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Documenting mixed reality performance: the case of CloudPad

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Abstract

This article introduces an original documentation and archiving tool, CloudPad, that integrates 'cloud computing' into the annotation and synchronisation of mixed media resources. Through CloudPad users are able to view a documentation, edit a version of it, and record their own comments in response to it. Whether users may have created and/or experienced a particular work, or whether they may simply wish to consult a work's documentation, their journey through these records and annotations are subsumed into the work's documentation, thus augmenting the 'original' artwork's field of social engagement. Before discussing CloudPad in detail, we proceed to explain how recent debates in performance documentation influenced our methodology and development, and the general challenges of mixed reality documentation that CloudPad aims to address.

Keywords: mixed reality, cloud computing, archiving, performance documentation

1 Performance and documentation

Performance documentation is a burgeoning field of investigation, whose impact on other disciplines is becoming more and more significant. As its position is increasingly consolidated, the function of performance documentation, and thus its relationship with performance itself, is ever more the subject of scrutiny. A number of studies have investigated and challenged the dependency of performance on documentation. Philip Auslander (2006, p. 1, p. 5), for example, describes this relationship as 'ontological' and explains that canonically documentation presumes that an original performance has occurred, whilst at the same time it is documentation that frames the performance as such. This line of argument presupposes that documentation is informative about a work, where by informative we mean that not only does documentation somehow (re)present the work but also that in doing so it *forms* the work. Discussing the relevance of these debates to preservation, Annet Dekker (Dekker *et al*. forthcoming) notes that the origin of the word document, which, she shows, derives from the Latin

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verb *docere*, indicates that a document constitutes a form of 'proof, an example, an instructive demonstration of some principle or idea'. This suggests that a document, in forming a work, gains an authority over it, which is archival in nature. We have discussed elsewhere (Giannachi *et al.* 2010) how Jacques Derrida's *Archive Fever* traces the word archive to *Arkhe*, to indicate that archives constitute both 'the *commencement* and the *commandment*', the '*there* where things *commence* – physical, historical, or ontological principle—but also the principle according to the law', the '*there* where men and gods *command, there* where authority, social order are exercised*, in this place* from which *order* is given—nomological principle' (Derrida 1996, p. 1, emphasis in the original). Documentation, in this context, is seen to be entailing a formative, educational, even authoritative dimension. It constitutes a legacy of a work. This, in turn, is no longer only seen as disappearing, ephemeral and ontologically unstable (Phelan 1993), but rather as remaining as trace (Schneider 2011, 2012).

For others the relationship between performance and documentation is more hybrid. In his analysis of site-specific art, Nick Kaye (2000, p. 218, emphasis in the original), for example, notes that 'site-specificity arises in a blurring of the opposition between a work and its contexts' so that 'where documentation is a tactic of the site-specific work, the distinction between *documentation* and *notation*, between that which is *remembered* and *anticipated*, *recorded* and *produced* may come under question'. Here, documentation is not so much subsequent to performance, or a consequence of performance, but rather a tactic for performance. Thus, Kaye notes, with respect to the site-specific works discussed in his volume, that the relationship between documentation and performance is not necessarily one of consequence but of necessity. For Kaye 'the hybrid might be understood as a work functioning *between* recognisable forms or schemes' (Kaye 1996, p. 122, emphasis in the original). The use of the term hybrid here presupposes that documentation is not necessarily something occurring *after* the performance event, but rather something which is contextual to the work—part of the environment within which the work not only occurs but is also generated and received. For Mike Pearson and Michael Shanks (2001, p. 57) the operation that marks the encounter with documentation is 'archaeological', in the sense that the document comes to be 'the matrix of places, objects and activities, of performer and context, worker and workplace, agency and structure' that constitute a 'rescue archaeology of the event'. Documentation then may be approached through ichnography, the science of traces (Shanks 2008) whereby traces do not necessarily only lead to the remains of a work but also to the conditions under which it emerged and may be replayed. Shanks and Pearson write: 'what has happened? What survives after the event? How is it remembered and recalled? The issue is the document.' (Pearson and Shanks 2001, p. 57). The issue is, precisely, the document—the proof, example, demonstration Dekker was referring to above—but the question of what the document may be a proof, example, demonstration of remains invariably unanswered.

We know from Jacques Le Goff's influential work *History and Memory* that 'The document is not objective, innocent raw material, but expresses past society's power over memory and over the future: the document is what remains' (Le Goff 1996, p. xvii). Le Goff seems to imply that the fact that a document has survived, that it has remained, is what gives it 'power' in that it expresses what was once chosen to be remembered or what was simply able to survive. Implicit in this is the fact that a document may have authority, though this does not imply that it is evidence of something that actually occurred, nor that this authority carries any value in terms of an understanding of an 'original' event. In one of the earliest studies of documentation, Suzanne Briet's (2006) seminal *What is Documentation?* documents are presented as signs, thus challenging the view that they were proofs of a fact and situating 'the practice of documentation within a network of social and cultural production' (MacDonald 2009, p. 59). Interestingly, Briet discusses the use of primary and secondary documents,

where by primary documents she refers to initial documents and by secondary documents she means documents that are created from the initial document. This relationship between primary and secondary documents is quite crucial in understanding our approach to art documentation practices and we will come back to this distinction in the next section. Briet then goes further in her analysis between life itself, or 'the real', and documentation. She writes:

> *Is a star a document? Is a pebble rolled by a torrent a document? Is a living animal a document? No. But the photographs and the catalogues of stars, the stones in a museum of mineralogy, and the animals that are catalogued and shown in a zoo, are the documents (Briet 2006, p. 10).*

She notes that a document should not be read in isolation. Precisely because documentation is contextual, rather than delivering remains of an isolated event, they form a matrix or network of signs. This, she notes, can lead to creation 'through the juxtaposition, selection, and the comparison of documents, and the production of auxiliary documents. The content of documentation is, thus', she concludes 'inter-documentary' (ibid.,p. 16). A number of important findings emerge from her analysis. First, while documents may constitute what remains, they are not necessarily proofs of an original event. Second, they are generated contextually, as part of the environment of an occurrence. Third, it is through the often dialectical juxtaposition of different documents that knowledge generation might occur.

We propose here, in agreement with Shanks and Pearson, that a document is generated before, during and after a performance (Pearson and Shanks 2001, p. 58) and, in agreement with Briet (2006), that it is the juxtaposition of documents, their inter-documentary dialogue, or, in Kaye's words, their hybridity, that allows them to inform an event not only at the time when an event may have originally occurred but also in the aftermath of it. Implicit in this is that the document is much more than the remains of an event. It is the sign of a series of contextual factors that may have mapped aspects of the conception, realisation and reception of an event – it is a culture. Moreover, the document is not static. It changes over time precisely because it is used in different ways. The document must be read as an inter-document, not only a proof of a past event but also a clue leading to a change in perception. This is evidenced in the fact that scholars and artists are increasingly comparing the detective genre to performance documentation. Thus, to understand what an original event may have been, Shanks and Pearson suggest, we need to apply forensic science and police procedure to performance documentation, focussing on the detection of detail ('anything might be relevant'); plurality of event ('many different, sometimes contradictory and divergent, narratives are generated'); sideways glance ('we may need to ask oblique questions' such as 'tell me about your performance scars'); orientation (the necessity to collect photos, plans and initial observation for 'successive investigators to orientate themselves at site and to "relive" the events'); symptomatic reading ('no hierarchy between empirical attention, analysis and leaps of the imagination'); and a poetics of absence (based on an archaeological approach to documentation, meaning also 'attending to things in an intimate way in following the connections' (Pearson and Shanks 2001, p. 60), and noting that 'objects as clues are inherently unstable' since 'the kitchen tool may also be the murder weapon' (ibid., p. 61).

Shanks and Pearson show that the document, like the murder weapon, is epistemologically ambivalent. It is so because of its hybridity of use. In other words, the document acquires and even changes in value through its use and its context over time. Thus, for instance, UK photographer Hugo Glendinning, principal investigator of the Arts and Humanities Research Council (AHRC) funded project (2008–11), 'Watching the Detectives – Investigations of The Event, its Record and the Aesthetics of Witnessing', which explored the role of the photographer as witness and documenter, points out that for him 'the witnessing at the moment of taking the picture is probably less important than the subsequent

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witnessing when you start looking at the picture, choosing it and looking at it again and again' (in Giannachi forthcoming). In this context, the document is not only interesting because of what it originally captured but also in terms of what it produces when it is encountered. In other words, the document operates as a medium through which we reposition ourselves in relation to the past. Bearing this postulation in mind, which implies the treatment of documents as clues (both past and future oriented) rather than traces (past oriented), we now discuss the way we generated, archived and evaluated a documentation of Blast Theory's *Rider Spoke* using cloud computing.

2 CloudPad documentation and the archive of Blast Theory's *Rider Spoke*

The CloudPad was devised by an international team comprising staff with expertise in Performance Studies and New Media, Information Science, Computer Science and Human Computer Interaction (HCI), in partnership with the UK artist company Blast Theory, the British Library, Stanford University Libraries, the San Francisco Art Institute, the Ludwig Boltzman Institute Media.Art.Research and the University of Sheffield. A customisable web-based platform, it facilitates the synchronised playback of cloud-based media entities such as YouTube video or audio files with layers of user annotations. CloudPad can be used by artists, curators, critics, participants, spectators, students and researchers from different disciplines to create documentation and archives of one or more performances, thereby facilitating the creation of legacies of pioneering artworks, whilst also integrating new documentation, annotation and metadata with existing digital archives (see also Giannachi *et al.* 2010).

Content-wise, the CloudPad was tested by using a bespoke documentation of Blast Theory's mixed reality performance *Rider Spoke* (2007–), a location-based game for cyclists (see Figure 1) that operates through Wi-Fi networks. *Rider Spoke* had been developed in collaboration with Mixed Reality Laboratory as part of the European research project IPerG (Benford and Giannachi 2011).

In *Rider Spoke* participants cycle through a city for a period of about one hour guided by a handheld device mounted on their handlebars (see Figure 2) and a soundtrack which together encourage them to record personal memories and make

Figure 1. *Rider Spoke* by Blast Theory.
Source: Copyright Blast Theory.

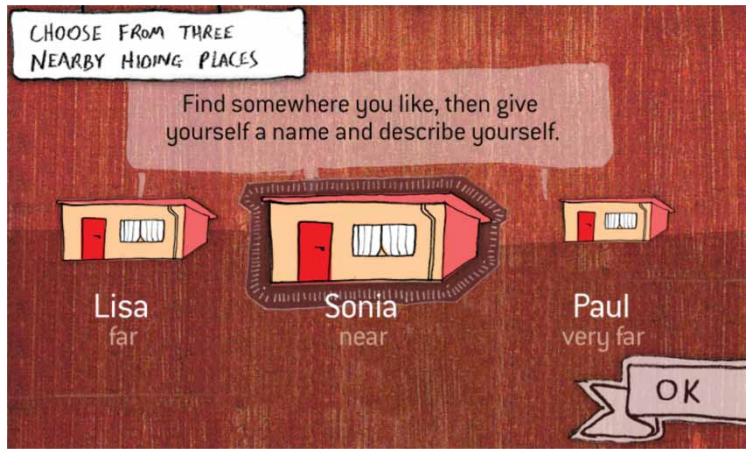

Figure 2. *Rider Spoke* interface.
Source: Copyright Blast Theory.

statements about their past, present and future associated with particular locations in the city. Participants also find and listen to the responses of other players. The soundtrack, generated by Ju Row Farr, entails a combination of descriptions, instructions and missions. The opening segment, for example, encourages participants to generate a role or character:

> *This is one of those moments when you are on your own. You might feel a little odd at first, a bit self-conscious or a bit awkward. But you're alright and it's OK. You may feel invisible tonight but as you ride this feeling will start to change. Relax, don't forget to breathe both in and out and find somewhere that you like, it might be near a particular building or road junction, it might be near a mark on a wall or a reflection in a window. When you have found somewhere you like, give yourself a name and describe yourself.*

To which one participant answered:

> *Hello my name is Kirsten I am quite ordinary . . . a bit lonely at the moment, but that's ok.*

Another moment in the work asks participants to set up a moment of theatricality by identifying a passer-by and watching them as if they were a performer:

> *Will you be a voyeur for me? Please will you cycle back towards a busier place and look for someone who catches your eye. Stay back, don't intrude; just watch them and follow them. Think about who they might be and where they might be going as you track them. Don't be afraid to make it all up. Then, stop your bike, let them go and tell me about them.*

This prompt often produces answers that involve a certain degree of identification, such as the following one:

> *There's a girl. She doesn't look anything like me. She's got long brown hair and she's wearing a wavy white skirt. I think she might be the same age as me. I think she might be a lot like me. . . . I think she's got quite a soft character. She is quite blameless. She hasn't done much wrong in her life and she's probably got quite a lot of romantic ideals. It's just sort of the way her hair is quite floaty (sic) and her dress is quite floaty (sic) too. But I think she's quite down to earth kind of a creature.*

Rider Spoke is archival in nature, in that Blast Theory rated and then saved responses to the game from the highest-rated participants. It has so far been experienced by over 2,000 participants

and toured in the UK, Europe, South America and Australia. Interestingly, a design goal for the piece had been to facilitate meandering (Adams *et al.* 2007); the designers assumed that spatial meandering would encourage mental meandering, leading participants to move in their thoughts from the present to the past as well as, at the end of the piece, into the future.

Rider Spoke was documented in September 2009 by a team comprising staff from the Universities of Exeter and Nottingham, as well as personnel from the Ludwig Boltzmann Institute Media.Art.Research in Linz. We were influenced by other hybrid approaches (Jones and Muller 2008, Depocas *et al.* 2003). We also drew from our own experience with the AHRC-funded Presence Project (2004–9), in which we used social media such as a wiki and the virtual world *Second Life* (http://presence.stanford.edu) to document user experiences of a number of artworks (Giannachi and Kaye 2011); and the Engineering and Physical Sciences Research Council (EPSRC) funded Creator Project (2008–10), in which we adopted the Digital Replay System (DRS). Developed by the Mixed Reality Laboratory at the University of Nottingham, DRS is an open software tool that has gained popularity with researchers in the social sciences by giving them the capability to synchronise and annotate different media for a prototype archive (Chamberlain *et al.* 2010). We also benefitted from the findings of the e-dance project (2007–9), which was jointly funded by AHRC, JISC and EPSRC, and conducted by colleagues from the Universities of Bedfordshire, Leeds, Manchester and Open University, which adopted access grid technologies for developing new approaches to choreographic composition involving the use of the Memetic toolkit for recording, replaying and annotating sessions in access grid. Finally, we worked in dialogue with artworks such as Lynn Hershman Leeson's RAW/WAR feminist film archives (2010) and sosolimited's interactive archival performances, which created stimulating relationships between original sets of events and their documentation, and between their encounter with and interpretation by contemporary audiences. We used a range of equipment to capture the user experience and recorded nine participants' experiences by including GPS to record location (see Figure 3); in-game audio along with the participants' responses to the game and environmental sounds; and video captured from two key vantage points. These vantage points were a 'chase cam' mounted on the bicycle of a documenter following the rider, which delivered an over-the-shoulder, third-person perspective, and a 'face cam' upwardly mounted on the handlebars of a participant's bicycle, which delivered a head-on perspective of the rider (see Figures 4 and 5). All nine participants were interviewed after the experience (for a more detailed technical account this documentation see Giannachi *et al.* [2010]). Overall, we aimed at collecting hybrid data from participants and gathering further interview materials from the artists and technologists involved in *Rider Spoke* and CloudPad at a later point.

The CloudPad offered a novel technical approach to the archiving and replay of pervasive media experiences by making use of Web 2.0 technologies (DiNucci 1999) rather than grid technologies. CloudPad users were empowered to view the repository as a living document in which they could leave their own impression of an experience (both of the original event recordings as well as any thematic connections or annotations provided by other visitors and subject experts). Previous interactive systems designed for the replay of events for analysis have lacked this level of emergent reflection (see Brundell *et al*. 2008), treating the corpus of recorded material as essentially immutable. To enable this capability, the CloudPad made use of server-based storage, which means that media from a wide variety of different sources could be included in a presentation (e.g. YouTube videos synchronised with images from Flickr). This integration was accomplished through the use of HTML5 (see http://w3.org), an emerging web standard that enables collaborative interactive applications to be structured to run inside a web browser (Murray 2005).

To design the architecture and determine the content of the prototype archive we adopted two

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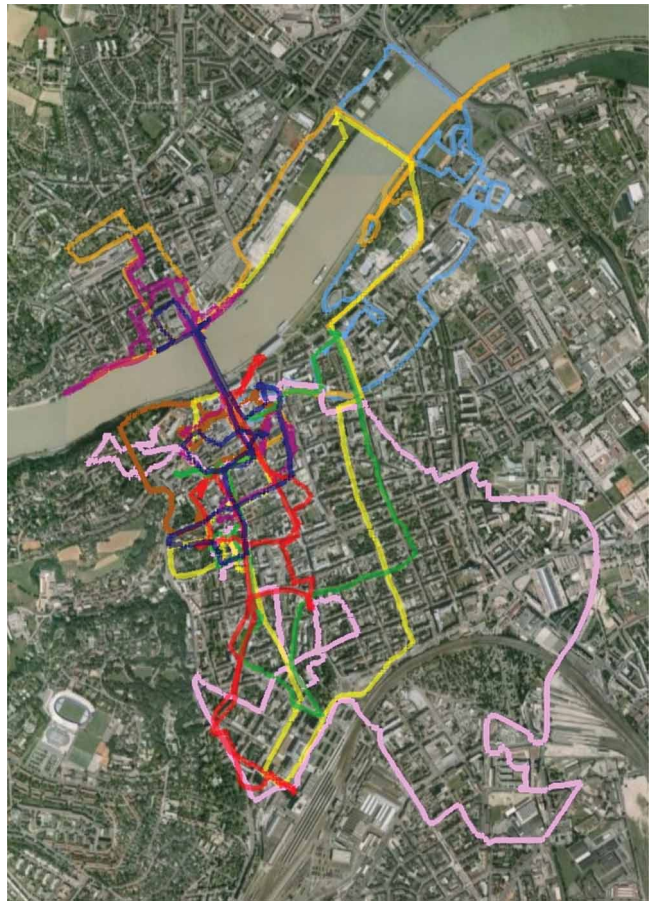

Figure 3. Linz documentation. Participants journey through the city captured on Google Maps.
Source: Copyright 2011, Geoimage Austria.

different approaches stemming from New Media curation and preservation. These influenced both our data collection and the construction of the CloudPad archive itself. The first was inspired by work at the Daniel Langlois Foundation, the second by the Capturing Unstable Media project at V2_Organisation; the resulting approach collated the artists' perspective (Jones 2008, p. 2), documented via interviews with Blast Theory's members, and the CloudPad users' perspective (see Giannachi *et al.* 2010). We also documented the research behind CloudPad by including interviews in the archive with the software engineers and performance studies scholars who developed CloudPad. In terms of content, the archive thus contained:

1. video and audio files documenting nine riders' journeys though the city of Linz (head-on and third-person perspectives);
2. interviews with nine riders;
3. GPS positioning data;
4. in-game data;
5. interview with Matt Adams from Blast Theory about *Rider Spoke* (representing the artist perspective);
6. interview with Steve Benford from Mixed Reality Laboratory about *Rider Spoke* (representing the HCI perspective);

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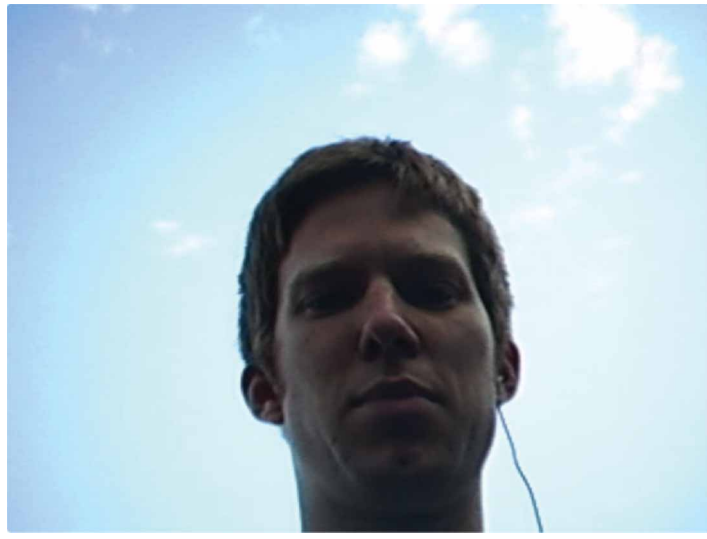

Figure 4. Linz documentation. Participant captured via head-on point of view.

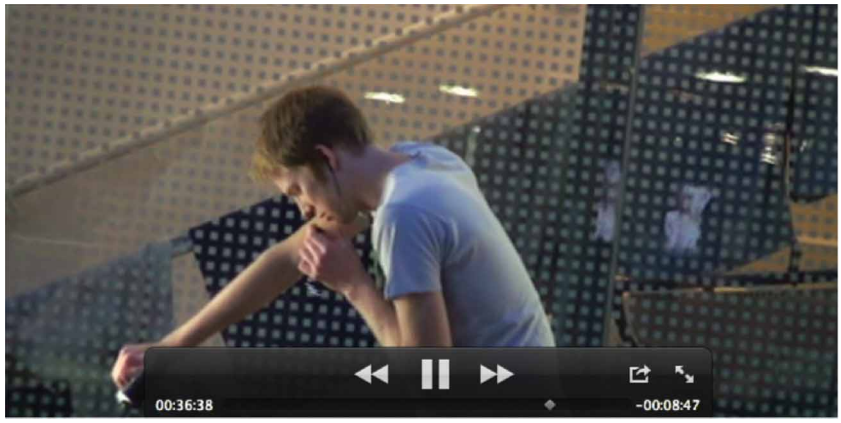

Figure 5. Linz documentation. Participant captured via third person point of view.

7. interview with Duncan Rowland, then based at Mixed Reality Laboratory, about the development of CloudPad.#

All materials were tagged 'neutrally' (i.e. offering descriptions only of what could be seen or heard in the archived video captures of rider's experiences) by Gabriella Giannachi. Three possible trajectories were constructed to facilitate navigation through the archive for those who wanted to organise their 'reading' of the documentation from a definite access point:

1. Matt Adams tagged one rider's journey by annotating how his experience related to the artistic intent of the work and how he felt looking at that particular rider's journey though the work;
2. Nick Tandavanitj tagged a rider's video to describe what he saw in it, including what the documentation could not capture;
3. Gabriella Giannachi offered an analysis of a rider's journey and explained how this related to the intent of the documentation, also by

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comparing this to the other documentary materials.

Based on our work on designing trajectories through mixed reality experiences (Benford and Giannachi 2011), the architecture was designed as follows. Each of the nine participants' experiences of *Rider Spoke* was described as an 'historic trajectory' through the work (constituting, in Briet's [2006] terms, a primary document). These individual experiences can be accessed through a number of 'canonic trajectories', i.e. through the historic trajectories forming the archive (constituting, in Briet's [2006] terms, a secondary document). Finally, users of the *Rider Spoke* CloudPad archive, by further annotating these materials, are expected to create sets of 'participant trajectories', which were thought of as adding value to the archive over time (constituting, in Briet's [2006] terms, auxiliary documents). Typically, whereas the historic trajectory of a rider, for example, shows him cycling down a wealthy part of Linz, the canonic trajectory, which in this case was created by Matt Adams of Blast Theory, comments on the origins of the dramaturgical structure of the piece (see Figure 6). While the historic trajectory shows the original documentation only as recorded on site in Linz, the canonic trajectory constitutes an authorial gaze recorded after the event itself and aiming to comment on the work from an aesthetic, academic or technical point of view.

Interestingly, the team found that canonic trajectories not only offered those who authored them the possibility of annotating a historic trajectory but also facilitated reminiscence about their own performance of the work or evoked moments that were cognate with it. Thus, for example, while watching a rRider reflect about his father in response to the question:

> *Please will you tell me about your father. You might want to pick a particular time in your father's life or in your life. Freeze that moment and tell me about your dad: what they looked like, how they spoke and what they meant to you. And while you think about this I want you to find a place in the city that your father would like. Once you've found it stop there and record your message about your father at that moment in time.*

Adams starts to reflect about his own father and recall memories of his own experience of the work at the Barbican in London (see Figure 7).

Figure 6. Matt Adams's annotation of a Rider in CloudPad.

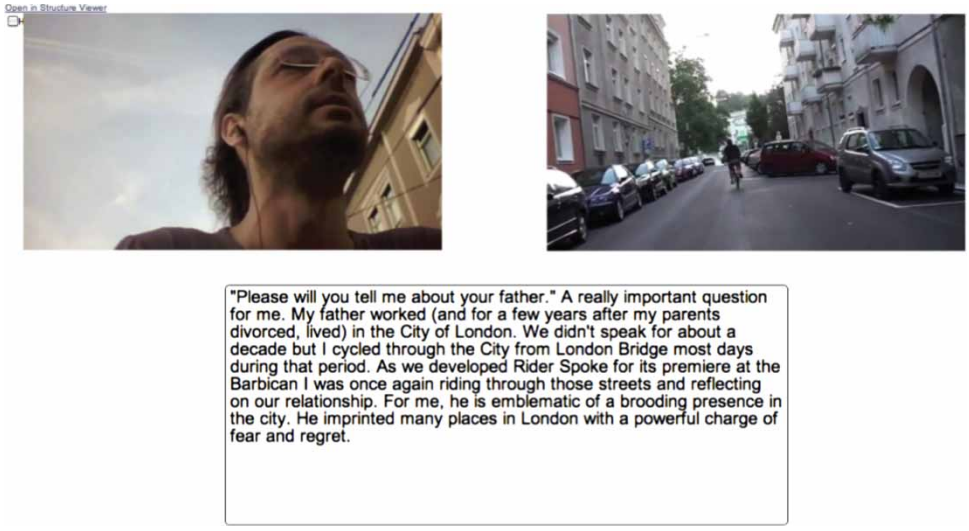

Figure 7. Matt Adams's annotation of a Rider in CloudPad.

Just as the 'original' *Rider Spoke* facilitated spatial and mental meandering, use of CloudPad encouraged temporal meandering between versions of the work, and between the work itself and associated experiences.

Whilst at one level the CloudPad offered a replay of instances of *Rider Spoke* in a way that constituted a tool for visiting and annotating primary documentation of new media works, at another level the CloudPad archive proved to be an effective medium for generating secondary documentation generated in the aftermath of the primary documentation but still pertinent to the work, as well as auxiliary documentation produced by archive users who annotated either the historic or canonic components of the archive. For instance, some users commented during prototype evaluation on what additional documentation they would have liked to see included in the archive (see Figure 8), while others used CloudPad as a tool to express their own opinions about what the piece or its documentation (see Figure 9).

Feedback from this the initial evaluation of the CloudPad offered by staff and students at the San Francisco Art Institute, staff at the Stanford University Libraries and students of the San José State University School of Information and Library Science (SJSU) in September 2010 was prompted in response to the question 'would they use the CloudPad in their own work?' Their answers to this question included the following comments:

> *I was impressed with the possibilities to curate archives and to allow patrons to do the same!!*
>
> *. . . presenting new materials in our collection; instruction; making exhibits widely known with a room for comments.*
>
> *I see the potential in CloudPad – enabling artists to upload work – images, videos etc.*

Additionally, students from SJSU commented:

> *The program epitomizes the idea of archiving of digital material as performance. CloudPad provides a solution to capturing information about important experiences that are fleeting in nature. One can argue that CloudPad allows for a more 'true' experience of a finding aid for a new media piece given that CloudPad does not attempt to constrain and re-structure a project to a description solely in the form of text. CloudPad is an attempt to provide a proper finding aid for multimedia collections and artifacts.*

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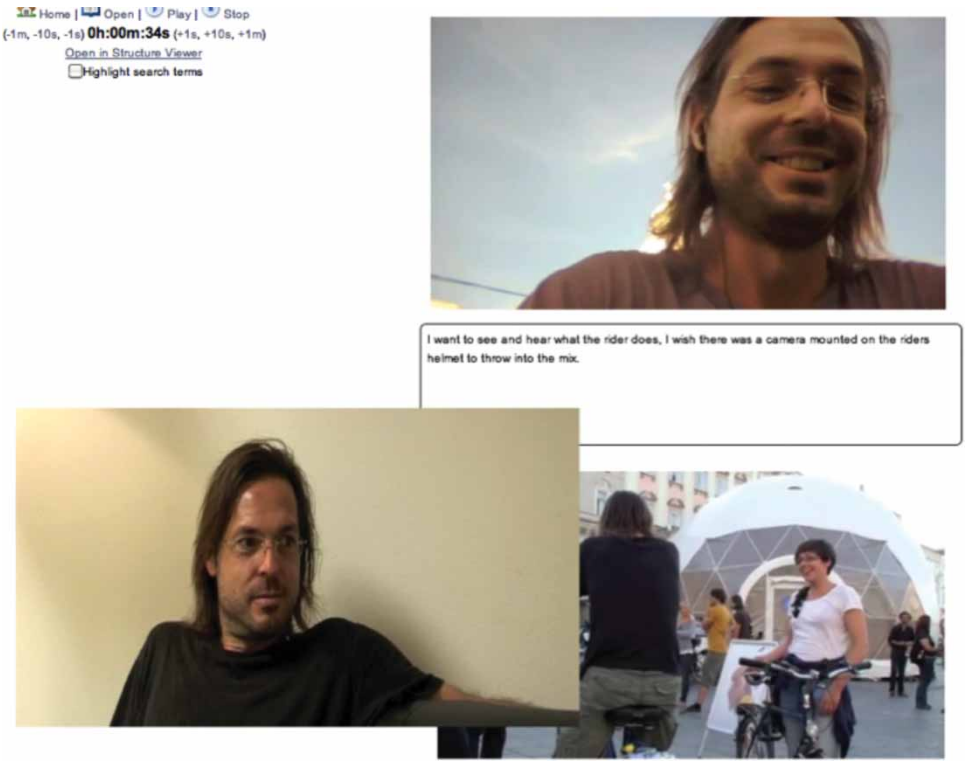

Figure 8. A user's annotation in CloudPad. The user overlaid the chase and face cam views with the interview conducted after the event.

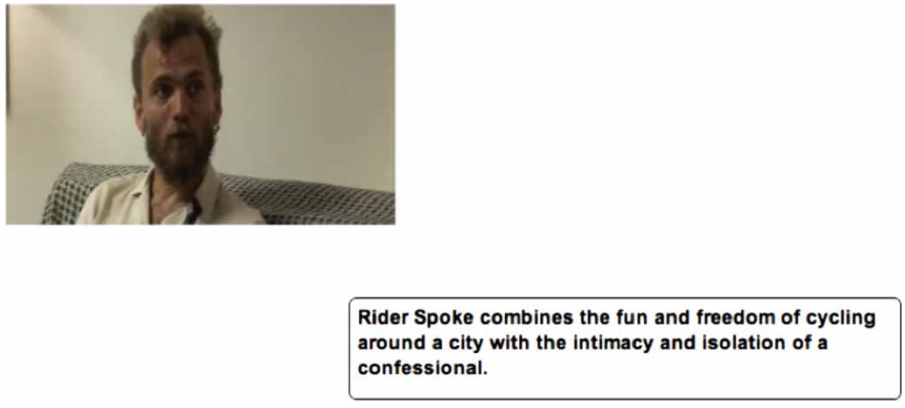

Figure 9. A user's annotation in Cloudpad. The user is listening to a Rider's interview.

The most interesting aspect was the invitation to create our own version of the riders' trajectories. This tool gives the CloudPad user, the Rider Spoke viewer, the possibility of becoming a creator of this living, growing artwork. We become the curator, creator, and audience all at the same time. No more static titles accompanying each piece of art, as dis-

> *cussed in Ippolito's Death by Wall Label (2008) but rather added annotations constantly shifting and growing with each user contribution.*

The reference to an archival finding aid is particularly suggestive of a role for tools such as CloudPad in professional archival practice. According to the Society of American Archivists, a finding aid is 'a tool that facilitates discovery of information within a collection of records' (Pearce-Moses 2005). As the comment points out, CloudPad recasts this notion of the finding aid as discovery tool in ways appropriate for interactive media and performance capture. At the same time, the feedback we gathered clearly showed that users identified CloudPad not only as an archiving tool for description and retrieval of documentation, but also as a creative curatorial tool. Whilst replaying the historical documents and generating, in Briet's (2006) terms, inter-documents (users looking at other users' annotations of the original *Rider Spoke* materials), the evaluators at Stanford University and the San Francisco Art Institute, as well as those at SJSU, particularly commented on CloudPad's creative, generative qualities. We will now move on to explore how the CloudPad's use of replay advances canonical understandings of performance documentation and archiving.

3 Replay

Geoffrey Batchen (1998, p. 47) remarks in his essay on 'The Art of Archiving' that:

> *The archive is no longer a matter of discrete objects (files, books, art works, etc.) stored and retrieved in specific places (libraries, museums, etc.). Now the archive is also a continuous stream of data, without geography or container, continuously transmitted and therefore without temporal restriction (always available in the here and now).*

This is perhaps one of the most fundamental differences between the material archive and the digital archive. For Batchen, as a consequence of this difference, '*exchange* rather than storage has become the archivist's principal function' (ibid., emphasis added). In fact, as Jacques Derrida (1996, p. 17) noted, archivisation 'produces as much as it records the event', which means that archives operate as sites of 'knowledge production' (Osborne 1999, Withers 2002), 'centre[s] for interpretation' (Osborne 1999, p. 52) and sites of performance (Giannachi *et al.* 2010). In this context, documents and archives made up of documents should of course be considered as tools for preservation, but they are also modes of 'production' (Santone 2008, p. 147) that are able to generate economies involved not only in the production, but also the distribution, consumption and re-generation of information.

This emphasis on exchange, supplementing the notion of an archival repository as site for storage and preservation, and the general trend towards participatory and interactive forms of user engagement may explain the growing interest in repeating, replaying and re-performing documents, a phenomenon so popular that one could describe it as an emergent 'genre' in late twentieth-century art. Early manifestations, such as Andy Warhol's Campbell soup cans (1962) and a number of Fluxus multiples, already highlighted a cultural tendency away from the figurative towards the performative. Later works added the element of archival replay. The RIP.MIX.BURN.BAM.PFA (2007–) exhibition at the Berkeley Art Museum and Pacific Film Archive invited artists to 'rip, mix and burn' elements from two digital media works in the museum's collection, Ken Goldberg's *Ouija 2000* (1999) and Valéry Grancher's *24h00* (1999), by altering the original code or medial files and remixing behaviours and methods into new works, and thus adopted replay as an aesthetic and performative mechanism. Likewise, the recent AHRC-awarded 'Performing Documents: modelling creative and curatorial engagements with live art and performance archives' (2011–14), run by Bristol University, Exeter University and industry partners Arnolfini and Inbetween Time Productions, aims to develop models for re-use of performance archives, including artists' use of their own documents, artists' use of other artists' documents, and the exhibition of documents and performance ephemera as a means for engaging

audiences not only in the replay and re-performance of documents. but also in the intrinsic aesthetic, i.e. performative, and social affordances these documents entail.

As Peggy Phelan (1993, p. 146, emphasis added) has argued, there is no equation between performance and documentation: 'Performance's only life is in the present. Performance cannot be saved, recorded, documented, or otherwise participate in the circulation of representations of representations: once it does so *it becomes something other than performance*'. However, as can be seen by the increasing number of works engaging with the replay, re-performance or re-enactment of performance documentation, there is a growing trend to treat performance documents as scores or prompts for performance. So, in a sense, the question here is not so much whether a performance can be replayed through its documentation, since, as Phelan shows, it can't, but rather what is it that emerges from the act of replay? In other words, what is this phenomenon that is, in Phelan's words, 'other than performance' but yet is so inexorably linked to it that it is hard to separate it from it?

It is known that in mixed reality performance, as well as in most digital games and virtual worlds, users/players inhabit diverse roles, which allow them to switch from being players to spectators, participants and performers (Lowood 2005, Benford and Giannachi 2011). This suggests that the users' creative participation in these works cannot be described by utilising the 'traditional roles of creator and consumer' (Lowood 2005, p. 10) but rather that the participant embraces a number of often hybrid roles that encourage engagement with an interactive work or environment from different perspectives (Benford and Giannachi 2011). This hybridity of roles is not something the user abandons at the point of turning toward and engaging with documentation, including self-documentation of one's own activities. On the contrary, users of such environments typically engage with multiple forms and types of documentation. The essential implication for mixed reality performance documentation is that a tool, which facilitates the management of a network of documents, is likely to produce a generative environment. One of the features of CloudPad that was most highly praised during the evaluation at San Francisco Art Institute and Stanford University was precisely that it facilitated the generation of 'trajectories' through the documentation. This meant that users could view trajectories created by other users (including the artists and technologists themselves, as well as by members of the team) *and* develop their own trajectories through engagement with one or more efforts available in the archive as documentation of *Rider Spoke.* The value of this aspect of CloudPad was that every time a user created a trajectory they not only re-viewed a document but they re-generated the work in a manner that simultaneously documented the original work and stood alone as a re-working of it. This is perhaps the most innovative feature of CloudPad. To go back to Phelan (1993), CloudPad therefore does not so much record or document a past performance as it produces a new performance. Not the original performance, but a *replay*—a re-generation of the work. It should be noted here that in our usage replay is itself hybrid as document generated from the original performance (as in the data generated by a played computer game), as play-back, and as material for a new engagement and re-working (as in the historical case of original machinima pieces created by editing replay or demo files from games such as *Quake* [http://www.quakelive.com/#!home]). Indeed, it has been suggested that replay in the form of machinima might in some ways be considered as a quintessential 'method for capturing footage about events and activities that take place in virtual worlds' (Lowood 2011, p. 5), and in this sense we see it as closely allied with the use of CloudPad to capture and re-work documentation of mixed reality performance works such as *Rider Spoke.*

In his study of Samuel Beckett and repetition, Steven Connor (1988, p. 3) states that 'repetition must always depend on some thing or idea which is by definition pre-existing, autonomous and self-identical'. He then argues, however, that not only is repetition dependent on originality, but also originality 'can never be apprehended as

such unless the possibility exists for it to be copied or reiterated (ibid.), making repetition the place where difference confirms identity (ibid., p. 6). This comment sums up some of the issues at the heart of the relationship between performance, documentation and replay that we have discussed in the last two sections. However, what it doesn't say is what the value of repetition, re-play or re-enactment might be and why it is becoming such a popular phenomenon in art that it could be described as an emergent genre. The answer may lie in findings produced by recent studies in neurology. These suggest that we continuously re-categorise the past so that our memories are never the same (Schiffer 2008, p. 15) and that remembering is in fact not so much 'equivalent to going through a photographic album but rather constitutes a creative process' (in ibid., p. 4, Giannachi's translation). In other words, remembering is not so much a recollection of a past event but rather the re-generation of a past event. Scientists explain this postulation as follows. As different neurons are engaged in the act of remembering over time, memories of an event are not only different among the different people who witnessed it, as of course we know already, but also, over time, they are different for every one witness, in that the brain categorises and processes these memories as separate though related events (ibid., p. 29). Thus, neurologist Davide Schiffer suggests that when we recall an event, new stimuli are created that become integrated into how the lived event was associated with from an emotional point of view. This phenomenon he calls *quale*, denoting the subjective quality of the conscious experience. He argues that 'every time there is a recall, its integration modifies the lived experience so that it will never be the same again' (ibid., p. 184, Giannachi's translation)—'these fluctuations,' he claims, 'are not unlimited but closed within the limits of recognition of one's own identity' (ibid., p. 192). In other words, the recall of a memory does not only regenerate an event; in the course of doing so, it modifies it. Acts of replay, re-performance and re-enactment thus operate at the level of retention and protention. Like a time machine they help us to modify our pasts and thus alter the course of our futures.

In *Descartes' Error* (1994) Antonio Damasio describes the neural substrate of the bodily basis of emotion. Movement, he claimed here, as well as in *The Feeling of What Happens* (Damasio 1999) and *Looking for Spinoza* (Damasio 2003), generates emotional awareness so much so that, in David Freedberg's words, in observing the physical and motional behaviour of others our brains 'assume the same state they *would have been if* we were engaged in the same actions—or underwent the same emotions—ourselves' (2011, p. 341, emphasis in the original). The discovery, then, by Giacomo Rizzolatti and others of mirror neurons became a crucial means to understand our response to art, and here, we tentatively propose, to performance documentation. Mirror neurons, Rizzolatti and his team discovered, are a particular group of visuomotor neurons in the rostral part of the ventral premotor cortex of macaque monkeys. What is interesting about them is that they discharge both when a monkey observes an action and when the monkey executes it (Gallese *et al.* 1996, Rizzolatti *et al.* 1996). Subsequent research found that when a goal-oriented action is observed, the same parts of the neural network in the premotor cortex become activated that are active during the actions executions. This occurs whether the monkey imitates the action or simply observes it (Fogassi and Gallese 2002, p. 13–19). This finding led to the belief that our brains are capable of reconstructing actions 'by merely observing the static graphic outcome of an agent's past action' so that, for example, even in just looking at a Fontana and a Pollock painting, there is an activation of the same motor centres required to produce a given graphic sign (Freedberg and Gallese 2007, p. 202). While new research needs to be conducted into the differences in the motor neuron response to performance and its documentation, it is possible that the photos, videos and sounds stored in CloudPad could activate the user's mirror neurons and thus encourage an empathic awareness that could be immediately captured via its annotation tool. Whilst a CloudPad

replay clearly does not constitute the 'original' performance, it re-generates it each time it is used by playing on the emphatic mechanisms activated by the act of observing participants' actions throughout the work. Again, this is corollary with the playback of a game replay of a game such as *Quake* (http://www.quakelive.com/#!home), in which the original gameplay is seen by a subsequent viewer from the same as first-person perspective as the player, such that the viewer literally sees the action as originally played. In doing so the 'original' performance is experienced at a neurological level *as if* the user was performing it themselves. By allowing users to experience different trajectories through an original work, and by encouraging them to record their reactions to it, CloudPad facilitates the generation of auxiliary documentation that informs us about how users experience the documentation of the 'original' work as *live* to them.

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