Library and information science and the digital humanities

Perceived and real strengths and weaknesses

Tibor Koltay
Department of Information and Library Studies, Szent István University, Jászberény, Hungary

Received 22 January 2016
Revised 3 March 2016
Accepted 5 March 2016

Abstract

Purpose – Library and information science (LIS) and the digital humanities are both interested in studying recorded information and often share institutional frameworks. The purpose of this paper is to go beyond outlining these similarities by examining the perceived and real strengths and weaknesses of both disciplines.

Design/methodology/approach – Epistemologies and methods of both disciplines are analysed, principally in the light of the growing importance of data-intensive research, taking into consideration that there is a tension about the academic status of these disciplines.

Findings – Epistemologies and methods of both disciplines are analysed, principally in the light of the growing importance of data-intensive research, taking into consideration that there is a tension about the academic status of these disciplines.

Originality/value – The paper intends to be an add-on to the recent discussions and the evolving body of knowledge about the relationship of these disciplines with the hope of indicating a possible new direction in the development of LIS.

Keywords Strengths, Digital humanities, Library and information science, Digital turn, Epistemologies, Weaknesses

Paper type Viewpoint

Introduction

It is clear that library and information science (LIS) and the digital humanities (DH) have close links with each other. They are similar in several respects and there are even synergies between them, even though the nature of their relationships is often unclear (Robinson *et al.*, 2015). Therefore, this writing intends to be a modest contribution the discussion about the nature of the relationship between the two disciplines by examining the perceived and real strengths and weaknesses of DH on LIS, first of all in the light of the growing role of data-intensive research.

Following the Wikipedia definition, accepted by a notable digital humanist, Matthew Kirschenbaum (2010) as a working one, we can define DH as an interdisciplinary field of study, research, teaching and invention concerned with the intersection of computing and the disciplines of the humanities. It involves investigation, analysis, synthesis and presentation of information in digital form. It studies how these media affect the disciplines in which they are used, and what these disciplines have to contribute to our knowledge of computing. In using this definition, we can follow the advice of Robinson *et al.* (2015), according to whom it is helpful to take the "Big Tent" understanding of DH, which regards it as "the study of what happens at the intersection of computing tools with cultural artefacts of all kinds" (Svensson, 2010).

As to LIS, it is also sensible to take a broad definition, based on the idea that it is associated with the study of the whole communication chain of recorded information: from creation, to use, through organization, management and dissemination (Robinson, 2009).

Journal of Documentation
Vol. 72 No. 4, 2016
pp. 781-792

0022-0418
DOI 10.1108/JD-01-2016-0008

Sciences of information

The main similarity between the two disciplines is in their general focus on study and practice of recorded information, i.e. documents in a broad sense that encapsulates all "containers" of recorded knowledge (Robinson *et al.*, 2015). In the case of LIS, this preference seems to be obvious, but DH is also deeply interested in text and in interpreting written documents (Schreibman *et al.*, 2004; Alvarado, 2012). The background to this assertion is given by the concept of "information as-thing", which covers anything that is physical perceived as signifying. Texts are a variety of this form of information, while the technical term, used for it is document (Buckland, 1991). Therefore, both LIS and DH can be considered to be "sciences of information", i.e. disciplines that are interested in the study of information.

Shared and differing epistemologies

Strengths and weaknesses of a discipline are deeply rooted in its epistemological traditions. In this paper, epistemology is understood as a framework, which – besides of describing how people acquire knowledge – examines how intellectual access to knowledge can be facilitated (Shera, 1970, cited by Fallis, 2006).

In this sense, the epistemologies of LIS and DH show both similarities and differences. An obvious difference between the two disciplines is that DH is deeply rooted in the humanities, while there seems to be a consensus about LIS being one of the social sciences (Harris, 1986). Nevertheless, many of its subfields address issues and use methods, taken from the humanities, thus – on the whole – LIS has a strong humanities tradition (Cronin, 2008b). The concept of relevance, for example, would be unimaginable without making use of philosophy of language and semantics (Budd, 2004). Some degree of similar interdisciplinarity is present also in the DH, as it has developed alongside of corpus linguistics, which is situated on the boundary between the humanities, the social sciences and the applied sciences (Fry, 2006).

Both disciplines are influenced by the data-intensive paradigm of scientific research, which is not limited to the natural sciences and is often called as the fourth paradigm of science (Lynch, 2009).

Besides the strong common feature of being interested in recorded information, the motivating force of the prevalence of data is clearly discernible in DH, because most DH projects rely heavily on the interpretation of data (Gibbs, 2011). DH is directed to a substantial extent by the assumption that data can be interpreted as texts, and – conversely – texts can be interpreted as data. A leading digital humanist, Trevor Owens (2011) claims that data, as a constructed thing is a species of artefacts. As authored object created for particular audiences, data can be interpreted as text, open to subsequent interpretation and analysis (Owens, 2011). Christof Schöch (2013), a researcher in digital philology adds that data in the humanities is not only digital and selectively constructed, but it is a machine-actionable abstraction that characterizes some aspects of a given object of humanistic inquiry. This also means that in many cases it offers only a partial representation of the object of study. However, it is often the only window into the object of study.

On the "LIS side", Nielsen and Hjørland (2014) affirm that when data is recorded and supplemented with metadata, it should be considered as a type of document. The characterization of data, information, knowledge and document by Liangzhi (2015) shows a slightly controversial picture. At the operational level, we see that both data and documents are transmittable and retrievable. From the ontological point of view, data and information are much closer to each other as both assume existence as signs,

though information consists of meaning attached to the signs. The difference grows at the epistemological level, where data can be qualified as non-informative due to the lack or presence of meaning, while documents are regarded to be informative.

On a more applied level, the interest in research data could prove to be a cultural moment for LIS (Weber, 2013), and there are already signs that LIS researchers pay attention to the consequences of data ubiquity. LIS has to be taken here in a wide sense as data-related issues are usually discussed not so much in relation to LIS, but as a new paradigm of science (see, e.g. Frické, 2014; Ekbia *et al.*, 2015).

DH is not one, coherent entity and it is characterized by tensions in general and between different epistemic traditions. It does not seem to privilege theoretical work that is integral to other parts of the humanities (Svensson, 2009; Liu, 2011). This indicates that DH requires bridges to other disciplines (Svensson, 2010). Despite the already existing contacts, there may be a strong bridge, built to LIS. If there are weaknesses in any of the two disciplines, such a bridge could easily turn some of them into strengths.

DH is struggling to understand the effects of a growing digital infrastructure as a system for knowledge production in the humanities. Such thinking may be extended to the act of looking at the digital component of the DH by thinking critically about the ways, how knowledge in the twenty-first century is transformed into information through computational techniques. In this process, computational devices require a given object be translated into the digital code that the computer can understand (Dalbello, 2011). Consequently, there is a need for acquiring a deep understanding of the mutual co-constitution of technology and of the human component (Frabetti, 2011). This goal is not just meaningful, but fundamental for both disciplines. In its turn, but in a similar vein, LIS interrogates the possibility of positively influencing the cyber-infrastructure (Dillon, 2007), addressing in this way an issue that has been qualified by Bawden and Robinson (2012) to be one of the "big questions" of LIS. Such an objective is also in accordance with the view of Wilson (2010), who departs from the existence of information society and sees LIS "as a central synthesizing discipline in understanding not simply information, but the world we live in".

Both LIS and DH are disciplines, which emerged, at least in part, from service functions associated with the academic use of recorded information, thus they still have a tension between their status as an academic discipline and as a support function for research in other disciplines (Robinson *et al.*, 2015). This causes difficulties for both disciplines in identifying their status, i.e. they may be identified as an academic discipline or a support function for research in other disciplines (Warwick, 2012). Notwithstanding – if this is a weakness – it can be overcome in the course of time by further investigations.

The development of DH has been characterized by movements both from inside out and outside in. While having a solid and well-established theoretical background in the "traditional" humanities, DH is often more concerned with method than with theory, first of all because methodological debates are more easily resolved than theoretical ones (Cecire, 2011).

DH honours the quality of results; but it also appreciates the steps by which results are obtained. It seeks to expand the range of scholarship, while accommodating its earlier epistemologies (Schnapp and Presner, 2009).

In comparison to the DH, the development of LIS seems to have followed a relative simple trajectory, which can be described as a movement from outside in. This means that in its case practice clearly preceded theory, i.e. LIS grew out of the professional

practice of librarianship. Though the relationship between discipline and profession is often difficult (Bawden, 2008), the "directional" origin of both disciplines is neither strength, nor weakness. The same is true about their cultural dimension, where culture is understood as a "complex whole that includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man as a member of society" (Tylor 1871, p. 1). Being actively engaged in the cultural sphere is related to the use of recorded information (Buckland, 2012), while LIS is anchored – among others – to the disciplines of the cultural record that have roots in the humanities (Bates, 2010). The reliance of the DH on computation also has an undeniable cultural dimension, because computer code can serve as an index of digital culture (Berry, 2012).

Technological determinism is a debated issue, so its influence on the development of the two disciplines may provoke controversies. For instance, Dalbello (2011) asserts that the development of DH has been characterized by technological determinism, coloured by an optimism about the democratizing power of technology.

The digital "side" of the DH is strongly informed by a narrative of technological progress, while the humanities side has strong roots in a humanities sensibility. However, this equilibrium may be questioned (Flanders, 2009).

Partially related to the questions of technological determinism is the use of big data, which offers the humanistic disciplines more possibilities of quantifying different phenomena, so that they can claim the status of quantitative science and objective method (Gordon-Murnane, 2012). This is one of the reasons, why DH uses massive stores of digital data to renew its theoretical traditions (Schmidt, 2011). Mathematical and statistical methods are often borrowed from computer science and the natural sciences. However, translating such methods to the DH is far from being trivial (Bruns, 2013).

DH evolved to a substantial extent from humanities computing (HC), which is about the applications of computing to research and teaching within the subjects of the humanities, maintaining in this way a very instrumental approach, where information technology is typically not seen as an object of study, an exploratory laboratory or an activist venue. It focuses rather on using existing tools, while being largely interested in methods and methodology (Svensson, 2009).

In contrast to HC, DH has a utopian core. A thorough analysis of the DH Manifesto 2.0, in which the word revolution repeatedly appears, shows this. DH is based on the understanding that print is no longer its exclusive and normative medium, because digital tools, techniques, and media have altered the production and dissemination of knowledge. Therefore, it is suggested that DH "must shape a future in which the medium-specific features of digital technologies become its core and in which print is absorbed into new hybrid modes of communication" (Schnapp and Presner, 2009). In accordance with this, DH is clearly attached to the ethos of social media in general and many DH scholars intend to replace the "read-only" ethos of the humanities with a "read/write/rewrite" ethos (Burdick *et al.*, 2012). All these features can be interpreted as signs of technological determinism. However, the pervasive influence of information technology is a reality that has to be approached by taking its complexity into consideration.

As to the use of social media for research purposes, Manovich (2015) goes further, by asserting that DH scholars use computers to analyse mostly historical artefacts created by professionals, while social computing (SC) allows for the study of items, created by the general public and enables their examination in a larger magnitude by analysing social media contents. He adds that there is already an overlap between DH and SC when computational methods developed to study contemporary user-generated content are applied to historical artefacts created by professionals. In the case of

"big cultural data," used for SC, the cultural and the social closely overlap. In other words, it enables combining the concerns of the sciences, the social sciences and the humanities to study the general and the regular with the individual and the particular.

Compared to the mainstream humanities, DH lacks cultural criticism in the sense that digital humanists rarely extend the issues involved into the register of society, economics, politics or culture (Liu, 2011). This thinking clearly shows similarity to the general development of LIS – seen both in its methodological and epistemological aspect – that led from focusing on the mathematical theory of information towards giving attention to meaning in a social perspective (Hjørland, 2014). Some of its turns exemplify this development. The cognitive turn focused on the cognition of information users, thus it has been criticized for alienating researchers from a sociological perspective (Nolin, 2007). As it is well known, there was also a sociological turn in LIS, though the appropriate attribute would be social, because this discipline has long been receptive to sociological thinking (Cronin, 2008a). The social perspective continues to be present in the socio-cognitive paradigm (also referred to as domain analytic paradigm) that provides an alternative to methodological individualism (Hjørland and Albrechtsen, 1995).

LIS is clearly tied to information technology and has to count with its constraints (Saracevic, 1999). Nonetheless, being determined by information technology is different in its case, as it always has been depending on the actual information technology of the given period, which is today a computing one.

In any case, researchers in both disciplines should be aware, how delicate it is to use networks as tools of investigation. As Weingart (2011) warns us, networks should be used on far fewer instances and circumstances, especially if not accompanied by theoretical and philosophical caveats. Zaagsma (2013) notes the relative lack of debate and reflection on these issues in DH, and confirms that the tendency towards technological determinism needs to be balanced by more attention to methodological and epistemological considerations. He reminds us of the opinion, expressed by Busa (1980) that computers have to be used in the humanities not only in order to lessen human effort and time. Their role is rather to enhance the quality, depth and extension of research.

In general, we can say that DH uses technology to create new objects for humanistic interrogation (Schmidt, 2011). It is "the application of information technology as an aid to fulfil the humanities' basic tasks of preserving, reconstructing, transmitting, and interpreting the human record" (Frischer, 2011, p. 28). We can turn this the other way round, saying that the DH goal is to study the effects of the human record on the development and use of information technology (Schreibman *et al.*, 2004). The latter objective clearly coincides with the one of LIS.

The ties of both disciplines to culture have already been mentioned. It is fundamental for them to find the ways of exploring the cultural dimension of computation by going beyond an understanding of culture through digital technology (Porsdam, 2013). Such thinking requires us to look at the digital component of the DH by studying how changes in media result in epistemic changes, how knowledge is transformed into information through within software. To achieve this, cultural objects have to be translated into the digital code by discrete encoding (Berry, 2011), because the essence of the digital can be boiled down to the discrete code, typically a binary one (Evens, 2012).

We know that computer code has a number of functions. It is a tool, a historical record and the basis of the theoretical canon of DH as it defines its borders, even though the precise level of this understanding has not been defined yet. Nonetheless, many

digital humanists consider it to be a *sine qua non* of entry to the field, obviously alongside with being knowledge of the humanities themselves (Smithies, 2014).

The code has the power to enable new communicative processes, and with the increasing social dimension of networked media, the possibility of new and exciting forms of collaborative thinking arises (Berry, 2011). Therefore, concentrating on computational or data-centric subjects involves the development of the – already mentioned – humanistic understanding of technology (Berry, 2011). This thinking should be supplemented by engaging with software as a problem of reading and writing, adding that the textual aspects of software make the concept of the document more than a simple metaphor (Frabetti, 2011). Requiring humanistic understanding and giving attention to reading and writing shows the tendency of the desire to avoid being overly committed to deterministic thinking and perspectives.

The real question for both disciplines is if software and code can bring in something truly collaborative that takes us beyond blogs, twitter feeds, and so forth, and "make possible something truly collaborative – something like the super-critical thinking that is generative of ideas, modes of thought, theories and new practices" (Berry, 2011, p. 8).

Common strengths and weaknesses

The nature of DH has, been contested from its origins (Terras *et al.*, 2013). The same is true for LIS, though not to the same extent as for DH (Robinson *et al.*, 2015). This may lead to a conclusion that both are weak disciplines. However, such judgements may prove premature.

LIS has been named by various terms (Schrader, 1984), from which the term information science still prevails. The DH developed from HC. The terms of both disciplines reflect discursive shifts and changes in the respective epistemologies. Nonetheless, HC has been renamed to DH, even though Svensson (2009) asserts that this renaming is not necessarily congruent with a broad and inclusive notion of the DH. This naming issue may be a weakness for both disciplines to a different degree. Nonetheless, it can be a sign of an ongoing and perhaps healthy discourse about the nature of the given discipline.

Another proposition, open to discussion, is that LIS is a small discipline in the sense that it cannot be expected that most universities will have a department of LIS (whatever term we use to cover the discipline), in the way that we might expect to find departments of mathematics, history, etc. However, small numbers do not necessarily mean weakness. By being a multi-faceted meta-discipline, LIS is also scattered. This means first of all that people doing work in this field are not always found in departments of that name. Even, when there are LIS departments, they are to be found in different areas of the academic structure: technical schools, humanities faculties, social science faculties, business schools, etc. Neither this is a weakness. On the contrary, it is strength, because it ensures that the discipline should always find a home for itself. Being a small discipline in the above sense seems to be true for DH, as well (Bawden, 2015). Having said this, we should not forget that LIS and DH are often located in the same academic units (Robinson *et al.*, 2015).

The disagreements about LIS being a scholarly discipline or not, can be answered by stating that it is both a profession and an academic discipline (Robinson, 2009). Nonetheless, the lack of sufficiently strong centripetal forces keeping the field together is a weakness, which could be resolved if we would be more generally concerned about the field as a whole and would not forget about its historical perspective (Hjørland, 2014).

The DH is not a unified field, but an array of convergent practices (Schnapp and Presner, 2009). Besides having strong fundamentals, it is pragmatically oriented (Dalbello, 2011), and it has a craft-like nature (Cecire, 2011), which shows similarities with the relationship of LIS to librarianship. Like in the Wikipedia definition, mentioned above, one of the potential ways of conceiving DH is defining it as a field of study (Gardiner and Musto, 2015). This approach is similar to the definition of LIS as a field of study in the sense that it is focused on a topic or subject of interest, using any of the forms of knowledge, which may be helpful in studying it (Bawden and Robinson, 2012).

All these features can be judged to be a weakness, but also as strength. Nonetheless, there is an obvious – though highly debated – field of DH, where we should look for weaknesses: it is the negligence and lack of methodology, already touched upon in this paper.

Besides the warnings, mentioned above, Rieder and Röhle (2012) suggest that there is a need to dig deeper into the methodological assumptions that are folded into the new tools of research. In regard to digital tools, Dalbello (2011) identified an urgent need in developing criteria, which would guide the use of technology to maintain the ideals of humanistic endeavour. Such suggestions are highly pertinent as digital tools of interpretation are core epistemological resource of the DH on the one hand.

"Hacking" seems to be a pervasive expression in the discussion around DH that denotes one of its dominant branches that appeared first of all due to the immanence of computer code (Smithies, 2014). Hacking is related to the epistemologies of doing, i.e. it is understood as making by doing. Such experiential knowledge is also called tacit knowledge (Cecire, 2011). In the DH, "a hacker is a person who looks at systemic knowledge structures and learns about them from making or doing"(Suiter, 2013).

This thinking is similar to the ways, when experimentalism became legitimated in the early modern period. In the language of the DH, the importance of doing is reflected by using expressions, associated with manual labour. The perhaps most widely known example of this is mining. This epistemology is experiential and extra-discursive. Being extra-discursive signifies in this context that saying is separated from doing and knowledge is produced by doing (Cecire, 2011).

What counts more is that Porsdam (2013) argues for a qualitative turn in DH that goes beyond making accessible more information by making sense and asking for understanding. He adds that there is a risk for DH if it wants to compete with the natural sciences by doing objective research, with the aim of reducing human bias and emotion. Schmidt (2011) also reminds us that "work in digital humanities should always begin with grounding in a theory from humanistic traditions. If it doesn't, it will aimlessly reproduce a problematic social world". On the other hand, he adds that the only possible route to renew its theoretical traditions is to use massive stores of digital data. Piez (2008) turns towards "media consciousness" of the digital age, which is "a particular kind of critical attitude analogous to, and indeed continuous with, a more general media consciousness as applied to cultural production in any nation or period". He adds that critique may imply refiguration and reinvention, i.e. DH should go beyond studying digital media, by being concerned with designing and making them. The latter idea answers the question asked by Kaplan (2015), if DH is exclusively about building things or is there room for purely interpretative approaches. The need to take into account the culture of long-established print scholarship and to establish links between the digital and the textual traditions is stressed by Warwick (2004).

As already mentioned, research in DH is often tied to big data. In general, big data research is rarely an end in itself, and does not replace other approaches. It is rather

used for initial exploration of datasets and for pinpointing the specific areas that will prove most fruitful for established analytical repertoire of investigation, i.e. close reading or ethnographic observation (Bruns, 2013). Owens (2011) asserts that data is not in and of itself evidence. Computers detect quantity, not quality, which means that scholars must change the nature of the questions they ask. Jones (2012) takes literary examples to illustrate that quantitative data allows inquiries, which can enlighten several factors of commercial success of an author. However, it cannot answer questions, about the artistic and aesthetic values of a given novel or short story.

Robinson (2014) argues that bigger is never better of itself, in the sense that there is a need for more tools that empower the individual instead of engaging in more grand, all-embracing solutions. Accordingly, there is a tension between DH that uses big data and the one that is built on small data. The latter aims at using more focused methods for the study of well-bounded samples instead of applying massive data processing, and sees appropriate to turn towards other interdisciplinary dimensions that link computer science and humanities research (Kaplan, 2015).

The concept of big data can be supplemented with smart data. The former is relatively unstructured, messy and implicit, relatively large in volume, and varied in form. The latter is semi-structured or structured, clean and explicit, as well as relatively small in volume and of limited heterogeneity. TEI documents prototypical examples of smart data, because they follow the relatively flexible data model of the Text Encoding Initiative[1], and are usually semi-structured (Schöch, 2013).

The opinions about the ability of LIS to import ideas from, and export ideas to other disciplines are far from being unanimous. Bawden (2015) says that it fails to do so, while adding that "where LIS does develop genuinely new and interesting ideas, other disciplines absorb them as their own". According to Cronin (2008b) and Buckland (2012), LIS has imported knowledge and methods from other disciplines, then exported ideas to different fields, such as computer science and management. The close relationship of DH to computing inn this regard is well known. Obviously, it would be a schematic view to regard importing as a weakness and exporting strength. The effects of these processes are much more subtle and complex.

Conclusion

This paper attempted to provide a non-exhaustive examination of the shared epistemologies of LIS alongside with their respective strengths of weaknesses. Therefore, two answers have been found to the question asked in the title of this paper. The first one is affirmative: LIS and DH do "meet", and they have common interfaces, also on the level of shared epistemologies, and should have more shared interest. The second answer is negative: the two disciplines are not unequivocally weak. Obviously, both have weaknesses, must face their debated issues and have to solve problems that originate in the fact that they do not pertain to the well-established "big" disciplines.

If we want to identify further research, it can be said that, on the long run, studying the relationship between the two disciplines could lead to answers about two points, identified by Bawden and Robinson (2012) as pertaining to the future research questions of LIS. One of them is about the relationship of LIS with research in other domains that also address information. The second one looks for the possible ways of making use of principles applied to other sectors where information is used.

Note

1. http://www.tei-c.org/index.xml

References

Alvarado, R. (2012), "The digital humanities situation", in Gold, M.K. (Ed.), *Debates in the Digital Humanities*, Minneapolis, MI, available at: http://dhdebates.gc.cuny.edu/debates/text/50A (accessed 22 January 2016).

Bates, M. (2010), "An operational definition of the information disciplines", *IConference 2010 Proceedings, University of Illinois, Champaign, IL*, pp. 19-25, available at: http://nora.lis.uiuc.edu/images/iConferences/2010papers_Allen-Ortiz.pdf (accessed 22 January 2016).

Bawden, D. (2008), "Smoother pebbles and the shoulders of giants: the developing foundations of information science", *Journal of Information Science*, Vol. 34 No. 4, pp. 415-426.

Bawden, D. (2015), "On not being a weak discipline", Blogpost on the occasional informationist blog on July 6, available at: http://theoccasionalinformationist.com/2015/07/06/on-not-being-a-weak-discipline/ (accessed 22 January 2016).

Bawden, D. and Robinson, L. (2012), *Introduction to Information Science*, Facet, London.

Berry, D.M. (2011), "The computational turn: thinking about the digital humanities", *Culture Machine*, Vol. 12, pp. 1-22, available at: www.culturemachine.net/index.php/cm/article/viewArticle/440 (accessed 22 January 2016).

Berry, D.M. (2012), "Introduction: understanding the digital humanities", in Berry, D. (Ed.), *Understanding Digital Humanities*, Plagrave McMillan, Basingstoke, pp. 1-21.

Bruns, A. (2013), "Faster than the speed of print: reconciling 'big data's social media analysis and academic scholarship", *First Monday*, Vol. 18 No. 10, available at: http://ojs-prod-lib.cc.uic.edu/ojs/index.php/fm/article/view/4879/3756 (accessed 22 January 2016).

Buckland, M. (1991), "Information as thing", *Journal of the American Society for Information Science*, Vol. 42 No. 5, pp. 351-360.

Buckland, M. (2012), "What kind of science can information science be?", *Journal of the American Society for Information Science and Technology*, Vol. 63 No. 1, pp. 1-7.

Budd, J.M. (2004), "Relevance: language, semantics, philosophy", *Library Trends*, Vol. 52 No. 3, pp. 447-462.

Burdick, A., Drucker, J., Lunefeld, P., Presner, T. and Schnapp, J. (2012), *Digital Humanities*, MIT Press, Cambridge, MA.

Busa, R. (1980), "The annals of humanities computing: the index Thomisticus", *Computers and the Humanities*, Vol. 14 No. 2, pp. 83-90.

Cecire, N. (2011), "Introduction: theory and the virtues of digital humanities", *Journal of Digital Humanities*, Vol. 1 No. 1, available at: http://journalofdigitalhumanities.org/1-1/introduction-theory-and-the-virtues-of-digital-humanities-by-natalia-cecire/ (accessed 22 January 2016).

Cronin, B. (2008a), "The sociological turn in information science", *Journal of Information Science*, Vol. 34 No. 4, pp. 465-475.

Cronin, B. (2008b), "The waxing and waning of a field: reflections on information studies education", *Information Research*, No. 17, Paper No. 529, available at: http://InformationR.net/ir/17-3/paper529.html (accessed 22 January 2016).

Dalbello, M. (2011), "A genealogy of digital humanities", *Journal of Documentation*, Vol. 67 No. 3, pp. 480-506.

Dillon, A. (2007), "Library and information science as a research domain: problems and prospects", *Information Research*, Vol. 12 No. 4, available at: http://InformationR.net/ir/12-4/colis/colis03.html (accessed 22 January 2016).

Ekbia, H., Mattioli, M., Kouper, I., Arave, G., Ghazinejad, A., Bowman, T., Suri, V.R., Tsou, A., Weingart, S. and Sugimoto, C.R. (2015), "Big data, bigger dilemmas: a critical review", *Journal of the Association for Information Science and Technology*, Vol. 66 No. 8, pp. 1523-1545.

Evens, A. (2012), "Web 2.0 and the Ontology of the Digital", *DHQ: Digital Humanities Quarterly*, Vol. 6 No. 2, available at: www.digitalhumanities.org/dhq/vol/6/2/000120/000120.html (accessed 22 January 2016).

Fallis, D. (2006), "Social epistemology and information science", *Annual Review of Information Science and Technology*, Vol. 40 No. 1, pp. 475-519.

Flanders, J. (2009), "The productive unease of 21st-century digital scholarship", *DHQ: Digital Humanities Quarterly*, Vol. 3 No. 3, available at: www.digitalhumanities.org/dhq/vol/3/3/000055/000055.html (accessed 22 January 2016).

Frabetti, F. (2011), "Rethinking the digital humanities in the context of originary technicity", *Culture Machine*, Vol. 12, pp. 1-22, available at: www.culturemachine.net/index.php/cm/article/viewDownloadInterstitial/431/461 (accessed 22 January 2016).

Frické, M. (2014), "Big data and its epistemology", *Journal of the Association for Information Science and Technology*, Vol. 66 No. 4, pp. 651-661.

Frischer, B. (2011), "Art and science in the age of digital reproduction: from mimetic representation to interactive virtual reality", *Virtual Archaeology Review*, Vol. 2 No. 4, p. 1932, available at: http://varjournal.es/doc/varj02_004_06.pdf (accessed 22 January 2016).

Fry, J. (2006), "Scholarly research and information practices: a domain analytic approach", *Information Processing and Management*, Vol. 42 No. 1, pp. 299-316.

Gardiner, E. and Musto, R.G. (2015), *The Digital Humanities: A Primer for Students and Scholars*, Cambridge University Press, Cambridge.

Gibbs, F. (2011), "Critical discourse in digital humanities", *Journal of Digital Humanities*, Vol. 1 No. 1, available at: http://journalofdigitalhumanities.org/1-1/critical-discourse-in-digital-humanities-by-fred-gibbs/ (accessed 22 January 2016).

Gordon-Murnane, L. (2012), "Big data: a big opportunity for librarians", *Online*, September-October, pp. 30-34.

Harris, M.H. (1986), "The dialectic of defeat: antimonies in research in library and information science", *Library Trends*, Vol. 34 No. 3, pp. 515-531.

Hjørland, B. (2014), "Information science and its core concepts: levels of disagreement", in Ibekwe-SanJuan, F. and Dousa, T.M. (Eds), *Theories of Information, Communication and Knowledge*, Springer, Dordrecht, pp. 205-235.

Hjørland, B. and Albrechtsen, H. (1995), "Toward a new horizon in information science: domain-analysis", *Journal of the American Society for Information Science*, Vol. 46 No. 6, pp. 400-425.

Jones, S. (2012), "When computers read: literary analysis and digital technology", *Bulletin of the American Society for Information Science and Technology*, Vol. 38 No. 4, pp. 27-30.

Kaplan, F. (2015), "A map for big data research in digital humanities", *Frontiers in Digital Humanities*, Vol. 2 No. 1, available at: http://journal.frontiersin.org/article/10.3389/fdigh.2015.00001/full (accessed 22 January 2016).

Kirschenbaum, M.G. (2010), "What is digital humanities and what's it doing in English departments?", *ADE Bulletin*, Vol. 150, pp. 1-7.

Liangzhi, Y. (2015), "Back to the fundamentals again", *Journal of Documentation*, Vol. 71 No. 4, pp. 795-816.

Liu, A. (2011), "Where is cultural criticism in the digital humanities?" available at: http://liu.english.ucsb.edu/where-is-cultural-criticism-in-the-digital-humanities/ (accessed 22 January 2016).

Lynch, C. (2009), "Jim Gray's fourth paradigm and the construction of the scientific record", in Hey, T., Tansley, S. and Tolle, K.M. (Eds), *The Fourth Paradigm: Data-Intensive Scientific Discovery*, Microsoft Research, Redmond, WA, pp. 177-183.

Manovich, L. (2015), "The science of culture? Social computing, digital humanities and cultural analytics", in Schaefer, M.T. and van Es, K. (Eds), *The Datafield Society. Social Research in the Age of Big Data*, Amsterdam University Press, Amsterdam, pp. 1-14.

Nielsen, H.J. and Hjørland, B. (2014), "Curating research data: the potential roles of libraries and information professionals", *Journal of Documentation*, Vol. 70 No. 2, pp. 221-240.

Nolin, J. (2007), "What's in a turn?", *Information Research*, Vol. 12 No. 4, Paper Colis No. 11, available at: http://informationr.net/ir/12-4/colis/colis11.html (accessed 22 January 2016).

Owens, T. (2011), "Defining data for humanists: text, artifact, information or evidence?", *Journal of Digital Humanities*, Vol. 1 No. 1, available at: http://journalofdigitalhumanities.org/1-1/defining-data-for-humanists-by-trevor-owens/ (accessed 22 January 2016).

Piez, W. (2008), "Something called digital humanities", *DHQ: Digital Humanities Quarterly*, Vol. 2 No. 1, available at: www.digitalhumanities.org/dhq/vol/2/1/000020/000020.html (accessed 22 January 2016).

Porsdam, H. (2013), "Digital humanities: on finding the proper balance between qualitative and quantitative ways of doing research in the humanities", *DHQ. Digital Humanities Quarterly*, Vol. 7 No. 3, available at: www.digitalhumanities.org/dhq/vol/7/3/000167/000167.html (accessed 22 January 2016).

Rieder, B. and Röhle, Th. (2012), "Digital methods: five challenges", in Berry, D. (Ed.), *Understanding Digital Humanities*, Palgrave Macmillan, Basingstoke, pp. 67-84.

Robinson, L. (2009), "Information science: communication chain and domain analysis", *Journal of Documentation*, Vol. 65 No. 4, pp. 578-591.

Robinson, L., Priego, E. and Bawden, D. (2015), "Library and information science and digital humanities: two disciplines, joint future?", in Pehar, F., Schlögl, C. and Wolff, C. (Eds), *Re:inventing Information Science in the Networked Society*, Verlag Werner Hülsbusch, Glückstadt, pp. 44-54.

Robinson, P. (2014), "Digital humanities is bigger, better?", in Longley, A.P. and Bode, K. (Eds), *Advancing Digital Humanities: Research, Methods, Theories*, Palgrave Macmillan, Basingstoke, pp. 243-257.

Saracevic, T. (1999), "Information science", *Journal of the American Society for Information Science*, Vol. 50 No. 12, pp. 1051-1063.

Schmidt, B.M. (2011), "Theory first", *Journal of Digital Humanities*, Vol. 1 No. 1, available at: http://journalofdigitalhumanities.org/1-1/theory-first-by-ben-schmidt/ (accessed 22 January 2016).

Schöch, Ch. (2013), "Big? Smart? Clean? Messy? Data in the humanities", *Journal of Digital Humanities*, Vol. 2 No. 3, pp. 2-13, available at: http://journalofdigitalhumanities.org/2-3/big-smart-clean-messy-data-in-the-humanities/ (accessed 22 January 2016).

Schnapp, J. and Presner, T. (2009), "Digital humanities Manifesto 2.0", available at: www.humanitiesblast.com/manifesto/Manifesto_V2.pdf (accessed 22 January 2016).

Schrader, A.M. (1984), "In search of a name: information science and its conceptual antecedents", *Library and Information Science Research*, Vol. 6 No. 3, pp. 227-271.

Schreibman, S., Siemens, R. and Unsworth, J. (2004), "The Digital humanities and humanities computing: an introduction", in Schreibman, S., Siemens, R. and Unsworth, J. (Eds), *A Companion to Digital Humanities*, Blackwell, Oxford, pp. XXIII-XXVII.

Shera, J. (1970), *Sociological Foundations of Librarianship*, Asia Publishing House, New York, NY.

Smithies, J.D. (2014), "Digital humanities, postfoundationalism, postindustrial culture", *DHQ Digital Humanities Quarterly*, Vol. 8 No. 1, available at: www.digitalhumanities.org/dhq/vol/8/1/000172/000172.html (accessed 22 January 2016).

Suiter, T. (2013), "Why 'Hacking'?", in Cohen, D. and Scheinfeldt, T. (Eds), *Hacking the Academy: New Approaches to Scholarship and Teaching from Digital Humanities*, University of Michigan Press, Ann Arbor, MI.

Svensson, P. (2009), "Humanities computing as digital humanities", *DHQ Digital Humanities Quarterly*, Vol. 3 No. 3, available at: www.digitalhumanities.org/dhq/vol/3/3/000065/000065.html (accessed 22 January 2016).

Svensson, P. (2010), "The landscape of digital humanities", *DHQ: Digital Humanities Quarterly*, Vol. 4 No. 1, available at: http://digitalhumanities.org/dhq/vol/4/1/000080/000080.html (accessed 22 January 2016).

Terras, M., Nyhan, J. and Vanhoutte, E. (Eds) (2013), *Defining Digital Humanities: A Reader*, Ashgate, Farnham.

Tylor, E.B. (1871), *Primitive Culture*, J. Murray, London.

Warwick, C. (2004), "Print scholarship and digital resources", in Schreibman, S., Siemens, R. and Unsworth, J. (Eds), *A Companion to Digital Humanities*, Blackwell, Oxford, pp. 366-382.

Warwick, C. (2012), "Institutional models for digital humanities", in Warwick, C., Terras, C.M. and Nyhan, J. (Eds), *Digital Humanities in Practice*, Facet, London, pp. 193-216.

Weber, N.M. (2013), "The relevance of research data sharing and reuse studies", *Bulletin of the American Society for Information Science and Technology*, Vol. 39 No. 6, pp. 23-26.

Weingart, S. (2011), "Demystifying networks, parts I and II", *Journal of Digital Humanities*, Vol. 1 No. 1, available at: http://journalofdigitalhumanities.org/1-1/demystifying-networks-by-scott-weingart/ (accessed 22 January 2016).

Wilson, T.D. (2010), "Information and information science: an address on the occasion of receiving the award of Doctor Honoris Causa, at the University of Murcia", *Information Research*, Vol. 15 No. 4, Paper No. 439, available at: http://InformationR.net/ir/15-4/paper439.html (accessed 22 January 2016).

Zaagsma, G. (2013), "On digital history", *Low Countries Historical Review*, Vol. 128 No. 4, pp. 3-29.

About the author

Tibor Koltay is a Professor, Head of Department and Course Director for LIS curricula at the Department of Information and Library Studies, of Szent István University, Faculty of Applied Arts and Pedagogy in Jászberény, Hungary. Tibor Koltay can be contacted at: koltay.tibor@abpk.szie.hu