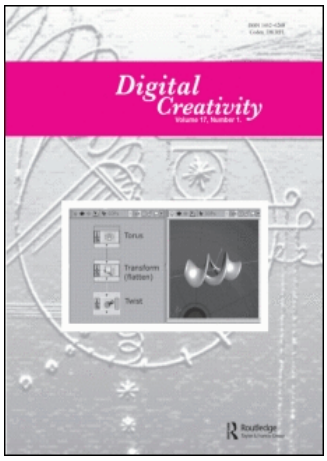

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Designing digital knowledge management tools with Aboriginal Australians

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Abstract

The paper describes an approach to digital design grounded in processes of Indigenous collective memory making. We claim the research should be understood as performative knowledge making, and accounting it should also be performative. Accordingly we present four texts generated in the course of our research as an exhibit. They attest design processes for a file management system *TAMI*. We briefly theorise our approach as exemplifying Suchman's 'located accountability'.

Keywords: collaborative software design, indigenous knowledge management, located accountability in design

1 *Introducing indigenous knowledge and resource management in northern Australia (IKRMNA)*

In northern Australia many Aboriginal parents and grandparents are concerned that the younger generation are growing up without a robust indigenous identity based in a strong grasp of their community's knowledge traditions. They endorse the use of computer databases and other digital technologies to work with audio files, texts, photos, videos, maps, lists, etc. to help with their work of teaching. This is how Wulumdhuna, the teacher on our research team, expresses her worries

> Nhawiku ŋarra ga dhuwal warwuyun ga djamarrkuḷiw' future yalalaŋumirri ŋunhi dhu murrmurryunmirra ŋaḷapaḷmirrinydja dhawar'yundja ga nhä, nhän walalanydja bulu marŋgithirr djamarrkuḷi yalalaŋuw walalaŋ. Ŋayi ga ŋorran ŋula documents walalaŋ balanyaŋurnydja nhäŋur mala, cdŋur or ŋula walal videoŋur walal documents dhu ga ŋorran. Nhäwipuynydja, Bäpurru'wuy, nhä ŋayi bäpurru' yolŋu ga yolthu ŋayi mala-bumar ŋunhi yothuny djamarrkuḷiny', yol nhanŋu ŋaḷapaḷ, ḷiyaw nhanŋu gan ŋäthil nhinan, ga yolku ŋayi mala-bunhawuy. Balanya rra ga

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warwuyundja djamarrkuḷiw' bukmakku djamarrkuḷiw' dhiyal nhakun bala gali'-ḷuŋgurrmaŋur.

What I'm really worried about is the future of the children. Later the old people will all pass away finish up, and what? What of theirs will the children end up knowing? There are all sorts of documents now for them, like CDs and videos, documents which will be kept. About what? Ancestral groups, what is his family name, who gave him life, that young child, who are his elders, his knowledge which was there before he was born, and for whom was be born? That's what I'm concerned about, for the children, for all children over here in this part of the world.
(IKRMNA 2004b)

A significant number of indigenous and non-indigenous people respond with horror to the idea of using digital technologies to do collective memory in indigenous communities. Are digital archiving technologies compatible with indigenous knowledge? The issue was raised during a meeting held at Charles Darwin University in December, 2002. "No, No, Aboriginal knowledge is out on the land. People live it doing things together on country [within their own clan lands], and computers actually are more harm than good." The concern grows from worries about disenfranchising Aboriginal knowledge authorities, further marginalising legitimate Aboriginal interests, diversion of energy and resources from Aboriginal priorities, backgrounding of Aboriginal sensibilities and sensitivities about valid knowledge practices, and misappropriation of intellectual property. In short there is a widespread suspicion that digital technologies can only work by treating indigenous knowledge as a commodity. The anxiety is well grounded, but so too are the worries of those who value the experience of being on country with today's generation of elders and want to keep that experience in a useable form for generations to come. As one young Aboriginal woman put it in replying to the comment above:

That's all very well, but while our elders are getting very old, the young teenagers today aren't interested in learning anything from them. We need to find good ways of keeping some of the knowledge of the old people of our country before they all pass away.

This paper considers an approach to digital design grounded in this dilemma. It is work that involves the intersection of two quite different knowledge traditions where little is held in common between the ways the traditions understand themselves. Our response is to problematise the process of knowledge making. We look for ways of proceeding that connect well enough with both traditions in particular circumstances. Processes of the research are emergent and situated, and accounting them becomes one of the products of the research.

Our approach is inspired by Lucy Suchman's writing. Informed as it is by feminist studies of science and technology, she asks the seemingly odd question, "Where is design?" Suchman suggests that locating design is the first step in re-placing design. Design should be valued as "views from somewhere" instead of as being "ways of being nowhere while claiming to see comprehensively" (Haraway 1991, pp. 193 and 196). After our research had been going for a little over a year, at a public meeting to launch the project website in December 2004, Michael Christie summed things up this way.

There are some common threads that run through the work that we're doing, but ultimately we're starting off with people on country doing what they're doing using digital technologies and then finding good ways of helping them to do it. And at the same time, helping to understand what the digital technologies they are using are doing there, and maybe ways in which they are actually steering people in a direction

they don't actually want to go. We begin with ways in which people are actually creating solutions for themselves using particular pieces of software, and ways in which their work of using computers and digital technologies are somehow integrated into the ordinary, everyday routine practices of grandparents talking to children, and grandchildren, and people being in country and learning and talking.

The crucial point about the way the research developed, was working from that notion that Aboriginal knowledge is always local and performed, it's integrated in lands and peoples and the lives that they lead, so that in fact, as soon as you try to think of one solution that is going to work for everybody, you're already starting to compromise some people's agendas, some people's histories, some people's contexts. So the visions and agendas of the different groups of people always arise from their histories and their contexts. So as it turned out we started working with half a dozen groups of people and they all had their own aims, and their own problems, their own projects, their own ways of using digital technology already, or the ways in which they wanted to do it.

Michael's description of our work here harks back to Suchman's account of located design.

Located accountability is built on what Haraway (1991, p.191) terms "partial, locatable critical knowledges". As she makes clear, the fact that our knowing is relative to and limited by our locations does not in any sense relieve us of responsibility for it. On the contrary, it is precisely the fact that our vision of the world is a vision from somewhere, that it is inextricably based in an embodied and therefore partial perspective, which makes us personally responsible for it. The only possible route to objectivity on this view is through collective knowledge of the specific locations of our respective visions. (Suchman 2002, p. 96)

2 Exhibiting *IKRMNA* research

To show some actualities of this approach we exhibit four texts that conjure up a particular episode of *IKRMNA* work. Our first exhibit is a software requirement document we put together in January 2005 (IKRMNA 2005). The primary audience for this text is members of the complex world of software development. It embeds an image of a small database and file management system *Texts Audio Movies Images* (*TAMI*) in which we hope to interest others. In particular, we have in mind those people with access to funding sources, and 'code crunchers' who might be interested in the task of concocting it.

The second exhibit begins with a narrative about an episode of *IKRMNA* field-work in April 2004. The story was told by Bryce (and recorded and transcribed) in introducing *For the children* (IKRMNA 2004a) during the public meeting in December 2004 when the project website was launched. He describes working with Wulumdhuna at her home in Djurranalpi, on Elcho Island in northeast Arnhem Land.

The third exhibit carries on from this story of field work showing some of what happened when Bryce returned to Darwin (IKRMNA 2004c). During conversations between Bryce, Michael and Simon Niblock (then project manager), Michael started sketching interfaces for working with a database that had been made available to the project by Jane Hunter from the Distributed Systems Technologies Centre (DSTC). Over the next few months the sketches of interfaces became specifications for *TAMI*, an unusual file management system, as shown in exhibit 1. The DSTC database *XMEG* (Koopman 2005) carried the conversation about *TAMI* for some months and then it dropped out of the picture. It was only in November 2005, as this paper came together that we fully recognised the role the abandoned *XMEG* had played in bringing *TAMI* to life.

Exhibit 4 is an extract from a recorded talk by Wulumdhuna, transcribed and translated by Waymamba Gaykamangu and Kieren Myers. Wulumdhuna articulates her vision of how she wants to work with digital technologies to assemble an archive, properly formed within Yolngu understandings of what knowledge and archiving are, to enrich and guide the lives and identities of future Yolngu children (IKRMNA 2004b)

2.1 Exhibit 1: software requirement document for *TAMI*

2.1.1 Description of the problem: why the software is needed

There are a number of initiatives that have begun to deal with the rapid loss of indigenous languages and traditions. Many of these initiatives are based on the model of the encyclopaedic archive to inform their development. Various groups have developed databases with rich metadata schema in an attempt to record and document oral knowledge traditions. One of the underlying assumptions of such systems is that knowledge can exist and be located within a collection through a priori ontological structures of metadata. The danger is that these collections become graveyards of objects which are no longer accessible to the practices of indigenous knowledge traditions, and that such knowledge is even more in danger of being lost. The reason these objects are graveyarded is because they lose their multiple possibilities in real worlds as they take on a status by virtue of the metadata structure itself. The metadata actually determine the limits and possibilities of the object.

If we assume rather that knowledge is produced at the point of performance of situated understandings we come to the conclusion that the producers of knowledge are to be inextricably involved in its production and reproduction. We explore computing solutions that will allow as much as possible the owner/users to employ a simple and ontologically free system whereby they can produce, organise and repurpose digital objects in ways congruent with their knowledge traditions. The objects do not contain knowledge, they represent traces of previous knowledge-production episodes which can become useful again in new contexts of performative knowledge making.

TAMI is a fluid file management and database system which carries no Western assumptions about knowledge, and which maximises the possibility for the user to creatively relate and annotate assemblages of resources for their own purposes.

2.1.2 General description

TAMI (*Text, Audio, Movies and Images*) is a database and file management system for indigenous use. *TAMI* is cataloguing-type software aimed at providing a visually-based system for people to manage their own digital resources for perpetuating collective knowledge traditions. The focus is on an easy to use, assumption-free system to view, organise, find and assemble digital resources.

2.1.3 *TAMI*'s objectives

- To remain faithful to the principles and practices of indigenous knowledge production.
- To be useful for people with little or no literacy skills.
- To store small collections of valued resources easily worked with and augmented for the purposes of collective memory making.
- To be ontologically flat: as far as possible it encodes no assumptions (through metadata structures) about the nature of the world or the nature of knowledge, it is the user who encodes structure into the arrangements of resources and metadata.
- For the users to become the designers as they bring together resources, group and order them, and create performances or products (DVDs and printouts).
- For the ways in which truth claims are assembled and validated collectively within particular indigenous knowledge traditions, can be left fluid.

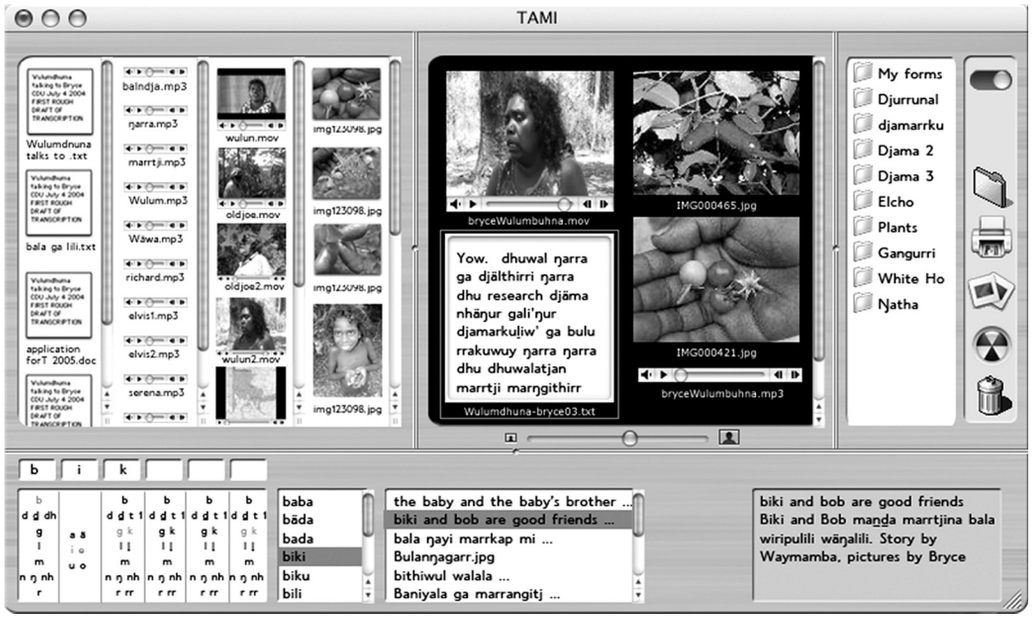

Figure 1. *TAMI* draft concept interface design by Trevor van Weeren ©CDU.

2.1.4 Features and functions

- One single interface screen enables search, building presentations, upload, metadata creation and amendment and view.
- A workspace enables different objects to be viewed simultaneously, and arranged into folders.
- Users will be able to upload resources into *TAMI* by a simple drag-and-drop.
- The only a priori ontological distinction at work in the database is the distinction between texts, audios, movies and images. Apart from that there are no pre-existing categories (as there are in other database where metadata are sequestered into fields such as 'author, 'title', 'subject'). This provides a certain ontological flatness so indigenous knowledge traditions are not pre-empted by Western assumptions.
- Objects can be uploaded and searched without metadata. (Metadata can be added at any time. Its purpose is to help text-based searching.)
- Where there is metadata, there is a simple 1-1 relation between objects and metadata. Each object or assemblage has only one set of metadata and vice versa.
- Individuals can make assemblages, (i.e. 'folders' of resources) and give these folders metadata. So the database can hold collections of resources based on a theme and these folders can be labelled and found through text-search.
- The 'natural' way to find objects in the database is without a text-string search, that is, without a text driven FIND function. Texts, audio files, movies, and images can be searched by flicking through the full set of thumbnail resources.
- Text-based searching will also be available and is guided by a few principles:
- a glossariser produces a list of all the words which are already in the metadata (including file names);
- the list contains English and vernacular words;
- the list is always visible on screen;
- users can scroll and click words for both

instigating a search, and adding metadata;

- key-in and drop down menus work to reduce the glossary list to help search. (Key in 'b' and only 'b'-words remain, key in 'a' and only 'ba'-words remain, etc.);
- Metadata for objects displayed in the workspace can be altered at any time. The glossariser continuously updates the list of searchable words.
- Wherever possible existing conventions from software solutions already familiar to indigenous users are employed.

2.1.5 Business and financial

While the ARC Linkage Research project has employed funds to research user requirements and develop conceptual frameworks for *TAMI* we will be seeking to develop *TAMI* through securing specific software development funding. Charles Darwin University holds the IP which comes out of this research. (The IP over the indigenous content of any of our software systems is retained by the original owners). Initially we envisage developing a proof of concept animation of *TAMI* as well as a supporting functional specification document and budget. We are seeking funding to continue the development to the point of useability testing and deployment of an initial version.

2.1.6 Description of software solution

TAMI is envisaged as an application window that will provide a view of digital resources stored on the computer. The *TAMI* drag and drop window interface will allow for collections of resources to be made and presented in various ways. Thumbnails of resources will provide the main organising form and options for text based metadata and searchability will also be available.

2.1.6 Competitive analysis

A number of software products are already available that have some of the functionality that *TAMI* is seeking. Notably the Apple *iLife* products are already successfully in use in similar contexts to where this project is working, i.e. in small indigenous communities. *iView Media* is another third party product that has some of the functionality that *TAMI* seeks. The key aspect where *TAMI* differs from all these solutions is that *TAMI* integrates them into one, and implementing a unique approach to text (metadata) production, search and modification.

2.2 Exhibit 2: a story about Wulumdhuna and Bryce working on Elcho Island

There's a track that runs all the way up the island and about half way, just off the track there is an outstation, Djurranalpi. It's one of the outstations where people live all the time, not very many necessarily but there's always somebody there. And there's a little schoolhouse there, and it's been there for some time.

Wulumdhuna, the lady that I've been working with up there is actually the family I'm adopted into in a sideways sort of a way. For a long time now she has been making scrapbooks with pieces of paper of different colours. She's been trying out patterns, trying to show the kids how they relate through places. She's been making resources by collecting bits together for the kids that come to the school. These diagrams and collections reflect the ways she wants kids to think about places and their connections in Elcho, if you like. Rather than always using the text books that come from other parts or whatever.

She's already done a lot of work like that and as she's been working with the Education Department she's been getting experience with computers. And just recently, we've managed to convince the main school on the island that they didn't need one of their computers that they hadn't used for some time. They agreed to let us use it for a while. So Wulundhuma is using this eMac, which comes with a variety of software built in like iMovie, iPhoto—quite simple organising programs. So now she goes out and she takes photographs of the plants and places and whatever and she brings them back,

plugs into the computer, the iPhoto pops up automatically. She organises the photos into different folders.

For example she will put a place name of a rock that is part of a turtle story, and then have a folder that contains digital objects like photos of the rock, turtle photos, photos of plants that relate through various narratives. These are all in iPhoto. She will add a video of someone talking about that place to the folder. Maybe an image of a related painting will also be added.

Working with her view of how a collection of digital objects expresses places she will make up various folders. It might be that she took one photograph of a particular thing but because it is multiple things in different places, and stories it belongs to are in say three different folders. That one photograph would go into each of the three folders.

Depending on which storage/collection she was putting it into there was a bit of a problem with the data file. In that every time she wanted to locate the same image differently she had a problem with changing the names. It had a different name every time even though it was the same photo. She'd change one then the names in other folders would change. The program kept trying to keep things consistent and messed things up by changing names. We've been sort of trying to get around issues like that which arise in just using proprietary-based software.....

For me one of the interesting things that happens [in these situations] is that once we have some videos and photos we go back to the computer. There'll always be a lot of time where you will spend say one second with the computer and then you'll spend the next hour talking about something that that's referenced. And the kids will be there and the old man will get called over and he'll talk about such and such. Then we'll have to go back off down the beach somewhere because there is another area that needs to be included and we might as well do it right now because it's a beautiful time, because it's low tide or whatever. So usually we don't actually spend much time with the computer, but we try to go to it, and a lot of the time we end up off doing other things so in effect in the process of having this computer there and attempting to do something with it is creating all this activity around the things that it is theoretically for anyway.

2.3 Exhibit 3: Drawings and comments made back in Darwin

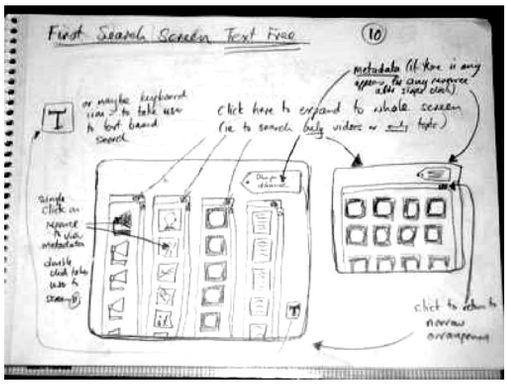

Figure 2. New opening screen. Text-free searching by Michael Christie ©CDU

Option for text-based search available from here, but first search options are text free. Four columns with sound files, videos, images and texts. (Bryce later added another column for folders (which contain collections of resources—see pic 13)). If we pursue this option (see discussion in section 4), we need to think how it can be organized, and whether the folders have logical arrangements (sequences, time lines, etc possible—to recreate journeys through the environment) Each stack can be clicked up top somewhere so it opens out to a wider view (so user can search only for texts, videos, etc if that's what s/he knows s/he is looking for) as displayed on rhs of graphic.

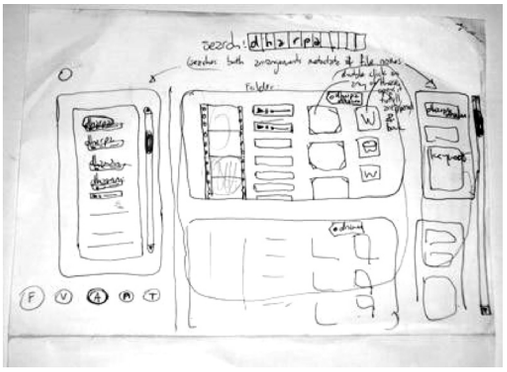

Figure 3. Bryce works on computer by Michael Christie ©CDU.

Need to discuss issues about complexity with first introduction to interface. Users will soon enough become familiar and have visual prompts at all times, starting to think about the object of the database to be arrangements of resources, focussing on ideas of how to include the maximum number of resources into the simplest most possible interface and incorporating searchability and display into this.

Then we started thinking about putting it all together and how folders might be created resources, (currently audios movies photos text), folders and workspace arranged from left to right. buttons along rhs.*

*BAK An item from any of these resource banks can be selected and moved into the collection panel on the rhs. at which point metadata can be added specifically for each collection. (It should be noted that metadata for any particular resource can be added using the same metadata screen on the lower rhs,) * Once collections of resources are considered complete buttons on the far rhs indicate whether a folder, CD rom, DVD, or other export presentation is required to be produced.*

Example, selection of the DVD export func-

Figure 4. *TAMI* early draft concept interface design by Bryce Anbins-King ©CDU.

tion produces a DVD which incorporates a slideshow of photographs, option for movie play, text scrolling (including separate text scrolling for metadata and this possibility of listening to any audio files which have been included. Software limitations would presume a basic template for this function. Similarly a CD rom could be produced. or VCD.
BAK: The concept of a database has its substrate predetermined by past models of databasing. Experience with indigenous people over the last few months in the project has informed us that requirements of continuing narrative uploading (or something like that) are desirable. MC: by 'narrative uploading' do you mean resources connected by some sort of narrative logic which is encoded in the metadata?

2.4 Exhibit 4: Wulumdhuna's vision for a digital archive

0:47	Ga dhuwanydja ŋarra dhu dhiyal bala runu'runukurr starttja boŋguŋ ŋurru-yirr'yun ga projecttja djäman.	So I will start along the islands, that will start the work.
1:56	nhäwiku rra ga djälthirri, walal dhu boŋguŋ rrakal ŋaḷapaḷmirriy dhuḷaŋ djäma, biḏi'yurr dhulaŋ wäŋapuy	What I want, is soon, my elders, will produce ancestral images, paint the old art of the land.
2:09	yän balanya nhakun yolthu bumara ŋunhiyi wäŋa nhä ŋulayi marrtjin	just like, who made that place, what passed through there
2:21	yä balanya mala, nhä ŋulayi marrtjin, nhaliy ŋayi bumar ŋunhiyi wäŋa	yes, those sorts of things, what went through there, what it was that formed that place.
2:29	dhuḷaŋ, maṉḏa dhu dhuḷaŋ ga dhäwu, ŋayiny ga dhäwuny' marrtji rrambaŋi maṉḏa	Art, together the art and the story, the story will go too, both of them.
2:37	dhäwu dhu boŋguŋ gäna ḏapmaraŋ ga dhuḷaŋ biḏi'yunawuy wäŋalil mala ga gäna	Stories will be recorded separately, and totemic images painted of land separately.
2:51	ga dhäwu ŋayi dhu ga ŋorra ŋunhi-wiliyi dhulaŋ, dhulaŋŋur ŋayi dhu ga dhäwu ŋorra	The story will lie there that relates to the art, in the image the story will lie.
3:02	marŋgithinyaraw djamarrkuḷiw' ga manapandhi ŋapa-ŋupan(follow) ŋayi dhu, ŋunhiyi dhäwu buŋgulyu ga manikayyu	for letting the children know. And joining in, following, will be the ceremonial performance and the ancestral song.
3:16	wanhami ŋayi dhu wäŋaŋur ga man-ikay marrtji, ga wanhami ŋayi dhu buŋgul mala dhawaṯthun ŋunhiliyi waŋaŋur, balanyaraw	Wherever that song will wander, and from where the performances of song and dance will emerge, in that place,
3:25	ga yalalaŋumirriynydja, bala linktja mala djäma mana'manapula balanya nhakun example ŋarra dhu ḷakaram	and later make links and join them. I'll give you an example.
3:38	dhiyal, Djurranalpi, dhuwalnydja	Here, at Djurranalpi, this place Djurranalpi I

	dhuwandja Djurranalpin wäŋa ŋunhi ŋarra li ŋänha'ŋanha ŋunhi ŋayi gan bumar dhuwal wäŋa wuwarkuy	have always heard that this place was created by wuwarku snake and there are many many links, to other groups.
3:53	ga link ŋayi ga ŋorra dharrwa mirithirri, wiripunydja bäpurru'lil	
3:59	dhuwal wäŋa Burrthi dhuwal Gaya-wala Wirrmuḷmuḷ ŋunhi ŋayi bumar dhiyaŋiyi bäpiy wäŋa	This place the Burrthi Gayawala Wirrmulmul which the snake created,
4:09	ga yalalaŋumirriy ŋayi dhu link dhuwali marrtji boŋguŋ maṉḏa ḷirrawuthana ŋunhi ŋayi gan nhäŋal ḷirrawuthanalil ŋayi nhäŋal dhipuŋur	and later there will be links made to the lirrawuthana. He saw from here to over there, to lirrawuthuna
4:23	ga maṉḏa gan waŋanhamin, ŋunha bala bäpi ga dhiyal	and they were speaking to each other, that snake and this one.
4:30	Yä balanya mala ŋunhi yalalan. Ŋarra dhu dhiyal bala gali' ḷuŋgurrmaŋur starttja	Yes Those sorts of things would be (added) later. I will start just in this area,
6:04	ŋayipi dhu yothuy dharaŋanmirr nhänhamirr wanha ŋayi, wanha ŋayi ga ŋorra ŋamini wo wayirri wo yapa'mirri nhanŋu wäŋa or wiripu wiripu mala	He alone, that child, will recognise himself, see himself, where he is, where he is and where his mother or his grandmothers' and great grandmothers' land are, and other things, like that.
6:22	ga balanya, ŋayipi dhu mala-djarr'yurr ŋuruŋi yothuynha, dhiyakidja ŋarra ga purposetja dhuwal djäma ŋayi dhu, yalalaŋumir-riy marŋgithirr, yalala dhu limurruŋ ŋaḷapaḷmirri dhawar'yun bala ga limurr dhu dhunupa yän walalany marŋgikuŋ, djamarrkuliny' ŋunhi.	He alone will be able to choose, that child, that's the purpose of what I'm going to do, S/he will understand. When our elders pass away, then we will teach them correctly those children.
6:36	dhiyak ŋarra ga dhuwal djäman, dhuwali rraku projecttja, ga dhiyaki ŋarra li ga warguyundja yalalaŋuw djamarrkuliw. Ga liŋgun dhuwal	That's what I'm working for, that's my project, and that's what I'm worried about, later for the children. That's it.

3 Notes to support reading our exhibit of *IKRMNA* research

We call *IKRMNA* 'a project' but our understanding of what a project is differs from the common positive modern usage of the term. We take the term 'project' rather literally using it to allude to planning, contriving or designing a 'throwing forth'. Using project more as a verb than a noun we emphasise the uncertainty and vagueness pervasive in any throwing and lodging of a grappling hook on the future. The confusions of the present insinuate themselves into our present's projections.

Understanding projects in this way the social and the cultural, sometimes thought of as contexts, for digital design become resources. Contexts of design become instead specific philosophical and technical puzzles and the

research becomes a way to arrange mutual interrogation and exchange of the philosophical and technical domains. Another way of saying this is that we are asking 'How can we work the ontologies native to computers with Aboriginal ontologies?' (Verran 2006). This framing in part explains the radical difference between *IKRMNA* tools for indigenous knowledge management and those generated in other projects.

Other projects approach design as a problem of managing various givens in socio-technical contexts, rather than seeing them as philosophical and technical puzzles that take specific forms. Because of this other projects end up designing tools for managing difference so it is subordinated to a sameness that connects. This has the effect of both trivialising difference, and entrenching an on-going blindness to the profound ontological issues at stake in design.

For example, Ngulube (2002) is interested in developing and marketing indigenous "IK services and products" . He advocates digital indigenous knowledge management by disciplining diverse local ontologies through thesauri with "controlled vocabularies", the terms of which derive from a Western ontology. The proposed solution actually destroys the very ontologies that need to be preserved in order to generate the unique products that might be sold.

Similarly the museum-centred work of Hunter et al., enabling

> *museums and indigenous communities in distributed locations, to collaboratively discuss, describe and annotate digital objects and documents in museums that originally belonged to or are of cultural or historical significance to indigenous groups (Hunter et al. 2004, p.1)*

obliterates indigenous ontologies. Instead it privileges curatorial categories. Both these are software designs generated as a "design from nowhere" in which designers are

> *encouraged to view technologies as objects and themselves as their creators. (Suchman 2002)*

A second type of approach seemingly more 'sensitive', reifies the social—a category deriving from Western metaphysics. Seeking to promote community development through indigenous knowledgement tools, many approach design through mapping categories of social forms, for example kin groupings. The solution reproduces the social categories of sociologists and anthropologists in the digital domain. This has two problems for indigenous users. The categories do not derive from the ontologies of indigenous knowledges. Inevitably using software ontologically privileging the social has indigenous users continually engaging in translations. Perhaps related to this is the observed proliferation of categories that accompanies this approach, often making the knowledge management tools unusable.[1] Examples of this approach are Gigler (2004) and Srinivasan and Huang (2005). Both these, advocating an action-research approach at the social level, might be said to be adopting design as "detached intimacy" in Suchman's terms. Citing Wagner (1994), Suchman points to processes of detachment that naturalise and justify designers' evasion of responsibility as the 'real design site'—the laboratory, a mathematical theory, a computer scientist and his/her computer screen, recedes from view as products are exported from that site.

In contrast we characterise our approach as located accountability, and our exhibit is designed so as to reveal what located accountability might be in practice. In located accountability for design there is a focus on responsibilities from the beginning. But this should not be interpreted as a 'White man's burden' type of all pervasive responsibility. Here as Haraway (1991, p.190) explains "we become responsible for what we learn to see" and Suchman adds, build, for the only possibility for the creation of effective objects is through nurturing the emergence of collective knowledge in the particular and multiple

locations of their production (Suchman 2002, p. 96).

Our claim could however be treated with some scepticism. As yet we do not have a functioning prototype of *TAMI*, and are still seeking alliances with those who might help in achieving this. We have not yet actually built anything so there is a sense in which our processes have not yet come up against the hardest test. What we are exhibiting here is what might be considered an outcome of the research so far: some principles and protocols of design in this particular project. We articulate the project as the mutual interrogation of philosophical and technical puzzles which proceeds with a minimum of conceptual mediation (for example we eschew involvement with 'social categories' such as kinship groupings) and a maximum of embodied collective work (workshops carry the research forward).

In our exhibit each text has a different role. The 'proof of concept' document brings *TAMI* 'to presence'. It has a foregrounding effect through rehearsing technical specifications and some of the ontological, political and sociological arguments which justify the design. In the other texts we juxtaposed with the *TAMI* 'proof of concept', we showed some of what had been backgrounded by that document. In contriving the exhibit of these texts we show what is backgrounded and also gesture towards the 'out-of-frame', the vague, indefinite "hinterland" (Law 2004, p. 42) of *TAMI*.

As the name *TAMI* came to stand in for an interface design it brought to presence only some of the messy designing work. Coming up with the acronym T.A.M.I. as a felicitous name and a sketched image of a computer screen, signalled the 'clotting' of the idea of *TAMI*, new grounds on which to proceed. Much was left behind. Some crude sketches in a rather tattered project book with rather enigmatic annotations (Figures 2 and 3). A crowded, rather hot room in Djurranalpi, an old man dozing on the sofa, his friends and relatives chatting and smoking out on the verandah, children tumbling around, a young woman with some computer skills, a borrowed computer and a vision, a story, of how to keep memories of those old men and their knowledge fresh for the children, to nourish them. Places visited, small boats and trucks, and stories told of past and future ceremonies with dance and song and painting (Exhibit 2).

Nowhere in the software specifications text are the roles of Wulumdhuna and her family at Djurranalpi and the people who we are involved with in the other places made explicit. Glimpses remain for those who are in the know, in the faces, hands and fruits that feature in the mock-up. The episode that acted as a crucial stimulus in 'clotting' our vague struggles towards doing collective memory with digital tools with ontological fluidity and openness receives no mention. Deleted too, but again still traceable, is the DSTC database *XMEG*. The 'back-end' of *TAMI* is cited (and sighted) only on non-technical terms. The work of designers Bryce and Trevor, and project managers Simon and Juli is an absent presence. Our final text, Wulumdhuna's statement of her 'vision', turns us towards part of the vast hinterland that lies outside the frame of *TAMI* designing,—pre-existing social and material realities, ramifying indefinite relations. This is just the Yolngu side, a vast hinterland also lies beyond, in Western technosciences.

How does all this attend to the controversy which frames the *IKRMNA* project? Our response recognises that both sets of anxieties around digitising technologies and indigenous knowledge practices are warranted and takes them seriously. Our adoption of a stance of located accountability insists that digital technologies can neither save Aboriginal knowledge nor destroy the capacities of young adults to 'do' their communities' knowledge traditions. But it does recognise that digital technologies do participate in re-distributions.

We are not supposing *TAMI* as an 'agent' that will ensure a robust future for Aboriginal knowledge traditions, but we reckon it a fairly sturdy grappling hook on possible futures. What agency it might prove to have lies in the openness of its future making capacities for redistributions of power.

Re-distributions are dangerous and tricky, and at the beginning no-one can be sure how things are going to work out. We saw that in Djurranalpi computers and digital cameras had people telling stories, going to places, singing perhaps, remembering names. Computers and cameras are joining death and puberty and perhaps replacing food-getting as occasions for visiting various places important to the various clans that own land around Djurranalpi. They grant specific sorts of influence to digitally-canny outsiders like Bryce, who can plead with education department officials, and tinker with computers and cameras keeping them working and connecting well enough with phonelines and solar panels.

In *TAMI*, grouped only by the techniques that make them digital objects (texts, audio files, movie clips, still images), digital objects are ready and waiting to be re-grouped and come to life as the expression of some aspects of some future child's specific and particular identity, and perhaps as some collective socio-cultural context of being. We hope that *TAMI* will be built and will intervene in promoting place-based knowledge making that evades Western objectivist epistemology.

Notes

[1] This proliferation of categories is seen in a Yolngu Aboriginal knowledge digital knowledge management project described in a newspaper report: "Even the most jaded techno-nerd would be given pause by the layered information system being created…The starting point was a 42-level relational database prepared so as to catch the way Yolngu people think about the world." (Rothwell 2003, p. 29)

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