

# AHRC e-Science Scoping Survey Experts Seminar Report

## 1 Group Profile

1. Sheila Anderson, P.I. eSSS; AHDS/AHeSSC
2. Tobias Blanke, AHeSSC
3. Luke Blaxill, e-Science Scoping Survey
4. Michael Daw, Access Grid Support Centre, University of Manchester
5. Stuart Dunn, AHeSSC
6. Tim Edkins, artist
7. Prof Nick Kaye, Performance Studies, Exeter University
8. Mary Agnes Krell, Media, Sussex University
9. Andrew Lavender, Central School of Speech and Drama
10. Angela Piccini, Drama: Theatre, Film, Television, University of Bristol
11. Grzesiek Sedek, AHDS
12. Prof Mick Wallis, School of Performance and Cultural Industries, University of Leeds
13. Katrin Weidemann, AHeSSC

## 2 Introduction

2.1 The core aim of the seminar was to determine how performing arts and media researchers understand the e-science agenda. The seminar aimed to outline an agenda that performing arts and media researchers wish to take forward to influence future planning and policy. The outputs from the seminar are to be disseminated to a wider audience to raise awareness and understanding. The seminar also aimed to assist the Arts and Humanities Research Council (AHRC) in the development of its longer-term strategy for e-Science and ICT.

2.2 E-Science refers to the development and deployment of a networked infrastructure and culture. e-Science emerged from the hard sciences first into the social sciences, which have recently undertaken a range of building and infrastructure projects. In addition to technology and tools, of interest is what e-Science means for performing arts and media researchers: eg., how might these tools and technologies enable new methods for collaborative research?

2.3 The Arts have yet to benefit significantly from funding streams, although some £2m is now coming out of the AHRC to take forward the e-Science agenda, with additional funding out of JISC (Joint Information Systems Council) and EPSRC (Engineering and Physical Sciences Research Council). In August, a call for major research grants will be issued by AHRC, jointly funded by JISC (deadline October 2006). A further funding opportunity exists within JISC's e-infrastructure programme, which includes a virtual research environments stream (deadline November 2006). Finally, EPSRC has expressed a willingness to fund some tools development for the arts and humanities.

### 3 Challenges and Opportunities

3.1 The seminar demonstrated that performing arts and media researchers are expert users of computing hardware and software, in addition to being experts in a range of collaborative research practices. In this way the sector has significant potential to inform the e-Science agenda.

3.2 There were five key areas for discussion:

- Performing Arts and Media as Virtual Research Organisation
- Performing Arts and Media as Spatial Data Infrastructure
- Visualisation and simulation: interpretation and methodology
- Resource creation and delivery
- Globalised Research

3.2.1 The performing arts and media are a virtual research organisation in that there is a high degree of distributed collaboration across many skills sets: from principal investigators through to technicians to creative fellows to people working outside of the academy who may have placements with us.

3.2.2 The sector is a spatial data infrastructure insofar as our particular concerns with space and time, site, presence, the issue of coming together to work within similar locations and how our practice is spatialised through performing arts and media. There are also issues to do with visualisation and simulation: eg., computer generated reconstructions of Roman amphitheatres; Jacobean theatre reconstruction; visualisations through computer-aided technologies, such as CAVEs.

3.2.3 There are issues around resource creation and delivery within a globalised research context.

3.2.4 While some have differentiated the e-Science agenda from the 'traditional' lone-scholar model, what the performing arts and media offer is a useful questioning of the lone scholar across the disciplines. In all fields there is a complex ecology of research that involves a range of different people. However, the way in which the performing arts and media produce and analyse data involves a creative practice base for research whereby the process of making is often the research practice itself.

3.2.5 Information and knowledge management and information retrieval from disparate sources raise a range of copyright and IPR issues. Digital objects generated by and through performance may then be accessible through distributed network environments and repurposed and reconfigured in different ways. What might be the associated intellectual property issues?

3.2.6 If adequate resources are available, there is an important role for the performing arts and media in technical research and development to facilitate trans-disciplinary collaboration with computing specialists. The performing arts and media sector asks questions that push the limits of technical platforms

and generates useful research questions for developers, while platforms, tools and infrastructures can generate specific research questions within our sector.

3.3 Examples of our experts' engagements with ICT outside of the e-Science agenda include:

- network-based international installations, using standard web cameras and Max/MSP or PureData patches in the background;
- real-time interactive installation;
- interactive DVD archive projects (Lee Miller Archives);
- developing Web platforms for private sector (Microsoft);
- exploring e-Science's standing in relation to existing platforms for networked performance;
- Performing Presence collaborative wiki that demonstrates the capacity of new media to create mobile, collaboratively authored documents;
- CAVE performances in which users encounter agents and avatars;
- Second Life, a 3-D virtual gaming world entirely built and owned by its residents;
- Presencio EU-integrated project in which 13 HEIs are advancing CAVE technology.

3.4 Examples of our experts' skills include:

- programming;
- developing research into infrastructure, metadata, organisation, file formats, image resolution;
- shifting between computing and performing arts and media discourses;
- acknowledgement that data is created, not discovered;
- White Rose Grid (Sheffield, Leeds and York);
- Great Western Research;
- Worldwide Universities Network.

3.5 Common challenges faced by our experts include:

- the lack of departmental and institutional infrastructural support where IT services are approached directly to use facilities used in informatics;
- due to the materiality of our research artefacts there is the challenge of linking the 'bodies of knowledge' to develop a more process-based approach to knowledge production;
- having to approach research with an *ad hoc* approach to scavenging skills and resources, 'hacking';
- competing funding cycles;
- research application structure that favours the lone scholar;
- the scale of using these technologies and platforms can often be accommodated only within large inter-institutional, inter-disciplinary funded projects;
- economic costs in relation to additional costing models of integrated projects within Europe;
- navigating manifold funding streams effectively;
- lack of infrastructure to generate the data currently residing within archives;

- the expectation that the sector deals with smaller bodies of information is against a reality in which there might be 300 hours of footage to be archived;
- e-Science tools often not easy to use and they require high levels of understanding and modification to make them work as desired;
- the need for a clear project before any approach to e-Scientists, although the technologies themselves may help to shape research projects;
- access to technologies, tools and platforms is difficult when resources are held in the sciences;
- institutional IT services modelled on firewalls and protection, rather than inter-institutional collaboration.

### 3.6 Common questions included:

- How might e-Science bring more computing power to researchers?
- How might e-Science use existing models of computing/performing arts and media collaborations?
- How might we fund and design e-Science interfaces that are useful beyond HE?
- How might we develop shared infrastructures across different institutions?
- How do we ensure sustainability?
- How will the sector manage inequalities of resourcing capabilities?
- How will the sector avoid the domination of e-Science by only those institutions able/willing to pay?

### 3.7 Significant opportunities for performing arts and media collaboration with e-Science include:

- transposition of questions and processes across platforms and discourses;
- development of multiple outputs from single exercises across sectors;
- use of computing technologies to shape questions around how presence is developed and enhanced;
- inter-disciplinary, inter-institutional and international projects fold disciplinary concerns within other sets of disciplinary practices;
- lab-base of many performing arts and media practices potentially leads to a range of inter-disciplinary outcomes;
- further development of partnership schemes with industry;
- modelling data capture and design through performance within a distributed exercise that attaches metadata to audio-visual data to allow us to analyse performance knowledge exchange;
- realities of raw data management to mediate current lack of access to storage facilities that results in limited future research opportunities;
- ensure that in each bid is included the necessary infrastructure;
- technology lends itself to access to and dissemination of process, which raises important questions about authorship and ownership, theory and practice, the way in which different local circumstances converge or map over each other;

- e-Science presents new challenges to the same kind of technologies – different usability's, using different applications and obviously new technologies, specifically how the Worldwide Universities Network data grid is looking for an application;
- tapping into knowledge bases of Access Grid Support Centre, Grid Operations Support Centre and National Grid Service

## 4 Definitions and Tools

### 4.1 E-science is:

- a name given to grid technologies;
- a term that covers most of computer-assisted research;
- a culture and a network infrastructure, through which resources are given the processing power, data expertise and labour-power to enable sharing.

It potentially permits a free interchange of resources and this can enable new forms of collaboration and advanced methodologies.

4.2 Most e-Science developments fall under the heading of Grid technologies, a term borrowed from the National Electronic Grid, which delivers scaled amounts of electronic power to consumers from the largest national grid user to the smallest domestic household. Computing power is the same, except that the e-Science Grid is global.

4.3 There are three forms of e-Science grid: the Computational Grid; the Data Grid; the Access Grid. Its potential impact upon arts and humanities research is in creation and management data, data sharing, collaboration and access to data, and analysis.

4.4 There are specific projects and tools that might contribute to e-Science in the performing arts and media:

- The Open Visualisation Data Technologies project, started by IBM, provides opportunities for animation, for processing video, for looking at a range of visual and graphical data.
- Video Grid technologies allow users to process and analyse large video paths.
- The Access Grid is the more popular grid system for performing arts, and has been used for many years in performance as a system that allows collaboration between several distributed places. Access Grid allows the use of any number of other computing technologies in performance to explore questions of presence and absence, place and space.
- Memetic was funded under the JISC Virtual Research Environments Programme and headed up by researchers at Manchester, Southampton, Edinburgh and Open University. Its objectives are to: provide extensions to the Compendium and Meeting Replay tools to make installation and administration simpler in both an AG and non-AG context; develop a robust and functionally-enhanced AG recording tool (known as Arena); enable the use of Meeting Replay within an AG context by integrating Arena; develop new means of automatic

annotation (such as by Compendium node or person speaking) to provide easy and flexible navigation of AG meeting recordings; fully involve end-user partners in requirements gathering, evaluation and testing of the software;

- Multi-Viewpoint Presence uses a game engine to implement the Access Grid to use it as a presentation space. The person making the presentation can walk around the space and trigger different media. Elsewhere media input can be streamed on to the grid, or an access grid signal can be processed and sent back through the grid, via PureData or MAX, mixing 3-D and real-time video.

## 5 Reflections on e-Science

5.1 The blurry distinctions between e-Science and Grid technologies are useful, as opposed to the term ICT. Within ICT the emphasis is on the technologies that exist already. E-Science suggests an active 'doing', developing tools and technologies as research progresses. Researchers are faced daily with a wide variety of tasks, so access to resources, collaborating with fellow researchers, managing projects, the administrative aspects of doing research, and particularly the way in which our research activities can quickly grow larger, in both scale and complexity.

5.2 It is important to foreground the specific qualities of the technologies employed in the creative process, rather than seeking to elide them. Where other disciplines might engage with e-Science to facilitate data discovery and management, in the performing arts and media these technologies are also used to generate creative practice. Therefore, the aesthetic qualities of e-Science are brought to the fore. An example of this might be the web-based collaborative choreography project in which student dancers in Holland and the UK attempted a distributed piece and found that lag was a problem. However, this led project participant Sita Popat to conclude that non-synchronous dialogue is valuable, in that it forces participants to focus on the *gestalt* of bodies rather than simply imagining that they were flowing.

5.3 Sound amplification and delivery in an Access Grid environment potentially limits the kinds of performance practice that are feasible. AG works in mono sound, so to create stereo the signals need to be split and delivered via separate tracks. Two sound cards allow two audio programmes to be played, and with stereo on each programme there are four audio channels. In an open-source AG environment CRMA can provide high quality audio, to be used with Open Mac (the video part of the Access Grid system on Apple Macs). There are also many ways of processing and sharing audio in real time, using digital to analogue (DAC) audio, an audio system and Radio Archiving and Scheduling software (RAS).

5.4 The key is to enable knowledge and expertise to be shared across the sectors. Researchers in the performing arts and media have high levels of knowledge in sound and vision manipulation and will innovate to extend Access Grid capabilities. However, there remains the challenge of open-source AG flexibility versus the user-friendliness but limited InSORS grid.

Open-source AG that runs on Linux has a 2.6 connection distribution, allowing multiple video input devices to allow sharing high-quality video in performance.

5.5 There are numerous interesting possibilities in combining e-Science with informal technologies, such as peer-to-peer (P2P) platforms, and with pervasive, ubiquitous and locative media, from mobile phones to RFID tags. The potential for a truly distributed grid is significant.

5.6 Examples of relevant projects to the performing arts and media include:

- Chimera (University of Essex), where a range of e-Science tools are used to organise and make searchable the entangled knowledge and data in community making in e-social science;
- MiMeG (University of Bristol) is a video annotation package that allows collaborative video analysis via data grid and Skype;
- Seedbed, (initiative for transdomain creativity) at University of Illinois at Urbana-Champaign ([www.uiuc.edu/initiatives/artsintech.html](http://www.uiuc.edu/initiatives/artsintech.html)) and ArtGrid are fostered by the Worldwide Universities Network (WUN) that use e-Science and cyberinfrastructure to innovate creatively.

5.7 A real challenge is one of access -- from the desktop, but also intellectual access to ensure that users are able to identify the potential of these technologies for their research practices. Our sector also requires appropriate institutional technical infrastructure, support and guidance in order to maximise access and use. There are also pressing questions around intellectual property and copyright that have to do with access and re-use.

5.8 Finally, there is the question of validating digital scholarship in the arts as academic research. While practice-led research is now accepted, it can be more difficult when it involves producing new digital technologies. They are sometimes marginalized as a teaching and learning tools and excluded from research funding

## **6 Participant Views**

6.1 Participants were introduced to Memetic by Michael Daw, University of Manchester. It is an AG based tool for recording AG meetings and annotating and navigating through AG recordings. In the seminar we used the Memetic tool called Compendium. It allows indexing meetings. Compendium was designed in the 1990s for use in meetings as a way of mapping dialogue. All participants can feed into the annotation process to ensure the map becomes an agreed record.

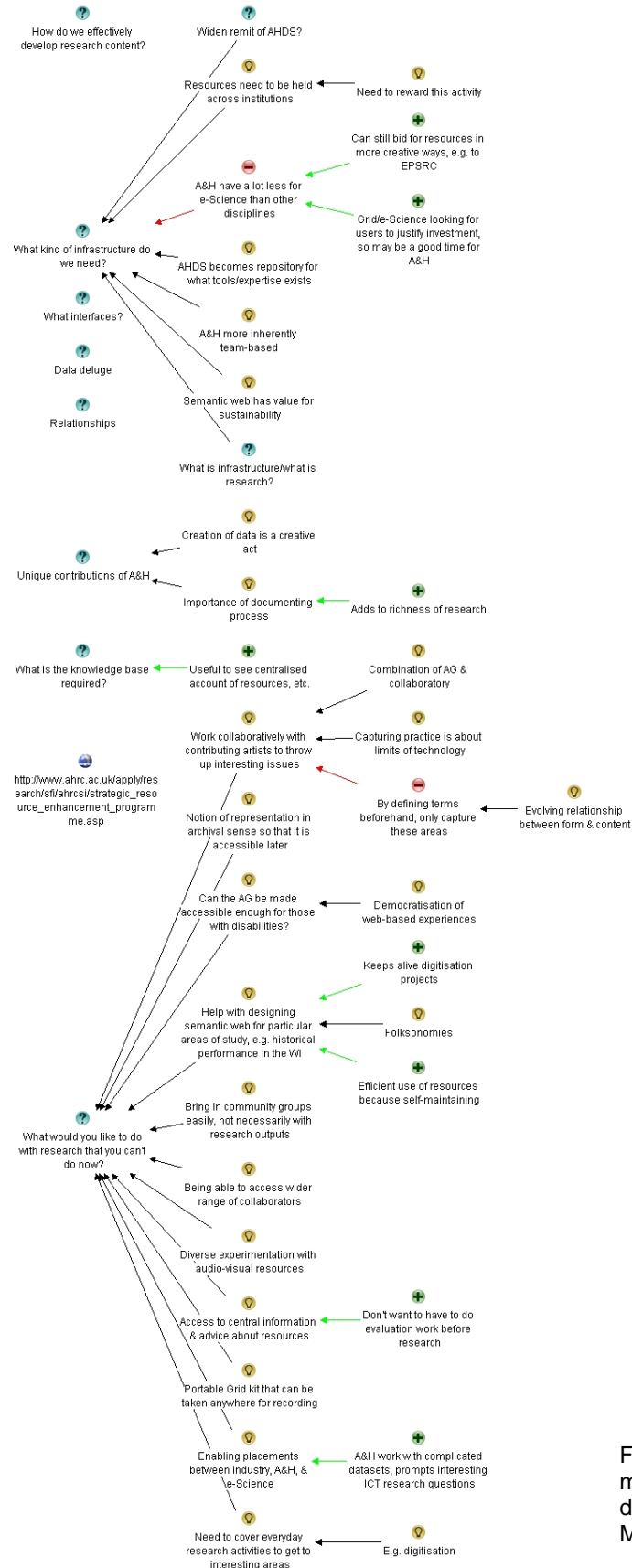


Figure 1 Compendium map of final seminar discussion. Mapped by Michael Daw, Memetic P.I.

6.2 In this final session participants discussed a range of specific questions generated from the day's presentations. This discussion was then mapped via Compendium. Questions focused on the need for infrastructures and interfaces. (see Figure 1 for Michael Daw's map of participants' views.)

6.3 The performing arts and media sector requires detailed information about the use and location of key resources for e-Science. The sector would like to know how to use these tools, but also how to acquire them and demonstrate to institutions that arts researchers need access to e-Science.

6.4 The performing arts and media sector potentially produces new ways of conceptualising 'data deluge'. While the sector does not currently generate large numbers of data objects, this is due to the absence of funding to digitise data resources in the first place, thus limiting archival access. Digitised objects that do exist are often complex and require large amounts of storage. There is a need to acknowledge that digitisation is part of, not separate from, research.

6.5 Participants focused on the relationships between performance making and text, particularly how metadata descriptions and annotations are mapped on to performance as event. Grid technologies capture and sort information but also generate theory/practice activities, which, in turn, are captured and sorted. The sector should explore how technology produces knowledges, which evidence the effect of 'capturing'. There is a relationship between research inside of data gathering, data creation, data shaping and data manipulation and the locating of research in the final artefact. While the creative practice focus on the limits of technology, the capturing of that practice is to do with the limits inherent in the mode of capture. Finally, it is important to disseminate the process of creation and the validation of that as research. This is greatly facilitated by social networking platforms such as wiki environments like Seedwiki, Backpack, Metamedia, Moodle, Twiki, ProjectForum. These potentially visualise the collaborative processes that happen in all research activities, yet which are largely invisible.

6.6 Participants focused on the importance of the AHDS as infrastructure and the need for AHDS and AHeSSC to have a higher profile amongst the researcher communities. If better resourced, they could effectively monitor all e-Science research across the arts to avoid duplication of work and technology and to disseminate research to the sector as a whole.

6.7 Participants discussed the need to propose large, complex research projects that involve large-scale, mixed-mode research practices. Such projects would evidence the sector's engagement in complex lab-based activities that involve significant resources and knowledge transfer.

6.8 Participants discussed the need for research applications that combined questions, outputs, methods with associated practical activities that could involve non-HE groups and would not, themselves, need to be research driven. A more heterogeneous approach to research projects is called for, with an understanding that not everything within a research project has a

direct research output. Facilitation of cross-sector activities with Knowledge Transfer opportunities would be ideal.

## **7. Participant Wish List**

- Greater infrastructural and technical support from institutions.
- Institutional Research Officers with a detailed knowledge of research trends to identify appropriate schemes.
- Region-based workshops for performing arts and media researchers to meet with e-Science researchers to develop projects that maximise KT, collaboration and innovation. They should be easily identifiable centres for work that are inclusive, rather than starving out those institutions that do not acquire the funding. They could be 'play' spaces for developing research projects.
- A programme of placements and secondments across industry, HE, professional arts and community groups.
- Information from AHDS that clearly outlines to institutional IT services the digital infrastructural needs for the arts and humanities.
- Detailed information from AHRC on the kinds of infrastructure they expect HEIs to provide for arts and humanities researchers.
- Funding to digitise the backlog of analogue data sources (video, audio, text).
- More profile for AHeSSC so that all stakeholders are aware that it maintains lists of resources and practical advice
- Greater support for process-based, rather than final outcome activities, to correspond with increasing importance of peer-reviewed research articles as interim reports.
- Portable grid kits that can be taken into different fields of practice, which could run off local Wi-Fi. Such kits would need to be user-friendly so that different collaborators would not be intimidated.
- Seamless user interfaces both within the institutions and via any portable tools and platforms.