

# Digital Humanities Research Through Design

Florian Kräutli  
Royal College of Art  
Kensington Gore  
London SW7 2EU

Stephen Boyd Davis  
Royal College of Art  
Kensington Gore  
London SW7 2EU

**Humanities Computing gave rise to the Digital Humanities, which brought considerations of a wider scope of the digital turn to humanities research. Increasingly, the area is understood to include the field of design, exemplified by definitions that describe the Digital Humanities as a “generative enterprise”. We suggest that design contributes not only to the making of digital artefacts. Design practiced with the aim to generate new knowledge constitutes a research method. Design research contributes to the Digital Humanities expertise in addressing complex problems and methods for making the knowledge that is generated during a design process explicit.**

## Humanities, Computing and Design

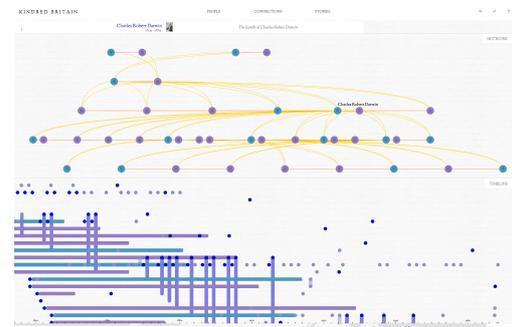
Before the term ‘Digital Humanities’ came into existence in 2001 (Kirschenbaum, 2012), the scholarly work that employed digital technology for research in the humanities went by the name of Humanities Computing (McCarty, 1998). The term made clear that what is being done is situated at the intersection of two previously separated fields, the Humanities and Computer Science. The exchange between the disciplines was however – and still often is – unbalanced. Humanities Computing consisted largely of the humanities adopting computing technology and methods, while little of humanities thinking made its way into computer science.

The endeavours in applying computing technology for research in the humanities that began with the pioneering work of Roberto Busa in the 1940s (Busa, 1980) and followed throughout the 1960s were primarily concerned with assembling datasets and converting (historic) sources into machine-readable formats (Hockey, 2004).

The recent proliferation of the term Digital Humanities is in itself evidence of an increasing awareness for a wider view on the digital turn in humanities scholarship. Discussing the title of a reader which would be published three years later, John Unsworth suggested “A Companion to Digital Humanities” (Schreibman, Siemens and Unsworth, 2004) as a reaction to the publisher’s original proposition “Companion to Digitized Humanities” (Kirschenbaum, 2012). In changing “digitized” to “digital” Unsworth wanted to move the emphasis away from mere digitisation of resources.

Humanities Computing laid the groundwork for what is now being discussed in the Digital Humanities: not only digitisation and digital access to content, but also the broader implications of the computational turn in humanities research. These

include the contribution of humanities methods to computer science, new synergies and collaborations between individuals and institutions, as well as the establishment of non-traditional forms of knowledge production and publishing. The Digital Humanities extend beyond the intersection of humanities and computer science. Increasingly, Digital Humanities projects incorporate and influence the field of design.



**Figure 1:** *Kindred Britain*, a network of 30,000 individuals made accessible in an exploratory interface

This development is brought forward by new forms of knowledge production that manifest in a shift of scholarly output from the *written* to the *made*:

The advent of Digital Humanities implies a reinterpretation of the humanities as a generative enterprise: one in which students and faculty alike are making things [...] (Lunenfeld et al., 2012, p.10)

Stanford’s *Kindred Britain* (Jenkins, Meeks and Murray, 2013) project, for example, is a scholarly publication in the form of an exploratory interface (Figure 1). Users are able to discover relationships across a dataset of genealogical information on roughly 30,000 individuals. Instead of releasing the

dataset as a standalone resource or using it to publish a paper on the subject, the authors have decided to design a tool that allows others to make sense of the dataset:

Kindred Britain does not store or remediate or just make slightly more accessible the already known, but it produces new knowledge (Jenkins, Meeks and Murray, 2013)

New knowledge is increasingly embedded in and enabled by artefacts; in this case, a visualisation tool. What we want to focus on in this paper is however not how digital artefacts serve as research outcomes, but how the design process itself enables the discovery of new knowledge.

## Digital Humanities Research Through Design

*Mapping the Republic of Letters*, also at Stanford, is a collaborative research project that employs digital methods to study the correspondence networks of the 18th century intellectual community. Researchers publish their findings in writing, but also through digital formats, making use of diagrams and interactive visualisations (e.g. Edelstein et al., 2010).

Central to enabling this research is a custom visualisation tool (Heer, 2009, **Figure 2**). Their developers reflect on what they were able to learn from collaborating on this Digital Humanities project:

For the computer scientists, it revealed how humanities scholars interact with data visualizations in ways that are unique to their research questions. (Chang et al., 2009)

They realised how their decisions when working on technical solutions have an immediate effect on the research outcome of the scholars' enquiries:

[...] it quickly became apparent that choices about visual representations of the data that were being made by computer scientists were also interpretive choices to which the humanities scholars needed to contribute. (ibid.)

An inconspicuous, yet remarkable observation appears towards the end of their reflection:

In many ways the questions that this visualization has opened up for humanities scholars have already proved more important than the direct insights and answers that the visualization has provided. (ibid.)

Calls for new software tools are widespread in the Digital Humanities community (Swierenga, 1974; Borgman, 2009; Drucker, 2011b). Such tools should enable researchers to answer new research questions. Yet the above comment suggests that questions that arise during the development process

can be more relevant than those that are answered through the final implementation of a tool.

What these developers experienced is a common phenomenon in design processes and one that has been recognised early-on in the discipline of design research (Boyd Davis and Gristwood, 2016). The questions, issues and problems that a designed artefact should address are reformulated and often only discovered as part of the development process:

During the course of the problem solving activity new objectives may tend to form and reform. (Archer, 1968 2.29)

For Digital Humanities research it is therefore important to recognise the new knowledge that is generated in the *process* of making, and to make this knowledge explicit. This requires an awareness of the role of design as a research method and the ability to follow a methodologically sound design process.



Figure 2: A custom visualisation tool developed to map the Republic of Letters.

## “Design” and “Design Research”

The typical task of a designer in a Digital Humanities project consists of taking care of the visual appearance of a user interface, or solving issues of legibility and usability of a digital artefact. Design, in this understanding, contributes the ‘final touches’ on what has been developed by the IT and humanities departments. The contribution of design, however, is not limited to the final outcome. Digital Humanities projects in particular can benefit from incorporating design as part of the research. For this to be effective, design researchers need to be involved in a project early on (Burdick 2009).

Design as a research method lends itself to address a particular kind of problem, that Rittel and Webber call “wicked problems”:

The problems that scientists and engineers have usually focused upon are mostly “tame” or “benign” ones. [...] the mission is clear. It is clear, in turn, whether or not the problems have been solved. Wicked problems, in contrast, have neither of these clarifying traits [...] (Rittel and Webber, 1973, p.160)

Rittel and Webber refer to problems that cannot be solved through analysis; the process of enumerating all possible solutions in order to pick the best one. Wicked problems exhibit incomplete and often unrecognisable characteristics, making them nearly impossible to solve completely.

Devising a visualisation tool for exploring the interrelatedness of 30,000 individuals, or the correspondence networks represented by 20,000 letters, are problems that are difficult, if not impossible, to grasp in their entirety. Designers address such problems not by analysing – the scientific method – but by making.

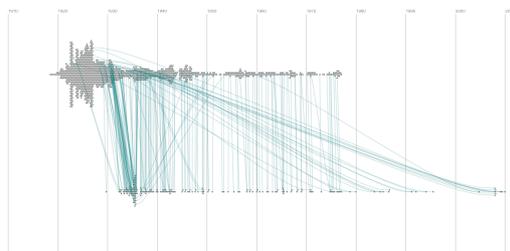
Design is the discipline that addresses problems through an act of making. The problems may be specific, such as the design of an exhibition in a particular space. They can be reproducible, such as the design for a mass-manufactured product. We speak of graphic or communication design, when the design problem applies to the optimal arrangement of type, shapes and images in a two dimensional space, or of vehicle or transportation design when the problem has to do with people or goods overcoming distances.

Designing for these problems is informed by research, involves doing research and results in new knowledge for the people participating in the design process. Can we therefore argue that doing design inherently results in doing research?

Design is interdependent with research, yet it is not equivalent. Design with the goal to generate new knowledge must share the characteristics of a research method. In order to determine when design constitutes research, we have to answer:

[...] was the practitioner activity an enquiry whose goal was knowledge? Was it systematically conducted? Were the data explicit? Was the record of the conduct of the activity ‘transparent’[...]? Were the data and the outcome validated in appropriate ways? (Archer, 1995, p.10)

If, and only if, the intention of doing design is to arrive at communicable knowledge and if the design process is undertaken transparently and rigorously, can we speak of research through design.



**Figure 3:** An example of our own visualisation prototypes which maps the dates of composition of works by Benjamin Britten in relation to their dates of first performance.

## Our Research

Our own research is concerned with timeline visualisations of cultural data for the purpose of visual analysis (Boyd Davis and Kräutli, 2014). We develop time-based visualisation tools for knowledge discovery in digital cultural collections. We seek to answer a two-part question: what kind of knowledge is hidden in digital collections and how can timeline visualisations enable researchers to discover that knowledge?

We recognise that our problem is a wicked problem. We seek to answer a research question that makes no assumption about the kind of undiscovered knowledge that might be contained in collections data. Neither do we know the potential beneficiaries of new visualisation tools – the general public, researchers within and outside cultural institutions, etc. We cannot anticipate the scope of the problem before trying to address it and we expect our research process to refine and reformulate our research question(s).

Our research is based on two observations; the first is that data visualisations around a dimension of time have a long history in serving as tools for visual data analysis, yet today are often reduced to simplistic linear storytelling devices (Lubar, 2013; Boyd Davis, 2015). The critical evaluation of existing approaches and the development of new tools in line with the requirements of scholarly research and the demands brought forward by the Digital Humanities scholarship therefore forms part of our work.

The second observation is an increased awareness of the possible merits of metadata – digitised cataloguing data of libraries, archives and museums. Institutions hope to gain new insights from what has previously received little attention:

A core objective will be the transformation of our collection metadata from a passive by-product to an active enabler. (The British Library, 2015)

Museums have therefore started to not only present their collections on their websites, but also offer their collections metadata for download (Cooper-Hewitt, 2012; Tate Britain, 2014; MoMA, 2015).

## Our Approach

We work with digital datasets that we obtained directly from cultural institutions as well as publicly available sources. Our practical research method is based on iterative design of functional visualisation prototypes for digital cultural collections (e.g. **Figure 3**). As indicated above, prototyping acts as a method to generate knowledge through making and reflecting on the creation process, as well as through evaluation of others' interactions with each created prototype.

We evaluate through critical reflection and ongoing dialogues with museum curators and archivists, who are both experts and potential users of our

visualisation tools. Our approach is a form of Critical Making (Ratto, 2011) which emphasises iterative and collaborative methods and uses the working process itself as the locus of evaluation, rather than employing a separately designed user study.

We begin by examining available cultural datasets and – given our interest in timeline visualisations – focus particularly on descriptions of time. In many datasets we identify multiple, conflicting and uncertain descriptions of temporal information.

Analysing existing projects we notice how digital timeline visualisations tend to struggle with the visual representation of large numbers of items – datasets that exceed a few hundred records. Given that one of the main challenges for the Digital Humanities is an increase in size and scope of the datasets being studied (Lunenfeld et al., 2012, p.38; Sternfeld, 2014), the need for timeline visualisations to be able to represent large datasets is evident. The problems are not simply that many digital visualisations degrade technically in the face of large datasets, but that they also cease to ‘work’ in terms of yielding comprehensible displays and valuable insights.

Based on our initial review we focus our efforts on the meaningful representation of large datasets, and multiple and uncertain temporal descriptions. We conceive possible solutions and build functional prototype implementations in order to test and evaluate them, and feed back new insights into further prototype iterations.

## Discussion

Our method of working, as described above, may appear as not significantly different from a typical design process that aims to solve a given problem. What qualifies this design process as research through design is a rigorous critical reflection of every design decision and our understanding of prototypes not as intermediate steps towards a final outcome, but a mode of enquiry.

Making a prototype requires the translation of conceptual approaches in an implementation. A designer and developer needs to decide on the specific visual appearance of a graphical element, the inner workings of an algorithm and the choice of a design tool or software library. Each practical decision has the potential to impact the research outcome. Therefore, every decision needs to be put into question and, ideally, be made explicit. Making as a method of research requires a critical stance towards what is *made* by everyone involved in the design process.

In designing towards procedural insights and not towards a final outcome, future iterations of a prototype are not directed towards refining and perfecting a conceived solution. Prototypes instead help to expose and identify yet undiscovered problems. Our aim is not to work immediately towards an ideal – potentially idealised – answer but to discover the problematics around timeline visualisations of collections data.

Where design seeks an acceptable solution for a particular problem within the given circumstances, research aims to arrive at communicable and generalisable ‘truths’:

Design is a way to ask questions. Design Research, when it occurs through the practice of design itself, is a way to ask larger questions beyond the limited scope of a particular design problem. (Zimmerman, 2003)

Last, but not least, a design *research* process differs from a design process through the absence of a client. Instead of working towards meeting the requirements of a contractor, we collaborate with curators and, through conversations and co-designing, together explore potential research questions and knowledge potential of visualising cultural datasets.

## Conclusion

Humanities Computing has introduced digital methods to humanities scholarship. The Digital Humanities have further expanded the cross-fertilisation of different disciplines. Increasingly, design becomes an essential part of a digital humanities project. As a result, considerations of the impact of design decisions and established (visual) paradigms in artefactual knowledge dissemination enter the humanities research agenda (Drucker, 2011a). In our research, we seek to answer prevalent calls for new digital tools for research in the humanities. What we found is that important insights are not only facilitated by the application of new tools, but most importantly during their design. We recognise the need to apply design research methods in Digital Humanities projects, in order to benefit from the knowledge being generated through the process of making.

## References

- Archer, L.B., 1968. *The Structure Of Design Processes*. PhD thesis. London: Royal College of Art.
- Archer, L.B., 1995. The Nature of Research. *Co-design, interdisciplinary journal of design*, 2(11), pp.6–13.
- Borgman, C.L., 2009. The Digital Future is Now: A Call to Action for the Humanities. *Digital Humanities Quarterly*, 3(4).
- Boyd Davis, S. and Gristwood, S., 2016. The Structure of Design Processes: ideal and reality in Bruce Archer’s 1968 doctoral thesis. In: *DRS 2016 (Design Research Society) Design + Research + Society: Future-focused thinking*. DRS: Brighton. In Press.
- Boyd Davis, S. and Kräutli, F., 2014. Scholarly chronographics: can a timeline be useful in historiography? *European Social Science and History Conference*. Vienna, 23-26 April. Amsterdam: International Institute of Social History.

- Boyd Davis, S., 2015. May not duration be represented as distinctly as space? Geography and the visualisation of time in the early eighteenth century. In: D. Beck, ed., *Knowing Nature in Early Modern Europe*. London: Pickering and Chatto.
- Burdick, A., 2009. Design without designers. In: *Keynote for a conference on the future of art and design education in the 21st century*. University of Brighton, England.
- Busa, R., 1980. The annals of humanities computing: The index Thomisticus. *Computers and the Humanities*, 14(2), pp.83–90.
- Chang, D., Ge, Y., Song, S., Coleman, N., Christensen, J. and Heer, J., 2009. *Visualizing the Republic of Letters*. Stanford University.
- Cooper-Hewitt, 2012. *Cooper-Hewitt's Collection Database*. [online] Available at: <<https://github.com/cooperhewitt/collection>> [Accessed 26 Jun. 2015].
- Drucker, J., 2011a. *Graphesis: Visual knowledge production and representation*. [online] johannadrucker.com. Available at: <[http://www.johannadrucker.com/pdf/graphesis\\_2011.pdf](http://www.johannadrucker.com/pdf/graphesis_2011.pdf)> [Accessed 25 Nov. 2013a].
- Drucker, J., 2011b. Humanities approaches to graphical display. *Digital Humanities Quarterly*, 5(1).
- Edelstein, D., Comsa, M., Conroy, M., Kassabova, B., Wilan, C., Edmundson, C. and Nyaosi, B., 2010. *Voltaire and the Enlightenment*. [online] Available at: <<http://republicofletters.stanford.edu/casestudies/voltaire.html>> [Accessed 10 May 2016].
- Heer, J., 2009. *RPLVIZ*. Available at: <<http://stanford.edu/group/toolingup/rplviz/rplviz.swf>>.
- Hockey, S., 2004. The History of Humanities Computing. In: S. Schreibman, R. Siemens and J. Unsworth, eds., *A companion to digital humanities*. Oxford: Blackwell, p.3-29.
- Jenkins, N., Meeks, E. and Murray, S., 2013. *Kindred Britain*. [online] Available at: <<http://kindred.stanford.edu/>> [Accessed 2013].
- Kirschenbaum, M.G., 2012. What Is Digital humanities and What's It Doing in English Departments? In: M.K. Gold, ed., *Debates in the Digital Humanities*. Minneapolis, London: U of Minnesota Press.
- Lubar, S., 2013. Timelines in Exhibitions. *Curator: The Museum Journal*, 56(2).
- Lunenfeld, P., Burdick, A., Drucker, J., Presner, T. and Schnapp, J., 2012. *Digital Humanities*. MIT Press, pp.1–153.
- McCarty, W., 1998. *What is humanities computing? Toward a definition of the field*. Centre for Computing in the Humanities.
- MoMA, 2015. *MuseumofModernArt/collection*. [online] Available at: <<https://github.com/MuseumofModernArt/collection>> [Accessed 11 May 2016].
- Ratto, M., 2011. Critical making: Conceptual and material studies in technology and social life. *The Information Society*, 27(4), pp.252–260.
- Rittel, H.W.J. and Webber, M.M., 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4, pp.155–169.
- Schreibman, S., Siemens, R. and Unsworth, J. eds., 2004. *A companion to digital humanities*. Oxford: Blackwell Publishing.
- Sternfeld, J., 2014. Historical Understanding in the Quantum Age. *Journal of Digital Humanities*, [online] 3(2). Available at: <<http://journalofdigitalhumanities.org/3-2/historical-understanding-in-the-quantum-age/>>.
- Swierenga, R.P., 1974. Computers and American History: The Impact of the 'New' Generation. *The Journal of American History*, 60(4), p.1045.
- Tate Britain, 2014. *tategallery / collection GitHub*. github.com.
- The British Library, 2015. *Unlocking The Value - The British Library's Collection Metadata Strategy 2015-2018*. [online] Available at: <<http://www.bl.uk/bibliographic/pdfs/british-library-collection-metadata-strategy-2015-2018.pdf>>.
- Zimmerman, E., 2003. Play as research: The iterative design process. In: B. Laurel, ed., *Design research Methods and perspectives*. Cambridge, MA: MIT Press.