics, collections or single artifacts. On the level of design, the visual encounter between items and texts is quite conservative: They usually remain separated, because the linearity of text possibly fights with the nonlinear structure of digital archives. But despite this, in digital collections archival and editorial functions support each other, possibly merging.

This is particularly evident in *Google Arts & Culture*, a project by Google Cultural Institute, which collaborates with more than 50 partner institutions from different countries (including museums such as the Tate Gallery, London the Metropolitan Museum of Art, New York City or the Uffizi, Florence) to digitize artworks and present them online on its hybrid platform. This online aggregator of museums offers over 300,000 images and videos and 150 online exhibits. Its publications comprehend not articles and links for further information, but

also visual galleries, multimedia slides with digitizations of art and literary works, 360-degree film clips of historical sites and narrating voices, and even georeferenced mappings of events and artifacts. Every record stored in the database can be opened separately, where it is possible to discover more through very rich metadata and astonishingly high-resolution reproductions. The strength of this project, which has established itself as a leading platform for online thematic showcases of history and art history subjects, lies in the way its flexible structure has been designed for enabling harmonious dialogue between different formats and media. Users can seamlessly jump from multimedia collections to articles, from thematic shows to the profiles of museums, or from virtual tours of heritage sites to short biographies about historical characters, perceiving all of them as part of a unique, well organized system. The delicate graphic style, in which texts are less invasive as possible and no decorative element is included, creates a sense of order and coherence that helps to focus on and enjoy the visual content.

1.3 THE VISUAL TURN

“The increasingly visual, dynamic and multi-textual character of history in the digital history environment is aligning it more closely with the idea of the museum as a place of *visual technology* [...]”²⁰

Parallel to the higher degrees of accessibility to cultural heritage on the Web, there is another online phenomenon that seems to pose a fracture with the discipline’s past: Compared to conventional historical scholarship, Digital History is above all much more visual. Yet, if we look at the explosion of historical images that populate the online world innovations from a larger distance, it becomes clear that more than a revolutionary shift, it represents a coherent step in the evolution of historical practice. During the 19th and 20th centuries, thanks to the technological progress that increasingly facilitated the reproducibility of images, historical studies experienced a shift in emphasis toward a growing concern with the importance of the visible. From photography to cinema and television, Western culture’s logocentrism started to be undermined by a new ocularcentric modernity.²¹ As novel

academic fields concerned with mass media emerged during the 1960s and 1970s—e.g. cultural studies, visual studies, film studies, media studies, or design history—visual artifacts gained more importance also for traditional historians, challenging the hegemony of written text that characterized their work. The power of visual resources to effectively convey what would otherwise be an incomplete description increased the potential attractiveness of historical narratives addressing non-specialist audiences. From the curation of photography exhibitions to the making of documentary films, popularizing history became to a large extent a visual practice. Eventually, in the 1990s, the affirmation of the Web and its plethora of images instantly available to anyone dramatically sped up and contributed to what art historian and critic W.J.T. Mitchell has defined as the *pictorial turn*.²² Under the conditions provided by the Internet, the ease to supplement textual material with reproductions of manuscripts, paintings, maps, photographs and even videos improved historians' familiarity with the use of images.

But what we may refer to as history's *visual turn* in the Information Age concerns not only the increased importance of visual material and its use, but also the intrinsic visuality of digital technology. The Web is indeed a visual concept itself, where any communication, regardless of content or media, cannot avoid the mediation of the Graphical User Interface (GUI). This should theoretically result in placing visual communication design at the core of online history practices. Yet, the work of digital historians often shows very limited design knowledge. For them, as well as for users, the poor quality of their designs did not represent a major issue. That is because visually, institutional websites and blogs created by amateurs did not differ so much during the 1990s and the early 2000s. But the Internet has incredibly evolved since then: The emergence of what has been called the Web 2.0—that is, websites that emphasize user-generated content, usability, and interoperability with different devices, systems, and platforms—has incredibly increased the range of possibilities for web designers. This shift has produced a far higher level of needs and standards. And as both information and entertainment migrated online, expectations about the quality of graphics increased. A growing global audience of digitally literate users is now demanding websites that correspond at least to the conventions to which they are accustomed. Subsequently, history websites are forced to compete with the user-experience and the aesthetic attractivity of cutting-edge web design. As argued by digital historian Sheila A. Brennan, **“Doing any kind of public digital humanities work requires an intentional decision from the beginning of the project that**

identifies, invites in, and addresses audience needs in the design, as well as the approach and content, long before the outreach for a finished project begins.”²³

Providing not only comfortable internal search engines and meaningful information hierarchies, but also engaging modalities to present historical content have become fundamental tasks to convert potential access to concrete use. How to display artifacts in ways that add value to the collections? How to integrate information and commentary to primary sources? All these questions imply visual design decisions that directly shape the way historical knowledge will be conveyed and used. There is no escape—in networked environments, historical knowledge requires to be designed, not only written, in the same manner as museum exhibitions employ exhibit designers besides historians and curators.

1.4 VIRTUAL TOURS

“In the most successful cases the online presence is building a cyclical relationship, with visitors going online before and after the physical visit and so extending their contact and engagement.”²⁴

In the context of Digital History, the parallel between the museum space and the Web works quite well also because compared to libraries, museums tend to give even more importance to the narrative and educational potential of primary sources, due to their greater experience with the presentation of history through artifacts. Indeed, very often museum websites show more attention on design, aiming to find engaging ways to present artifacts and original visual approaches to connotate their content. The much higher selectivity of museums and their subsequent narrower range of holdings enable them to build original visual identities that are somehow related with their content, possibly to the specific era, location, or topic, that defines the institution. But whether the mentality aimed at making cultural heritage freely accessible through the Web is increasingly spreading also among museum institutions, some of them are still worried that sharing digital reproductions of their repertoire could decrease the visits *in loco*. Thus, they choose to limit the number of viewable

items to a narrow selection, or to provide only low-resolution reproductions. On the contrary, online access effectively increases the interest in physical collections.

Not taking into account the cases in which museums' websites work very similarly to digital libraries, museums have two main different approaches to use the space of the Web: the online exhibition and the virtual tour. When collections include 3D objects, sculptures, installations or large-scale artworks, and especially when locations themselves are of some natural, architectural or historical interest, some museums opt for showing their goods by offering virtual tours of their spaces. Visitors can explore rooms, halls, churches or even entire palaces and gardens through 360-degree photos or videos with panoramic interactive view, grasping an idea of what visiting the actual museum would be like. At the present day, the number of museum virtual tours is hard to calculate, due to their popularity: The platform *Google Arts & Culture* alone offers over 2000 museum street views in its collection. Among the benefits brought by this format there is undoubtedly the possibility to move through incredible spaces and artifacts while comfortably sitting on a desk, and discovering details that would not be visible to the naked eye. For instance, one could zoom in and contemplate small particulars of the Sistine Chapel on the *Musei Vaticani* without standing in a queue or being surrounded by a crowd. What goes often unnoticed is the potential advantage virtual tours to show not only artifacts and spaces themselves, but also exhibition design choices of museums, their curatorial work, and subsequently their own identities as historical cultural institutions. This innovation represents a keystone in access to institutions and historic sites, especially considering that for disabled persons, victims of political restrictions, and people with financial issues or living in remote areas it can represent the *only* access. Yet the form of virtual tours is not limited to photographic panoramas of stitched images, but it can also be based on 3D modeling. In this regard, the most interesting example is *CyArk*, a California-based nonprofit organization whose goal is to preserve cultural heritage sites before passage of time, cataclysms or human violence could damage or even destroy them. Founded by engineer Ben Kayra after being shocked by the devastation of ancient sites during the war in Iraq, it operates through its online archive. The website works as a repository of detailed 3D representations of world's historically significant monuments and architectures, created by using cutting edge reality capture technologies such as laser scanning and digital modeling. The resulting detailed 3D representations are then shared on the website. Moreover, they are supplemented by commentary and narrative descriptions,

resulting in an outcome thought as an educational tool. Till now, the free archival content includes hundreds of cultural heritage sites, covering all the continents. A timeline and an internal search engine enable to find historical structures according to the period in which they were built, or based on their country, culture, or theme they belong to. But unfortunately, the projects index does not include any textual information or visual hierarchy to understand which sites that have already been, are currently being, or will be digitized; in this way, the visitor is forced to click on each of them to discover what is already available and what is not. Moreover, the 3D models already online are only browsable on the website, and are not downloadable or usable in other ways. So, how does the project promote the preservation? Shouldn't it provide full, public access to the models to ensure their reproducibility? The main goal of the initiative seems to not fully coincide with the means it provides. For what concerns design instead, the defect of the initiative is the weakness of its visual identity, which lacks of personality and seems totally disconnected by the themes and technologies that characterize the project. But despite such limits, this unique initiative demonstrates how virtual tours can actually be intended as a means for documenting and preserving the human record. Unfortunately, the way museums utilize this tool is not always as much committed to open access. When spatial explorations are not accompanied by inventories and are the only way to take a look inside the collections, they are only meant as windows to impress the public and promote physical exhibitions or sites.

1.5 ONLINE EXHIBITIONS

“Many of the principles underlying the processes of designing exhibits for displaying history in physical settings are being applied in the virtual arena.”²⁵

A very different way to conceive online access to cultural heritage is the one of online exhibitions—exhibits whose the only venue is the space of the Web—which treat the digital arena as an extension or even as a substitute of conventional shows. Such approach allows to experiment with formats and interactions not viable in physical settings. But especially, it closely involves graphic design as a tool for connoting and contextualizing historical

collections visually by addressing questions of style and identity. The design of online exhibitions concerns not only the creation of interfaces that allow to easily navigate through historical artifacts, but it is also about conceiving of recognizable identities coherent with the project's theme and mission, and providing interpretative visual frameworks through which reading the contents. Although surely not the most articulate form of interpretation, **“The compilation of information is an increasingly creative activity that involves contextual framing that itself performs a quasi-interpretative function.”**²⁶ An interesting aspect of such activity is that curatorial choices with design decisions concerning the modes of navigation and display can totally merge.

This becomes clear in a project like *Thngs*, a digital archive about material culture conceived, designed, and managed by a group of Russian designers and developers led by Dima Dewinn. This ambitious work in progress aims at gathering and showcasing reproductions of items ranging from Stone Age hunting weapons to mobile phones, with the help of producers, museums, and individual collectors occasionally invited to deliver and curate their collections on the website. The objects, all correlated by rich metadata that includes ownership, geographical origin, media, can be displayed as a unique, gallery, in thematic sub-galleries, or in interactive timelines that enable to visualize chronological relationships. For instance, by typing the word “radio” in the search bar, it is possible to explore a timeline encompassing the historical development of this device. The team places digital preservation before its physical counterpart, believing that **“Material things are volatile, unstable, and eventually cease to exist. The disappearance of things is the disappearance of objective information. [...] Humans need a new storage format that will extend the life of things’ information, if not their physical substance.”**²⁶ But the website is still in beta version, far from accomplishing its symbolic, unrealistic goal of collecting the whole existing objects. From a historian's point of view, the project lacks of basic features to be considered a proper history project: A clear set of criteria that would allow a rigorous selection and documentation of the objects; a precise management of secondary sources, which are sometimes incomplete or even absent; a temporal and geographical coverage of material history coherent with the stated ambitions. But concerning design, the apparently neutral interface of *Thngs*, on a shows how historical collections can be recontextualized empowered by visual means. The completely white background of the website provides an aseptic atmosphere aimed at emphasizing the contents' visual features.

The items, all digitized through frontal, cropped photographs, are neatly displayed in random sequence on a thumbnail grid that can be explored through infinite-scrolling. The rigorous photographic reproductions, perfectly equivalent in terms of framing and lighting, make the variegated collection seeming homogeneous. As a result, the visual approach and structure of the website stress and magnify the aesthetic values of the items, making the archive looking more like an product design gallery. The emphasis on framing context is starting to spread within online exhibitions, playing with the structure and the functioning of web pages as expressive means.

A fine work in this sense is *Net Art Anthology*, an online exhibition that is presenting 100 works of net art history over a two-year period, staging one project per week. The initiative by Rhizome, a nonprofit organization dedicated to new media art, challenges the scarcity of historical perspectives on little studied and often inaccessible works. The project is based on the identification, preservation, and presentation of works that make it possible to trace the development of net art—the field of digital artworks made from the late 1980s through the present day, meant to circulate via the Internet. The team behind *Net Art Anthology* is composed by developers, designers, editors, and curators, with the support of an advisory board of media theorists, art historians, artists, and other humanists, and their work could be considered as one of the best made, ongoing historical exhibitions on the Web. Its five distinct chapters, organized chronologically, are based on a highly selective set of criteria that reflects the critical curation process behind of the project. The framework consists in a long homepage to scroll, where texts introducing the different chapters alternate with frames displaying previews of all the chosen artworks, and blank flames (thought to contain works which have not to been published yet). By clicking on each of them, dedicated pages open up, showing narrative and commentary texts with the complete artworks. Due to the particularity of this exhibit, whose medium coincides with the medium of the artworks it displays, users are given the opportunity to experience the original works. In this way, remediation is absent, or rather limited; of course the technology used by artists 30 years ago was different, but the artworks are displayed through the use of software emulators developed by Rhizome itself. The strength of the project lies also in its design: The minimalist graphic style and the rough structure of the website make it a congenial space to display and contextualize the contents. Entirely typeset in Arial (the default font of Microsoft computers created to emulate Helvetica), its extremely essential layout is on border between looking amateurish and

modernist. Thick, black frames around titles and project thumbnails create order and homogeneity among the diverse visual features of the content showcased. Plain, bright background colors that change while moving the cursor from one project to another, generate constant vibrating contrasts, also amplified by violet, the color chosen for the project title and all the active links, which is the only one color to always remaining unaltered.

Projects like *Thngs* and *Net Art Anthology* prove how visual contextualization can make the navigation through cultural heritage items an aesthetic experience, in which processes of discovery and learning are accompanied by coherent visual systems that valorize the records they display. Whether both of them are based on relatively small-scale collections as well as on quite basic means of representation and navigation, the type of knowledge that these projects convey vary significantly, from the very broad but generic of the former to the very specific but deep of the latter.

SUM UP

We have seen how early digital historians considered visual design as a marginal aspect in their practice. For them, the possibility to share historical information online coincided with the democratization of knowledge. Later, thanks to mass digitization and online sharing of cultural heritage, this perspective has been replaced by the idea of accessibility as availability of sources, and the new central role acquired by visuality increased the need to design of comfortable and meaningful interfaces. Apart from repository building, the diverse approaches of institutions of memory towards online access have defined different uses of the Web to popularizing history, ranging from the sharing of virtual tours to the design of exhibitions specially conceived for the online space.

Each of these types of access has its own benefits and limits:

– **Large-scale digital collections** such as digital libraries and archives contain incredible amounts of historical materials and often provide open access to sources, but such huge quantities and diversity often limit the depth of contextualization.

- **Virtual tours** can make users explore remote locations and artworks otherwise not accessible, but the records they show are not usable or reproducible.
- **Online exhibitions** instead can generate much deeper access to knowledge through curation, visual contextualization, and narration, but only about a specific theme and using limited amount of sources.

Since they serve different purposes, none of these models or genres has to be considered better or worse than the others, but together they expand and complicate the concept of online accessibility to historical sources.

PART 2

OPEN FORMS

FROM REPRESENTATION TO INTERPRETATION

“The tools of humanistic inquiry have become objects of experimentation and research as have their modes of dissemination.”⁰

2.1 DESIGNING HISTORICAL KNOWLEDGE

“Knowledge Design places visualization tools closer to the core of humanistic inquiry.”¹

Conventional historical scholarship is traditionally characterized by a recognizable form that has remained consistent through centuries, that is, the printed pages of journals and books. Usually, the authors of the content are not involved in the design decisions concerning this medium.² On the contrary, the non-standardized, unfixed forms of digital history work encourage or even force scholars themselves to get their hands dirty with issues concerning typography, color, layout, sequences, graphics, visualizations, mappings, and so forth, that mediate and model their work. The reborn interest of digital historians in design has probably its roots in the new wave of digital humanities work, symbolically inaugurated by the publication of the book *Digital Humanities* in 2012, collaboratively written by American scholars Anne Burdick, Johanna Drucker, Peter Lunenfeld, Todd Presner, and Jeffrey Schnapp. The manifesto stressed the overlap between the *what* and the *how* as one of the founding principles of this transdisciplinary area, in which design occupies a dialogical position. Indeed, it acts as a bridge between humanistic inquiries and technological tools, balancing imagery with functionality. Cultural historian and digital humanities pioneer Jeffrey Schnapp went further with this concept by coining the new formula *Knowledge Design*, that would provocatively replace, or better to reinforce, the phrase *Digital Humanities*. According to his introductory text about the new label, **“Knowledge Design describes the situation in the contemporary humanities [...], a setting in which neither the methods that produce humanistic knowledge nor the forms and genres into which such knowledge is shaped are givens.”³**

For what concerns online projects, the renovated and increased use of visual forms of knowledge production—that is, graphical representations that generate the knowledge they draft⁴—is increasingly expanding the boundaries of digital historical scholarship. Today, as we have seen, the amount of historical data and materials available online is enormous. Despite this can cause excitement, it does not necessarily facilitate the comprehension of historical complexity, nor one can take for granted that it is going to attract audiences of non-experts. Schnapp wonders what happens when collections of cultural heritage move from the thousands to the millions and billions of objects, questioning how can we understand such

vastness. The greatest contradiction between the terms *digital* and *history* lies in the fact that whether digital technology allows to manage and use immense quantities of information, historians, as well as all humanists, have always based their work on a regime of scarcity. In rare cases of overabundancy, the norm in the pre-digital era was to address problems of quantity and scale by means of extreme selectivity.⁵ Now digital repositories can contain and display enormous quantities of items that reverse this paradigm. But the list-based form of online libraries and galleries is perhaps inappropriate for understanding gigantic corpora of thousands, millions or even billions of records: Big historical data require to be processed and re-presented in visual forms that enable interpretations and discoveries. Indeed, among the shifts that the digital turn brought to historical studies there is a boost towards approaching the quantitative methods typical of natural and social sciences. Practices such as the analysis of huge agglomerates of data, the use of statistic methods, and the support of visualization tools to discover patterns and clusters among large-scale amounts of information have become common among historians. This expansion of the historical practice is particularly significant, especially remembering that as all humanities scholars, historians conventionally distinguish themselves from scientists for their roots in qualitative analysis. Quantitative methods instead, usually require teamwork, based on the collaboration of different scholars and professionals and the convergence of plural perspectives from various disciplinary areas. That explains the emergence of collective studios like Cultural Analytics Lab or metaLab (at)harvard, which are challenging the conventional idea of humanities scholarly work usually conducted in solitude, by replacing it with the co-operative, practice-based concept of the laboratory. For instance, Humanities+Design, a research lab at Stanford University, focuses on building open source tools for research, facilitating the diffusion of data-driven humanities scholarship that make large use of visualizations. One of its works, *Mapping the Republic of Letters*, tried to discover intellectual networks in the early modern period through the mapping of correspondence between scholars, roughly from 1500 to 1800. The social relationships of characters such as Erasmus, Galileo or Franklin have been visualized through various interactive tools that display the information extracted from the scholars' letters. While the team was developing different visualization tools, the desire to open them to the use of external scholars for other projects started to take form in an open source platform. Such efforts led to the lab's best known work until now, *Palladio*, an analytic tool for visualizing complex historical data and discovering patterns, clusters, and connections across time and

space. Conceived for humanities scholars, it allows users to easily upload contents in the form of spreadsheets, and then to explore it through a variety of visualization options: lists, galleries, graphs, and maps. The list view is conceived for rearranging and customizing data; in the gallery view instead, information is displayed within a grid, with the possibility to correlate it with images; the Graph view provides information displayed as connected nodes; and using the map view, coordinates data become points on a georeferenced map, while relationships between single points can be linked by lines. Behind such initiative is the awareness that not all humanities scholars can be designers or developers; especially because of that, tools allowing them to successfully employ effective visualizations in their work are extremely useful and needed. On the other hand, it must be noticed that the platform introduces a normalization of visualization methods which directs the possibilities of historical investigation to the ones expected by the authors of *Palladio*; in addition to that, its default templates produce a standardization of visualization aesthetics that dramatically reduces the role of data visualizations to the one of mere representation tools, losing all their interpretative and narrative power. That is why the project works very well as a tool for scholars, but the automatized visual outcomes it produces fail as vehicles for the popularization of history. Communicating historical knowledge through graphic means requires to find a balance between functionality and engagement, between universality of visual syntax and specificity of visual language.

2.2 FLUID AGGLOMERATES

“the flexibility of digital data lies not just in the ability to encompass different media. It also resides in the ability of the same data to assume multiple guises instantaneously.”⁶

If we consider the fragmentary coverage of digitization initiatives around the world due to different cultural politics and diverse economies, it becomes quite clear that it is important to always scale back the extension of large digital archives of historical records, even when their visual forms are meant to stress the multiplicity of their holdings. Thus, even

when facing enormous assets, we must remember that they represent only microscopic portions of the existing artifacts. According to theorist and digital humanities pioneer Lev Manovich, despite the Web promises to enlarge our imagery about past, in a way it reproduces the same selectivity occurring in analog circumstances. He warns that **“islands of digitized historical contents are constantly growing. But will they ever be big enough to let us understand the *ocean* [..]?”**⁷ Despite that, finding innovative and effective ways to represent, navigate, and understand such fragments of memory represents a major challenge for digital historians, because their quantity already challenges human understanding.

Manovich is one of the leading scholars to have focused on using computational and visualization techniques to analyze giant cultural data sets.⁸ The approach he developed, known as Cultural Analytics, aims at representing culture by data, creating tools and methods for processing large-scale corpora of images. Thanks to the use of parameters designed for identifying visual information within images, features such as color, shape, structure, orientation, and texture can be classified and sorted, allowing examinations and comparisons on a scale and with an immediacy unthinkable by using analog means. In several research projects conducted by the Cultural Analytics Lab led by Manovich himself, large-scale assets of images are distributed in bidimensional spaces of which the axes or coordinates measure two or more visual characteristics. These spatial arrangements enable viewers to discover and acquire knowledge about historical developments, cultural patterns, thematic clusters, or aesthetic anomalies within the images visualized, with no need of textual information to facilitate the comprehension. As stated by Johanna Drucker, **“Paradoxically, the primary effect of visual forms of knowledge production in any medium [...] is to mask the very fact of their visibility, to render invisible the very means through which they function as argument.”**⁹ In Cultural Analytics projects, the visual characteristics examined as well as the sequences and the dimensional and spatial relationships between the items become the syntax of a language which is not translatable in textual or numeric forms. By choosing different visualization parameters—for instance passing from axis X=brightness and axis Y=saturation, to axis X=time and axis Y=author—the arrangement of the images automatically changes, allowing different understandings and interpretations about collections. Thanks to the versatility and effectiveness of such methods, both the technological and graphic solutions used to shape them have largely inspired other scholars to design systems for visualizing huge agglomerates of visual cultural sources in fluid ways.

One of such projects is certainly *Public Domain Visualization*, a platform released by The New York Public Library to gather and visualize its over 187.000 digital items in public domain. They are shown through four visualizations that display extremely small thumbnails of the images one next to another, without separations between them, as pieces of a mosaic. Together they form a cascade of images can be sorted in four different orders; each of them corresponds to a specific manner of classifying the items, according respectively to: The century in which they have been created; their genre; the collection to which they belong; and the main color that composes their image. By choosing an organizational criterium rather than another, the images move and change arrangement. Whereas the first three options are based metadata about content, the latter one focuses on chromatic reading as an innovative way to arrange and explore the collection. With no doubts, the four possible arrangements enable users to picture the scope of the collection, as well as to acknowledge generic characteristics of the library's holdings at a glimpse. But though apparently fluid, the visualization system seems quite rigid in terms of the understanding gained. A combination of two or more criteria would allow to discover much deeper information about the gathering: Associating chromatic recognition and chronological order for instance, could show trends and patterns throughout time. Instead, displaying the collection by colors only shows how many items with a certain prevalent pigment are included in the collection. Moreover, despite the impressive visual impact of the visualizations, it is hard to browse the content they display. The thumbnails cannot be zoomed, and the only way to discover what items they conceal is to hover them one by one to see a larger preview with a caption, and then to click on them and get redirected to the source page, leaving the visualization. In this way, the project is quite uncomfortable as an explorative tool.

A more flexible system is the one behind *Past Visions*, a research prototype published online by VIKUS – Visualizing Cultural Collections (*Visualisierung kultureller Sammlungen*, a research theme at the University of Applied Sciences Potsdam, Germany that develops new forms of GUI for supporting the examination of digitized collections). The website displays three interactive visualizations of a collection of drawings penned by Frederick William IV of Prussia. The sketches, lightly drawn on bright paper, are immersed in a black space that enhances their visibility. Apart from their artistic value, the high-resolution images offer the unique point of view of the author on the historical events he lived, ranging from war to revolutions, and on literature protagonists of his time.^{PAST VISIONS} The visualizations, namely

timeline, t-SNE, and grid, are organized in two dimensions. They all reveal thematic and historical connections between the sketches. A series of keywords related to prominent topics in the drawings, written diagonally on the top of the page, provide contextualization and help users to orientate within the agglomerate; by clicking on each of them, only the content linked to the chosen tag remains completely visible while the other ones become darker, narrowing down the selection of drawings. On the timeline, items are distributed on charts that horizontally span across time, supplemented by historical information. To each year from 1795 to 1861 corresponds one column containing all the sketches created at that time. Thus, the height of the columns varies according to the King's artistic productivity. Moving from timeline to t-SNE, all the agglomerate animates, with all the items moving from their position and re-distributing according to the new criterium. This one is based on t-distributed stochastic neighbor embedding (t-SNE), a machine learning algorithm that allows the visualization of high-dimensional data in a low-dimensional space. Each item is modelled by a two or three-dimensional point, so that similar items are located in nearby positions and dissimilar items are more placed more distant.^{t-SNE, WIKIPEDIA} In this way, clusters concerning content, form or technique are immediately recognizable, as well as it easy to identify more isolated cases. The grid visualization instead is apparently an ordered version of the t-SNE, where items are placed in similar way but forced into a grid constructed into a circle. The problem about these two visualizations is that the principles behind them are not declared, and the user is given no information to understand the how they function.

Despite their limits, the latter two platform discussed reveal the trend to experiment with visual forms of searching, a trend that will probably increasingly impact the way we browse archives and understand cultural objects. This tendency is well confirmed by *Arts & Culture Experiments*, a meta-platform of *Google Arts & Culture* created to present its cutting-edge web design prototypes “**at the crossroads of art and technology**”¹⁰, that aim to make users experiencing cultural heritage through experimental modes of navigation. With the open access to the all the collections shared by partner institutions, Google's designers and creative coders are creating algorithms able to reading the artifacts and automatically tagging them with metadata that describe their form and content: Such methods allow the analysis of visual features such as color and brightness, but also to identify and examine the entity of subjects with no intervention of human eye. The resulting high-resolution descriptions of the images—including also all the information provided by archives and

museums about artists, titles, dates, media, and so forth—transform them in smart objects that can be searched, arranged, and combined in multiple ways. For this reason Manovich has described the platform as the most fluid interface among sites dedicated to navigation of massive collections.¹¹ The website’s minimalist visual identity is based on white text composed in a monospaced font and a black background, clearly suggesting a link to the aesthetics of programming language, as well as a prelude to the immersive spaces characterizing some of the projects showcased. One of the prototypes, called *X Degrees of Separation*, presents a an exploratory visualization aiming to reveal the hidden paths within visual culture. By analyzing the visual features of artworks, machine learning techniques allow to find visual pathways between any two images. Users can pick whatever two images from the collections, and the algorithm connects them with a chain of other artifacts in between, that should gradually show the passage from the visual characteristics of the first image chosen to the features of the other one. The unexpected connections and surprising combinations deriving from the process, especially when the two selected images are extremely different from one another, put diversity and serendipity at the core of the experiment, in which famous artworks are mixed and related with the images of unknown artists and mundane objects. More immersive experiences can be found in other prototypes that introduce an impressive, innovative way to explore collections of visual records: The free exploration of artifacts floating in 3D, blank spaces. One of them is *Curator Table*, in which artworks are placed in a grey 3D landscape where they are arranged in groups and “families” close or distant to each other according to their respective collection, author, year, media, and style assigned with metadata. Another one, *t-SNE Map*, looks similar but no metadata is used: The images are distributed in the same space but arranged according the same image algorithm used in Google Search for tracking visual similarities. In both cases, the interactive virtual spaces can be browsed and zoomed from any angle and scale, enabling visitors to get lost between archipelagos of floating images as well as to discover patterns and connections among the vast inventory. The most engaging virtual experience is therefore the one of the *Free Fall* prototype. Here, artworks are suspended in a black 3D space resembling the cosmos. The vastness and diversity of the visualized collections leave the user amazed to browse the four different visualizations available. The first one is called *Big Bang* and starts with an animation of the *Figurine from Berekhath Ram* (233000 BCE) literally exploding in thousands of other images, generating a cosmos of artifacts arranged haphazardly. Also here,

guidelines and curated arrangements are replaced by serendipity and randomness. Among the main benefits of such approach is of course the increased possibility to make new discoveries and encounters with artifacts usually less-known or considered of minor importance, as well as the overcoming of the traditionally linear vision of time. Yet this interface does not add any precise information to the collection, providing no tool for tracing connections or understanding groups of objects. Paradoxically, though the artifact appear as a galaxy of images, it is hard to understand what kind of relationship is linking or separating one from another. The same applies to the second and third visualizations, *Sphere* and *Waves*. Whether the former reorganizes images on a bidimensional, spheric surface that facilitates orientation and reading, the latter rearranges them on animated waves whose movement makes them looking impressive, but extremely uncomfortable to browse. Funnily enough, the most useful visualization is probably the simplest: *Timeline*. The fourth option presented is indeed the only one that directly creates the knowledge it drafts by letting us discovering the distribution of the artworks across time, or the predominant coverage of certain periods over other ones; by inserting keywords, it is also possible to visualize groups works made by a specific artist, in a given country, or belonging to a certain movement, arranged in chronological order. All these prototypes show how non-linear, fluid web interfaces can augment the experience of browsing large-scale archives in ways impossible to reproduce in physical or print media. They can generate multiple perspectives on historical materials, challenging conventional formats based on lists or rigid grids. But whereas fluidity of form and serendipity of discoveries are what makes them interesting to navigate, the other side of the coin is the impossibility to record the paths, choices, and selections we make while navigating them. How to find again an artwork that caught our attention 5 minutes ago, on the other side of this archipelagos of records? How to balance immersive experience and visualizations that make us learning through their form? Till now, the interfaces of such initiatives seem more focused on impressing visitors rather than on providing them really usable tools for getting oriented within huge-scale historical collections. This type of experiments require ways to visually explain the principles underlying the arrangement of images in the space, so that users can acquire knowledge while moving through them. The next main challenge within 3D exploratory navigation should be converting fluid visualizations in real search engines, where the users' researches and findings, or even all their actions and movements literally constantly re-model the agglomerates in meaningful ways.

2.3 ANIMATED TIMELINES

“A timeline, with its single, linear, homogeneous directional flow, expresses a model of temporality consistent with empirical sciences. But humanistic documents embody many alternative versions of temporality.”¹²

Chronology and geography have long been considered as **“the two eyes of history”¹³**. But whether cartography experienced a great, constant development through the centuries, graphical representations of chronological sequences of events have not changed that much from the end of 18th century. As a matter of fact, the language of contemporary chronology is still constructed on the same basic principles that characterized what we can consider the first modern timeline, the famous *A New Chart of History*, designed in 1769 by Joseph Priestley. The innovations brought by digital technology to the format of timeline concern more than anything else enhanced capacity and flexibility. As we have seen in *Thngs*, *Public Domain Visualization*, *Past Visions*, and *Arts & Culture Experiments*, vast datasets can not only be automatically visualized in chronological order, but their elements and sequences can vary according to different inputs, such as the organization in categories or sections, or the presence of a internal search engine that allows to selecting specific content. Moreover, whereas analog forms of chronology require big surfaces and extreme syntheses, digital timelines allow instead to condense huge quantities of information in dynamic, zoomable spaces that can animate, expand and shrink, or constantly change time scale. For these reasons, timelines are ubiquitous in digital history projects, where they are often combined with other kinds of visualizations, or even serve as mere indexes. But the number of online projects that solely rely on timelines is still not so great, probably because innovating the functions of this medium is not an easy challenge. It means less to redesign their structures than to imagine dynamic modalities through which to make data converge into them, and productive ways to browse the items they display. This territory seems still to be explored, and leaves space for several questions—e.g. how to represent the connection between events beyond their mere sequence? How to overcome timelines’ rigid grid? In certain cases,

projects especially based on experimental uses of this format aim at expanding the functions of the timeline and enhancing the ways we can interact with them.

Histogramy for example, is a project that uses an algorithm for identifying and extrapolating historical events from Wikipedia's immense database. Historical events are mapped in an interactive timeline encompassing 14 billion years, from the Big Bang to 2015. Updates are automatic: Each new historical article appearing on the online encyclopedia is added to the website. The timeline is composed of thousands tiny black dots on a pink background. Each dot represents a historical event, and all together they span horizontally throughout time, showing an increasing quantity and density as they approach the present. Scrolling the chart horizontally is not allowed, but thanks to a cursor in the lower space of the web page it is possible to select the time span to visualize; each time users move the cursor, new events come flying in and automatically arrange themselves in the new time frame selected. By clicking on whatever dot, an internal window opens up showing content embedded from the respective Wikipedia page, plus one video from YouTube, an image from Google, and links to related events. The materials are reassembled on the window whose layout is designed according project's visual identity, based on the combination of the typeface Bodoni used on titles and Lato for all the other texts. On the left of the screen, a dark grey sidebar displays a list of 13 selectable thematic categories that filter contents, allowing more targeted research. By clicking on a small green square located on the upper left corner of the frame containing the timeline, the background becomes green and the dots rearrange on a spiral timeline, showing only a curated selection of very significant historical events. But despite the project's potential, using the website is not so comfortable as it might be. One of the main problems is the overabundance of animated elements conceived to enrich the interactive experience, but that rather make navigation harder: Redundant, repetitive soundtrack and sound effects, as well as decorative, continuous animations that can make the user annoying after a short while. Instead of being composed by numbers, the constantly changing timespan is written in big letters composed in capslock Bodoni font, forcing large numbers such as to be read on three or even four lines, depending on the page size. Such choices of course complicate the understanding of the range of years we are examining. Furthermore, the major difficulty is to orientate within the messy, constantly moving dots that correspond to the events; also here, retracing a topic that previously caught our interest it is very difficult task.

A more successful example of interactive timeline can be found *The Museum of the World*, a microsite developed by The British Museum with the technological support of Google. This interactive experience allows to explore a curated selection from the museum's collection, including fascinating objects from prehistory to the present. The website's visual system has its own original identity (neither directly linked to the artifacts nor to other visual communications of the British Museum), based on the combination of the dark grey background and five bright colors, namely yellow, orange, green, blue, and purple, used for distinguishing different origins of the content displayed. The records are shown on an interactive 3D timeline using the most advanced Web Graphics Library technology now available. Instead of sliding horizontally as usual, the timeline follows a central perspective—perhaps resembling the interface of the video game *Guitar Hero*—where more recently created artifacts are placed in the foreground and older ones in the background. Floating in the grey empty space, the items are represented by dots, whose horizontal distribution, together with color, refers to the continent of origin. Moving across time and space, visitors can learn when and where the objects come from, and how they are connected to each other. Choosing a theme among the five listed (Art and design; Living and dying; Power and Identity; Religion and belief; Trade and conflict) allows instead to focus on a specific type of artifacts, as well as to compare themes and continents. Clicking on the dots, popups with detailed information appear, providing reproductions of the artworks, embedded maps showing their original provenance, and relative audio comments containing insights shared by the curators. The navigation is also enriched by sound effects simulating the touch of wind chimes when hovering the dots, a detail that could be seen as a mere decorative element, but that actually adds an interesting illusion of physicality which makes user experience more engaging. The project surely enhances the understanding of the stories behind the cultural heritage it displays, not because of its interactivity, but especially because the temporal dimension intertwines with the geographic one. The contextualization provided by the enhanced overlap with cartography is indeed the major innovation that characterizes the design of chronology in digital environments, finally overcoming the limited model of temporality inherited by the timeline.

2.4 TEMPORAL CARTOGRAPHIES

“[...] there is a trend towards an increased emphasis on spatialisation of digital environments for historical information.”¹⁴

Every event, character, or artifact has geographic connotations: locations, origins, destinations, movements, expansions, migrations, and so forth. Together with the visual turn, digital technology has dramatically fostered the overlap between time and space in representations of historical information. As web mapping platforms such as Google Maps or CartoDB started circulating and developing, their potential for displaying and even discovering historical information began to be exploited by scholars. As cultural and social historian Stephen Robertson noticed, **“In the last decade, the development of the geospatial web has made mapping available and accessible to digital historians, with web mashups allowing maps to be created and iterated with unprecedented ease. [...] With these tools, historians explored a range of questions and topics: urban development, housing, ghettos, moviegoing, language use, sound, industries ranging from iron to cutlery, events such as bombing, military recruitment, the slave trade, slave revolts, and gaining freedom from slavery, the spread of disease, witchcraft accusations, feminist activism, and the circulation of correspondence.”¹⁵** Indeed, any kind of data can be placed in Geographic Information Systems (GIS), pushing historians to adopt spatial solutions for presenting and narrating stories. Overlaying temporal and spatial data on the same map means that we are able to visualize not only the geography of events, but also their non-linearity. Whether historians rediscovered the importance of space and place during the 1970s in what has been defined as the spatial turn in the humanities, it is only with the Digital Revolution that mapping started to permeate historical practice at a widespread level. Digital maps are extensions of traditional maps. They are dynamic visual systems that augment, multiply, and expand the functions of conventional cartography. Today, digital mapping represents one of the most common activities of digital historians, characterizing the field to such an extension to be one of the practices that most clearly distinguishes Digital History within the Digital Humanities.¹⁶

The unique type of comprehension derived from reading digital temporal maps make them crucial for several purposes. First of all, understanding the complexity of political

history, of which cartography has always been the main visual tool, had never been as easy and rewarding as it is now. Political maps show boundaries between states at a given moment, but usually they have a great limitation – they do not represent the change and development of such borders throughout time. This task becomes incredibly simple with digital mapping, where the dimension of time can be added to the spatial one. In this way the interactive maps not only show the dynamics of borders, but also include the ones of battles and wars, the development of cities and geographic discoveries.

This is the case of *Running Reality*, an online map aiming to explore the history of human civilization from 3000 BCE to the present day through the comparison of political borders across time. The initiative consists of a website and a series of downloadable apps. Data coming from thousand different historical maps have been converged on the same interactive map, so that all the political changes in any geographic area and in any time can be visualized. By moving the cursor on the timeline on the top of the screen, the borders on the map change according to the selected year, month, and day, showing the political borders of that time, including names and presence of cities, kingdoms, or nations. By clicking on a city's name, its history is summed up through the list of political entities that ruled it across time; the visitor can also discover when the town was founded, which historical events determined its political status, and much more information. Despite the great usefulness of the project from the content point of view, the access to the content is conditioned due to poor design decisions showing the lack of attention to issues concerning visual communication. First of all, the decision of using a default physical map as background makes the animated borders less legible, due to all the colors shades and details that overlap with them. Moreover, since each state has its own borders and name in a different color, the many colors used in the map have different degrees of brightness that make their legibility different from one to another. Zooming out, the font size of the nations' names remains as big as in closer distances, causing a messy overlap of multicolor writings, one above the other. The few other graphic elements in addition to the map seem disjointed, especially in terms of color: Each of them has different color combinations, resulting in a chaotic interface that lacks identity and uncomplicated access to the contents of the website.

Another major function of digital mapping is to locate events, characters, or cultural items. The online project *ToposText* is one of the most successful examples in this sense. It indexes ancient Greek and Latin texts and mapped places that have been significant in

Greece's history and mythology, ranging from ancient cities to medieval castles, from modern museums to archaeological sites.^{TOPOSTEXT} It displays a customized Google map where more than 5000 sites converge together with over 500 classical texts that are distributed across space according to the place where they have been written, or the places they mention or describe. Contrary to the previous project, *ToposText* is supported by a simple yet clear information hierarchy and icons that helps orientating within the website, and by a recognizable visual style that makes all the elements coherent with each other. The color palette is mostly composed of different shades of brown associating to nature. Apart from the light blue waters, all the other colors in the map have been modified in order to fit with the project's identity. The whole land has been colored in very light grey, showing only current streets, national borders, and city names, that also allow to locate historic sites and towns that do not exist anymore. Dots on the map indicate places, displaying a number standing for the amount of mapped sites included in that macro geographic area; by clicking on one them, the map automatically zooms in and the dot multiplies in different dots that cover more precise areas; the process continues until the user arrives to the specific single sites, whose category is identified by orange icons representing their typology. Once a site is selected, users get redirected to the respective index of literary quotes in which the location appears, written in Greek or Latin and all translated in English. The texts they belong to are full accessible on dedicated pages where a smaller version of the map appears, enabling new research. Accessing the index through the map makes the whole experience a visual and spatial exploration, helping to orientate within Greek history and ancient literature in a novel way. But paradoxically, what is missing in a tool for orienting throughout time: No timeline has been added to the project.

Besides these initiatives committed to facilitate access to cultural corpora, digital mapping can be employed also for exploratory research. For instance, digital historians use it to trace the scope and dynamics of migratory flows, the connection and the separation between different cities, civilizations, or characters through history, as well as to discover historical patterns, clusters, and anomalies within different cultures. Regardless of themes or intents, what motivates most of this kind of projects is the will to make discoveries and at the same time to illustrate the arguments derived from it. The interactive project *Mapping Occupation* produced by the University of Georgia introduces the facts about the United States Army's presence and movements in the regions it occupied in the South during the

1870s. The history and geography of such events are presented in two different ways. A spatial narrative guides visitors in the chronological stages of the Reconstruction period, while an exploratory map allows to freely construct their own narrative paths within the data curated by the authors. Describing the project, Stephen Robertson has pointed out that whether some icons can be clicked to show more information, **the maps are limited to illustrating a particular argument.**¹⁷ Examining the project's visual identity, it is quite clear that there is no direct link between content and form. Despite the clarity of the visual vocabulary of the mappings, well explained in the legends on the right side of the screen, the aesthetics of the maps extremely arid, cold, anonymous. The data is well differentiated: Different colored backgrounds are used for presenting the information concerning states or citizens; textures trace zones of occupation; and black dots sign the position of troops, whose size indicates their number of soldiers, and whose stroke-color stands for their typology. A black sidebar on the left presents the menu, the index of the chapters (each of which including a different interactive map about a single stage of the occupation), and white texts that describe the mappings. By scrolling the sidebar, the textual narration goes on from one chapter to another, and the maps change subsequently. Only one small-size photograph or illustration is shown in each chapter, and no other visual reference related to the topic has been included. Despite the argumentative and narrative goals of the project, such choices, together with the extremely dry look of the website and the complexity of maps whose comprehension is not immediate, the resulting online publication seems to address other scholars rather than a wider audience of non-experts.

The complexity of maps is often connected to the number of different layers of information gathered on the same space. Reducing it in favor of clarity implies loose of information but also enhanced comprehensibility and impact. It also makes it easier to animate the mapped data through time. Indeed, the very meaning of temporal cartography should be cartography augmented by the dimension of time. Many projects are based on this concept, and the most effective animated temporal maps usually display a single layer of information of which understanding is very intuitive, for instance using animations that show the increase of world population or the paths of migratory flows throughout time. Yet, at the present day, the such practices are usually published as videos rather than as interactive formats.

SUM UP

Whereas digital archives and online exhibitions are mostly meant to gather, organize, and present contents, more spatialized arrangements of large-scale cultural heritage corpora or complex historical data can generate meaning through their forms themselves. The three most common spatial forms identified among digital history projects are:

1. Fluid agglomerates – Interactive visualizations in which the items of a given corpus of records are tagged with metadata and arranged in 2D or 3D spaces whose axes measure specific features. By modifying the arrangement criteria, the items change their position in the space according to the new parameters and the agglomerate takes a new form.

2. Animated timelines, in which the same methodological principles of fluid agglomerates is applied to sequential representations of time.

3. Temporal cartographies – Mappings of historical events, characters, sites, or records based on georeferenced spaces, that can eventually be augmented by the dimension of time.

But even though such representations display meaningful information, it cannot be taken for granted that they also produce knowledge. Transforming them into online environments capable to communicate the information they draft and to be effectively used by a wide audience requires also visual communication design choices aimed at opening their forms to interpretation. Intuitive interfaces, clear information architectures and accurate instructions are necessary to allow users to navigate into the visualizations, while appropriate, coherent visual identities can help contextualizing contents, enhancing attractiveness, and encouraging use.

PART 3

OPEN MEANS

FROM INTERACTION TO PARTICIPATION

“At least potentially, digital media transform the traditional, one-way reader/writer, producer/consumer relationship. Public historians, in particular, have long sought for ways to “share authority” with their audiences; the web offers an ideal medium for that sharing and collaboration.”⁰

3.1 INTERACTIVE DOCUMENTARIES

“What identifies these kinds of experimental interactive narrative works is that rather than being designed for greatest *usability* in terms of facilitating free-flowing information access, they require investigative user participation and navigation.”¹

Interactivity is inseparable and intrinsic to digital media. Whereas nonlinear consumption is possible also by using older media (e.g. jumping randomly from one spread to another in a book, or watching a VHS cassette in an scattered order), print and video formats are naturally based on sequentiality. Browsing content on the Web World Wide is instead always a fragmented experience, in which the interaction with different hyperlinks—references to data that can be followed by clicking, tapping, or hovering them—defines nonlinear paths of reading. It is therefore quite hard to picture websites in their entirety: Most of the time we are browsing only small portions of them, focusing on the information that captures our interest at the moment and ignoring the entire structure, which can be constantly updated and expanded. In addition to that, even when sitemaps are provided to help users getting oriented, the number of possible paths within a website can exceed our understanding. For these reasons, it is especially around the concept of hypertext (text documents interconnected by hyperlinks) that most of the earliest history websites were conceived, with the intention of disrupting traditional historians’ obsession with chronological sequence. According to George Landow, a pioneer in media criticism and theory, **“Hypertext emphasizes that the marginal has as much to offer as the central by refusing to grant centrality to anything [...]. In hypertext, centrality, like beauty and relevance, resides in the eye of the beholder.”**² That explains why digital media allow and encourage historians to build nonlinear narratives and platforms enabling multiple perspectives.

Currently, interactive formats for narrating history are rather enhanced by hypermedia—the extension of the concept of hypertext applied to multimedia content—and are often conceived as immersive environments that should engage spectators. This could be defined as an approach to historical narration as entertainment, a quite common tendency among interactive documentaries. Such projects can be seen as extensions of traditional

documentary films in which videos, animations, visual and audio records are supplemented by a series of interactive features. They can concern the possibility of selecting material to browse, jumping from one section to another, moving through maps and infographics, or opening pop-ups with captions or more information. But despite all these actions can potentially augment the user experience, often the main narration flows linearly and independently of them, making interactivity a purely accessory function. As warned by Paul Arthur, **“There is no doubt that while interactivity can encourage engagement and learning, it can also become an end in itself, where the activity eclipses the goal of using the technology.”**³ Interactive documentaries are probably among the digital history works that most embody the risk of falling into the technology trap—that is, the one of adorning projects with a digital patina that, however, does not really add value to their contents. Most of them can be described as rich media—interactive, multimedia formats that include advanced features conceived for impressing and engaging viewers. But the spectacularization of interactivity is condemned to exhaust its own attractiveness very fast: As soon as the new interaction features introduced become normalized, they cease to be impressive.

The other side of the coin of this entertaining approach is a greater commitment to involve the audience through visual means. Compared to other kinds of online history projects, web documentaries often present much more curated visual identities and greater attention to graphic and information design. In *The Fallen of World War II*, an interactive documentary created by American designer Neil Halloran, data visualization is the absolute protagonist. The project is based on cinematic visualizations of quantitative data about the victims of World War II, supported by the narrating voice of the author. The initiative can be considered a narrative experiment at the intersection between data visualization and documentary film. Self-titled “data documentary”, it is in fact a data-driven storytelling that analyzes the cost of human lives during the war. The animation follows a chronological path, but in two moments it allows to make pauses to explore and confront data. The animated visualization starts with a narrated explanation of its visual language, clearly inherited by Isotype, which is based on a black background where small icons of human figures are employed as units to count victims. Depending on the presence or absence of a rifle on the icons, each of them stands for 1000 soldiers or civilians killed, while their fill color changes according to nationality. The story begins with the numbers of American soldiers who have lost their lives, and goes on depicting the European theatre, dividing victims between each

nation that is gradually involved in the conflict. The framing moves and zooms in and out very frequently, in order to combine information about a specific country or moment with the full picture of the occurrences. The drama grows up in a *crescendo* leaving the viewer bewildered, and the climax is picked when the victims of Eastern front, and particularly of the Soviet Union, are presented through the wearing animation of a red human icons forming a bar that goes up endlessly, counting 20 million people killed. The victims of the Holocaust are yet to come, presented through a grid composed of over 6000 human icons that, while zooming out, take form in a light blue star of David. Only supported by few historical photographs, the project incredibly succeeds in the hard challenge of creating a deep emotional impact by mainly using bar charts and timelines. *The Fallen of World War II* remains an isolated case to successfully mixing data visualization with documentary filmmaking, historical commentary and argumentation. It shows a very inspiring, possible direction that the popularization of history through digital means might take. Besides this, it must be noticed that interactivity plays a superfluous role in experiencing the website. The marginal space given to interactive moments raises questions about their usefulness and actual sense: Could not they be employed much more and in much more fruitful ways, for instance enabling users to freely interrupt the narration flows and constantly play with the data visualizations they are facing? As a matter of fact, the home page of the website provides two options: *Interactive* and *Video*. And frankly, by choosing the second version neither the impactful narrative nor the value of the whole work are compromised.

A much greater use of interaction can be found in *Warsaw Rising 1944*, certainly one of the best examples to illustrate both the benefits and the limits of interactive historical documentaries. This website, conceived by the Warsaw Uprising Museum, is a summary of the homonym exhibition held in the Topography of Terror history museum in Berlin. It showcases the history of Warsaw split into 10 chapters, covering different historical periods in chronological order. The narration starts from 1918, when the city was living a vibrant cultural and economical ferment, later drastically interrupted by the outbreak of World War II, but the main focus is about the 63 days of the 1944 uprising, in which Warsaw and Poland fought for their freedom. Each chapter is filled with rare multimedia content, ranging from photographs and posters to audio and video recordings. It also includes brief biographies of key characters, as well as animated infographics and maps. Coherently with interactive documentaries' tendency to develop very elaborate and characterizing graphic designs, the

strong visual identity of the project pervades every detail in the website. All the images and videos are in black and white with few exceptions, and the interface itself is based on a dark grey background and only two more colors for texts and graphic elements: White and beige. This chromatic choices contribute to creating a gloomy atmosphere aimed at emphasizing the drama; in some specific sections, maps, or infographics also other dim colors are used, contributing to the overall impression. The texts, all set in Avenir typeface, are most of the time centered, with the very big, bold caps lock titles of the chapters reminding of movie titles. Vintage animations with countdown numbers and old film effects introduce each chapter while the new material is loading. This cinematographic approach is also evident in the structure of the website itself: Videos and the other visual materials occupy almost full screen, while dark grey horizontal bands cut thin portions on the top and bottom of the page, framing the visuals. Besides the possibility to watch the documentary in its standard sequence by scrolling the page, it is interesting to notice the constant presence of an index on the bottom band, which grounds users in where they are in the story, and allows them navigate in the sections. By clicking on the menu icon, a special timeline in circular form pops up. Years are distributed radially, while the time span related to the different chapters is shown by highlighting portions of the circles. Alternating with the videos and the photographic galleries, animated maps and data visualizations decorated by cropped photographic elements enrich the comprehension of the conflict. The good balance between the narrated parts and moments dedicated to free exploration of the diverse media content creates an interactive experience able to reach a great level of intimacy and depth, transporting the viewer into the story. But unfortunately, browsing the documentary is quite intricate, and passing from one section to another is not that immediate. Indeed, the time necessary to load the contents of each chapter and the impossibility to skip all the automatic animations of titles, visual materials, and other graphic elements appearing on the screen require a lot of patience. Whereas such decorative animations support the highly filmic visual language of the project, they do not help users willing to explore the website in non-sequential ways. Moreover, all the media content shown is not downloadable, neither browsable outside of the “walls” of the website. The complex, rich media environment of the website corresponds to its lack of flexibility.

Similar potentials and limits can be found in *A global guide to the first world war*, **“an ambitious multilingual interactive documentary that seeks to take explanatory**

journalism to a new level by combining techniques from documentary film, sound design, interactive design and data mapping.”⁴ This work produced by The Guardian enables an unprecedented insight into the complexity of the World War I, here explained through the perspectives of 10 historians from different countries that intertwine within the narration. Its seven video chapters chronicle the course of the war through incredible, rarely-seen silent footage. Information about military and diplomatic strategy is balanced with much more emotional and accessible details on cultural and social aspects, as well as with stories of people who lived that global tragedy. Between one section and another, the videos are interrupted by an interactive world map showing the development of the Great War across time, supplemented by soundtrack linking the interactive parts to the filmic ones. It is possible to explore the relief map to discover step-by-step when, why, how, and allying with whom each empire or country joined the conflict; to understand how the numerous fronts around different corners of the globe contributed to shaping the outcome of the war; or to see how borders changed after the end of the war. Apart from the videos and the map, also original news reports, data visualizations, and more than 2 hours of audio records with the contribution of the historians are available. The project has been designed using an essential, non-invasive visual language that coherently dialogues with the vintage footage. Colors are employed only to highlight countries or areas of battles on the black and white relief map, while a grey band on the bottom works as an index to move through the chapters. Also in this case, no media is reproducible outside the project, yet navigation is simpler, faster, and the separation between videos and interactive sections is neat. Despite this, the interactions are almost always limited to the free navigation through chapters and sections, and to the selection of specific content to deepen the knowledge, making the role played by users resulting essentially passive.

The contradictory nature of interactive documentaries lies in the ambiguous role they assign to their audiences: Are they considered as participants or as mere spectators? Should they actively intervene in the process, or simply enjoy the show? Problems come when none of these behaviors is fully possible. Most web documentaries tend to offer media content to be consumed through interactions that do not produce or alter any content. But if interactions are not enough significant to impact the course of the narration or to dig the information deeper, interactivity itself becomes not more than the end in itself.

3.2 SOCIAL MEDIA SIMULATIONS

“Can we build a “Google Maps” of the past? Can we make a “Facebook” of the Middle Ages? So, can we build time machines?”⁵

Since 2012, the École Polytechnique Fédérale de Lausanne (EPFL) and the Ca’ Foscari University of Venice embarked on an epochal enterprise that in the best case should bring digital history work to an unseen level. The *Venice Time Machine* has an ambition to reconstruct the history of Venice through the digitization of some 80 kilometers of shelves filled with documents covering more than a thousand years of the city. Due to the highly efficient bureaucratic machine behind the Most Serene Republic of Venice, the Venice State Archive (*Archivio di Stato di Venezia*) has collected an unbelievable amount of data concerning life in the city over centuries. It includes cadastres, censuses, bank accounts, as well as reports about urban plans, architectural projects, commercial activities, and maritime movements, not to mention records documenting the private lives of citizens, immigrants, and travellers. Started in 2015, the digitization plan directed by Swiss computer scientist and professor of Digital Humanities Frédéric Kaplan has till now achieved the scanning of over two million images guarded in the state archive and other major Venetian libraries and foundations, ranging from administrative documents to books and photographs.⁶ The team is now planning to open the access of all the cultural heritage to the public via three search engines that would allow users to browse different types of documents, extremely rich in terms of resolution and metadata. Kaplan has described the project stressing how, once digitized and annotated, all the data could be used to create a digital reconstruction of the development and life of the former capital across time, a sort of virtual model that would allow to explore Venice during the timespan of the millenium covered. What he calls “an information time machine”, that is, an artificial intelligence system capable of processing historical big data, would be able to reply to questions such as **“Who lived in this palazzo in 1323? How much cost a sea bream at the Rialto market in 1434? What was the salary of a Murano glass worker in 1544?”**⁷ In order to explain the concept behind the initiative, he uses the example of social networks, which may constitute information time machines

themselves: They register and organize records in various forms and media; these contain different types of data, ranging from temporal to spatial information, or describing contents and identities; moreover, social networks trace movements, communications, reactions, and relationships between people, informal groups, organizations, and institutions. But most of all, they witness the cultures of people using them. As a matter of fact, many scholars including Lev Manovich have understood the enormous potential of social media as means for studying the complexity of contemporary cultures, providing quantities of data and a degree of accuracy that are simply unimaginable for digital humanists studying the past.

It is probably for this reason that, despite the *Venice Time Machine* is still a work in progress, the idea of applying the way social media work to the presentation of historical information started to spread: Their form perfectly embodies public historians' will to build pluralistic narrations that take into account the intertwining or parallel perspectives of multiple protagonists.

Project 1917 (also known as *1917: Free History*) is a simulated social network that, by emulating the structure and functioning of Facebook, retraces the year of the Russian Revolution. The profiles of prominent historical characters and newspapers of the time populate the platform with daily posts. The network includes more than 300 characters, from political protagonists of the Russian Revolution to cultural figures such as Sergei Eisenstein, Kazimir Malevich, and Vladimir Mayakovsky. Also several international characters contribute to originating the project's incredible plurality of voices. On a daily basis, the simulated profiles post text or multimedia content: Public declarations, letters, diaries, newspapers, photographs, artworks, film clips or audio recordings. All taken from real documents, the contents are posted on the platform on the exact same day of the year in which one century ago they have been created, recorded, or published. The narrative potential of social media is exploited here to reconstruct facts and relationships in a nonlinear way, providing a look at the last century through the lens of present day communication. Users are allowed to like, comment, or share the posts as if they were on Facebook. The project was developed by Yandex Publishing, a branch of Yandex, the largest technology company in Russia, and authored and directed by journalist, writer and filmmaker Mikhail Zygar. The team behind the website is large and diverse, including editors, developers, designers, illustrators, and animators. As introduced, the website structure and functioning resemble the ones of Facebook, but with a timeline on the top which allows to browse a specific day in the

calendar. The rest of the interface is also very similar to Zuckerberg's creature, with a white background and the logo and the names of characters are composed in blue. But other visual features reveal original graphic design choices. The color palette is also based on four different combinations of two bright colors that form gradients: These are used to replace white in the black and white profile pictures of the characters, as well as header backgrounds. Everyday, a new header introduces the homepage with a different combination of colors and cropped duotone images extrapolated from the main events of the day. Apart from headers, the minimalistic, clean design of the platform aims at characterizing the project but influencing navigation as less as possible. A different approach has been chosen for the illustrated videos which interrupt the coherent visual system of the website. All the team has also invested in a practice that is still not so common among digital humanities projects: All the content published on the website has been re-posted also on the project's official pages on Facebook, Instagram, Telegram, and VKontakte. The great diffusion gained due to such redundancy contributed to a large media coverage and reaching out to wide public to an extent that is very rare for digital humanities initiatives.

Surprisingly enough, *Project 1917* has not been the only one digital history re-enactment of the year of the Russian Revolution to be attempted through social media. Russia Today (RT), the international television network funded by the Russian government, has produced another project based on exactly the same idea and ambitions, released in the same period, and even named with a similar title: *#1917LIVE*. The work re-tells the story behind the revolution through posts on Twitter. "Real-time" tweets are daily published by a network of simulated accounts that impersonate over 50 historical characters, both from Russia and elsewhere, with the objective celebrating the 100 years of the Revolution by informing and entertaining the public with an unusual format for narrating the past. It is interesting to notice that neither the creators of *Project 1917* nor the ones *#1917LIVE* have never mentioned each other; no media has talked about both projects, neither anyone has publicly raised questions about such incredible similarities between the two concepts of outcomes. Yet, if one focuses on differences rather than similarities, this strange occurrence offers an interesting opportunity to confront two diverse communication approaches on the same digital history concept. This represents a unique chance for understanding how design choices severely shape digital history works. Whereas the delicate visual identity of *Project 1917* does not connote contents with specific intentional meanings, *#1917LIVE* has chosen

the opposite approach. Every visual choice reflects the will to celebrate the Russian Revolution as a glorious, epic event: An extremely bold, geometric font imitates Cyrillic characters in Latin script. Red is the main color, placed as background on the website, whose main function is actually to redirect to the project's Twitter account. Vector illustrations stand out on the home page, presenting the silhouette of a mass of protesters marching with flags, the profile of the main buildings in Moscow's Red Square, and the heroic figure of a revolutionary, whose facial features inexplicably look like the iconic portrait of Ernesto Che Guevara. And, most of all, the key figures as well as the messages and media content they respectively post suggest one point of view that many times seems to look like a strange mixture of shallowness and propaganda.

What emerges from this comparison is that, despite the same topic and idea, the two projects differ significantly in terms of language, approach, aim, and especially outcome. This difference becomes even more evident in the additional narrative materials created for both websites. In the case of *Project 1917*, the narration through posts is supplemented by animated videos. Despite their cartoonish style, which looks too different and detached from the rest of the project's visual identity, they serve to providing synopses of the historical events spanning across the year 1917. On the other hand, *#1917LIVE* is supported by live action videos with astonishing costumes and scenographies. The major focus in the filmed scenes is not on history itself, but rather on emphasizing the concept behind the initiative and to promoting the project: Historical figures such as Stalin or Kerensky are texting on smartphones to tweet their thoughts about the ongoing revolution. Amusing or grotesque result? The boundary between the two impressions is really blurred. What is sure is that such approach can provoke an initial greater curiosity, but then it easily becomes repetitive and an end in itself. The communication of the other project is perhaps weaker, but definitely more appropriate and durable.

Clearly enough, the two websites are far from being considerable as information time machines. They are rather symbolic, first attempts towards more effective uses of the power and benefits of social media applied to the communication of history. Thought as "**educa-ment**"⁸, something in between being educational tools and an entertainment products, their formats are interesting because of the plural perspectives they manage to gather and present, and for the potential great participation they can encourage. All the content published is in both cases extremely easy to copy, download, and reuse; users can

also like, comment, and share the historical characters' posts on their own accounts contributing to the visibility of the project and thus actively participating in the process of popularization. But even though such interactions are extremely more meaningful and significant than the ones usually provided by interactive documentaries, they also do not exert impact on the content itself, pursuing the conventional simplex communication between historians and the public.

3.3 PLURALIST NARRATIVES

“[...] the Web becomes a place for new forms of collaboration, new modes of debate, and new modes of collecting evidence about the past.”⁹

Communicating history through interactive media is not necessarily an act aimed to the spectacularization of digital technology's features in favour of impressive, top-down narratives. It can also serve the completely opposite purpose of fostering bottom-up contributions and fragmentary perspectives. Such attitude clearly applies the principles of Public History to the means provided by digital technology, and it represent a coherent step in the long progression of thought that, starting in the 19th century, has transformed historians' work **from authoritarian to democratic approaches, from a focus on 'big' history [...] to multiple and partial histories, and from trusted high authority to participant and processor, eventually attuning history to the multiple, fragmentary and deterritorialised world of digital media.**¹⁰

At the dawn of the new millennium, a web project marked a new chapter in the path of digital history. *The September 11 Digital Archive*, asked visitors connected with the 9/11 terrorist attack to actively participate in the making of the online repository. They were invited to submitting their emails, audio messages, sms, photographs and artworks in order to help historians and archivists to gather and preserve the records. On the one hand, the project was an early experiment of collective history-making through the Web; on the other hand, it illustrated how the Web itself can be used as a means for archiving and historicizing the

recent past, confusing the once clear distinction between history and journalism. Once again, the heritage of Public History deeply influenced the work of digital historians, determining the scope and objectives of their online projects. Since then, a growing number of digital public history projects started to exploit the participatory nature of the digital realm. Cohen and Rosenzweig stated that “[...] **interactivity enables multiple forms of historical dialogue—among professionals, between professionals and nonprofessionals, between teachers and students, among students, among people reminiscing about the past—that were possible before but which are not only simpler but potentially richer and more intensive in the digital medium.**”¹¹ Indeed, interaction can be employed as a means for enhancing public awareness concerning historical themes. Common practices include the use of multiple-choice tests, or the aggregation of ordinary people’s contributions. It is important to notice that in all these initiatives, preliminary research and curation of the first contributions to insert is strictly necessary, due to the fact that even the first visitors must have the sensation of being potentially part of something that is already significant in terms of content. Only the presence of already collected interesting sources can push more people to share their contributions. When dealing with user-generated data, experts working on content management and curation are extremely fundamental, as well as are developers and designers for what concerns the forms and modalities chosen for re-presenting it.

A very interesting case study in this sense is *After 6/4*, a project by Australian Special Broadcasting Service (SBS). This interactive journey compares the different historiographies of the 1989 Tiananmen Square Massacre, as it is known in the Western world, or the June Fourth Incident, as it is officially called in China. The website is structured on a single page where users face questions aimed at testing their previous knowledge and position regarding the historical events, through a double-choice test. Two possible answers appear on the two sides of the screen, showing the opposite ways in which Western and Chinese media depicted the protests happened in the People’s Republic of China during that year. By clicking on any of them, the relative section of the screen gets filled with a photographic image of the historical events, while a caps lock quote extrapolated from newspapers or television channels of that time appears, animated as if it were typewritten and composed in a bold, condensed font. The chosen perspective contains also multimedia material can be explored, examined, and then compared with the opposite. Full articles, audio records, photographs and videos show how events have been documented and described at that time in China and in the

West. All the archival material has been translated in English and Chinese, so that full comparison is possible from both sides. Unfortunately it is not downloadable or browsable out of the single-page application—a characteristic that, as we have seen, is quite common among rich media websites. In addition to that, the visual features of the website do not help contextualization nor the legibility of materials: The background, which is composed of different shades of beige forming gradient and sometimes decorated with threshold photographs, is often in conflict with the red titles and the colored images shown, while the use of too many different fonts prevents a coherent typographic style to characterize the project. The strength of *After 6/4* lies in its use of interactivity, conceived as a tool for guiding and organizing digital storytelling, aimed to offer a demonstration of the unique way in which digital media can support historical argumentations based on plurality rather than on a single interpretation. Were the Tiananmen protests part of a spontaneous, students-led movement or the consequence of a conspiracy against the Chinese Communist government? Was the famous Tank Man a courageous rebellious or a lone scoundrel? Rather than imposing one historical truth, the project questions the objectivity of history itself, revealing how in both cases certain elements have been totally ignored, or on the contrary well instrumentalized for political purposes. After experiencing the customized path through the interactive documentary, no conclusion or comment is provided, and the audience is free to decide what to think. The diverse perspectives of the users become thus part of the pluralism promoted by the project itself: The last section is dedicated to the messages of users, distributed on a world map showing the provenance of each contribution. In the end, what emerges from the project is the sharing personal opinions built on experience or through the documentation and the comparison of conflicting claims.

Designing the conditions for people who lived historical events to share their testimonies in innovative ways that could attract public is an increasingly urgent challenge for digital public historians. But conceiving online environments that encourage some users to actively contribute, and that at the same time would represent an interesting narrative format for all the other visitors is not an simple task. The Web is filled with initiatives committed to collecting and sharing the stories of local communities, minorities, and ordinary people, but usually they are based on editorial formats such as the blog or the online magazine. Others employ oral or video interviews, but just a few of them really experiment with digital media. In certain cases, different types of media are mixed on the same platform,

where it is possible to read, listen, watch individual or collective stories, and explore data visualizations.

Quipu Project for instance is a collective memory archive/interactive documentary aimed at shining a light on the sterilization of over 270,000 women and more than 22,000 men in only four years during the 1990s, under the authoritarian government of Alberto Fujimori, in Peru. Nevertheless, the whole project is meant to raise awareness about this scandalous events and ask visitors to take action by making a donation, becoming a volunteer or signing a petition. Therefore, the digital platform acts in this case as a sort of bridge between past events and possible future actions. The information, collected also thanks to voluntary contributions on the project's blog, has been organized in audio chapters and single audio records that have also been transcribed, so that the visitor decide if listening or reading them. The voices of the testimonies form a unique narration, but it can be explored through fragmented paths by clicking on a truly unique interactive diagram. Its shape resembles the one of a *quipu*, a tool used by the Incas and Andean civilizations as a method for recording dates, accounts, and historical events. Thought to have been used for centuries, a *quipu* is made of strings of different colors and several hundred knots all tied in various ways. Its shape has been stylized to be used as the interactive index that shapes the navigation of the web project. On the left side of the screen, 135 black rays branch off the a semicircle; each of them stands for a witness whose memories and thoughts has been recorded, while their length represents the duration of the sound recording they contain. As explained by a legend, the colors of the many dots placed on different parts of the reys stand for the different the topics touched by the witnesses. By clicking on whatever dot, the rays adjust their position, the selected one positions itself in the middle, and the specific voice recording linked to it starts playing. In this way, users can explore the recordings according to their personal interests. The weakness of such index is that despite its originality and fascinating direct link with the project's theme it is very uncomfortable to use. While the topics are represented by colors, there is no tool for identifying the testimonies, so that the exploration of the various recordings is only guided by randomness. In addition to that, the continuous movements of the rays that change their position at each click surely does not help recognizing which recordings have already been listened and which ones not. Thus, despite the premise, the shape of the index is more a decoration than a useful tool.

Another significant digital public history project is a series of self-titled “pluralist archives” mapping the personal stories of witnesses of tragic events occurred in Japan. It includes a single platform for each episode, ranging from the explosion of the two atomic bombs to key battles of WWII, or from earthquakes to tsunamis. The only one providing full translation in English language is the *Hiroshima Archive*, which collects the thoughts of survivors of the American atomic attack that destroyed the city, killing around 140,000 people, mostly civilians, and that would have affected the lives of many other people in the next decades, due to the radiations. The particularity of the whole series is that the testimonies are placed in a 3D world map showing the exact locations of their stories. The map includes three selectable levels: The 1945 street map, the contemporary one, and the satellite view from Google Earth. A huge red ball stands in the middle of the city, representing the epicentre of the explosion. Small circles containing the avatar photographs of the witnesses are distributed on various parts of Hiroshima, linked to their georeferenced locations by thin lines. By clicking on each avatar, popups compare showing written messages, pictures, and even embedded youtube videos documenting public speeches of survivors. All users, even those not involved at all with the events, are invited to share their thoughts indicating their provenance. Unfortunately, the low resolution of both the map and the photographic avatars impoverishes the experience, and moving through the 3D space is not so easy. But the result is therefore an extremely original, hybrid format for presenting ordinary people’s testimonies. By mixing narration with georeferenced mapping, text and multimedia content, data extrapolated from museum collections and information shared by users, it manages to emotionally involve the visitor due to the collective scope of the story it conveys.

As these projects demonstrate, design firstly and most importantly serves for building a functional user experience, a tool enabling the audience to participate. Here the aesthetical function comes in the second place even though of course is part of a more general discourse regarding designing various projects’ visual identity of which one of the toles is to attract and keep the attention of public. To be effective, these tools for participation have to be prototyped and designed in contact with potential users, and taking accounts with potential user feedback throughout the design process.

SUM UP

In some digital history projects, the fundamental role of interactivity is stressed by emphasizing the participation of users. Such participation vary according to the approach adopted, that can be based on top-down or bottom-up communication, not excluding hybrid formats. Consequently, the role assigned to users by the authors of the project, can range from the most passive one of mere spectators/consumers to the very significant one of actors/collaborators. The three genres of history websites described in this section illustrate the spectrum of these possible approaches:

1. Interactive documentaries are usually among the digital history projects to most symbolize the passivity of interaction when it does not produce any influence, meaning, or content. Due to their close connection with cinema, these works often embody an entertaining approach to history. Whether highly engaging, the risk of such projects is to spectacularize interactivity for its own sake.

1. Social media simulations are still too few to be defined as a genre, yet the projects using the language of social media for narrating historical networks and events reveal a peculiar use of interaction. The content they provide, already set in the form of social media posts, is perfectly ready to be shared by users, and thus to be liked, commented, quoted, copied, and reused. But whether this solution may involve users in the process of popularization of history, it does not directly activate them in producing knowledge.

3. Performative access does not stand for a genre, but rather for the key characteristic of allowing relatively open access to the means of knowledge production. Projects adopting it are based on enabling users to generate historical knowledge by sharing their own experiences, thoughts, or records about historical events. Such hybrid platforms, in between documentaries, archives, and social media, require content curation and the mediation of design as a means for gathering, contextualizing, and presenting users' contributions.

CONCLUSIONS

The projects presented in this thesis, extremely heterogeneous in theme, function and feature, offer an understanding of the different ways in which the Web is currently being used for public dissemination of historical knowledge. Clearly, they represent only a partial section of the landscape of Digital History that is not ment to provide a comprehensive overview of the entire field. By highlighting the relationship between historical popularization purposes and issues concerning visual communication, the research has instead mapped out some of the possible directions in which public historians and designers can virtuously move together in the online space. The three sections in which the work has been organized, namely ***OPEN SOURCES***, ***OPEN FORMS***, and ***OPEN MEANS***, have identified the main benefits that the Web potentially offers to the popularization of history, strictly connected to design:

1. **The rising democratization of historical sources** through their digitization, online sharing, sorting, and contextualization.
2. **The disruption of conventional forms of scholarship** based on linear writing in favour of visual and spatial means of knowledge production.
3. **The enhanced role of users** that participate in the popularization process through interaction.

Yet it is mandatory to scale back the entity and impact of such benefits by remembering that they correspond to the new challenges and limits highlighted by the analysis of the case studies presented:

1. **The so-called democratization of history is highly relative.** Common politics of digital archives often do not include public domain, limiting download, use, and circulation of cultural heritage. Nevertheless, availability alone does not guarantee access: How many people really search and use the historical items gathered and presented in uncomfortable, intricate institutional websites? What is the point in digitizing collections of cultural heritage in low resolution? And who needs millions of historical items if they are not supplemented by proper information, commentary, and contextualization? The emphasis on accessibility rightly stresses the need and will to open history to

the public. But the meaning of online accessibility itself should be questioned: Is it really a matter of quantity? The more artifacts digitized, the more knowledge becomes accessible? Several case studies demonstrate that large-scale online repositories alone do not exhaust the meaning of open access to history. Much narrower digital collections, curated by experts and designed and exhibited with more attention on issues concerning aesthetics, identity, user experience can lead to much greater public engagement, comprehension, and appropriation of historical knowledge. Online access to sources with needs to be balanced with web projects capable to popularize them. This urges approaches to cultural heritage that look at the Web not just as a place for storing materials, but rather as a space for reactivating them.

2. **The use of graphical forms of knowledge production does not necessarily lead to greater comprehension.** Visualizations can be more attractive, impactful, and immediate than linear text. Yet their attractivity may be quite limited if they are realised using poor technological and graphic means, or compiled by employing automatic templates which usually do not allow high levels of customization. Subsequently, their impact is related to many factors ranging from the novelty and significance of the information they present to the actual ability to represent it in engaging, unexpected ways. And their immediacy is far from being a certainty: Whether they display data, it cannot be taken for granted that such data creates information, enabling users to make interpretations and acquiring new knowledge. These problems can be found in many online history projects presenting amateurish visualizations, as well in aesthetically appealing platforms that employ complex data visualizations whose comprehension requires much effort or is even not possible due to the absence of guidelines or legends. This reveals two opposite approaches that are both wrong: On the one hand, in some initiatives the importance of visual communication is neglected, as if it would not affect their popularization purposes; on the other hand, other projects tend to spectacularize visuality without providing a means for interpretation.

3. If not aimed at enabling participation, interactivity can be an end in itself.

All history websites are by default interactive, in the sense that they require human-machine interaction in order to function or be browsed. Digital media enhanced role of users, not thought as mere spectators but rather as participants who are asked to perform actions and choices. But what content, information or impact do such interactions generate in history websites? Most of the time the approach of institutions and digital historians is based on conventional top-down communications in which users are conceived as visitors rather than active collaborators. Thus, their role is often limited to just freely browsing digital archives, interactive documentaries or animated visualizations. The tendency to spectacularize interaction can lead to producing projects whose lifespan and usefulness are severely limited by the speed at which their innovative feature cease to be surprising. Instead, in order to exploit the participatory nature of the Web, digital historians should move towards the opposite direction, already experimented by many digital public history initiatives: Designing online platforms where users can contribute to historical documentation, narration, and interpretation, or even digital environments designed for welcoming bottom-up, collective content production, annotation, and curation.

The visual communication design choices concerning these issues impact the usefulness, usability, understandability, attractiveness, and duration of any digital history project. As a matter of fact, in history websites the centrality of design has a triple reason, which concerns respectively the realms of graphic, user experience, and information designers:

- 1. The intrinsic visuality of the Graphical User Interface**, which mediates every communication occurring through a screen, requires the design of web interfaces and information hierarchies aiming to facilitate search, navigation, interaction, and legibility (User Experience Design).
- 2. The explosion of visual sources** (such as photographs, illustrations, scans, and videos) and the predominance of visual language on the Web demands the conscious management and use of such materials, as well as the design of

virtual environments suitable for their presentation and interpretation, and of layouts capable to contextualize or eventually connote them (Graphic Design).

3. The enhanced possibilities of graphical forms of knowledge production

such infographics, maps, timelines, network visualizations causes their subsequent increased use that urge the design of data visualizations not only to display complex information but also to communicate it in intelligible, meaningful, and attractive ways (Information Design).

Despite such centrality, until now the worlds of Digital History and visual communication design have struggled to encounter each other on an scholarly level. The knowledge of design is a trifling part of digital humanities academic curricula, which, barring exceptions, do not involve collaboration with design studios or schools. Many scholars rely on their self-taught design skills, producing works that are not aesthetically attractive, thus keeping public-at-large and especially designers far from the field. Indeed, it can hardly be said that the design community is particularly aware of or interested in Digital History either. This lack of, or at least scarce, contact is blatantly obvious in digital history projects, especially when developed within academic settings: Obsolete interfaces and unfriendly navigating systems; amateurish use of space, color and typefaces; ambiguous information architecture and inadequate visual languages. But this heterogeneous field can produce also experimental narratives, hybrid formats, and innovative features that open and expand the boundaries of historical scholarship as well as the ones of visual design. Even though this thesis has introduced a critical approach to the design of history websites, taking into account the strict relationship between their form and content, how to gauge these factors remains an open question. Digital history still lacks the attention and space needed for a generalized critical awareness. Identifying common problems and major limitations, singling out virtuous examples among existing models, and especially giving visibility to these emerging practices is therefore the first step toward encouraging a debate, in the hope that more designers will be involved in the challenges that history poses in the Information Age.

LIST OF LITERATURE

BOOKS

A

Arthur, Paul. (2008) *Exhibiting history: The digital future*. In: reCollections: Journal of the National Museum of Australia, vol. 3, no. 1. pp. 33–50. URL: http://recollections.nma.gov.au/issues/vol_3_no_1/papers/exhibiting_history#1

B

Bolter, David J.; Grusin, Richard. (1999) *Remediation: Understanding New Media*. MIT Press, Cambridge. URL: https://monoskop.org/images/a/ae/Bolter_Jay_David_Grusin_Richard_Remediation_Understanding_New_Media_low_quality.pdf

Burdick, Anne; Drucker, Johanna; Lunenfeld, Peter; Presner Todd; Schnapp, Jeffrey. (2012) *Digital Humanities*. MIT Press, Cambridge, 11-16-2012, preface. URL: https://mitpress.mit.edu/sites/default/files/titles/content/9780262018470_Open_Access_Edition.pdf

C

Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. University of Pennsylvania Press, Philadelphia. URL: <http://chnm.gmu.edu/digitalhistory/introduction/>

D

De Luna, Giovanni and Colombini, Chiara. (2014) *Storia*. EGEA spa. URL: https://books.google.it/books?id=ShvcCgAAQBAJ&printsec=frontcover&source=gbs_atb#v=onepage&q&f=false

Drucker, Johanna. (2014) *Graphesis: Visual Forms of Knowledge Production*.
Harvard University Press.

H

Hughes, Lorna M. (ed.). (2012) *Evaluating and Measuring the Value, Use and Impact of Digital Collections*. Facet Publishing. URL:
https://www.researchgate.net/publication/275264697_Evaluating_and_Measuring_the_Value_Use_and_Impact_of_Digital_Collections

K

Karaganis, Joe (ed.). (2007) *Structures of Participation in Digital Culture*. Social Science Research Council, New York. URL:
https://s3.amazonaws.com/ssrc-cdn1/crmuploads/new_publication_3/%7B6A130B0A-234A-DE11-AFAC-001CC477EC70%7D.pdf

L

Landow, George P. (1997) *Hypertext 2.0*. Johns Hopkins University Press, Baltimore.

M

Mitchell, W. J. T. (1995) *Picture Theory: Essays on Verbal and Visual Representation*. University of Chicago Press.

R

Rose, Gillian. (2001) *Visual Methodologies: An Introduction to the Interpretation of Visual Materials*. Sage, London.

Rosenberg, Daniel; Grafton, Anthony. (2013) *Cartographies of Time: A History of the Timeline*. Princeton Architectural Press.

S

Schnapp, Jeffrey T.; Battles, Matthew. (2014) *The Library Beyond the Book*. metaLABprojects, Harvard University Press.

ARTICLES

B

Blevins, Cameron. (2016). *Digital History's Perpetual Future Tense*. In: Matthew K. Gold and Lauren F. Klein, Editors. *Debates in the Digital Humanities 2016*. University of Minnesota Press. URL: <http://dhdebates.gc.cuny.edu/debates/text/77>

Brennan, Sheila A. (2016) *Public, first*. In: Matthew K. Gold and Lauren F. Klein, Editors. *Debates in the Digital Humanities 2016*. University of Minnesota Press. URL: <http://dhdebates.gc.cuny.edu/debates/text/83>

C

Chayka, Kyle. (2016) *The Library of Last Resort*. On: nplusonemag.com, 07/14/2016. URL: <https://nplusonemag.com/online-only/online-only/the-library-of-last-resort/>

Cohen, Daniel J. (2004) *Digital history: the raw and the cooked*. On: *Rethinking History* 8:2, pages 337-340. URL: <https://www.tandfonline.com/doi/abs/10.1080/13642520410001683996>

D

Darnton, Robert. (2011) *Six Reasons Google Books Failed*. On: The New York Review of Books, 03/28/2011. URL: <http://www.nybooks.com/daily/2011/03/28/six-reasons-google-books-failed/>

Doran, Aileen. (2014) *Free Libraries for Every Soul. Dreaming of the Online Library*. In: The Bear, March 2014. URL:
<https://thebear-review.com/#!/free-libraries-for-every-soul/c153g>

Drucker, Johanna. (2013) *Is There a "Digital" Art History?*. In: Visual Resources, Volume 29, Numbers 1–2, March–June 2013. URL:
https://people.finearts.uvic.ca/~ddudley/AHVS310B_Presenting_Art_History_Fall_2016/Materials/Entries/2016/9/12_Reading_for_Thursday_files/Drucker%20Is%20there%20a%20digital%20art%20history.pdf

F

Fischer, Suzanne. (2011) *On the Vocation of Public History*. On: #alt-academy, mediacommons.futureofthebook.org, 07/05/2011. URL:
<http://mediacommons.futureofthebook.org/alt-ac/pieces/vocation-public-history>

G

Glinka, Katrin; Pietsch, Christopher; Dilba, Carsten; Dörk, Marian. (2016) *Linking structure, texture and context in a visualization of historical drawings by Frederick William IV (1795-1861)*. In: International Journal for Digital Art History, Issue #2, Graphentis Verlag e.K., Munich, Germany, October 2016. URL:
<https://www.google.it/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwjNi5TZru7YAhVHuBQKHemKAPMQFggwMAI&url=https%3A%2F%2Fjournals.ub.uni-heidelberg.de%2Findex.php%2Fdah%2Farticle%2Fdownload%2F33527%2F27215&usg=AOvVaw0tsLTEFsBvm2JUcPDSXTC1>

Gorgels, Peter. (2013) *Rijksstudio: Make Your Own Masterpiece!*. In: Museums and the Web 2013, 04/17-20/2013. URL:
<https://mw2013.museumsandtheweb.com/paper/rijksstudio-make-your-own-masterpiece/>

H

Heymanoct, Stephen. (2015) *Google Books: A Complex and Controversial Experiment*. On: nytimes.com, 10/28/2015. URL:

<https://www.nytimes.com/2015/10/29/arts/international/google-books-a-complex-and-control-versal-experiment.html>

Hui, Yuk. (2013) *Archivist Manifesto*. On: Mute, 05/22/2013. URL:
<http://www.metamute.org/editorial/lab/archivist-manifesto>

J

Jackson, Joad. (2010) *Google: 129 Million Different Books Have Been Published*. On: pcworld.com, 08/06/2010. URL:
https://www.pcworld.com/article/202803/google_129_million_different_books_have_been_published.html

Jeanneney, Jean-Noël. (2008) *Google and the Myth of Universal Knowledge: A View from Europe*. University of Chicago Press. URL:
https://books.google.it/books?id=rc19MRhlUEgC&printsec=frontcover&redir_esc=y#v=onepage&q&f=false

K

Keller, Paul. (2014?) *Europeana: making Europe's cultural heritage available for reuse*. On: Kennisland. URL:
<https://www.kl.nl/en/cases/europeana-making-europes-cultural-heritage-available-reuse/>

Kissane, Erin. (2015) The Library as Map: an interview with Rick Prelinger and Megan Shaw Prelinger. In: Springer, Anna-Sophie; Turpin, Etienne, ed., (2015) *Fantasies of the Library*. K. Verlag and Haus der Kulturen der Welt, Berlin. URL:
<http://contentsmagazine.com/articles/the-library-as-a-map/>

L

Lorusso, Silvio. (2015) *What We Talk About When We Talk About Publishing*. In: Progetto grafico, issue #28 – “Publishing”. AIAP Editions. URL:

<https://medium.com/progetto-grafico/what-we-talk-about-when-we-talk-about-publishing-ec3534f0321d>

Lovink, Geert. (2000) *Closed Networks in an Open Society (Plus Interview)*. On: world-information.org, 06/20/2000. URL: <http://geertlovink.org/texts/closed-networks-in-an-open-society-plus-interview/>

Lunenfeld, Peter; Presner, Todd; Schnapp, Jeffrey, ed. (2011) *The Digital Humanities Manifesto 2.0*. URL: http://www.humanitiesblast.com/manifesto/Manifesto_V2.pdf

M

Manovich, Lev. (2017) *Cultural Data: Possibilities and limitations of the digital data universe*. In: Oliver Grau, editor, with Wendy Coones and Viola Rühse. (2017) *Museum and Archive on the Move. Changing Cultural Institutions in the Digital Era*. De Gruyter, Berlin, Boston, pp. 259-276. URL: http://manovich.net/content/04-projects/102-cultural-data/cultural_data_article.pdf

Manovich, Lev. (2017) *Cultural Data: Possibilities and limitations of the digital data universe*. In: Oliver Grau, editor, with Wendy Coones and Viola Rühse. (2017) *Museum and Archive on the Move. Changing Cultural Institutions in the Digital Era*. De Gruyter, Berlin, Boston, pp. 259-276. URL: http://manovich.net/content/04-projects/102-cultural-data/cultural_data_article.pdf

N

Noiret, Serge. (2009) “*Public History*” e “*Storia Pubblica*” nella Rete. In: Francesco Mineccia and Luigi Tomassini, Editors. *Ricerche storiche*. N. 2-3. Media e storia. URL: https://www.academia.edu/230580/_Public_History_e_Storia_Pubblica_nella_Rete

P

Prescott, Andrew. (2012) *The digital library*. In: Hughes, Lorna M., ed. (2012) *Evaluating and Measuring the Value, Use and Impact of Digital Collections*. Facet Publishing, pp. 13-34. URL:

<https://books.google.it/books?id=vd8qDgAAQBAJ&printsec=frontcover#v=onepage&q&f=false>

R

Robertson, Stephen. (2016) *The Differences between Digital Humanities and Digital History*. In: Gold, Matthew K. (ed.); Klein, Lauren F. (ed.). *Debates in the Digital Humanities 2016*. University of Minnesota Press. URL:
<http://dhdebates.gc.cuny.edu/debates/text/76>

S

Scheinfeldt, Tom. (2014) The Dividends of Difference: Recognizing Digital Humanities' Diverse Family Tree/s. On: foundhistory.com, 07/04/2014. URL:
<http://foundhistory.org/2014/04/the-dividends-of-difference-recognizing-digital-humanities-diverse-family-trees/>

Schnapp, Jeffrey. (2014) *Knowledge Design: Incubating New Knowledge Forms, Genres, Spaces in the Laboratory of the Digital Humanities*, In: Volkswagen-Stiftung. URL:
http://jeffreyschnapp.com/wp-content/uploads/2011/06/HH_lectures_Schnapp_01.pdf

Sfligiotti, Silvia. (2013). *La collezione è di tutti / It's Everyone's Collection*. In: Progetto grafico 23 – L'uso delle immagini / How Images Are Used. AIAP Editions, Spring 2013, pp. 123-124.

Sfligiotti, Silvia. (2017) *Più immagini per tutti? / More images for everybody?*. In: Progetto grafico 30 – Tecnologie aperte / Open Technologies. AIAP Editions, Autumn 2016, pp. 105-113. URL:
https://issuu.com/progettografico/docs/pg30_anteprema_issuu_38b63a032f4670

T

Thomas, William G. III. (2004) *Computing and the Historical Imagination*. In: S. Schreibman, R. Siemens e J. Unsworth, Editors. *A Companion to Digital Humanities*, ed. Oxford: Blackwell, pp. 56-68. URL: <http://www.digitalhumanities.org/companion/>

V

Varnelis, Kazys. (2007) *Network Culture*. varnelis.net. URL: http://index.varnelis.net/blog/admin/introducing_network_culture

THESES

Giorgetta, Davide; Nicoletti, Valerio. (2015) *Amateur: Pratiche indipendenti tra archiviazione digitale e publishing / Non-institutional practices between digital archiving and publishing*. Supervisor: Marco Tortoioli Ricci. Master's thesis in Communication Design and Publishing, ISIA Urbino.

VIDEOS

Feliciati, Pierluigi. (2015) *La percezione dell'archivio nel quadro delle Digital Humanities – Qualche riflessione*. At: Quarto convegno annuale dell'AIUCD - Digital Humanities e beni culturali: quale relazione?, Università di Torino, Italy, 12/19/2015. URL: <https://www.serviziweb.unito.it/media/?content=7797>

Kaplan, Frederic. (2013) *How to build an information time machine*. TEDxCaFoscariU, June 2013. URL: https://www.ted.com/talks/frederic_kaplan_how_i_built_an_information_time_machine

Schnapp, Jeffrey. (2013) *Digital Humanities*. At: Internet Festival 2013, Pisa, Italy, 11/11/2013. URL: <https://www.youtube.com/watch?v=LjIgvnkmnIw>

APPENDIX

PART 1 OPEN SOURCES

⁰ Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. University of Pennsylvania Press, Philadelphia, introduction. URL: <http://chnm.gmu.edu/digitalhistory/introduction/>

1.1

¹ Arthur, Paul. (2008) *Exhibiting history: The digital future*. In: reCollections: Journal of the National Museum of Australia, vol. 3, no. 1. pp. 33–50. URL: http://recollections.nma.gov.au/issues/vol_3_no_1/papers/exhibiting_history#1

² Burdick, Anne; Drucker, Johanna; Lunenfeld, Peter; Presner Todd; Schnapp, Jeffrey. (2012) *Digital Humanities*. MIT Press, Cambridge, 11-16-2012, preface. URL: http://mitpress.mit.edu/sites/default/files/titles/content/9780262018470_Open_Access_Edition.pdf

³ Roy Rosenzweig Center for History and New Media. Official description, consulted on 12/14/2017. URL: <https://rrchnm.org/our-story/>

⁴ Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Op. cit.

⁵ Ibidem.

⁶ Brennan, Sheila A. (2016) *Public, first*. In: Matthew K. Gold and Lauren F. Klein, Editors. *Debates in the Digital Humanities 2016*. University of Minnesota Press. URL: <http://dhdebates.gc.cuny.edu/debates/text/83>

⁷ Noiret, Serge. (2009) *“Public History” e “Storia Pubblica” nella Rete*. In: Francesco Mineccia and Luigi Tomassini, Editors. *Ricerche storiche*. N. 2-3. Media e storia. URL: https://www.academia.edu/230580/_Public_History_e_Storia_Pubblica_nella_Rete

⁸ Blevins, Cameron. (2016). *Digital History’s Perpetual Future Tense*. In: Matthew K. Gold and Lauren F. Klein, Editors. *Debates in the Digital Humanities 2016*. University of Minnesota Press. URL: <http://dhdebates.gc.cuny.edu/debates/text/77>

⁹ Scheinfeldt, Tom. (2014) The Dividends of Difference: Recognizing Digital Humanities' Diverse Family Tree/s. On: foundhistory.com, 07/04/2014. URL: <http://foundhistory.org/2014/04/the-dividends-of-difference-recognizing-digital-humanities-diverse-family-trees/>

¹⁰ Blevins, Cameron. (2016). *Digital History’s Perpetual Future Tense*. Op. Cit.

¹¹ Drucker, Johanna. (2013) *Is There a “Digital” Art History?*. In: Visual Resources, Volume 29, Numbers 1–2, March–June 2013. URL: https://people.finearts.uvic.ca/~ddudley/AHVS310B_Presenting_Art_History_Fall_2016/Materials/Entries/2016/9/12_Reading_for_Thursday_files/Drucker%20Is%20there%20a%20digital%20art%20history.pdf

1.2

¹² Drucker, Johanna. (2013) *Is There a “Digital” Art History?*. Op. cit.

¹³ Manovich, Lev. (2017) *Cultural Data: Possibilities and limitations of the digital data universe*. In: Oliver Grau, editor, with Wendy Coones and Viola Rühse. (2017) *Museum and Archive on the Move. Changing Cultural Institutions in the Digital Era*. De Gruyter, Berlin, Boston, pp. 259-276. URL: http://manovich.net/content/04-projects/102-cultural-data/cultural_data_article.pdf

¹⁴ Ibidem.

¹⁵ NYPL – *Digital Collections*. Consulted on 01/18/2018. URL:

<https://digitalcollections.nypl.org/>

¹⁶ Darnton, Robert. (2011) *Six Reasons Google Books Failed*. On: The New York Review of Books, 03/28/2011. URL:

<http://www.nybooks.com/daily/2011/03/28/six-reasons-google-books-failed/>

¹⁷ Keller, Paul. (2014?) *Europeana: making Europe's cultural heritage available for reuse*.

On: Kennisland. URL:

<https://www.kl.nl/en/cases/europeana-making-europes-cultural-heritage-available-reuse/>

¹⁸ Drucker, Johanna. (2013) *Is There a "Digital" Art History?*. Op. Cit.

¹⁹ Manovich, Lev. (2017) *Cultural Data: Possibilities and limitations of the digital data universe*. Op. cit.

1.3

²⁰ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

²¹ Rose, Gillian. (2001) *Visual Methodologies: An Introduction to the Interpretation of Visual Materials*. Sage, London.

²² Mitchell, W. J. T. (1995) *Picture Theory: Essays on Verbal and Visual Representation*. University of Chicago Press.

²³ Brennan, Sheila A. (2016) *Public, first*. Op. cit.

1.4

²⁴ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

1.5

²⁵ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

²⁵ Ibidem.

²⁶ Dewinn, Dima. (2015) *Thngs: A place for every thing*. On: Medium, 01/15/2015. URL:
<https://medium.com/thngs-company/thngs-55cc520816ee>

PART 2 OPEN FORMS

⁰ Schnapp, Jeffrey. (2014) *Knowledge Design: Incubating New Knowledge Forms, Genres, Spaces in the Laboratory of the Digital Humanities*. In: Volkswagen-Stiftung. URL:
http://jeffreyschnapp.com/wp-content/uploads/2011/06/HH_lectures_Schnapp_01.pdf

2.1

¹ Schnapp, Jeffrey. (2016) *Knowledge Design*. ACDH Lecture 2.1, 04/07/2016. URL:
<https://www.youtube.com/watch?v=FttED2UKemY&t=2749s>

² Burdick, Anne; Drucker, Johanna; Lunenfeld, Peter; Presner Todd; Schnapp, Jeffrey. (2012) *Digital_Humanities*. Op. cit.

³ Schnapp, Jeffrey. (2014) *Knowledge Design: Incubating New Knowledge Forms, Genres, Spaces in the Laboratory of the Digital Humanities*. Op. cit.

⁴ Drucker, Johanna. (2014) *Graphesis: Visual Forms of Knowledge Production*. Harvard University Press.

⁵ Schnapp, Jeffrey. (2014) *Knowledge Design: Incubating New Knowledge Forms, Genres, Spaces in the Laboratory of the Digital Humanities*. Op. cit.

2.2

⁶ Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Op. cit.

⁷ Manovich, Lev. (2017) *Cultural Data: Possibilities and limitations of the digital data universe*. Op. cit.

⁸ Ibidem.

⁹ Drucker, Johanna. (2014) *Graphesis: Visual Forms of Knowledge Production*. Op. cit.

¹⁰ Arts & Culture Experiments. Consulted on 03/24/2018. URL:
<https://experiments.withgoogle.com/arts-culture>

¹¹ Manovich, Lev. (2017) *Cultural Data: Possibilities and limitations of the digital data universe*. Op. cit.

2.3

¹² Drucker, Johanna. (2014) *Graphesis: Visual Forms of Knowledge Production*. Op. cit.

¹³ Rosenberg, Daniel; Grafton, Anthony. (2013) *Cartographies of Time: A History of the Timeline*. Princeton Architectural Press.

2.4

¹⁴ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

¹⁵ Robertson, Stephen. (2016) *The Differences between Digital Humanities and Digital History*. In: Gold, Matthew K. (ed.); Klein, Lauren F. (ed.). *Debates in the Digital Humanities 2016*. University of Minnesota Press. URL:
<http://dhdebates.gc.cuny.edu/debates/text/76>

¹⁶ Ibidem.

¹⁷ Ibidem.

PART 3 OPEN MEANS

⁰ Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Op. cit.

3.1

¹ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

² Landow, George P. (1997) *Hypertext 2.0*. Johns Hopkins University Press, Baltimore.

³ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

⁴ *A Global Guide to the First World War — Interactive Documentary*. On: Online Journalism Awards, 2015. URL:
<https://awards.journalists.org/entries/global-guide-first-world-war-interactive-documentary/>

3.2

⁵ Kaplan, Frederic. (2013) *How to build an information time machine*. TEDxCaFoscariU, June 2013. URL:
https://www.ted.com/talks/frederic_kaplan_how_i_built_an_information_time_machine

⁶ *Consegnati a Venezia i primi risultati di Venice Time Machine*. On: Università Ca' Foscari di Venezia, 10/17/2017. URL: https://www.unive.it/pag/14024/?tx_news_pi1%5Bnews%5D=3890&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&cHash=5cdc3360c2296a8a0fbcefc671454a50

⁷ Kaplan, Frederic. (2013) *How to build an information time machine*. Op. cit.

⁸ Zygar, Mikhail. On Pushkin House, 2017. URL: <http://www.pushkinhouse.org/project-1917/>

3.3

⁹ Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Op. cit.

¹⁰ Arthur, Paul. (2008) *Exhibiting history: The digital future*. Op. cit.

¹¹ Cohen, Daniel Jared; Rosenzweig, Roy. (2006) *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Op. cit.