Beyond the Map: Issues in the Design of a Virtual 3D Knowledge Space for Aboriginal Knowledge

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Abstract. This paper examines the role of Virtual Reality technologies (in particular, the Digital Songlines Environment), in the expression of a sustainable Aboriginal landscape knowledge base. The effectiveness of these new kinds of knowledge practice is framed by their sustainability and how they complement existing cultural knowledge practices. These issues of sustainability and complementarity need to be addressed in the design and implementation of the VR product. This paper frames the process and product of Digital Songlines Environment as a performative, cross cultural knowledge space, which has the potential to negotiate the controversies between Western techno-science and Aboriginal knowledges. The twin themes of reflexive design and respectful cross cultural engagement and trust, are seen as imperatives for the process and product to align with the authenticity, ownership and purposes of Aboriginal knowledge traditions.

Keywords: Virtual Heritage, Design, Information Visualization, Cross cultural.

1 Introduction

This paper sets out to explore some issues in the design process of a 3D virtual world which aims to express and allow performance of Aboriginal knowledge practices. It draws on a project – the Digital Songlines Project that is currently being developed and operationalised within the Australian CRC for Interaction Design (ACID).

Although sophisticated in its look and feel and the technological investment which underlies it, the Digital Songlines Environment is nevertheless a representation of people, knowledge, artifacts and landscape, and the relationships between them. As with any representation, it works to render the heterogeneous expressions of reality in a more fixed, and singular mode. Yet, the paradigms of Aboriginal knowledge and knowledge practice which it aims to express are radically different to Western traditions. Digital Songlines Environment and all digital archiving projects are "boundary objects" between Aboriginal cultural knowledge and the Western techno-science that is utilised to express it.

As "boundary objects" they inhabit a boundary across the social, cultural and technological aspects of radically different knowledge traditions. They also do a particular kind of work in negotiating the controversies between knowledge traditions.

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The explicit and reflective deployment of the controversies emerging from this project is integral to its authenticity and the role it might play as a new form in the ongoing process of Aboriginal knowledge production and transmission. The concept of the project as a new kind of performative knowledge space [1] based on heterogeneity and trust is explored and the consequences for the iterative design process are investigated.

2 Design as Translation and Transformation

The cultural stories of all cultures are aligned with the forms, materials, performances and paradigms that are authenticated and stabilised in that culture. [2] However, when a culture attempts to tell its cultural stories through the forms, materials and performances provided by another culture, there are unintended effects that need scrutiny. The telling of the cultural stories with new media forms becomes a process of innovation that involves a series of translations and transformations. Lucy Suchman [3] sees such technological innovations as not the creation of new discrete objects but the "cultural production of new forms of material practice." (p.9)

The process of design and implementation is enacted by a collective of actors both human and non-human, and becomes one of crossing the boundaries between the two cultures and deploying controversies and negotiating equivalences. Turnbull [1] asserts that this involves holding knowledges in tension. He argues that any account of cross cultural knowledge making describes "…the contingent processes of making assemblages and linkages, of creating spaces in which knowledge is possible" (p.552). This is ontological and epistemological work that negotiates what entities exist in the world and how we can know about them. It is also political work that is concerned with how particular views of the world become stabilised and accepted, how they exert influence and even come to dominate. At the same time, it forms of resistance and the emergence of new permutations of practice which act to incorporate the new form into existing networks of cultural learning.

Aboriginal knowledge traditions exist in a profoundly reciprocal relationship with Land. The role of the Land differs radically from Western notions of a passive backdrop for human cognition and exploitation. For Aboriginal knowledge, the landscape itself is simultaneously a physical space; a sentient collective of diverse entities, a meaning system and an historical, spatial visual record of all past events. Aboriginal knowledge practices are constructed in this reciprocity between people and Land, through a variety of performances and representations. Knowledge constructed in this way is locally authentic, specifically owned and has specific purposes. If we (both Aboriginal and non- Aboriginal workers) are to attempt to express these knowledge traditions and practices with the forms and materials of Western techno-science (such as 3D digital virtual worlds), we therefore need to design for authenticity, ownership and purpose in ways that are aligned with existing Aboriginal knowledge practices.

How precisely this work is done is problematic indeed. The technology of 3D virtual worlds is at the end of the long chain of techno-scientific development that historically has been involved in the collecting and archiving of Aboriginal knowledge traditions. This process is inherently heterogeneous and spatial and has

involved people, technologies, sites and skills. It also inherently involves ontological and epistemological work of *symbolising, categorising, and representing* the various artifacts and performances of Aboriginal knowledges into forms and materials which Western science can accommodate into its established conventions and standards.

There are two important negative consequences of this ontological translation and transformation. First, there is a reduction of the diversity and richness of the ontologies of situated knowledges. Second, there is the long-term domination of a Western techno-scientific knowledge tradition with its claims of being able to authentically represent the ontological foundations and epistemological processes of diverse knowledge traditions, regardless of context. The result of such a process is inevitably a derivative form of knowledge that must be constantly evaluated with regard to its legitimacy. [4] At worst, this derivative form of knowledge risks being extracted, abstracted, and transformed from its oral, performative formats, dislocated from its place of origin and connection, and severed from its web of relationships with other entities in country. [5]

3 New Knowledge Spaces

It would seem to be a fact of history that knowledge practices change in accord with changes in knowledge technologies. The increasingly profound and widespread entanglement of social and technological practices suggests that this process will only become more powerful as time goes by. Various authors maintain that design is a culturally laden process [3; 6] yet, how can the design process of new media negotiate the two undesirable consequences stated above? That is, firstly, can we be reflexive and critical about the translation process, in order to make meaningful gains in avoiding the reduction and domination inherent in the use of techno-science, and the epistemological assumptions which underpin it? And secondly, how will it be judged that those gains have in fact been made?

These two threads are interwoven and integral to the design process of new media which seek to represent Aboriginal knowledge traditions. The actions of translation between Aboriginal knowledges and Western techno-science need to be critically examined and theorised, in order to arrive at representations which might be deemed to be capable of supporting, enabling and fitting in with a wider ecology of Aboriginal knowledge practices. As Victor Hart [7] maintains, "…there is a clear danger that digital tools and activities will supplant myths, rituals and learning about country from one's direct experience and immediate community" (p.53). In other words, the responsibility for judgements about the translations process and the resultant authenticity must always rely on Aboriginal knowledge custodians and their involvement in all aspects of the design process.

The design of such new media as Digital Songlines Environment can therefore be seen to be a process of translation which inhabits a boundary zone between two disparate knowledge traditions. When one of these knowledges is a hegemonic Western techno-science, then the major issue becomes the maintenance of plurality and equity of knowledges. Various authors [1; 8; 9] maintain that two moves are essential to address this issue. First, Western techno-science has to be de-privileged and framed as but one among many, partial, situated knowledge traditions. Its

historical alliance with industrial capitalism has allowed it to be exported to all parts of the world and assume hegemonic proportions. Second, any theoretical treatment of the translation process into new media needs to align with the ontic and epistemic constructs of Aboriginal knowledge traditions.

These two moves have many profound effects on the design process. One consequence is that the traditional roles of user, designer and researcher are practically re-defined and aligned in terms of motivations, purposes and power relationships. The three roles are more practically seen as one role expressed differently in different situations. Also, alignment with Aboriginal ontologies requires recognition of a range of new entities and relationships with the Land as sentient organiser. In addition, alignment with Aboriginal epistemologies requires an embrace of spatialised narrative and improvisatory performance. This epistemic move allows a view of the innovation process as improvisatory performance, which goes beyond the dualism of subject and object, yet incorporates aspects of both in a way that allows for the heterogeneity of situated knowledges and temporal change. Such a new kind of performative knowledge space is a *boundary performance* which requires a move away from singular and de-contextualised representation. This allows any creation of new knowledge to be more effectively critiqued not merely on its cognitive and intellectual characteristics but on its *performances* and the sites of those performances.

The move away from singular representation towards spatial performances of knowledge offers some hope for the re-distribution of power and the maintenance of the plurality of knowledge traditions. As Turnbull [1] asserts, the history of cross-cultural knowledge production can be seen "…as a history of the contingent processes of making assemblages and linkages, of creating spaces in which knowledge is possible." (p.552) Hart [7] also argues that any sustainable expression of Aboriginal culture and identity must be built on a foundation of heterogeneous and complementary technological and traditional methods of knowledge storage.

Paradoxically, the tools of Western techno-science offer possibilities for Aboriginal knowledge traditions to halt the erosion of cultural knowledge, and the incursions by Western knowledge traditions. The viability and stabilisation of new kinds of knowledge spaces depend on two main components [1]. The first component is the heterogeneity of people, skills, local knowledge and technology (maps, visualisations, knowledge artifacts). Secondly, there is a negotiation of the social organisation of trust which allows disparate knowledge traditions to work together. Therefore, different kinds of cross cultural knowledge spaces are performed by different assemblages from the available collection of practices, people, technologies and theories. The process of assemblage is one of making connections and negotiating equivalences between heterogeneous components while simultaneously establishing a social order of trust and authority [1]. An essential part of this process is the establishment of a hierarchy that determines the priority of components (for example, negotiations need to determine the relative priority of the information and judgements of Aboriginal Elders, the requirements of design, and the limitations of computer code). This hierarchy of authority arises out of the social organisation of trust within a knowledge space and should be explicitly addressed in both design and implementation phases. Unless trust is born out of the respectful engagement of knowledge traditions, assemblages struggle to become stabilised.

New performative cross cultural knowledge spaces such as Digital Songlines Environment may start to look distinctly *unlike* the Western notion of information because they are heterogeneous assemblages of collective knowledge practices, trusted authority, spiritual values and local social and cultural organisation [1]. The integration of new knowledge spaces within existing knowledge ecologies provides opportunities for palimpsests and co-existing knowledge practices that more efficiently serve local interests and resist hegemonic knowledge politics. The performances of new cross-cultural knowledge spaces are more likely to make explicit the hidden assumptions of power and politics about subjects, objects and relations that is not feasible at a purely representational level. Such spaces allow knowledges to be mapped according to different ontological categories using different epistemological tools. As a result, the purposes and outcomes of knowledge spaces are more closely aligned to local requirements than the generic outcomes of progress and development so closely aligned to most Western techno-science innovation.

4 Knowledge Spaces as Subject and Object

If Digital Sonlines Environment is to perform as a new kind of knowledge space it must be both **object** (something we use to store and represent knowledge) and **subject** (something that causes people to do things and generates new forms of activity and performances). This has implications for what Digital Songlines Environment looks like and how it functions within the broader Aboriginal knowledge community.

Aboriginal knowledge practices are inextricably located in the sentient Land that is both subject and object. By their attachment to specific localities they are narratives that are spatial and performative. Just as the actual country changes from year to year, season to season, day to day, so these narratives and their enactments are not fixed. They are negotiated, improvisatory truth-testing performances that gather related entities in stabilisations that work for that place and time [9]. This sort of ontology based on heterogeneity, relationship and uncertainty is at odds with the ontology of a digital world such as Digital Songlines Environment, based on algorithm, data and logic structures. Thus, Digital Songlines Environment, as an entity based on discrete data, can never hope to be a self-contained presentation of the abundance and complexity of Aboriginal knowledge practices. The issues of authenticity, ownership and representation of knowledge practices are too heterogeneous and emergent for an entity based on discrete data to come to grips with.

It is only when Digital Songlines Environment is incorporated into that "radical complexity and interconnectedness" [9, p.5] that it can become a powerful actor in what John Law [10] terms an assemblage of methods that are used to present Aboriginal knowledge. Although Digital Songlines Environment is constrained by its genesis in data, three important characteristics of its design allow it to be incorporated more easily into collaborative knowledge testing in the actual world.

First, it represents a landscape, which although generated from discrete data allows two important performativities—embodiment and wayfinding. The user is immersed in a 3D environment which requires conscious locomotion or "walking country". The agency of the user is foregrounded in the choices made about where to go, where to

stop, where to look. The landscape allows a sense of embodied wayfinding that can generate an almost infinite set of personal spatial narratives through the virtual country. Regardless of the number of informational data nodes in the world (which must always be finite), the possibilities of lines of travel between them are potentially infinite.

Second, the concept of a sentient landscape provides the metadata, relationships and narratives for cultural "objects" (artefacts, performances) to exist within. Inherent in this sentient landscape is the provision of the "law" which provides the semantics, logic, goals and possibilities for change within the virtual world. Aboriginal concepts of landscape and ontology are helpful because they provide explicit structure, boundaries and modes of action for both narrative and data objects. Although the structure may be explicit, it is not static. As Hart [7] states there is, "…a system of Indigenous landscape mapping which is an ongoing process of revelation, guided by customs and traditions, both old and new" (p.54). Located at the centre of this system is the sentient landscape. Hart explains that, "what has remained central is the means by which the land is spoken for, as against how land is spoken about." (p.54)

Digital game theorists, whether they are proponents of narrative or ludology, agree that the richness and power of digital game environments is dependent upon the design of the higher levels of epistemology and ideology within the game environment. Thus objects and events are not as influential as the rules which govern their appearance and the goals and rationale for interacting with them. Chris Crawford [11] asserts that, "… an essential task (of game design) is to envision a dramatic storyworld, not a storyline."(p.56). The storyworld is made powerful by the designer's control which, "… is exercised through the rules of the gameworld rather than the events of the gameworld" (p.52). Similarly, Frasca [12] has elicited a corresponding typology of the requirements of powerful game design, which relies on 3 ideological levels. The first and weakest level deals with representation and events, the second and more powerful level deals with the manipulation rules or what the player can do in the game, with the final and most powerful level being that of goal rules or what the player must do to "win" (in the case of Digital Songlines what they must do to reveal knowledge contained in the sentient landscape).

The generation of spatial narratives by users enables the third characteristic of design, which is the "leaking" of performativity from the virtual world into the actual world. This connection with the actual world is accomplished by collaborative truth testing between users themselves and between users and significant others (e.g. Elders) who overlay the issues of authenticity, ownership and representation on the virtual world experiences of the users. This extension into the actual world is essential if the narratives generated by users are to be tested in terms of the relatedness of entities in actual country.

Like the relationship between people and country, any collaboration between virtual and actual worlds needs to be reciprocal. Users in the virtual world must collaboratively seek further truth testing from other humans and country in the actual world, in order to establish the relatedness of their virtual narratives. At the same time, the issues of authenticity, ownership and representation flood from the actual world into the design of the virtual world. Elders and Traditional Owners upon seeing the virtual world that presents their local country have made clear the deficiencies through comments such as "You got to make those stones smaller—that's

important—the way you got them now, they are too big to walk over like that—they are smaller—about like this." The absences in the virtual world are ruled equally by authenticity and ownership—some places cannot be presented, some must be skirted around— "I can't tell about that place"; "I can't speak for that place. Only (name of Elder) can talk for that".

This porosity between the virtual and actual world places Digital Songlines Environment as a *'telling object'* within a network of relations that perform Aboriginal knowledge. In the process of leaking between the virtual and actual worlds, Digital Songlines Environment becomes also a *'telling subject'* that exists as both the stimulus to collaboration and a collaborator in the continued performance of, and connection to, an actual sentient world. It is through this process of ongoing negotiations and improvised performances back and forth between virtual and actual worlds that ontological priorities and epistemological processes are reaffirmed by performances within the existing knowledge ecology. Barbara Flynn [13], building upon Lefebvres' [14] work, asserts that reconciling mental and real space allows spatiality to become a dynamic category that requires overlapping modes of engagement. A dialectical rather than a causal relationship operates between the experiential, the perceptual and the imaginary, and this links players in the virtual world to the historical, social and cultural of the actual world.

As a "telling subject" Digital Songlines Environment has to be both *porous and fluid*. That is, it needs to be able to be easily adapted to local knowledge ecologies and new performance situations. Information needs to be easily put in to the virtual world and accessed in culturally appropriate ways. Being fluid means that it can change the way it is used in different contexts, for example, in schools, family groups, community groups. It must still address the issues of authenticity, purpose and ownership. Basically, these processes act to reduce the gap between designer and user so that Aboriginal people are involved in all aspects of planning and design.

This relationship serves to promote the social organization of trust, necessary for the stabilization of new knowledge spaces. The performativity of the Digital Songlines Environment is enhanced by the intended development of a ToolKit interface which enables local community groups to add and delete various forms of media content from the 3D environment. Local groups can choose which forms and performances of knowledge they wish to put into the 3D virtual world and can modify this content to suit different iterations for different user groups, catering to cultural requirements of gender, clan, and age. This flexibility that can be added to the basic 3D virtual landscape allows for local control and foregrounds the role of local Aboriginal people as users, designers and researchers in an ongoing improvisatory performance that is the evolving knowledge space.

5 The Role of Design in Knowledge Spaces

The complex nature of advanced information technologies such as virtual reality means that any new product is necessarily the result of a team of people with different skills working with a variety of technologies usually in a variety of sites. This complexity of skills, people, technologies and sites means that the work of design is about "bringing it all together". Increasingly, new technological artifacts are being

seen not as passive objects which are acted upon by users as subjects. Rather they are conceptualized as one link in a chain of performances which link designers and users. The production process is not separate from its precursors or how the completed object is configured in practice and in context. Correlated with this move to performance is the re-evaluating of both what counts as innovation in techno-science, and the separation of the roles and socio-cultural knowledges of designers and users. Consequently, systems development can be seen not as the creation of new discrete objects but, "… it is increasingly also one of animating and finding subjectivity in technical artifacts." [3, p.2]

All these new forms of material practice are dependent on a re-negotiation of both the relations of production and the relations of use. This involves the production process diminishing the conceptual and practical distance between designer and user and integrating new objects into the existing contextual ecology of knowledge practices. Suchman [3] maintains that this sort of design should attempt, "…to bring developing objects out into the environment of their intended use, such that their appropriability into those environments becomes a central criterion of adequacy for their design." (p.9) Rather than isolate the production of a new object in controlled conditions and test it without reference to situation, there is the move to *integrate* it in to the heterogeneous hybrid collectives and working practices of specific environments. The standardized, de-contextualized, universality of the "one size fits all" ICT application is replaced with a situated, partial object. This new kind of object arises out of working with existing collectives and practices that are largely determined by users and their situations. As Barry [15] argues, this is true innovation because it is associated with opening up questions and possibilities and the importance of technological innovation, "…not in the artifacts themselves but in the arrangements with activities and entities within which artifacts are situated, and might be situated in the future." (p.6)

6 Implications for Design

There are important implications for the role of designers, the nature of the design process, and the role of research from this move towards situated, collective practice. The first implication is a move away from the figure of the "heroic designer" to throw light upon the ongoing practices of socio-material configuration and re-configuration in use. Suchman [3] maintains that the development of useful systems requires developers to cross boundaries and not stand outside, locating themselves in the process, creating situations that allow for the meeting of different partial knowledges. To do this is to identify and be responsible for their participation in the translations and boundaries that are mediated by new technologies. Local networks need to be mapped and located within extended and global networks. Also, the control and judgement of the design process is deferred to an extended set of actors who are both designers and users. As Aanestad [16] emphasizes, the ongoing work of design takes place in the worksite by actors who must use the new technological artifacts to accomplish daily work tasks, rather than by inventors and designers in research and development facilities.

Secondly, any design process needs to move away from being a de-contextualized, commodity based, self-referential assembly line model, that is primarily concerned with standardized, homogeneous production. The consequences of such a design model are the invisibility of economic and organizational imperatives and assumptions of the neutrality of technological systems. Van der velden [7] asserts the design of information technologies contributes to the *visibility or invisibility* of different forms of knowledge by dividing between what can be digitized (commodities, artifacts) and what cannot be digitized (social relationships and processes), and the use of categories and forms which are chosen to organize and represent these knowledges. She states that, "The technology that produces digital connectivity also produces the non-existence of people and their stories, the fabric of the social nature of knowledge."(p.3)

The recognition of the design of the technological artifact as a boundary performance requires a move to a "located accountability" [3, p.6] which is built upon partial, locatable and critical knowledges. In these kinds of knowledges our objectivity is constructed by the collective knowledge of specific locations, rather than the singularity of a de-contextualized, standardized development environment, "…that can be stabilized and cut loose from the sites of their production long enough to be exported en masse to the sites of their use." [3, p.5]

Thus design work becomes a "view from somewhere" [3, p.5] that recognizes both the visible and invisible work involved in the design process; understands the transformations engendered by technology designed at a distance (physically, culturally) from its point of use, and it values heterogeneity that is achieved through integration with existing practices rather than by the domination of standardised homogeneous artifacts.

The third implication is that the role of research and theoretical critique is tied more closely to design and development. The recognition of partial, situated and owned knowledges such as Aboriginal knowledges requires critical analyses and alternative imaginings of the politics and power accompanying the production of technological artifacts which represent them. Yet, such critical analyses and imaginings can only be entered into after, "…progressively closer, more detailed inquiries in to the elaborate structures and intricate dynamics that comprise technical systems." [3, p.4] These detailed inquiries need to be sensitive to a number of central propositions in Feminist research. First, the concept of knowledges as partial, situated and performative. Second, the need to make explicit the visible and invisible labours required to stabilize socio-technical assemblages, and, also, the importance of the relations and symmetries between persons and things, which give rise to boundaries that are not fixed and given, but enacted locally within existing networks of practice.

Analyses informed by such propositions give rise to questions which address issues about the design process such as responsibility, power, and judgements about authenticity and effectiveness. They orientate research, "…towards the politics of difference combined with forms of constructive engagement aimed at more just distributions of symbolic and economic reward." [17, p.6] As imaginaries of alternatives of distribution of power and rewards, they call into question what truly counts as innovation both in techno-science endeavour and in representation of

cultural knowledge practices. As critical analysis of taken for granted labour and technology in the innovation process, they act to de-centre sites of innovation from singular persons, places and things to engage with such innovations as multiple acts of everyday activity and the actions of actors at various scales.

In distributing these practices more widely, the value of innovation itself may be questioned as reproductive of specific Western cultural values and historical processes. Also called into question is the alignment of socio-technical innovation with the motivations, purposes and outcomes in terms of politics and everyday life for the wider range of actors, at the core of which are Aboriginal people as generators and users of knowledge.

Therefore any research approach needs to look at how such innovations have political consequences for Aborigines, in terms of possibilities that are truly available to them, the visibility of their contributions, and the control over ownership, authenticity and judgement that is afforded to them.

7 Conclusion

Visualisation of non-Western concepts of space as a sentient landscape, together with culturally specific embodiment and navigation, supported by spatialised narratives, provides a compelling manifestation of Aboriginal cultural presence in the virtual world. Flexibility of productions of iterations that fit into local, situated knowledges, allow a reframing from digital object to improvisatory collective performance. Linkages and relationships between the virtual world and the actual world mean that meaningful cultural learning can occur in different ways for different users, Aboriginal and non-Aboriginal in different settings. Different ways of representing landscape in the world lead to “dissonance” or “interference” [8] which are productive ways of holding knowledge in tension for learners, and make explicit the differences and assumptions of different knowledge traditions. Such interference acts both to prevent the collapsing of cultural difference into sameness, and also to promote the understanding of the differences that cultural knowledges construct. This is useful for both indigenous and non-indigenous learners.

Using 3D virtual reality technology for archiving and representing Aboriginal knowledge traditions allows a double move from representation to performance and also from object to subject. Overlap of experience in virtual and actual worlds leads to new kinds of performances of knowledge production. When such new performances are incorporated into existing Aboriginal knowledge ecologies, knowledge performance is extended into a knowledge space, built on heterogeneity and the social organisation of trust. Such a heterogeneous socio-technical collective may work to produce a sustainable hybrid of technological and traditional processes by which the complexity of Aboriginal landscape knowledge may be expressed into the future.[7] How, where and if this happens, remains to be seen, but the development of Virtual Reality 3D artifacts such as Digital Songlines, has at the very least brought into sharp focus the controversies of theoretical design, the examination of roles of all actors, and the importance of judgements by Aboriginal owners.

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