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Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science

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Abstract

This paper arises out of a brief period in the early- to mid-2000s when the British funding and research climate facilitated a relationship between the technical, operational language of e-Science and the creative and performing arts. It concerns the ways in which live creative practices produce media traces that are fractured across screens and networks to produce new spatial relations between live events and their records. The split and contradictory subjectivities produced in these highly mediatized environments bring to the fore creative tensions between the live event and the recorded document. That is, the discourses, technologies and practices (if we may separate these) of e-Science not only produce new, spatial connections between events and their archives, they enact the “liveness” of archives as they are accessed and recombined to produce new art forms. Locating Grid Technologies: Performativity, Place, Space, a research workshop series funded by the A&H e-Science Initiative in its 2006 round, aimed to investigate how e-Science technologies might inform new understandings of space and time for distributed, creative research practices. Arts and technology researchers from the UK, US and Japan met to generate, analyze and re-use audio-visual documents of distributed practice-led research. Specifically, the project sought to combine and repurpose e-Science tools in order to investigate the spatial relationships produced between time-based, live events and their immediately mediatized traces. This paper investigates those performative fragmentations of place and space. It suggests that the potentialities and pitfalls of e-Science tools and technologies present fertile material for the arts researcher, particularly within the area of practice-based research: from the politics of surveillance to the aesthetics of video compression, from the ethics of multidisciplinary collaboration to the theoretical implications of mixing video time and space with the time and space of the performance event.

Introduction

Figure 1.

I am interested in human remains: in the residues, artifacts and traces left after the party is over, in the kinds of things that people produce when they gather together. And I am interested in how those remains might be rearranged on some

occasion to create even more littering. I am an archaeologist of sorts, but one who looks at the relationship between performance and documentary forms. More precisely, I track the transformations that occur across media, bodies and space as performances are documented and as documents are incorporated into other art practices and as those practices are subsequently documented and so on, in myriad permutations and combinations. That is, I am interested in where the spaces and times of events are transformed into the spaces and times of their representations in video.

Figure 2.

This paper arises out of a brief period in the early- to mid-2000s when the British funding and research climate facilitated a relationship between the technical, operational language of e-Science and the creative and performing arts. Although the creative and performing arts have always been at the leading edges of technological innovation, the formalization and funding of e-Science presented arts researchers with new opportunities to engage and extend their relationships with new technologies. However, where new media arts have emphasized the critical-creative transformations afforded by technologies, e-Science has largely been articulated in operational and technological terms, providing practical, secure, networked tools to enable (science) research. Thus, the UK's Arts and Humanities Research Council (AHRC) defined e-Science as "a specific set of advanced technologies for Internet resource-sharing and collaboration" [AHRC 2006]. Certainly, as evidenced elsewhere in this volume, e-Science has presented exciting opportunities for researchers across the arts and humanities to unlock the potential of archives and existing data sets. 2

However, what are the implications for other forms of research, in particular, practice-as-research, where questions of knowledge production are of a different order? Specifically, how might e-Science offer new ways of complicating key issues in the performing arts? Where might e-Science, as traditionally understood, facilitate data access, visualization and use? Within a performing and creative arts context, e-Science tools not only present new opportunities to develop arts practices, but they also produce traces and artifacts that may be combined to produce new work. This paper concerns the ways in which live creative practices produce media traces that are fractured across screens and networks to produce new spatial relations between live events and their records. The split and contradictory subjectivities [Haraway 1998] produced in these highly mediatized environments bring to the fore creative tensions between the live event and the recorded document [Piccini & Rye]. That is, the discourses, technologies and practices (if we may separate these) of e-Science not only produce new, spatial connections between events and their archives, they enact the "liveness" of archives as they are accessed and recombined to produce new art forms. Where conventional telematic performance perhaps privileges a focus on the production of a "third space" [de Lahunta 2002] in which mediatized, distributed arts practice coheres as "event," the emphasis in e-Science on maintaining the integrity of myriad data sets refuses such coherence. Within an e-Science context, practice-as-research is simultaneously an event and a series of traces – from flattened dialogue maps to video data. 3

Figure 3.

Performativity, Place, Space, a research workshop series funded by the AHRC e-Science Initiative in its 2006 round, aimed to investigate how e-Science technologies might inform new understandings of space and time for distributed, creative research practices. Arts and technology researchers from the UK, US and Japan met to generate, analyze and re-use audio-visual documents of distributed practice-led research. Specifically, the project sought to combine and repurpose e-Science tools in order to investigate the spatial relationships produced between time-based, live events and their immediately mediatized traces. This paper aims to address questions concerning those performative fragmentations of place and space. To do so, it will review the current state of e-Science in the arts and humanities, while revisiting the achievements and outcomes of the 2006 workshops in order to assess the potential of e-Science to track, understand and visualize transformations of performance from the live event through to its documentation, retrieval and reuse in other live events. This paper does not, therefore, focus on distributed performance per se, but rather on the "affordances" [Gibson 1979] that e-Science brings to arts research activities. Additionally, this paper, and the others in this volume, may simply mark a brief period in the history of funded arts research in the UK when information and communications technologies were seen to present exciting opportunities to produce new ways of thinking research practice. The e-Dance project, based at University of Bedford and representing a collaboration between Manchester, Leeds, Open University and Bedford, is now the UK's sole major funded e-Science project that focuses on the performing arts. The collaborators developed the key ideas introduced at the Bristol workshops in conjunction with their individual, pre-existing research activities. 4

e-Science Background

Rather than emphasizing the provision of high performance computing to researchers — with some notable exceptions (see Terras article in this issue) — the UK e-Science agenda has focused on large-scale, distributed collaborative research enabled through the Internet. It aims to facilitate flexible, secure and coordinated resource sharing to produce new research and has been expressed in terms of producing a network of computing power acting as a single, extensible computer. The investment of some £230 million [1] in UK e-Science was driven by an increasingly globalized research market that sees researchers faced daily with geographically distributed tasks that involve analysis, access to resources, interdisciplinary collaboration and project management. The common characteristics of e-Science are coordinated problem solving via distributed computing; networked resource sharing; virtual organizations; and transparent, efficient pervasiveness. This vision is given form via three principle grid architectures: computational, data and communications grids. 5

Computational grids allow for distributed processing power. An example of a computational grid might be the Condor-G multicore network, developed by the University of Wisconsin-Madison. It harnesses unused processing power while people are not using their computers, similar in spirit to the well-known SETI program, which searches for extraterrestrial intelligence via at least three million user desktops.[2] Computational grids automate, rationalize and 6

democratize procedures across national borders and institutional infrastructures. In a sense, they comprise a globalized production network, geared towards recent changes within an academic sector increasingly competing with private-sector interests for both funding and posts.

Data grids are distributed file systems and federated databases organized in secure networks. In order to manage these file systems, a dizzying array of “storage resource managers” are in development, from the open-standards Storage Resource Management collaboration to the proprietary Storage Resource Broker (SRB), which is a logical distributed file system based on a client-server architecture that presents the user with a single global namespace or file hierarchy. It provides secure access, via a uniform API, to various types of data storage across local and wide-area networks, and maintains metadata (data about the data) about each stored object (files).[3] Where a computational grid is, in effect, a system of production, data grids hold out the promise of seamless, globalized procurement. 7

Finally, the communications grid encompasses both open source (such as Access Grid) and proprietary (such as the Chicago-based IOCOM, formerly InSORS, Grid) solutions for distributed communication and collaboration. Both Access Grid and IOCOM assemble resources including multimedia large-format displays, presentation and interactive environments, and interfaces to Grid middleware and to visualization environments. They are flexible, interactive audio-visual networking environments that deliver high-quality, multiple video stream and sound across IP networks to support group-to-group interactions across the Grid. They differ significantly from ISDN-based video-conferencing and telematic performance platforms in that they enable highly expandable, uni- and multicast meetings among many locations. More than facilitating face-to-face meetings or mixing audio-visual signals the communications grid is intended to be a computational environment, which allows the recording and reuse of meetings. If I continue to follow the logic of the industrial metaphor, communications grids facilitate the delivery of produced and procured data for specific purposes. By creating a globalized network that facilitates efficient production, storage and retrieval the e-Science agenda has aimed to position UK research teams at the forefront of the “knowledge economy.” 8

e-Science in the Screen and Performing Arts

The neo-liberal flavour of e-Science as a means to open up new research “markets” thus differs significantly from the political utopian visions of the electronic arts and new media communities. Where e-Science has focused on funding infrastructure to facilitate prospective new research, the new media arts communities are project- and problem-oriented. In other words, while e-Science has been seen as a solution in search of a problem, new media arts may be characterized in terms of creative problems that work towards solution. Where both communities may share tools and technologies, the differing production contexts are important. The UK’s e-Science Core Programme was very clearly aimed at placing UK researchers at the top of the global research market. Making research visible and available is seen to be a “good thing” in itself. For the arts and humanities researcher, however, production contexts and funding infrastructures are at the heart of how we engage critically and creatively with such questions as technicity, presence, play and so on. Technologies are never transparent tools for producing knowledge. The material and coded constraints of any tool are what make data and shape understanding [Kittler 1999]. 9

2005 saw the launch of the UK’s AHRC e-Science research strand. One of the early activities initiated through the AHRC was the e-Science Scoping Study (May-August 2006). Principle Investigator Sheila Anderson spearheaded the creation of an Arts and Humanities e-Science Support Centre and organized a series of “Experts Seminars,” to which key researchers in each subject domain were invited to discuss the opportunities and challenges that e-Science presented in their fields of research. The aim was to identify strategic areas for further development and funding by research councils. Through the Scoping Study process e-Science in the arts and humanities communities was defined as 10

> the development and deployment of a networked infrastructure and culture through which resources — be they processing power, data, expertise, or person power — can be shared in a secure environment, in which new forms of collaboration can emerge, and new and advanced methodologies explored. [AHDS 2006]

While it may be straightforward to measure and express the benefits of, for example, large-scale, biomedical visualization projects, practice-led research in the creative, performing and screen arts is not always goal-orientated in this way. The Scoping Study's definition was, therefore, particularly welcome in that it was sensitive to the need for arts and humanities research to frame itself in not wholly instrumentalist ways. In order to engage with e-Science and produce new research, careful attention needs to be paid to the kinds of data that we want to analyze, process, deliver and — more interestingly — create. E-Science in the performing and screen arts is challenging precisely because creative research does not map directly onto dominant research models in the sciences. These communities do not often face problems that require new tools. Instead, our work operates in the other direction: new tools and technologies inspire questions that we address through creative research praxes. With its emphasis on infrastructure, e-Science can provide the materials with which the screen and performing arts can generate research questions useful in both disciplinary areas.

11 There are endless gazetteers and critical studies of new media arts. A comprehensive discussion of new media arts is well beyond the scope of this paper. Moreover, e-Science has developed quite separately from the wider arena of new media arts. Nonetheless, the background to the arts and technologies context is useful in framing the potential relationships that might be forged with e-Science. The investigation of relationships among science, technology and the arts has been well established since the late 1960s. The 1968 launch of *Leonardo* , the international journal of arts, sciences and technology, marked the much longer history of this kind of fertile interplay, while publications by [Dixon 2007] and [Giannachi 2007] are merely two examples in a string of books in this field. Arguably, early adoption of new technologies is a defining characteristic of the creative avant-garde. From the use of photography and film by the early modernists and ISDN lines for telematic performance in the early 1990s, to the subversion of GPS systems and mobile telephones by twenty-first century locative and pervasive media artists, technological innovation presents artist-scholars with new questions, rather than answers. Indeed, artist-scholars working with computing technologies are already using the newest tools and platforms in their practices. And with the geopositional turn in so many new media technologies, it is hardly surprising that so much of the art in this area is concerned with questions of space — its fractures and potentialities.

12 We might, therefore, conclude that there is nothing new about the application of e-Science tools and methods to the screen and performing arts. Lev Manovich's discussion of the history of the "database narrative" [Manovich 2002] located within the constructivist film making of Dziga Vertov (1929, *Man With a Movie Camera*) and Michael Century's examination of the imbricated practices of artists and technologists throughout the twentieth century provide a useful historical lens through which to see the current potential for e-Science [Century 2005]. Whether we look at the work of Natalie Bookchin or Blast Theory, Paul Sermon, Johannes Birringer, Andrea Zapp, the myriad works coming out of ZKM (the German digital arts powerhouse, based in Karlsruhe and headed by Peter Weisel) or the Second Life collaboration between artist Lynn Hershman Leeson and archaeologist Michael Shanks (which explores the ways in which personal archive might be spatialized and animated within virtual environments) computing-based technologies have been at the heart of leading-edge arts practices.

13 Given that new media arts practitioner-researchers are already working successfully in existing collaborative, multi- and inter-disciplinary teams with interoperable tools, what contribution might e-Science make to knowledge in this area? On one level, of course, e-Science fits Bolter and Grusin's remediation model, in which the modernist myth of the new is complicated in order to explore the cultural and aesthetic impact of digital technologies [Bolter & Grusin 2000]. Nonetheless, by exploring the specific uses of e-Science in the context of the workshop, the particular, potential impact on the creative arts can be described.

Locating Grid Technologies Workshops

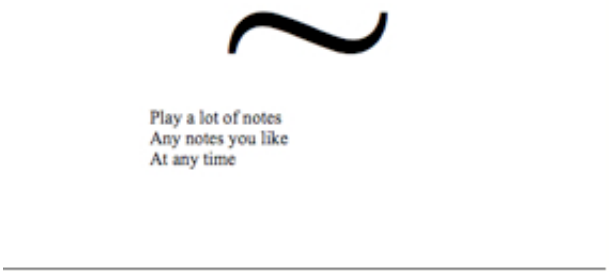

Figure 4.

The physical environment of the Locating Grid Technologies workshop sought to provide an appropriate space for exploring these questions. The setting was a large, air-conditioned room on the top floor of Bristol University's Graduate School of Education. Space was created for a four-piece improvisational orchestra, microphones and a large sound-mixing desk. At the front of the room, the reader should imagine a long stretch of plain, white wall. During the workshop, a man and a woman sit in front of one computer and another man is at a laptop. A different man stands and gestures towards the band and towards four web cameras, three of which are mounted at regular intervals along the blank wall, while the fourth is mounted on the opposite wall, at the back of the room. 14

Figure 5.

Projected on to the blank, slightly textured wall are several windows, presenting four different camera points of view of another room, somewhere else. It is clear that in that other room are also four cameras, set up in much the same way as the ones in the first room. Those windows frame four differently angled, full-body views of a woman with loose clothes and bare feet. In three of those windows, we can see that the woman is joined by several spectators, who sit in a row at the back of the room. In a fourth window, the camera focuses on the dancer as she faces the projection wall in her room to keep an eye on what is happening elsewhere. The orchestra's conductor signals to begin. A second after the first notes sound, the dancer begins to dance. The man with the laptop busily makes adjustments that correspond with camera movements and resizing and repositioning of viewing windows, which can be layered but not overlaid. The man and the woman at the computer discuss what is going on both in the flesh in the big room and via the projections from the other space. They try to map these performances by transforming them into nodes, lines, text and tags. 15

The music stops, the dancer settles and the mapping activity is saved. 16

It begins again, but this time the recordings of band, dancer and mapping are replayed into the two rooms and performers and participants enter into dialogue with the artifacts. 17

These workshops sought to focus on a whole cycle that involved performance, recording and reworking by using specific e-Science tools, rather than such established performance media software as MaxMSP, Pure Data, Isadora or Ableton Live. The objective was to assess the suitability of such research-oriented software and hardware platforms for creative practice. 18

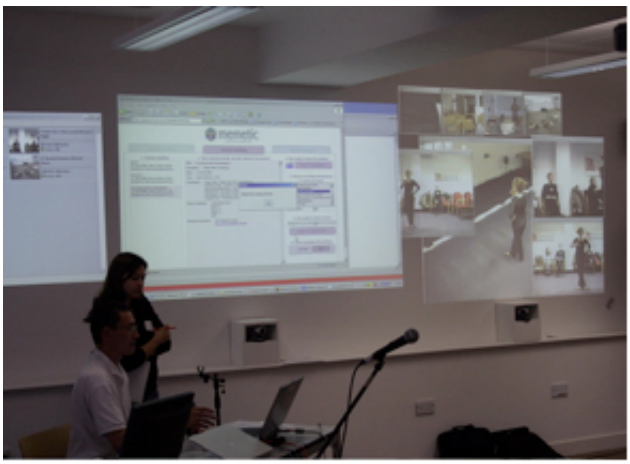

Figure 6.

Collaboration, Tools and Infrastructure

The research undertaken in these workshops arose specifically out of my interest in the relationships between events and their documents and the ways in which space is practiced and transformed across media. This is an interest in things as productive, shifting, performative. By performative I do not mean activities that are performance-like or artificial [Flynn 2002, 50]. Rather, I am keen to consider the specific material processes by which relations are enacted. Judith Butler's argument that the body (and here I would argue both the human and non-human body) has no "ontological status apart from the various acts which constitute its reality" [Butler 1999, 173] accords with this. I was interested in how both institutional and computational space (and time) enact specific creative practices but also in how different creative practices productively transform institutional and computational space (and time). 19

As part of the University of Bristol research theme Performativity | Place | Space, the "Locating Grid Technologies" workshops and symposium specifically investigated the potential of these Grid technologies to produce new understandings of space and time for distributed, creative research practices. Key to the success of the workshop series was the effective interdisciplinary partnership between the author, as principal investigator, and the Centre for e-Research at the University of Bristol's Institute for Learning and Research Technology, the Graduate School of Education and the Access Grid Support Centre at University of Manchester. The project brought together mixed-mode researchers from the UK, US and Japan to generate, analyze and re-use audio-visual documents of distributed practice-led research. In doing so, the project explored fragmentations of space and time in networked environments by using IOCOM as a telematic performance environment and as a dissemination tool for other performance forms; by using a range of software interfaces within IOCOM events to record, annotate and retrieve the meetings; and by using a Semantic Web database to query that audio-visual archive in such a way as to facilitate its reuse in performance, in programmed installation environments and in virtual working environments. 20

The choice of platforms was based on existing e-Science tools and research relationships at University of Bristol, which had hitherto not been investigated in conjunction. IOCOM was already in place as the contracted communications grid solution and is the dominant platform in the UK's Higher Education environment. The project used two of the University of Bristol's nodes then in existence: a large "lecture" type room in the Graduate School of Education and a smaller "panel" type room in the Department of Physics. Furthermore, University of Bristol has a user group in a project based at University of Manchester that was developing a suite of software solutions to record, annotate and retrieve communications grid meetings. The Virtual Research Environment (VRE) Memetic was a Joint Information Systems Committee (JISC) initiative that coupled the recording of meetings with the ability to map information, ideas and 21

arguments via Compendium software and the replaying and additional annotation of these documents through Meeting Replay. Finally, through my work in the AHRC-funded PARIP (Practice as Research in Performance) project (2000–06) I had collaborated with Bristol's Institute for Learning and Research Technology (ILRT) to develop the PARIP Explorer Semantic Web tool. PARIP Explorer presents an intuitive, FOAF-like interface to the end-user for deep semantic visualization of the connections between people (such as researchers and artists) and practice-led research outputs (such as performance documentation and interview transcripts). The objective in the e-Science workshops was to develop the tool as a proof of concept for the querying of moving image data in such a way as to facilitate the subsequent use of these media data in performance, in programmed installation environments and in virtual working environments. In other words, the workshops aimed to demonstrate how through IOCOM we could devise events that would be recorded, annotated and replayed within communications grids settings and could be searched and played through a data grid application for future use in new creative research practices: production, distribution and use were thus linked.

Fragmenting and Mapping

Of key interest at this initial workshop were the transformations of living bodies and immediate proprioception, our sense of how our bodies move in space (see report for more details). The fragmenting of performance with musicians in one space and dancer in another, with audience split between the two spaces, set up a number of interesting challenges. Both sound and image in a communications grid environment are marked by significant time lag, making synchronization difficult. Furthermore, due to the differences between camera view and eye view, it is difficult to establish effective eye contact. The indexicality of the projected image draws workshop participants and performers to the eyes of the mediatized face, rather than to the mechanical camera lens, which in fact stands in for the human eye. A body moving in a projected image extends an arm and another body in a different space wishes to mirror that movement. However, as these are not mirror images, the studio-trained dancer has to learn to move counter-intuitively. The space of the video does not operate according to the logic of the performance space. New ways of performing have to be developed in the moment — in the time of performance. At the same time, the various interfaces between artefact and performance are precisely what structure the collaboration. Fernandez's notation is used both to guide the orchestra and to present prompts for Norman. She does not simply "respond to" the music. 22

A further transformation occurs with the mapping of these activities via the Memetic toolkit. The dialogue mapping through Compendium enhances our understanding of multiple practices of collaboration by adding a further layer of textual interrogation. In a conventional meeting setting, Compendium will be used by a single participant to track rhetorical shifts in discussion and argument. The flow of words can be stopped at any time when someone requires "clarification." The aim is to make decision-making more visible. However, here in real time, we cannot stop the improvisation for such clarification. At any rate, the clarification of the processes that Norman uses to work within her space, with the audio and with the architecture of the room that she is in and of the projected windows has a different set of aims and concerns to those that structure Orchestra Cube's improvisation. Although the orchestra refers to Norman's movements in relation to Fernandez's notational prompts, their practice is not spatialized in the same way as is hers. Norman's movement works both with and against the forms of projected images of herself and of the orchestra, whereas the orchestra appears to work more with what appears within individual frames. 23

Simon Buckingham Shum and I, who work with Compendium, have to begin to make these observations in the moment. We cannot predetermine where interesting themes may arise in the performance, nor can we unproblematically record the performance to revisit later. Achieving this end is, of course, an impossible task, but the process is still one that is useful. The speed with which performance occurs allows us to perceive activities. However, the time that is required to materialize those perceptions as memory-image ([Bergson 1912]; [Connolly 2002, 26–30]) and to transform those into scripts in a piece of software means that the impossibility of "capturing" liveness is clear. Yet, by looking at what we *do* notate, we can begin to consider the relationships between performance, Compendium operators and the affordances of the software. On one level, Compendium allows spectator-participants to mark points of interest that might be revisited for further discussion. Those points of interest are themselves situated nodes in the process of transforming performance event into text: the spikes of activity that they indicate do not necessarily point towards spikes of intensity in performance. This transformation thus renders some aspects of the performance invisible or absent, while presencing 24

other points in the performance. In other words, Compendium produces new performatives which can neither be separated from the performance nor be wholly coterminous with it.

The recording, mapping and annotating of fragmented performance brings to the fore those exact qualities of the live event that escape documentation. When used within conventional meeting scenarios, these technologies seek to smooth out chance, accident and intuition in favour of design, planning and a sense of teleological progress, transforming dialogue into blueprint. When applied within the context of creative event, the arbitrariness of decision-making and the excessiveness of the live are enacted via the technologies. 25

Describing and Connecting

The first workshop generated a range of audio-visual media, from photographs to the Memetic recordings held on Manchester University's servers. The second workshop focused on using these to develop ways in which media data might be linked via the Semantic Web database application. I wanted to explore this in order to ask how other researchers might gain access to these kinds of research practices to generate further practice-as-research projects. While Memetic recording metadata are stored as RDF in the Manchester databases, the information is only accessible via the Memetic interface. But what if practitioner-researchers could use an online tool to search for and play a wide range of practice documents, from short QuickTime movies and still images to Memetic recordings? How might the practice-as-research communities themselves inform the processes by which such distributed resources are described and connected through a single interface? 26

The second workshop focused on presentations that introduced and described the field of data grids for participants so that we could begin to work with the Memetic recordings produced in the first workshop. Nikki Rogers (ILRT) demonstrated a proof-of-concept interface between PARIP Explorer and Memetic that had been developed by Rogers, Ale Fernandez and Damien Steer. This allowed PARIP Explorer to query the Memetic database. When search terms such as "Kyra Norman," "Angela Piccini" or "University of Bristol" were entered, still images from the first workshop's Memetic meeting were visualized in relation to the other information held about these people and institutions. When combined with the full Memetic functionality, there would be the potential to drill down into specific moments of Memetic meetings that were tagged with the relevant keywords. In effect, were a user to search for dance, improvisation and space, she might well be faced with a window showing text, still images, relationships and a video-playing window that would play the video recording and Compendium mapping of that meeting from the point that was tagged. 27

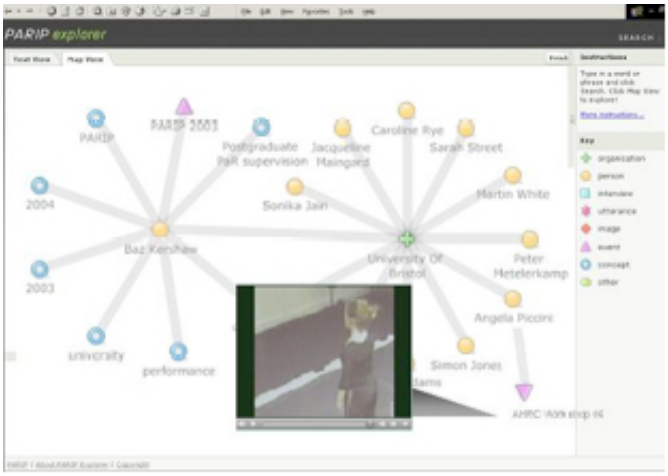

Figure 7.

The resulting fracturing of performance documentation and its reconfiguration via a two-dimensional "map" of practice-as-research further flattens practice. At the same time, via the projected window, this map extends the practices of the first workshop into a much broader international setting of cognate work. Where people, institutions and practices are rendered as abstract symbols, the ability to expand graphical relationships among actors continually points beyond the perceived lack of the document to the absent times and spaces of the performances to which they refer. 28

In order to locate materials they must be described in such a way that both the machine and their varied human users may find them. PARIP Explorer uses RDF to describe its contents and the simple relationships between objects. This description is combined with an ontology based on Web Ontology Language (OWL) to describe the properties, characteristics and classes of those objects and their relationships. All of this data is queried through the SPARQL query language for RDF. RDF relies on a consistent ontology; that is, on a formal description of concepts, relationships and terms within a field. While this makes sense for developers seeking to produce real-world demonstrators of semantic web tools, users now accustomed to Web 2.0 models of interacting with online materials want to be able to generate their own descriptions of and comments about these online resources. 29

By combining a user-generated component with the semantic web tool, we create the potential to build new relationships into these media data. Not only may a wide range of screen grammar terms be built in, such as camera angles and movements, but spectator memory and performers' experiences of the space and time of the performance may be attached as metadata to the space and time of the video. If we consider the use-case scenarios for these materials, since PARIP Explorer does not hold media files but rather mines them from other repositories, there is a liveness to the experience of using the database. If we consider the potential for search and use of media artefacts within subsequent practice-as-research contexts, there are a range of material concerns that practitioner-researchers might wish to highlight, having to do with the reappropriation of those documents within a performance event when these fragments of video time are connected to be transformed once again into the logic of the live event. In particular, the spatial and temporal logics of the live event may be transformed into these metadata. The aim is not to suggest that in providing this form of almost choreographic notation the artist may reproduce the time and space of the initial performance event. Instead, attention to the spatial relationships among data produces new spatial orientations towards the performance event and beyond. 30

Combining and Remediating

The promise of e-Science tools and technologies is their extensibility and reconfigurability. The ability to sample and combine data in new contexts has been at the heart of much art production in this field. By combining the production of performance documents in communications grids with the generative description and visualisation of those documents within a data grid, comes the potential for new, remediated works that seek to layer visualized space and time to trouble the boundaries of where and when events begin and end. These are questions of memory and forgetting, too. If, as Paul Ricoeur says, memory is an act of telling otherwise [Ricoeur 1999], then the memories that accrue to the media objects held within databases in the form of tags and comments might usefully complicate any direct associations that may be made between events and their documents. 31

Figure 8.

In the third and final workshop, participants drew from the activities of the first two to consider how these media fragments might feed in to subsequent small-scale collaborations. A distributed improvisation using IOCOM, the Memetic recordings of the first workshop and elements of PARIP Explorer saw Bristol meet with Jem Kelly and a group of his University College Chichester undergraduate performance students in Southampton's Access Grid node; with the 32

sound poetry collective *mmmmm* http://www.mmmmm.org.uk, who participated from Imperial College London using voice and objects; and with the Access Grid Support Centre in Manchester. Dancers, musicians, poets, performers, visual artists, film makers, digital artists, sound artists, archive-based researchers and e-Science researchers participated in a series of “call-and-response” exercises. These were intended to explore the impact of locational context on performance. Each node took it in turn to initiate an improvisatory practice that subsequent nodes would then follow.

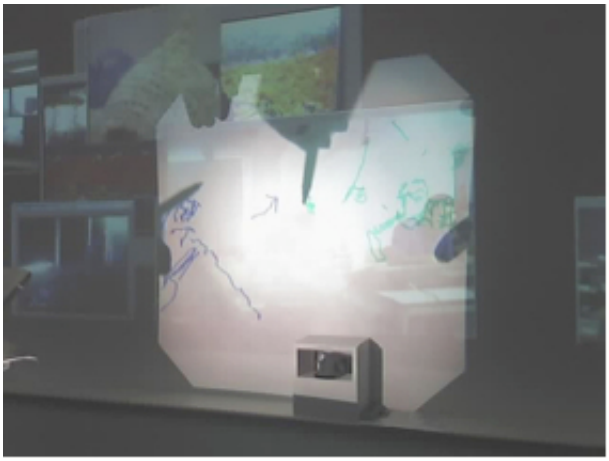

Figure 9.

33 By bringing together a very large group of people who do not ordinarily work together, we were keen to test the limits of these technologies in order to highlight research and development potential for developers. This final workshop scenario thus explored how people’s existing practices, developed within other institutional contexts and via heterogeneous technologies, might be transformed through an engagement with the e-Science agenda. Clearly, a significant barrier to the production of sustained creative research was the workshop structure itself and also the collaboration with independent artists already familiar with a diverse range of computing tools and platforms. Those who had worked in distributed networks and engaged in traditional telematic art were underwhelmed by the capabilities of e-Science. Yet, the university setting in which these workshops took place is unaccustomed to these multi-disciplinary practices. Despite the fact that the Drama and Computer Science departments at the University of Bristol are among the foremost in the UK, very little sustained collaboration between the two has taken place outside of functional approaches to making data more easily accessible. E-Science presented the opportunity to begin to build a culture in which transdisciplinary laboratories could begin to be planned.

34 What became clear, however, is that by the end of this workshop series, in a funding structure that supported only minimal work on either side of each workshop, participants had learned to understand and begun to work creatively with the affordances of the e-Science tools. Once the formality of the room architecture and furniture had been disrupted on a number of occasions, and once the seeming inflexibility of the corporate audio-visual configuration had been disrupted, with web cameras removed from mountings and projectors swivelled to face in multiple directions, it became clear that e-Science tools can provide a similar creative impetus to existing telematic, distributed and digital performance and art platforms. That is, throughout the workshop context, it was the analogue space of the institutional rooms and the conferencing configuration of the hardware that constrained potential collaboration. No artist would choose to create work in these kinds of spaces. Nonetheless, the dialectical relationship between arts practice and e-Science quickly indicates that migrating creative practices into institutional spaces of the university that are designed for classes, seminars and lectures and constraining that creative practice within the temporalities of e-Science is a highly useful method for identifying research and development needs. This may not be appropriate for the production of “good art.” Yet, at this moment in the UK sector, the opportunity to play with and stretch tools and technologies and the very modest funding structures in place for this has meant that only fairly tentative progress can be made. Thus, it is particularly heartening that the Bedford e-Dance project was the sole successful applicant in the 2007 AHRC e-Science research strand as it provides the only continuity between my own workshops and fully-funded work in this area.

Aesthetics, Space and Time

As indicated previously, defining and exploring the performative limitations of the institutionalized spaces of e-Science is a key question. The use of IOCOM grid-enabled lecture-room spaces placed constraints around what was achievable. Fixed cameras, microphones, speakers and projection surfaces, air conditioning, fluorescent lighting, carpet glue, concrete floors and chairs with built-in desks all suggest particular sets of activities, which were not ours. At the same time, the apparent fixity of those spaces clearly inspired workshop participants to push at their limitations. Unlike a multimedia CAVE environment, which is set up to facilitate a wide range of immersive events, the rooms in universities that house the kinds of tools and technologies that artists wish to use are very often not conducive to fully realized art works. 35

These spaces were mediatized via our range of e-Science tools into frames that are themselves suggestive of a techno-corporate situation. While the proprioceptive implications of distributed performance have been discussed at length within digital performance contexts (e.g. [Birringer 1999]), what are the implications of embodied experiences of moving in a room while watching the projected image of oneself and others where that image is framed with corporate branding and within which further software is being manipulated? The branding of academic research outputs places multiple filters on to the experience of event. IOCOM windows bear the IOCOM logo and the name of the institution in the banner that runs across the top, placing a very clear frame around the image. The fact that windows can be tiled yet cannot be overlaid with any kind of transparency also maintains the discrete identity of each grid node. When using the off-the-shelf IOCOM software the practitioner-researcher cannot mix institutions to create a hybrid space, despite the ubiquity of the third space within telematic work. Bedford's e-Dance project has faced similar issues and is working with its dedicated programmers who are able reconfigure the communications grid interface to produce frames that respond specifically to the aesthetic and conceptual concerns of individual projects. 36

Yet, such issues do not necessarily have to be considered within such a negative framework. While the technical glitches, the time lag between image and sound, and the low image quality of the H.261 video codec used in the communications grid may suggest failure, they provide an interesting aesthetic counterpoint to the seeming verisimilitude and heightened realism of much digital media art. They introduce an impressionistic quality to the practice that works against the stark borders of the frame and the precision of the software applications that appear in separate windows. The interplay between the fully haptic experience of the event, the highly compressed flatness of the video images and mono sound and the crisp graphical transformation of both into the database present specific aesthetic and conceptual possibilities for the practitioner-researcher. Specifically, a material concern with projection and performance surfaces as architectures (see [Imperiale 2000]; [Leatherbarrow & Mostafavi 2002]) offers the artist a way to think about the interpenetrations of the different media through a focus on different forms of skins and transparencies. Despite the apparent blank solidity of the IOCOM node projection walls, their slight texture breaks up the light and produces a micro landscape of projected image. Moreover, the image itself seemingly erases the wall in that we no longer act as though we see it. Instead, we react to the image, rather than to the wall. The wall becomes both window into another world and, at the same time, the ability to project on to its surface reproduces a certain solidity. 37

Similarly, the materiality of the projection surface is both reproduced through its use and rendered invisible as it becomes another desktop on which data is manipulated, moved and positioned within a flow of juxtapositions. Bodies, video projections and computer visualizations can be flattened into the same conceptual space when they are all treated as equally framed data to be resized, minimized, maximized or redeployed at will. Where communications grid "drivers" may be concerned to ensure that the windows are aligned and rigidly organized, this enacts a conferencing logic at odds with a focus on the specificity of such placement as aesthetic-conceptual choice. In the field of telematic, distributed art practice, technicians and artists are often the same people and there is a heightened awareness of the importance of placement and framing. The collaboration between e-Science and the creative arts presents a useful challenge to the developers of these tools and technologies to attend more closely to the materialities of their practices and how these may shape research outcomes. 38

Arguably, the spatializing practices of PARIP Explorer and similar semantic web databases raise more troubling questions about the political implications for creative artists adopting e-Science tools and technologies. With its emphasis on mapping technologies, the role of cartography within research, e-Science presents interesting intellectual challenges to those of us who agree with Herman Melville that "It is not down on any map; true places never are" 39

[Melville 1994, 70]. Given the ways in which e-Science is implicated within the military-industrial discourses of U.S. cyberinfrastructure, if arts practitioner-researchers are to engage with the agenda in an informed way then we have to find ways in which, through these spatializing practices, we can point always to that which exceeds the map. A clear and often-quoted example of the political implications of this was John Poindexter's Information Awareness Office, established by the US Defense Advanced Research Projects Agency (DARPA). Although defunded in 2003, at the time Poindexter argued,

> We must become much more efficient and more clever in the ways we find new sources of data, mine information from the new and old, generate information, make it available for analysis, convert it to knowledge, and create actionable options…. Tools are needed to facilitate these collaborations, and to support these teams that work to ensure our security…. Doug Dyer is starting a new program called Genisys, which addresses our database needs. This project will imagine and develop ultra-large-scale, semantically rich, easily implementable database technologies. One goal is to develop ways of treating the world-wide, distributed, legacy data bases as if they were one centralized data base, and another is to develop privacy protection technologies. [Poindexter 2002]

Artists need to remain cautious of the seemingly democratic potential of making their work so highly visible. Such issues underlie what is commonly argued to be the radical potential of live performance [Phelan 1993]. Because the event does not produce a single object to be tagged and re-circulated, to some extent it escapes surveillance. Yet, in engaging with networked technologies artists can use the logic of late capitalism to critique the very idea of "total information awareness" in that the work must always exceeds its documenting or mapping apparatuses. The challenge is to produce artwork that works with the affordances of e-Science to question the politics behind its production. In this way, arts practices engaging with e-Science may share concerns with some within the Locative Media communities, who use mobile phone, GPS and a range of mapping technologies to critique the surveillance society through participatory arts practices [Galloway 2008]. E-Science is both performative of the desire to invent engines that will make visible and locatable all knowledges across time and space and the impossibility of that desire. It is performative of its own failure, yet in that failure lays its potential.

Both the potentialities and pitfalls of e-Science tools and technologies present fertile material for the arts researcher, particularly within the area of practice-based research: from the politics of surveillance to the aesthetics of video compression, from the ethics of multidisciplinary collaboration to the theoretical implications of mixing video time and space with the time and space of the performance event. Of course, technologies are always-already performative of the cultures from which they are developed. They express what we collectively deem important and while they open up certain avenues of research they must also close down others. Friedrich Kittler has argued that we can never "understand" media because media themselves control the possibilities of understanding, because there is no place outside of media from which to understand it [Kittler 1999]. The UK's e-Science agenda presents researchers with an exciting opportunity to research through practice the limits of knowledge within a particular moment of intensified academic globalization. I feel very privileged to have been a small part of the first steps in the arts and look forward with interest to the challenges that lie ahead. 40

Appendix

Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science. The eight camera views and streamed computer screen all document the 40-minute afternoon performance within Workshop 1. Each camera view is a direct feed through the INSORS grid system rather than being generated by independent video cameras. 41

Cameras Cam1-4 show the Graduate School of Education INSORS grid node activities. Cameras 2Cam1-4 document activities taking place in the Physics Department INSORS Grid node. Simon Buckingham Shum, Orchestra Cube and the workshop team present and perform in the Graduate School of Education node. Kyra Norman performs in Physics and we also see Tobias Blanke of the Arts and Humanities e-Science Support Centre, Nick Kaye (Exeter University), Sita Popat (University of Leeds), Michael Daw (University of Manchester), Nigel Derrett (University of Bristol). The 42

workshop, however, takes place both within these specific places, across the network and across the surfaces of the fragmented screens. Each of the camera viewpoints is projected on to the walls of each node space and the windows are arranged and resized by users over the course of the workshop.

Simon Buckingham Shum, Open University, and member of the Memetic VRE project, demonstrates Compendium as a dialogue mapping tool for use in the creative and performing arts. At the 14-minute mark, Ale Fernandez of Orchestra Cube speaks. He introduces Orchestra Cube and his conducting exercise, which uses a range of notational symbols streamed over the network. He discusses how dancer Kyra Norman, who is located in the second grid location (shown by videos with the 2cam suffix), may respond to both the streamed notation and the Orchestra's performance. Ale then introduces a series of exercises in which performers in each grid location participate. The documentation ends with all participants being thanked.

Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (2cam1)

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Figure 10. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (2cam1). This camera points towards the rear of the Physics INSORS grid node. The camera is placed at the centre of the room space.

Figure 11. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (2cam2). This camera points towards the rear of the Physics INSORS grid node. The camera is placed to the right of the room space.

Figure 12. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (2cam3). This camera points towards the front of the Physics INSORS grid node. The camera is ceiling mounted at the centre of the room. The projected windows of the 4 camera views and streamed screen from the Graduate School of Education node are visible.

Figure 13. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (2cam4). This camera points towards the rear of the Physics INSORS grid node. The camera is placed to the left of the room space.

Figure 14. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (cam3). This camera points towards the front of the Graduate School of Education INSORS grid node. The camera is ceiling mounted at the centre of the room.

Figure 15. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (cam1). This camera points towards the rear of the Graduate School of Education INSORS grid node. It is the centrally placed camera in the room.

Figure 16. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (cam2). This camera points towards the rear of the Graduate School of Education INSORS grid node. The camera is placed to the left of the room space.

Figure 17. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science (cam4). This camera points towards the rear of the Graduate School of Education INSORS grid node. The camera is placed to the right of the room space.

Figure 18. Locating Grid Technologies: Performativity, Place, Space: Challenging the Institutionalized Spaces of e-Science. The video is produced through the Screen Streamer function within Memetic and shows Compendium being used.

Notes

[1] http://web.archive.org/web/20080530213136/http://www.epsrc.ac.uk/PressReleases/DeliveringeScience.htm, accessed 05.03.2007

[2] http://www.seti.org/site/pp.asp?c=ktJ2J9MMIsE&b=178025, accessed 03.03.2007

[3] http://www.sdsc.edu/srb/index.php/FAQ#What_does_the_SRB_do.3F, accessed 05.03.2007

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