

Digital Humanities

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ABSTRACT: Digital humanities is a transdisciplinary scientific area that can be seen both as a research subject and as a methodological tool. It connects humanities with information and communication sciences, that is, it connects the pragmatic (user and programming) dimension with the media historical dimension of information technologies and their usage. The term digital humanities hasn't been established until the emergence of the Internet and realization of the importance of processing of and research over large data sets. Terms that were used before, such as Humanities Computing and Computer Linguistics have been replaced with the concept of humanities in the context of not only digital surroundings, but also digital artefacts as subjects of interest for scientists in the broad field of social sciences. In this paper, we outlined not only the history of Digital Humanities, but also the history of the ideas of digitization, i.e. converting data into another format of presentation, more complex for humans, but easier for machine, computer processing. It is important to point out that in this nexus of disciplines and scientific areas, avid representatives of digital thought are not in conflict with practitioners of digitization. Both of them, in spite of different traditions, follow the general line of the shared ideology of unfaltering confidence in the scientific truth provided by technology. The aim of this text is to reflect upon that truth from the perspective of socio-cultural historical archaeology of science and media.

KEY WORDS: Digital Humanities, Media theory, Historical methodology of digitization, History and philosophy of science, Computational linguistics, Actor-Network

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"Digital humanities" are a heterogenic field of research between IT, cultural studies and humanities in general. Recently, because of higher availability of digital data, they gained even more importance. The term "Digital humanities" has prevailed due to the wider usage of the Internet and it replaced the terms like "Computational Science" and "Humanities Computing", which have been used since the beginning of the computer era in the 60s. These terms were related mostly to the methodological and practical development

of digital tools, infrastructures and archives.

In addition to the theoretical explorations on science according to Davidson (2008), Svensson (2010), Burdick (2012) and Gold (2012), Digital humanities are divided into three trend-setting theoretical approaches, simultaneously covering the historical development and changes in the field of research according to the epistemological policy:

1. The usage of computers and digitalization of "primary data" within humanities and cultural

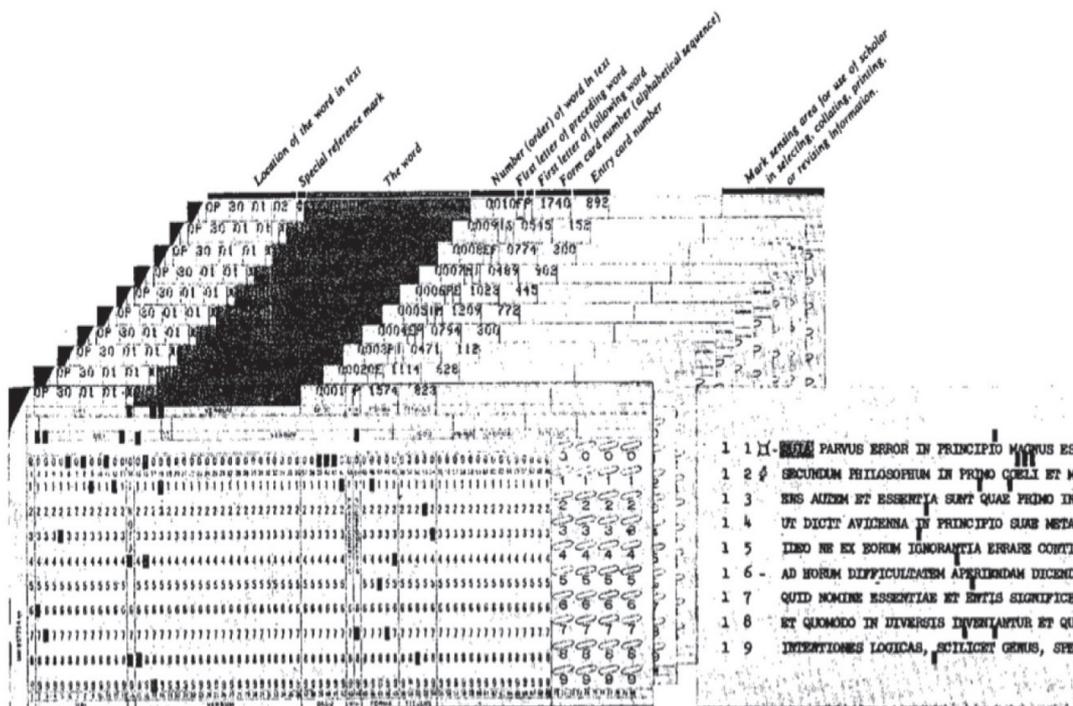


Figure 1. Roberto Busa and associates during the preparation of cards for the Index

studies are in the center of Digital humanities. On the one hand the digitization projects relate to the digitalized portfolios. On the other hand they relate to the computerized philology tools for the application of secondary data or results. Even today these elementary methods of digital humanities are based on philological tradition, which sees the evidence-driven collection and management of data as the foundation of hermeneutics and interpretation. Beyond the narrow discussions about the methods, computer-based measuring within humanities and cultural studies claims the media-like postulates of objectivity within modern sciences. Contrary to the curriculum of text studies in the 50s and 60s within the "Humanities Computing" (McCarthy 2005) the research area of related disciplines has been differentiated and broadened to history of art, culture and sociology, media studies, technology, archaeology, history and musicology (Gold 2012).

2. According to the second phase, in addition to the quantitative digitalization of texts, the research practices are being developed in accordance with the methods and processes of production, analysis

and modeling of digital research environments for work within humanities with digital data. This approach stands behind the enhanced humanities and tries to find new methodological approaches of qualitative application of generated, processed and archived data for reconceptualization of traditional research subjects. (Ramsey/Rockwell 2012: 75-84).

3. The development from humanities 1.0 to humanities 2.0 (Davidson 2008:707-717) marks the transition from digital development of methods within "Enhanced Humanities" to the "Social Humanities" which use the possibility of web 2.0 to construct the research infrastructure. Social humanities use interdisciplinarity of scientific knowledge by making use of software for open access, social reading and open knowledge and by enabling online cooperative and collaborative work on research and development. On the basis of the new digital infrastructure of social web (hypertext systems, Wiki tools, Crowd funding software etc.) these products transfer the computer-based processes from the early phase of digital humanities into the network culture of the social sciences.

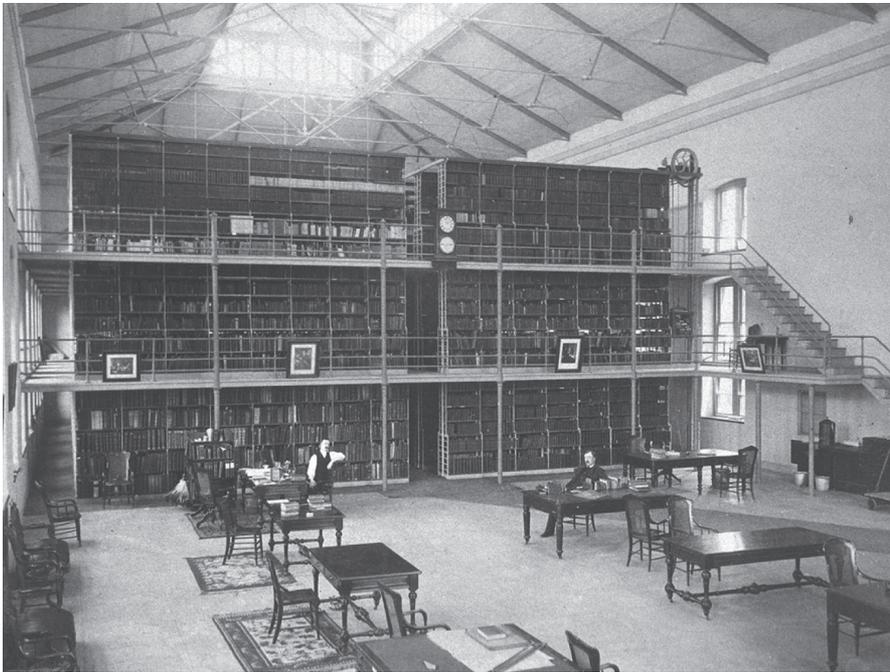


Figure 2. P. Tasman about the methods used in the Index of Roberto Busa

Today it is Blogging Humanities (work on digital publications and mediation in peer-to-peer networks) and Multimodal humanities (presentation and representation of knowledge within multimedia software environments) that stand for the technical modernization of academic knowledge (McPherson 2010). Because of them Digital Humanities claims the right to represent paradigmatically alternative form of knowledge production. In this context one should reflect on the technical fundamentals of the computer-based process of gaining insights within the research of humanities and cultural studies while critically considering data, knowledge genealogy and media history in order to evaluate properly the understanding of a role in the context of digital knowledge production and distribution (Thaller 2012:7-23).

1 History of digital humanities

Digital Humanities have been considered only occasionally from the perspective of science and media history in the course of last few years (Hockey 2004). Historical approach to the interdependent relation between humanities

and cultural studies and the usage of computer-based processes relativize the aspiration of digital methods on the evidence and truth and support the argumentation that digital humanities were developed from a network of historical cultures of knowledge and media technologies with their roots in the end of the 19th century.

Relevant research literature of the historical context and genesis of Digital Humanities regards as one of the first projects of genuine humanistic usages of computer a Concordance of Thomas of Aquino based on punch cards by Roberto Busa (Vanhoutte 2013: 126). Roberto Busa (1913-2011), an Italian Jesuit priest, is considered as a pioneer of Digital Humanities. This project enabled the achievement of uniformity in historiography of computational science in its early stage (Schischkoff 1952). Busa, who in 1949 developed the linguistic corpus of "Index Thomisticus" together with Thomas J. Watson, the founder of IBM, (Busa 1951; 1980: 81- 90), is regarded a founder of the point of intersection between humanities and IT.

The first Digital edition on punch cards initiated a series of the following philological projects: "In the 60s the first electronic version of 'Modern

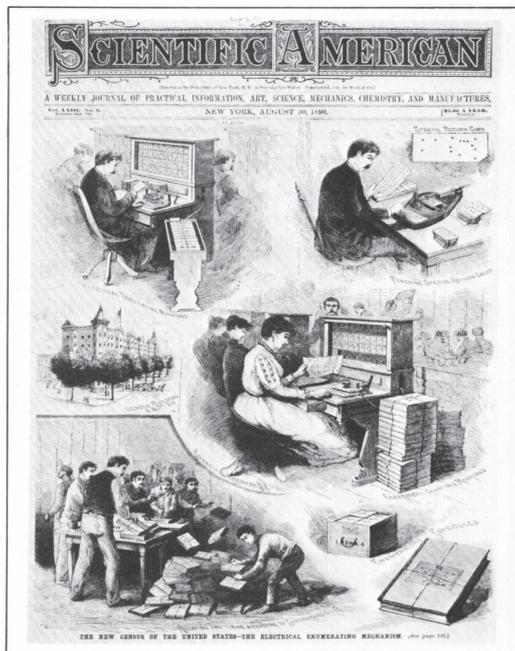


Figure 3. Library in the Army Medical Museum and Library

Language Association International Bibliography' (MLAIB) came up, a specific periodical bibliography of all modern philologies, which could be searched through with a telephone coupler. The retrospective digitalization of cultural heritage started after that, having had ever more works and lexicons such as German vocabulary by Grimm brothers, historical vocabularies as the Krünitz or regional vocabularies" (Lauer 2013:104).

At first, a large number of other disciplines and non-philological areas were formed such as literature, library and archive studies. They had longer epistemological history in the field of philological case studies and practical information studies. Since the introduction of punch cards methods, they have been dealing with quantitative and IT procedures for facilities of knowledge management.

It should be noted that the presentation and popular intermediation of research based on data relied on earlier cultures of data. Both historical continuity and a number of media turnovers which could be understood only if put in historical, social and cultural context chartered those cultures (comp. Gitelman/Jackson, 2013). Comparative analysis of data processing with an overview of

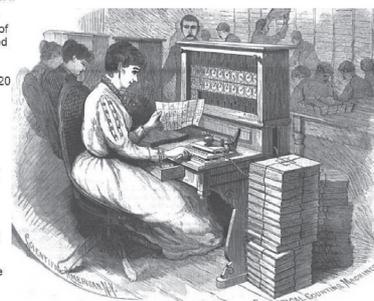
Hollerith Tabulator Keyboard

In the last issue of the VIE, we mentioned that the "first pass" of the 1890 census was completed in six weeks and that amazing feat was a result of using the Hollerith tabulator fitted with a 20 key keyboard rather than the "waffle iron" card reader.

This picture from an 1890 Scientific American magazine shows an operator keying directly from the census forms.

In the 1890 census, each form contained information for one household with up to five members.

Later cards were punched and used for detailed analyses. This picture also appears in the film loop shown above the abulator.



Hollerith Tabulator - Auto Feed

At the right is a tabulator, c. 1902, showing an automatic feed at the right. Also note that the abulator had 33 counters rather than the 40 that our 1890 replica has.

Above the machine is what appears to be a little bell. In 1890, the bell signalled successful reading of a card. Perhaps in 1902 it signalled an error in the auto feed.

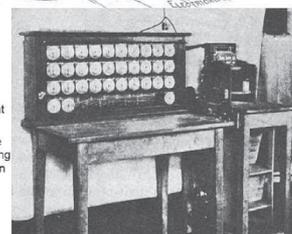


Figure 4. Front page of the journal in which advantages of punch cards compared to the older system are shown.

material cultural practice with regard to processing of data from 19th to 21st century, shows that as early as the 19th century mechanical practice in data processing procedure greatly influenced the taxonomy of epistemological interest of researchers – long before the computer methods of data collection appeared (comp. Driscoll, 2012). Since the introduction of the punch cards method various scientific disciplines have dealt with quantitative and computational procedures of knowledge management. That is how Kevin Driscoll did research on the genealogy of processing of big data in which he discerned three historical periods:

"The first period begins in the late-19th century with the development of mass-scale information processing projects and the electro-mechanical punched card systems that made them possible. Although these early machines were gradually replaced by programmable computers in the 1950s and 1960s, the organizational logic embedded in such systems persisted more or less unchanged until the 1970s. The second period is marked by the rise of database populism and the increasing availability of microcomputers in the late-1970s. Implementations of the relational data model enabled the production of more accessible interfaces for non-specialists and large

institutional databases were increasingly accompanied by small personal databases built by individuals and stored on microcomputers. In the third period, however, small personal databases receded from the desktop with the increasing sophistication of spreadsheet software and the diffusion of internet access. In the early 21st century, the demanding, task of tracking millions of users through highly-centralized communication systems such as Facebook brought about new approaches to database design that departed significantly from the previous four decades." (Driscoll, 2012: 6)

Driscoll's periodization of the history of Big Data forms a promising approach in the sense of revealing social and historical results of processing of such information. From this perspective one can notice that neither Busa's set up of research nor that method was without preconditions so they can be projected in the wider history of knowledge and archeology of media.



Figure 5. Table describing the writing keyboard and tabulator used for reading the cards.

As one can see, neither the research question nor the Busa's methodological procedure have been without its predecessors, so they can be seen as a part of a larger and longer history of knowledge and media archaeology. Sketch models of mechanical knowledge apparatus capable

of combining information were found in manuscripts of Suisse Archivar Karl Wilhelm Bürer (1861-1917, Bürer: 1890: 190-92). This figure of thought of flexible and modularized information unit was made to a conceptional core of mechanical data processing. The Archive and Library Studies took part directly in the historical change of paradigm of information processing. It was John Shaw Billings, the doctor and later director of National Medical Library, who worked further on the development of apparatus for machine-driven processing of statistical data, machine developed by Hermann Hollerith in 1886 (Krajewski 2007: 43). Technology of punch cards traces its roots in technical pragmatics of library knowledge organization; even if only later – within the rationalization movement in the 1920s – the librarian working procedure was automatized in specific areas. Other projects of data processing show that the automatized production of an Index or a Concordance marks the beginning of computer-based humanities and cultural studies for the lexicography and catalogue apparatus of libraries. Until the late 1950s it was the automatized method of processing large text data with the punch card system after Hollerith-Procedure that stood in the center of the first applications/usages. The technical procedure of punch cards changed the lecture practice of text analysis by transforming a book into a database and by turning the linear-syntagmatic structure of text into a factual and term-based system. As early as 1951, the academic debate among the contemporaries started in academic journals. This debate saw the possible applications of the punch-card-system as largely positive and placed them into the context of economically motivated rationality. Between December 13 and 16 1951 the German Society for Documentation and the Advisory Board of German Economical Chamber organized a working conference on the study of mechanization and automation of documentation process, which was enthusiastically discussed by philosopher Georgi Schischkoff. He talked about a "significant simplification and acceleration [...] by mechanical remembrance" (Schischkoff 1952: 290). The representatives of computer-based humanities saw in the "Literary Computing", starting in the early 50s, the first autonomous research

area, which could provide an “objective analysis of exact knowledge” (Pietsch 1951). In the 1960s the first studies in the field of computer linguistics concerning the automatized indexing of large text corpora appeared, publishing the computer-based analysis about word indexing, word frequency and word groups.

The automatized evaluation procedure of texts for the editorial work within literary studies was described already in the early stages of “Humanities Computing” (mostly within its areas of “Computer Philology” and “Computer Linguistics”) on the ground of two discourse figures relevant even today. The first figure of discourse describes the achievements of the new tool usage with instrumental availability of data (“helping tools”), the other figure of discourse focuses on the economical disclosure of data and emphasizes the efficiency and effectivity of machine methods of documenting. The media figure of automation was finally combined with the expectance that interpretative and subjective influences from the processing and analysis of information can be systematically removed. In the 1970s and 1980s the computer linguistics was established as an institutionally positioned area of research with its university facilities, its specialist journals (*Journal of Literary and Linguistic Computing*, *Computing in the Humanities*), discussion panels (HUMANIST) and conference activities. The computer-based work in the historical-sociological research has its first large rise, but it remains regarded in the work reports less than an autonomous method and it is seen mostly as a tool for critical text examination and as a simplification measure by quantifying the prospective subjects (Jarausch 1976: 13).

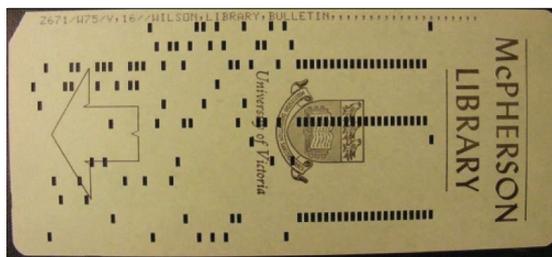


Figure 6. Hollerith’s tabulator used in Census, photographed probably in 1890

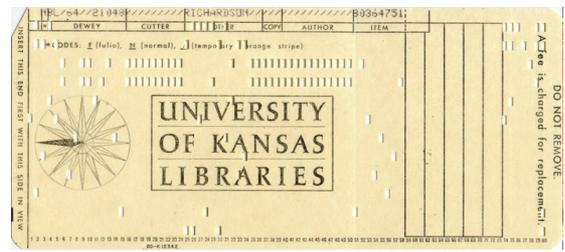


Figure 7. Example of a punch card from the University of Kansas Library



Figure 8 Programming with punch cards, second half of the 20th century.

A sustainable media turn both in the field of production and in the field of reception aesthetics appeared with the application of standardized markup texts such as the Standard Generalized Markup Language established in 1986 and software-driven programs for text processing. They made available the additional series of digital modules, analytical tools and text functions and transformed the text into a model of a database. The texts could be loaded as structured information and were available as (relational) databases. In the 1980s and 1990s the technical development and the text reception was dominated by the paradigm of a database.

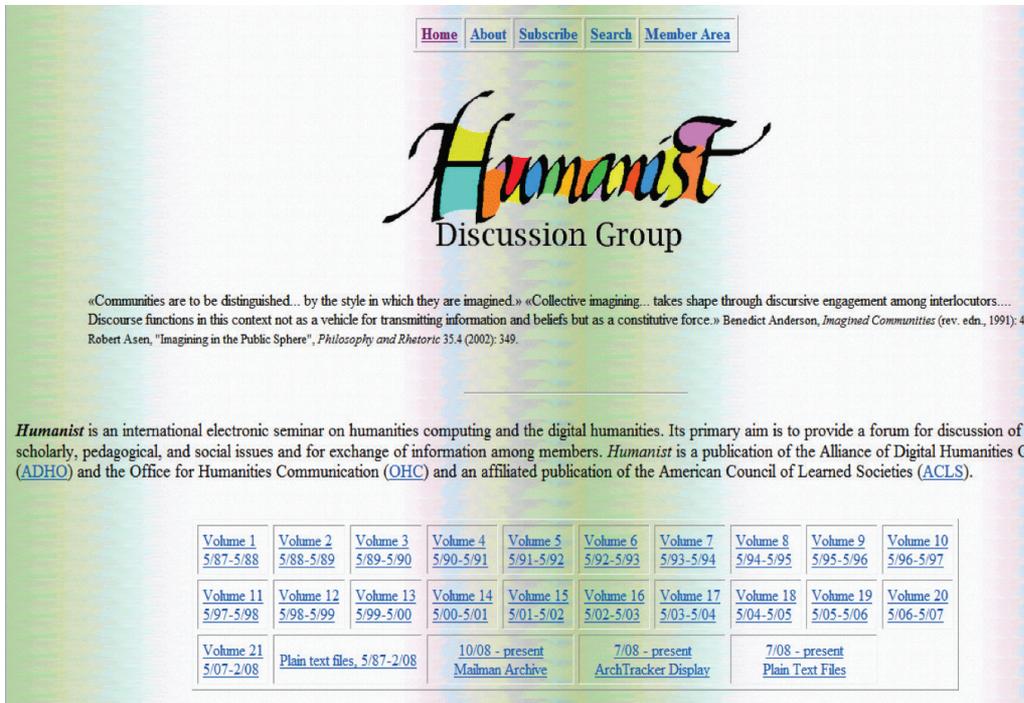


Figure 9. One of the early platforms for Digital Humanities was created in partnership with the King's College in London.

With the domination of the World Wide Web the research and teaching practices changed drastically: the specialized communication experienced a lively dynamics through the digital network culture of publicly accessible online-resources, e-mail distribution, chats and forums and it became largely responsive through the media-driven feedback mentality of rankings and voting. With its aspiration to go beyond the hierarchical structures of academic system through the re-engineering of scientific knowledge, the Digital Humanities 2.0 made the ideals of equality, freedom and omniscience attainable again.

As opposed to its beginnings in the 1950s, the Digital Humanities today have also an aspiration to reorganize the knowledge of the society. Therefore they regard themselves "both as a scientific as well as a socioutopistic project" (Hagner/Hirschi 2013:7). With the usage of social media in the humanities and cultural studies the technological possibilities and the scientific practices of Digital Humanities not only developed. But they also brought to life new phantasmagoria of scientific distribution, quality evaluation and transparency

in the World Wide Web (Haber 2012: 175-190). In this context Bernhard Rieder and Theo Röhle identified five central problematic perspectives for the current "Digital Humanities" in their text from 2012 "Five Challenges". These are the following: the temptation of objectivity, the power of visual evidence, black-boxing (fuzziness, problems of random sampling etc.), institutional turbulences (rivaling service facilities and teaching subjects) and the claim of universality. Computer-based research is usually dominated by the evaluation of data so that some researchers see the advanced analysis within the research process even as a substitution for a substantial theory construction. That means that the research interests are almost completely data-driven. This evidence-based concentration on the data possibilities can deceive the researcher to neglect the heuristic aspects of his own subject.

Since the Social Net is not only a neutral reading channel of research, writing and publication resources without any power but also a governmental structure of power of scientific knowledge, the epistemological probing of social, political

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<?xml version="1.0"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema">
  <element name="KM_Library">
    <complexType>
      <sequence>
        <element name="Book" maxOccurs="unbounded">
          <complexType>
            <sequence>
              <element name="Title" type="string" />
              <element name="Author_1" type="string" />
              <element name="Author_2" type="string" />
              <element name="Author_3" type="string" />
              <element name="Publisher" type="string" />
              <element name="Publish_Date" type="string" />
              <element name="Publisher_Location" type="string" />
            </sequence>
            <attribute name="category" type="string" />
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>
</schema>

```

Figure 10. Example of code in SGM (Standard Generalized Markup Language).

and economical contexts of Digital Humanities includes also a data critical and historical questioning of its computer-based reformation agenda (Schreibmann 2012: 46-58).

What did the usage of computer technology change for cultural studies and humanities on the basis of theoretical essentials? Computers did reorganize and accelerated the quantification and calculation process of scientific knowledge; they did entrench the metrical paradigm in the cultural studies and humanities and promoted the hermeneutical-interpretative approaches with a mathematical formalization of the respective subject field. In addition to these epistemological shifts the research practices within the Digital Humanities have also been modified, since the research and development are seen as project-related, collaborative and network-formed and on the network horizon they become the subject of research of network analysis. The network analysis itself has its goal to reveal the correlations and

relation-patterns of digital communication of scientific networks and to declare the Digital Humanities itself to the subject of reflections within a social constructivist Actor-Network-Theory.

What is the Actor-Network-Theory and what is its value in the field of digital media theory? The Actor-Network-Theory was established owing to the empirical turnover in the theory of science in the 60s. As a result, in the course of the theoretical and scientific development of this approach, social and cultural dimension of scientific knowledge came into the focus of contemporary research (Latour 1987). Scientific knowledge was observed as a result of social interest and technological materialization (Callon 1986: 19–34). The Actor-Network-Theory deals with and connects medialization processes, technical infrastructure, social activities and media content (Latour 2005). However, it does so with a clear focus on concrete situations and medial agency.

The Actor-Network-Theory can be understood

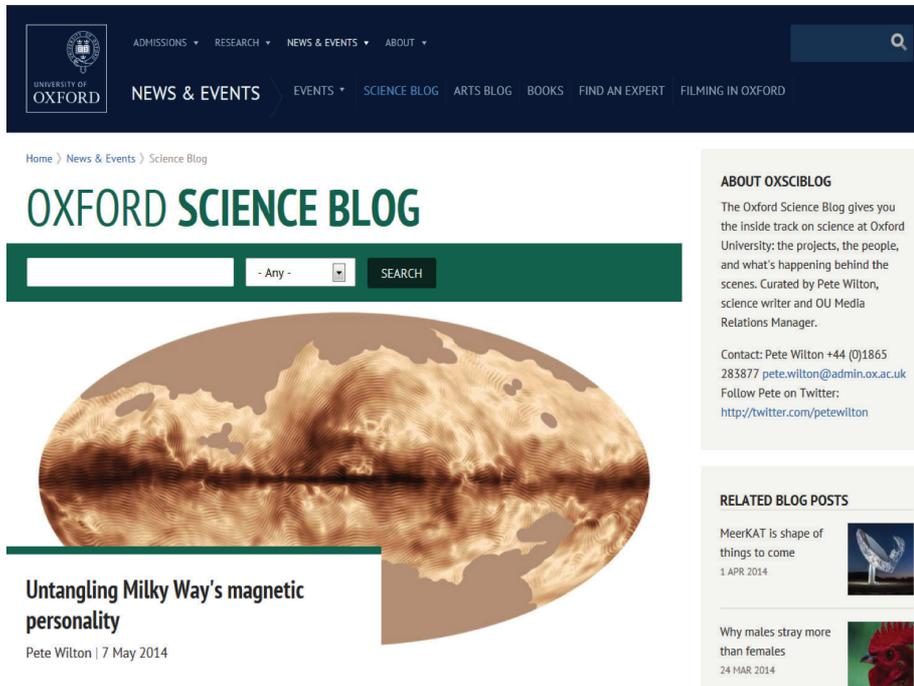


Figure 11. Internet page of the Oxford Science Blog



Figure 12. The concept of acting and the concept of medium are problematized from this perspective within the Actor-Network-Theory as it was shown Matthias Wieser in a critical discussion with Bruno Latour (2012: 199ff).

as a social media theory directed towards technology. Regarding digital humanities it opens the dialogue with transformative effects of digital technologies that register subjects and social structures. In that way, not only social networks become the object of research of digital humanities but also digital networking of agents in science configures research practice in a new way. Social media and digital networking technologies have transformed the whole spectrum of scientific activity from research to the development of education. In the processuality of social humanities 2.0 which is in constant emergence, scientific creativity and reception are in circular proportion of technology, subject, society and culture which can be understood as the effects of network. In this regard it goes not only beyond the dichotomy of technology and society but also the periodization which generalizes medial turnovers and transformations (such as for instance the Gutenberg galaxy according to McLuhan

from 1962 or the age of information according to Castell's from 1996). In a wider perspective¹ AMT deals with concrete actions and specific programmes, platforms, protocols, algorithms and applications which determine the mutual relationship between digital media and agents of digital humanities (comp. Latour 2012: 590–615). From the point of view of medialization of scientific knowledge AMT also looks at the importance of software in technology or culture, which enables networking of sciences into Peer-to-Peer networks which positions scientific creativity and communication in a new way. In that respect the Actor-Network-Theory and theoretical perspective of culture of networking for the purpose of digital production of scientific knowledge can give a significant contribution to the understanding of digital network agents which are in process of perpetual (re-)formation and which are always technically, socially, performatively and discursively constituted.

Note

This is the text corresponding to the lecture author gave at University library "Svetozar Markovic" which was published under title Digital Humanities in Jens Schröter (ed), Handbuch

Medienwissenschaft, Stuttgart/Weimar: Metzler 2014, 511–516. For Serbian audience and Infotheca journal the text has been additionally changed and enriched.

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Guest of the University Library "Svetozar Markovic" Ramón Reichert. Context and Relevance of Ramón Reichert's Data Theory

Jan Krasni

For the sake of better understanding of the text by Ramon Reichert, readers need to be given an explanation about the subject of his scientific interest, of his academic development, his area of research that is being studied in the tradition of the theory of media in the German speaking region (Medienwissenschaft) and the references that are offered in the paper, and might not be recognizable to those readers who do not know enough about German scientific trends in Humanities. It is not our intention to underestimate the reader, of course, but to explain the context in which the need for the theme, offered by Reichert in his lecture given in April 2014 in Belgrade, arose.

Ramon Reichert is a professor at the University of Vienna and is considered as one of the leading theoreticians of culture and media of the middle generation in Austria. After finishing his studies in Germany, Austria and Britain, he obtained his PhD at the University of Vienna, and obtained his habilitation at the University of Linz.

After successful work as a chief-researcher at the Institute for European History and Public of the Ludwig Boltzmann Institute in Vienna and serving the function of the Art Director/Head curator in the Siemens Art Program, he was awarded with the Theodor Körner Award for his research endeavor *Media Cultures of Life. Biopolitics in the 19th and 20th century*. Finally, from the position of an associate at the International Research Centre for the Theory of Culture, he got promoted to the professor rank at the Institute for Theory of Theatre, Film and the Media of the University of Vienna. Since 2014, he has organized a study program called *Studies of Data* at the University of Krems, in which the phenomenon of Big Data and related disciplines are being studied.

Reichert's research focuses on history and the theory of media on one side, and on the other side, it sheds light on the social and cultural processes based on technical and scientific development. The development itself is not only a

result of individual or group efforts, but is seen as a consequence of a discursive process whose actors can be recognized only through analysis, as (not adequately clarified) historical givens, (inter) cultural influences or scientific and ideological paradigms. His analytical approach implies methodic pluralism and interdisciplinarity because the research subject itself is heterogeneous. As the area of his scientific interest, Reichert concretely states visual documentary media, the phenomenon of visual culture, technical history of the media, theory of the media narrative, archeology of the media as well as history of the media discourse. Of course, the media phenomenon cannot be observed without the contents created through them. Apart from that, the term medium itself need not be reduced to the technical-apparatus dimension, but should be expanded to the processes it conditions in everyday life, or processes that lead to its creation.

The following titles are considered as Reichert's significant publications: *Discourse of Epidemic. Social Pathologies from 1700 to 1900* (*Der Diskurs der Seuche. Sozialpathologien 1700-1900*, München: Fink 1997), *Constitution of social world. On Epistemology and Critic of Cognition in Humanities, Social Sciences and the Theory of Culture* (*Die Konstitution der sozialen Welt. Zur Epistemologie und Erkenntniskritik der Human-, Sozial- und Kulturwissenschaften*, Frankfurt a.M./ New York: Lang 2003), *Knowledge of the Stock Market. Media and Practice of the Financial Market* (*Das Wissen der Börse. Medien und Praktiken des Finanzmarktes*, Bielefeld: transcript 2009), *The power of Many. On the New Cult of Digital Networking* (*Die Macht der Vielen. Über den neuen Kult der digitalen Vernetzung*, Bielefeld: transcript 2013).

In his paper, Ramon Reichert wishes to offer not only a chronological overview, but also a theoretical-historical development of Digital Humanities (DH) and the change of the center of gravity of various schools, that is to say, individuals who

left their mark on them. Since the very beginning and different comprehension of the role of computers depending on the discipline, up to the entire ecology of media formats, that is to say, technological and computer/digital world as subject matter of DH, there is a plethora of different scientific and ideological destinations. Reichert wishes to show that the DH themselves are in a way a fruit of faith in the superiority of machine processing as an a priori objective, and therefore advantageous compared to the human kind. At the same time, he recognizes a similar ideology in the fashion of visualization and transformation of Big Data into graphic i.e. visually portrayable forms. Reichert sees the early phase of digitization in the use of the system of punch cards in library catalogs which allow for quicker finding of artefacts/documents compared to the older practice of registers. Digitization represents a change of the paradigm which is in part independent from the ideological commitment. In that regard, Reichert points out the collaboration of catholic clergymen with an IBM engineer as the first step in computer processing of text, i.e. computational linguistics within DH. With this, he doesn't as much show the intention to ironically remark on the way that subdiscipline emerged and that religion, contrary to popular opinion, doesn't have to stand in the way of scientific development,

as he wants to draw attention to the necessity of transdisciplinary engagement for the achievement of sustainable scientific trends. Despite the fact that he doesn't represent his school of thought explicitly in order to keep perspective and narrative position of the archeologist of discourse, Reichert still has to point out the future tendencies which are already outlined in sociological and ethnological research of interaction between human actors and inanimate entities, that is the Actor-Network Theory.

Gaining insight into the history of merging of digital tools and computing with the Humanities, as well as getting acquainted with the Digital Humanities in a broader sense in the German speaking region, and trying to think through the methods and the meaning of the discipline itself, we can, after reading the text that was especially adapted for the Journal Infotheca and for Serbian audience, be happy that we had Ramon Reichert as our guest and that our own discussions can be extended, if not completed with this approach that differs from the mainstream approaches in the English speaking region and helps us to give a subjective critical review of our subject interest and to think it through, maybe even finding original ways of usage and change of digital approach for the sciences of the spiritual sphere.