

Digital Humanities: Challenges of the Transformation of Tools and Objects of Knowledge in Contemporary Humanities

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Abstract. This paper aims to sketch some bases for the problematization of digital tools as objects of knowledge for Social Sciences and Humanities (SSH). Our purpose is to raise some relevant questions about the Digital Humanities (DH) and how SSH and Computer Sciences (CS) can work together to face new challenges. We discuss some tension points and propose a model for SSH and CS collaboration for joint projects in cultural digitization.

Keywords: Digital Humanities, Social Sciences and Humanities, Computer Sciences

1 Introduction

In the transformation of contemporary sciences, a new research field, situated at the intersection between computer science and humanities, is increasingly developing and spreading. The frequency of academic events and publications, related to the so-called Digital Humanities (DH), makes us think that the growth of this movement is far from ending.

*“Digital Humanities is an important multidisciplinary field, undertaking research at the intersection of digital technologies and humanities. It aims to produce applications and models that make possible new kinds of research, both in the humanities disciplines and in computer science and its allied technologies. It also studies the impact of these techniques on cultural heritage, memory institutions, libraries, archives and digital culture.”*¹ (Claire Warwick, UCL)

As a typical DH activity, this paper will examine *the digitization of cultural heritage*, which stages with accuracy the digitization of both objects and tools of knowledge in Social Sciences and Humanities (SSH).

Based on collaboration between a sociologist and computer scientists, this paper is mainly an attempt to sketch some bases for problematization of digital tools as objects of knowledge for SSH. Our purpose is to raise some relevant questions about the

¹ <http://www.ucl.ac.uk/dh/courses>

Digital Humanities and how SSH and Computer Sciences (CS) can work together to face new challenges. Our hypothesis is that this transformation of objects and tools leads to a new style of knowing in the humanities which is accompanied by a share of legitimacy, which begins since the founding stage of the problematization [Callon, 1986] of the technological artefact to do.

After a short presentation of the Digital Humanities (DH) field, this paper proposes an example of thematization of the joint productions of SSH and Information Sciences (IS) with the help of some of the conceptual tools developed in SSH in the Social Studies of Science.

In the second part, based on many completed research and development (R&D) projects of cultural digitization, we discuss some tension points and propose a best practice model for SSH and CS collaboration for joint projects, focusing on the role that the humanities can take.

2 Digital Humanities: a New Field of Study under Question

The most visible Digital Humanities laboratories belong to the Anglo-Saxon area of the world, for example, the Universities of Alberta, Victoria, Chicago and the Maryland Institute for Technology in the Humanities (MITH). The latter has created CenterNet, a worldwide network of DH research centers. In Europe, University College London and King's College offer master's degrees and PhD programs in DH. More recently, the Swiss Federal Institute of Lausanne (EPFL) has created its DH Laboratory (DH LAB), which is involved with Ca' Foscari University and Telecom Italia in the ambitious project "Venice Time Machine". This research project has received the label "Joint Research Center on Digital Humanities and Future Cities". It should be a good opportunity to create "a historical and geographical simulation of the city that is one of the well-documented in the world"². In France, the Ecole des Hautes Etudes en Sciences Sociales (EHESS) is building a network involving French researchers on DH.

At the same time, the consensual legitimacy of the DH label is not built yet. There are several pending questions. Is DH a paradigmatic revolution in the sense of Kuhn (1962)? Is DH a transition label driving to Humanities becoming entirely digital in 20 years' time? If the main purpose of this research field is to develop new applications of Information Technologies (IT), is it a new kind of knowing for SSH or only a continuation of *humanities computing*, that began with the *Index Thomisticus* of Roberto Busa (1946)³ [Burnard, 2012]? However, uses of IT have been studied for a long time.

Parallel to the development of DH, we observe a proliferation of statements with low-level problematization, such as "How to deal with 1 million books?" or "How to deal with 1 million photos? With 1 billion words?". We also notice that this new kind

² <http://actu.epfl.ch/news/the-venice-time-machine-science-humanities-and-the/>

³ In collaboration with Thomas J. Watson (IBM) between 1949 and 1980. It's a complete lemmatization of the works of Saint Thomas Aquinas and of a few related authors available online: <http://www.corpusthomicum.org/it/index.age>

of data needs radically new approaches and that with DH we are facing a “turning point” in the manner of knowing in the SSH. Thus, DH is promised to renew the SSH and to save the Humanities from the worldwide financial crisis. In the same line of radical promises, DH is invested with the power of filling the gap between Science and Humanities!

These mottos lead to the formation of “rhetoric of Big Data” where the most important thing seems to be data managing of huge corpora. This “rhetoric of Big Data” does not rely on the achievements in SSH and the risk that the development of DH highlights a “data driven” knowledge leading to “the end of theory” still exists.

3 Digitization of Cultural Heritage: the Joint Transformation of Tools, Objects and Disciplines

3.1 IT Applications in Digital Humanities: Tools or Objects?

The digitization of cultural heritage is one of the main DH research activities. It combines at least two ingredients of DH: multiplying encounters between actors from humanities and computer sciences, mediated by multiple IT applications and co-production of new digital tools such as digital libraries. But these two academic communities have seized new problems accompanying digitalization of cultural heritage in different ways. Computer sciences have early inscribed the digitalization of cultural heritage in their academic calendar through research, educations programs, projects, scientific publications, conferences, etc. Computer sciences have transformed digitization into research problems relevant to their own community, leading to the creation of new research areas that receive and create institutional resources.

On the other hand, we cannot find the same academic movement in humanities. Schematically the SSH community is divided into two sides. The first is pessimistic, focused on the potential consequences of IT uses and see DH as challenging the way they do their job. The second is more enthusiastic and considers that DH will bring new tools of knowledge. As a whole, the applications of IT are mainly considered as tools and not as objects of knowledge. It is rare to find studies that take into consideration what is going on «behind the screen» and looking for the ingredients of these new tools.

It could be interesting to look at DH in another way than making a (constantly growing) list of the potential social consequences of IT applications in SSH. Where are the uses shaped? This paper rejects the idea of the adjustment of society to techniques, where technological change can be explained only by its internal logic. The analysis of the construction of society and techniques in terms of the impacts of technology on society supposes “an automatic relation between the introduction of a new technology and a set of social changes and profits”⁴ [Miège & Vinck, 2012, p.126]. This spontaneous theory of technological determinism is widely criticized by the social science studies research community. Instead of evaluating social impacts of technology, researchers focus on the way these “impacts” are build [MacKenzie et Wa-

⁴ Own translation from French.

jcman, 1985]. They have reformulated the social studies of science programme by the study of the co-construction of sciences, technology and society [Williams, 1997]. Applied to the technological artefacts involved and produced in DH, a new field of study is open. How are these digital tools build? How are cultural artefacts digitized? What kind of transformations do they pass through?

3.2 The New Life of Cultural Artefacts: Towards a Share of Legitimacy

Focusing on the transformation of cultural artefacts in the digitization process, we can find a trajectory of „becoming digital” supported by the digital infrastructure. As Latour & Woolgar showed about scientific fact-construction (1979), we can consider that digital artefacts bear the marks of the tools, which made them digital. In this way, the construction of digital identity is the result of the combination, comparison and interpretation of marks left by instruments involved. The dynamic process of interpreting marks forges the new qualities and testifies for the new digital identity of these cultural artefacts. This process allows cultural artefact to leave their home world to reach a new universe of reference. Their new life as digital artefacts will be prolonged and reinforced in their scientific life into publications. Their former cultural identity is increased with a new digital identity.

This first point, concerning the transformation traditional objects of knowledge of SSH, has to be developed. If we stop for a moment and consider what these new qualities mean for the SSH, will find that their traditional objects of knowledge are now shared with computer science, insofar as that digital artefacts can combine both cultural and digital identity in their contemporary life. But is there any cultural artefact that cannot acquire digital identity?

This perspective supports the idea that the development of DH asks the question of the share of legitimacy with accuracy: Who are the parents of these new objects? To which world, Humanities or computing, do these cultural and digital objects belong?

These questions cannot find an answer without trying to thematize the productions of the encounter between humanities and computer sciences. We will continue our attempt to problematize the transformation of objects and tools in SSH by examining the digital content management system (digital libraries, for example) as a place, which supports and exposes both digital and cultural artefacts.

3.3 Boundary Object and Problematization: How to Perform an Articulation between Heterogeneous Worlds?

We consider such technological artefacts as digital libraries as intermediary objects [Vinck, 2012] that help to coordinate the worlds involved. They become boundary objects [Star & Griesemer, 1989] while performing a digital and social infrastructure. The concept of boundary object helps to consider technological artefacts developed by DH as active mediators in performing the articulation of heterogeneous worlds involved. The perspective of symbolic interactionism developed by Star & Griesemer

focuses on the way agreements are built between worlds involved and on the way these tools permit the coexistence of each world identity. These agreements ground the basics of the emergence of a new common world. But how is the heterogeneity of the world involved in these boundary objects managed?

If we want to go back to the very beginning of the co-production process, another sociological approach focuses on mediations as an important factor for building technological artefacts. It considers the set of mediations leading to the production of a new artefact as a translation process defined as a suite of displacements sustaining the construction of a network of actors, knowledge and productions [Serres, 1974][Callon, 1986][Latour, 1987]. The so-called Actor-Network-Theory (ANT) takes into consideration problematization as an essential milestone of the translation process, giving meaning to the collaboration. It is also the moment to fix the identities of actors taking part of the process, where they are forging the object so that it corresponds to their explicit interests [Latour, 1987]. There is an identity test accompanying this first milestone of problematization. Moreover, the problematization can be a resource for a most effective action in the clash of opposing positions in the definition of the object of the collaboration.

This second point supports the idea of the emergence of a share of legitimacy between sciences involved in DH activities. The encounter of SSH and computer sciences is first of all a moment of definition of what they have to do together and how to do it. Each actor brings its own definition and grasps shaped by its reference universe. The problematization supported by computer sciences is reinforced by a structured research field, where research activities nourish a collective problematization and form knowledge on these boundary objects.

At the end of this first part we propose to consider DH initiatives as so many scenes where the identity and legitimacy of each of the participants and objects in SSH and computer science is redefined. With the idea to develop the problematization of SSH, we propose to take into consideration the digital artefacts constructed by DH researchers, not only as new tools but also as new objects of knowledge. Studying the construction of these new tools and objects of knowledge seems to be a good opportunity to understand where the power of transformation of these technological artefacts comes from.

In addition, the mutation of objects and tools grows to question the possibilities of producing SSH knowledge on this particular type of object, for example, computer ontologies, databases and programming languages, without engagement by SSH with computer scientists. While the choice of the co-construction of knowledge on the digital infrastructure based on a joined problematization between SSH and computer scientists seems fruitful (even inevitable), it depends on the construction of an agreement on sharing of legitimacy and on parentage of this knowledge.

4 SSH and CS Collaboration in Joint R&D Projects

In this part, a best practice model for SSH and CS collaboration for joint projects in cultural digitization field, is included. The model is developed by the team from the

Mathematical Linguistics Department (MLD) in the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences (IMI—BAS).

The current research activities of this team include the study and implementation of knowledge-based methods for creation, integration and development of digital libraries for cultural heritage and the team has relatively long experience in the technical development of information systems, knowledge processing and management systems, content management systems, distributed multimedia environments, semantic web applications and interactive teaching environments. The team includes highly qualified specialists – researchers in the field of ICT, digitization, software applications and presentation of cultural heritage. Some of the members of the team have not only CS profile, but also MA and PhD in SSH.

The MLD team’s developments at the digital libraries and portals for Bulgarian cultural heritage include several systems such as: the Bulgarian Iconographical Digital Library (<http://bidl.math.bas.bg/>) [Pavlova-Draganova et al., 2010], the Bulgarian Folklore Digital Library (<http://folknow.math.bas.bg/>) [Paneva-Marinova et al., 2010] and the Bulgarian Folklore Artery (<http://folkartery.math.bas.bg/>) [Pavlov et al., 2011], Digital Library “Encyclopaedia Slavica Sanctorum” (<http://www.eslavsanct.net/>) [Goynov et al., 2011], etc., created during the following national and international projects:

- “Digital Libraries with Multimedia Content and its Application in Bulgarian Cultural Heritage” (contract 8/21.07.2005 between the IMI—BAS, and the State Agency for Information Technologies and Communications);
- FP6/IST/P-027451 PROJECT LOGOS "Knowledge-on-Demand for Ubiquitous Learning", EU FP6, IST, Priority 2.4.13 "Strengthening the Integration of the ICT research effort in an Enlarged Europe";
- NSF project D-002-189 SINUS “Semantic Technologies for Web Services and Technology Enhanced Learning”;
- NSF project IO-03-03/2006 “Development of Digital Libraries and Information Portal with Virtual Exposition “Bulgarian Folklore Heritage””;
- DDVU 02/68 (2010) Encyclopaedia Slavica Sanctorum: Saints and Holy Places in Bulgaria (in electronic- and Gutenberg versions), etc.

In these projects the team provides:

- High quality digitization of artefacts and art collections in different media types (text, images, video, audio);
- Graphical processing of the digital objects, 2D and 3D objects design, digital restoration;
- Technical and semantic description of the digital objects according to the approved standards;
- Presentation of the artefacts and their description in a virtual environment for a complex multimedia exhibition – the so-called virtual museum, based on the prototype of a multimedia digital library. This multimedia digital library provides flexible and effective access to the multimedia presentation of the cultural heritage artefacts and art collections. It maintains different forms and formats of the digitized

information content and rich functionality for interaction. It is mainly used for storage and preservation of digital content and provides innovative services for:

- Entering, indexing, semantic annotation and management (store, edit, preview, delete, group) of archives and collections of unlimited number of multimedia objects – images, video, sound, text, etc.
- Metadata management (ontological and technical)
- Navigation, preview, access and browse of digital objects, collections and/or their descriptions; interactive, complex multimedia presentation of the digital content.
- Search (standard - keyword, complex, semantic, context-based, etc), object selection and grouping, creation of digital collections (thematic, time and space dependant, etc.) and their attractive virtual exposition;
- Personalization and adaptive access to the digital content;
- Multilingualism;
- Administration and data tracking services; analysis services; data export;
- Protection of the digital content (Watermarking, Copyright), etc.

The IMI—BAS team aims to create innovative solutions for assembling multimedia digital libraries for collaborative use (especially in the cultural heritage context), while maintaining their semantic interoperability; to create new services for dynamic aggregation of their resources, access improvement, personification, intelligent curation of content, and content protection for insuring Intellectual Property Rights.

During the project work, the MLD team has to discuss, share experience and knowledge with specialists in SSH and several challenges of the collaborations were identified:

- ambiguous understanding of the nature of the digitization process, its goals, results, and impact;
- insufficient understanding of the specifics of the transition from real to digital objects – their existence, use, maintenance, continuous update, digital life, etc.;
- misunderstanding and different consideration of the simple digitization process (the production of digital copies from objects) and the digital content managing (all the activities such as digital objects indexing, semantic annotation and management, metadata management, search, navigation, preview, browse, group, etc.);
- project tasks distribution and partners roles in the creation of new objects of knowledge;
- insufficient training, cognition, interest and desire of SSH specialists for transfer of SSH knowledge to digital world;
- ownership and property rights ambiguity and conflicts;
- inefficient usage of the product of the digitization process;
- misunderstanding of the digital tools and services that could maintain the SSH tasks, etc.

Concerning the above said and on the base of the wide range MLD team experience and profile, the following model for SSH and CS collaboration for joint projects in cultural digitization field is developed (see figure 1).

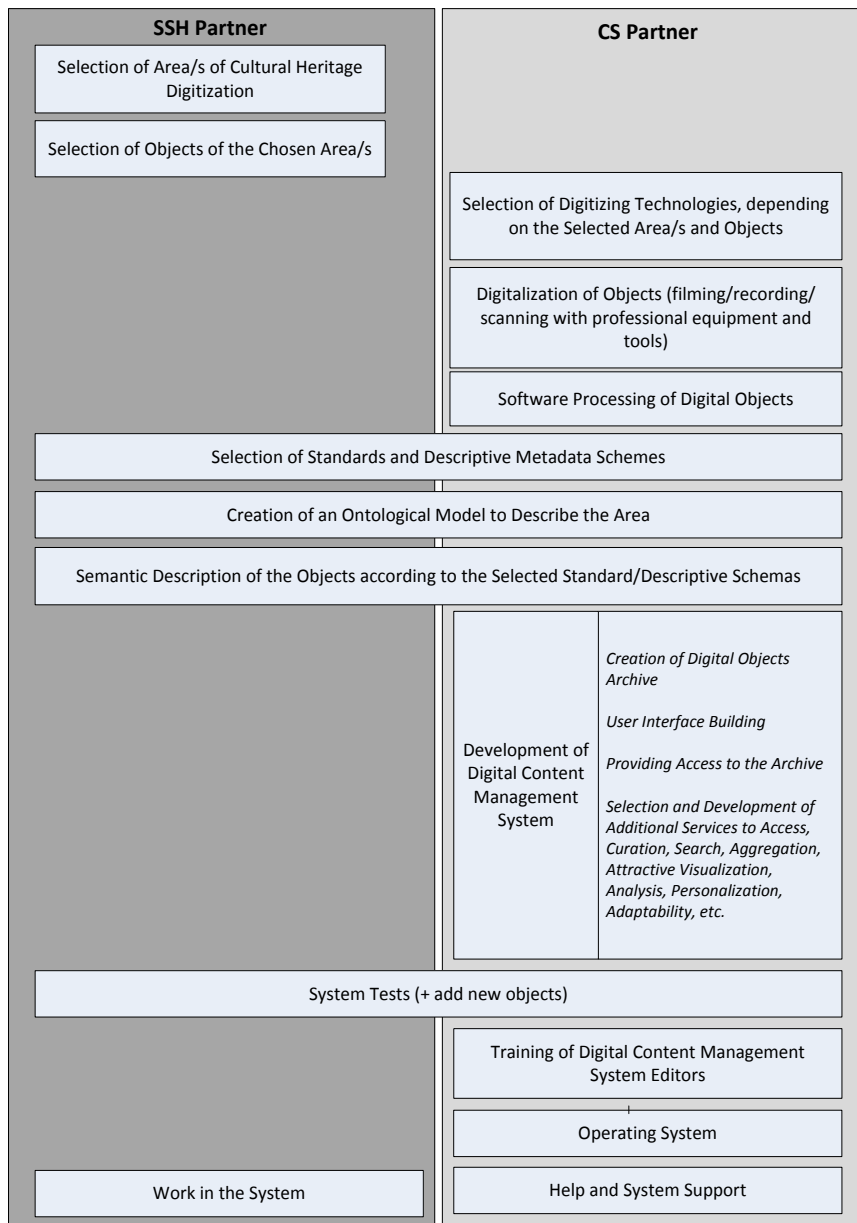


Fig. 1. Model for SSH and CS collaboration for joint projects in cultural digitization

This model is created to synchronize the cultural digitization activities of SSH and CS for better joint work understanding and effectiveness.

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