



## Arts and humanities e-science—Current practices and future challenges

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### ABSTRACT

This article offers an analysis of UK arts and humanities e-Science practices in order to identify current trends. It also considers challenges of how arts and humanities disciplines fit into the overall e-Science agenda. We will discuss a first phase of early experimentation projects in 2007 and continue with a second phase since 2007, which more systematically investigates methodologies and technologies that could provide answers to grand challenges in digital arts and humanities research.

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### 1. Introduction: e-Science in the arts and humanities

This article offers an analysis of UK arts and humanities e-Science practices in order to identify current trends. It also considers challenges of how arts and humanities disciplines fit into the overall e-Science agenda. We aim to develop a specific research agenda for arts and humanities e-Science that builds upon experiences from early experiments and subsequent systematic investigations during the first three years of the UK arts and humanities e-Science projects. The article will focus on research projects and trends and therefore not cover the institutional infrastructure to support them.<sup>1</sup>

The UK arts and humanities e-Science initiative is among the most well established in the world, but has by far not been the only one worldwide. There have been several projects in the US that try to link arts and humanities research with cyberinfrastructure developments. Especially, the recently funded Bamboo project<sup>2</sup> aims to deliver shared technology services to the arts and humanities community. HASTAC is another significant platform for the US.<sup>3</sup> In Germany, TextGrid has been very successful in building

a community grid for textual editing as part of the national D-Grid initiative.<sup>4</sup> Its approach however is different from the UK one in so far as almost the complete investment for arts and humanities e-Science went into this single project. There have been several other attempts worldwide to use grids and other e-Science technologies for humanities projects—particularly in library and information science. But these have mostly remained isolated projects. UK arts and humanities e-Science is following a different approach by distributing the existing money among as many researchers as possible to make it easier to find out about grass-roots research interests in the community.

This article argues that from the grass-roots activities in the UK specific research interests in arts and humanities e-Science have been developing over the past three years, which justify further investigations. The contribution of this article will be to bring them together into a common research agenda. Rather than simply surveying these activities, we offer a classification of them that allows us positioning them within the newly emerging discipline of arts and humanities e-Science. Therefore, we have concentrated on common agenda items such as e-Science empowered collaboration in arts or virtual workbenches for support of research on digital data. These projects are all good indicators of what the future might deliver, as grand challenges for the arts and humanities e-Science programme such as the data deluge [4] emerge. For example, the Bush administration will have produced over 100 million emails by

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<sup>1</sup> An overview of these activities can be found on the Arts and Humanities e-Science Support Centre website: <http://www.ahessc.ac.uk>.

<sup>2</sup> <http://projectbamboo.org/>.

<sup>3</sup> <http://www.hastac.org>.

<sup>4</sup> <http://www.textgrid.de>.

the end of its term [8]. These can provide the basis for new types of historical and socio-political research that will take advantage of computational methods to deal with mass digital data.

The integration of data items into arts and humanities research is non-trivial, as complicated semantics underlie the archives of human reports. Humanities data may be highly contextual, its interpretation depending on relationships to other resources and collections, which are not necessarily digital. For instance, a historian discussing the war in Iraq and the involvement of the Bush family might refer to two different historical events—depending on the historical context they are writing about. Also, new retrieval methods for digital data must be intuitive for the user and not based on complicated metadata schemes. They have to be specific in their return and deliver exactly the particular piece of information the researcher is interested in. This is fairly straightforward for structured information if it is correctly described, but highly complex for unstructured information [8], as most common in the arts and humanities.

Some answers to such challenges have already been tried out in the early experimentation projects in UK arts and humanities e-Science, but they have been even more systematically investigated in the second generation projects since 2007.

## 2. Early experimentations in arts and humanities e-science

The first set of projects within the UK arts and humanities e-Science programme, which ended in 2007, can be seen as a pioneering phase, in which ad hoc experiments of early adopters have dominated [2]. The second phase, which will be discussed in the next section, can be considered as one of systematic investigations where specific experimentations deliver specific building blocks of an e-Infrastructure for future arts and humanities research. The challenge of the first phase was to prove that e-Science in the arts and humanities holds substantial benefits for research and can therefore spark interest among researchers. At the same time, the first phase also confronted established methods in computing with new challenges specific to arts and humanities research data. The second phase of systematic investigation continues to work on these specific challenges. It explores how e-Science tools and methodologies are useful for research in the arts and humanities. Methodological commonalities are clearly emerging.

In this section, which covers the early experimentations, we will first describe the initial user requirements gathering attempts; second, the early ideas about how to deal with the data deluge; third, we will analyse what virtual workbenches could mean for arts and humanities research; fourth, the enthusiastic uptake of e-Science in performance theory and practice will be considered.

### 2.1. User requirements

Over the past few years, substantial efforts have gone into the capture of user requirements for arts and humanities e-Science and e-Research [9]. It has long been noticed that the uptake of e-Science infrastructures seems to be particularly challenging for the arts and humanities [5]. There are some exceptions of highly integrated disciplines in the broad range of arts and humanities sub-disciplines, but generally speaking, uptake is slow and more challenging than in more quantitative-oriented research areas such as the natural sciences or quantitative social sciences. Having said that, without a concrete user need e-Science would be an ineffective exercise.

In Oxford, three workshops entitled *User Requirements Gathering for the Humanities* were held at the Centre for the Study on Ancient Documents in order to analyse best practices in user requirement studies for e-Science solutions that work for humanities research.<sup>5</sup> They complemented the larger e-Science Scoping Study,<sup>6</sup> which produced reports on ‘grand challenges’ for different subject areas in the arts and humanities. These grand challenges are mostly linked to the specificities of arts and humanities data and the complex requirements to run, for example, information extraction algorithms on fuzzy and incomplete historical records.

Due to space limitations, we would like to focus on another project to look at the use of the video conferencing tool Access Grid. A series of workshops and experiments organised by the Humanities Research Institute in Sheffield investigated *The Access Grid in Collaborative Arts and Humanities Research*.<sup>7</sup> For some time now, the Access Grid has sparked interest in arts and humanities, as their research often takes place in highly specialised domains and subdisciplines, niche subjects with expertise spread across universities and countries. The Access Grid can provide a cheaper alternative to face-to-face meetings.

All of the Sheffield workshops were remote collaborations across the Access Grid.<sup>8</sup> The first workshop, for instance, dealt with digital images, as they become more and more important for many aspects of humanities research. Recent years have seen a steady increase in digitisation projects that demand marrying high-resolution image technologies with grid environments. In Section 2.3, we will discuss the digitisation example of the Froissart Chronicles, which have been used in grid research activities of the World Universities Network.<sup>9</sup> The main finding of this workshop and experiments with digital image applications in the Access Grid has been that the limited number of applications realised to work directly within the Access Grid restrict real interaction. Although the Access Grid might have been designed as a conference tool, the researchers missed additional services, e.g. the opportunity to collaboratively annotate the digitisation images and add them to their research repositories. Access Grid development seems to be too focussed on advancing its video conferencing facilities, but little if any attention has gone into tools and methodologies for sharing and collaborating in computer supported collaborative research.

Overall, the Sheffield experiments confirmed that Access Grid might be a good environment to substitute some face-to-face meetings, but lacks innovative means of collaboration, which can be especially important in arts and humanities research. The researchers’ concern has been how to realise real multicast interaction, as it has been done in VNC technology or basic wiki technology. These could support new models of collaboration in which, as the workshop organizers stress, the physical organisation of the Access Grid suite can be accommodated to specific needs that would e.g. allow participants to walk around and interact more like in a real room. The procedure of Access Grid sessions could also be changed, away from static meetings towards more dynamic collaborations.

The workshop series in Sheffield offered insights into specific interests and concerns of humanities researchers in dealing with advanced network technologies such as the Access Grid. The next subsection will look into the needs of researchers with regards to the new mushrooming of digital resources. A preparatory project at

<sup>5</sup> <http://ahessc.ac.uk/files/active/0/URH-report.pdf>.

<sup>6</sup> <http://ahds.ac.uk/e-science/e-science-scoping-study.htm>.

<sup>7</sup> <http://ahessc.ac.uk/files/active/0/AG-report.pdf>.

<sup>8</sup> Information on the all the completed projects including their reports can be found: <http://www.ahessc/projects>.

<sup>9</sup> <http://wungrid.org/>.

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