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DESIGN FOR THE CONTACT ZONE

Knowledge management software and the structures of indigenous knowledges

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Abstract. This article examines the design of digital indigenous knowledge archives. In a discussion of the distinction between indigenous knowledge and western science, a decentred perspective is developed, in which the relationship between different local knowledges is explored. The particular characteristics of indigenous knowledges raise questions about how these knowledges can be managed. The role of technology in managing indigenous knowledges is explored with examples from web-based databases and digital archives. The concept of contact zone is introduced to explore the space in which different knowledges, such as indigenous knowledge and the technoscientific knowledge of the database, meet and are performed. Design for the contact zone, this article proposes, is an intra-active and adaptive process for creating databases that are meaningful for indigenous knowers. The meta-design approach is introduced as a methodology, which may provide indigenous knowers tools for self-representation and self-organisation through design.

1. Introduction

When I began writing this text, my word processing programme notified me that there was something wrong with the spelling of the subtitle. I tried another word-processing software, but I was told the same thing: There is no such thing as *knowledges*. Can we not write about *knowledges*? I found the following question on WikiAnswers[1]:"What is the plural form of knowledge?" The answer was: "This is a silly question. There is no plural to knowledge. Knowledge in and of itself contains multiple information."

This is an example of how technology, in the form of word-processing software, is involved in creating a reality in which we can only speak of knowledge, not knowledges. I instructed my word-processing software, however, to add the term *knowledges* to its dictionary. I thus reconfigured the dictionary and produced a new

[1] See http://wiki.answers.com/Q/What_is_the_plural_form_of_knowledge

iteration of reality. I propose to take this anecdotal evidence as inspiration for this article.

In the following sections I will amplify three themes, which are inspired by this anecdote. In section two I will explore the visibility of other ways of knowing the world and focus on the distinction between indigenous and non-indigenous knowledge. Section three addresses the theme of managing indigenous knowledges and will focus on some of the challenges of building indigenous knowledge databases. Section four addresses the relationship between the western technoscience knowledge of database software and indigenous knowledges. I will look closer at the role of technology in protecting and sharing indigenous knowledge and briefly explore a conceptual framework that may contribute to the design of knowledge management software that matters to indigenous communities.

2. Knowledges?

There are scholars who maintain that there is only one type of knowledge that counts and that is modern western science. Only knowledge that can be taken out of its local place of production, to become global, universal, objective and true, can be called science. Some proponents of this perspective present western modern science as superior knowledge (Gross and Levitt 1994; Koertge 1998;Nanda 2003). Local, traditional or indigenous knowledge – knowledge that is bound by its place and its relations, such as culture, religion and community - is considered mere belief.

On the other hand, there is a growing community of people who maintain that all knowledge, including modern western science, is local. David Turnbull calls this the 'localist position'. In "*Reframing science and other local knowledge traditions*", Turnbull (1997) describes two different perspectives in which this localist position can be expressed. In the first perspective it is argued that also science is value-laden – science should therefore let go of its value-free and universalist stance and adopt a set of quasi-universal values. In the second perspective it is argued that all knowledges are situated within a particular set of values. Turnbull refers to this perspective as the *de-centring of science*, the recognition that there are other ways of knowing the world besides our Eurocentric and egocentric way (see Cunningham and Williams 1993).

2.1 DE-CENTRING SCIENCE

An important role in the de-centring of science is played by feminist theory, which addresses this issue by questioning the frameworks in which science is produced. One central theme in feminist theory is the notion of objectivity. Sandra Harding (1995) proposed the notion of 'strong objectivity' to counter understandings of objectivity based on the subject/object dichotomy, detachment, and value-neutrality. Harding argued that knowledge that includes experiences of those who have been traditionally left out of the production of knowledge may in effect be more objective as women and other subordinate groups are motivated to understanding the views of the people and institutions that are more powerful.

A second example can be found in the work of Donna Haraway. In particular Haraway's essay "*Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective*" (1988) played an important role in understanding how we can talk about *knowledges* in science. Haraway presents her understanding of objectivity as *situated knowledges*. Located between the 'God-trick' of objectivity-from-nowhere found in Science and the 'God-trick' of the objectivity-from-nowhere found in relativism, *situated knowledges* present embodied objectivity through partial perspectives (Haraway 1988; 1991). Such partial perspective is not based on identity but on a partial connection with the 'other'. It is partiality, not universality - a view from somewhere, not a view from nowhere - that offers, according to Haraway, the preferred position for making rational knowledge claims.

The de-centring of science is also supported by postcolonial theory, which queried questions of knowledge and power in wider social and economic terms by locating it in former colonised societies. The work of Shiv Visvanathan (2003; 2007) and Vandana Shiva discusses how indigenous sciences and technologies were made invisible by the practices and discourses of colonial and global powers. For example, in "*Monocultures of the Mind"*, Shiva (1993) shows how scientific forestry and scientific agriculture split the plant world in two separate, non-overlapping domains. In an ecological perspective, the plant world connects forest and agriculture, providing food, fodder, and fertilizer. The categories of science, following the global commodity markets, see only timber as a product of the forest, while food is confined to the category agriculture. In a later publication, *Biopiracy and the plunder of nature and knowledge*, Shiva (1997) argues that only through the cultivation of diversity, both in terms of biodiversity and knowledge diversity, will we be able to recover the possibility of self-organisation through decentralisation and local democratic control.

Feminist and postcolonial theory have inspired the study of science and technology since the 1980s. Their cross-fertilisations have resulted in science studies that include the discussion of indigenous knowledge traditions, see for example the work by Hess (1995), Turnbull (2000), Verran (2002), Visvanathan (2000), and Figueroa and Harding (2003). In *Science and Other Indigenous Knowledge Systems,* Watson-Verran and Turnbull (1995) describe a variety of indigenous knowledge systems. In their analysis they propose a *symmetric* treatment of all knowledge systems, which enables them to describe these systems on the one hand as very different from Science, but on the other hand as knowledges that are systematic and innovative. They discuss how local innovation is the implicit basis of all knowledge systems. With this recognition of the localness of modern western science, they argue, all knowledges can be understood as indigenous knowledges.

2.2 DEALING WITH DIFFERENCE

If we take the de-centring of science position, we are faced with an important question: 'How to deal with the relations between these different, local, situated knowledges'? Informed by Turnbull (1997), we can generalise two positions. The first one argues for incommensurability between these knowledges and stresses the uniqueness of a particular local knowledge, a position found for example in radical feminism, e.g. Mary Daly (1984; 1998), indigenous peoples activism, for example Sydney Possuelo and the no-contact policy (Söderström, 2010; Wikipedia, 2010; Angelo, 2007); and maybe also

in neo-luddite positions, such as taken by anti-civilisation theorist John Zerzan (1994; 2005).

The second position argues that despite the differences between knowledges, it is important to find ways in which these knowledges can co-exist. This perspective is not based on a relativist stand, calling for automatic justification of situated knowledges. Such relativism, based on the equality of positioning, is, a denial of responsibility and critical inquiry (Haraway, 1988). It is a way of being nowhere while claiming to be everywhere. The second position is a responsible, mobile and split position, always partial, never whole. The proponents of this position refer to concepts such as 'symmetry' (Watson-Verran & Turnbull, 1995), 'cognitive justice' (Visvanathan 2000; Santos 2007) or 'postcolonial moment' (Verran, 2002), to explore how these knowledges can co-exist.

Distinguishing indigenous from non-indigenous knowledge

The recognition of the localness and situatedness of all knowledges brings up a second question: 'Can we and should we distinguish between indigenous and non-indigenous knowledge'? Scholars who have looked into this issue argue that there are no simple or universal criteria that can be deployed to separate indigenous knowledge from western scientific knowledge (Agrawal, 2002; Ellen, Parkes, & Bicker, 2000). But if we can't formulate strong distinctions between indigenous and non-indigenous knowledge, should we make separate categories of knowledge?

The increased use of the term indigenous knowledge since the 1960s has both romantic and practical reasons (Ellen & Harris, 2000). The re-discovery of indigenous knowledge in the "1960s counter culture" was based on the romantic notion of "primitive people living in harmony with nature". Practically, the increased use of the term is connected with socio-economic development and environmental conservation (Agrawal, 2002). Anthropologist Paul Silitoe (1998) describes how, before 1990, there was no explicit mentioning of the role of indigenous knowledge in international development projects of the British Department for International Development. In fact, traditional knowledge and practices were often seen as obstructing development.

In the 1990s, analyses of development discourse and practices, for example in the work of James Ferguson (1990) and Arturo Escobar (1995), created space for questioning whose knowledge and what kind of knowledge should inform development practices. These questions opened up the development sector for insights developed with feminist theory and postcolonial theory, in which the question of knowledge and power had been critically addressed. Nevertheless, the dominant perspective in development thinking is the inclusion of indigenous knowledge on the level of artefacts and particular practices. This perspective builds forth on the dichotomy between indigenous and western-scientific knowledge. The category indigenous knowledge is added to the development discourse as a resource that can be mined to improve development efforts. This approach does not challenge the development practice or engage the ontologies underlying these indigenous artefacts and practices. This perspective is found among a wide variety of international organisations such as the Word Bank, the United Nations Development Agency, the World Intellectual Property Organisation, development agencies, and conservation organisations.

Protecting indigenous people

The focus on indigenous knowledges is, on the other hand, used as a lobbying strategy by and for indigenous peoples. Indigenous knowledge has become an important concept

in legitimating local practices. Babidge et all (2007) describe, for example, how indigenous knowledge provides a management process for engaging with state agencies in Australia. Also non-indigenous awareness of indigenous land issues and biopiracy (Shiva, 1997) has resulted in a variety of initiatives to conserve and protect indigenous knowledge as a way to protect indigenous peoples and cultures. This has resulted in a growing number of indigenous knowledge management initiatives that propose to do this work of conservation and protection.

2.3 THE STRUCTURES OF INDIGENOUS KNOWLEDGES

Arun Agrawal (1995) argues that we should not bother advocating a distinction between indigenous and non-indigenous knowledge as long as western science is the ultimate arbiter of knowledge. It is more productive, he maintains, to examine specific forms of investigation and knowledge creation in different countries and different groups of people. This way we can make the existence of diversity visible within what is commonly seen as western or indigenous. At the same time we can find common links when we concentrate on the ways in which 'indigenous' or 'western' scientists create knowledge: “Instead of trying to conflate all non-Western knowledge into a category termed 'Indigenous', and all Western knowledge into another category, it may be more sensible to accept differences within these categories and perhaps find similarities across them” (ibid).

A similar perspective is proposed by Christie (2004a), Verran (2005), and Watson-Verran and Turnbull (1995). They are able to describe overlapping processes and practices, as they situate their work as both within the social sciences and within the Yolngu Aboriginal community in Australia. Their descriptions are strictly symmetric, “as neither side is privileged in producing true or good knowledge”. Their work shows that instead of focusing on indigenous knowledge as a resource frozen in time and place, we may prefer to look at the structures of indigenous knowledges. We can investigate the frameworks and manners in which knowledge is produced; where knowledge is located, i.e. who can have knowledge about what, and where it is stored or archived; how knowledge is shared and how knowledge evolves over time.

Onwu and Mosimege (2008) formulate a definition of indigenous knowledge that incorporates both content, context, and structures is formulated by:

> “An all inclusive knowledge that covers technologies and practices that have been and are still used by indigenous and local people for existence, survival and adaptation in a variety of environments. Such knowledge is not static but evolves and changes as it develops, influences and is influenced by both internal and external circumstances and interaction with other knowledge systems. Such knowledge covers contents and contexts such as agriculture, architecture, engineering, mathematics, governance and other social systems and activities, medicinal and indigenous plant varieties, etc.”

Overwhelmingly, scholars of indigenous knowledges describe the structures of indigenous knowledges as based on *connectedness* with the land and on the *performance* of knowledge. For example, Paul Richards (1993) develops a theory of performance based on studies of agricultural practices among indigenous peoples in Africa. He argues that farmer practices are not based on a static body of indigenous knowledge but rather on “a set of improvisational capacities called forth by the needs of the moment” (ibid, p. 62). A question we thus need to address is: Can we manage something that is connected, evolving, heterogeneous, and social?

3. Managing indigenous knowledges

The description of indigenous knowledges as dynamic, heterogeneous, social, and distributed; experimental, collective, and in the process of continuous adaptation and negotiation (Grenier 1998; Onwu and Mosimege 2008), introduces the second theme of this article, namely the management of indigenous knowledge. The management of knowledge, expressed in approaches such as Knowledge Management (KM) and Knowledge Management for Development (KM4D), includes a range of practices to identify, create, represent, distribute and enable adoption of insights and experiences in an organisation. Such insights and experiences comprise of knowledge, either knowledge embodied in individuals or knowledge embedded in organisational processes and practices. The idea that we can manage knowledge can be traced to the early 1990s and was initially closely connected with the new information and communication technologies that supported the archiving, organising, and sharing of information in an organisation. Two main approaches can be distinguished in organisational ICT-based Knowledge Management: a knowledge-centred approach and a knower-centred approach (van der Velden, 2002). The knowledge-centred approach focuses on the collection and codification of knowledge and depends heavily on information systems such as expert systems, portals, digital directories, and best practices databases. The knower-centre approach perceives knowledge as a human resource and focuses more on creating enabling situations in which knowledge can be shared in more informal ways, such as in communities of practice, story-telling, tagging etc. The technologies used in this second approach offer tools for collaboration and knowledge sharing, such as discussion forums, blogs, wikis, and social networking sites. One key motivation that underlies all these knowledge management practices is the understanding that knowledge has tacit dimensions (Polanyi, 1966). An important role of knowledge management in organisations is to enable processes that facilitate the transformation of tacit knowledge[2] into explicit knowledge.

3.1 INDIGENOUS KNOWLEDGE MANAGEMENT

The term ‘Indigenous Knowledge Management’ can be perceived as the combined result of the introduction of Knowledge Management in the international development sector and the digitalisation of efforts to turn non-codified, tacit traditional environmental knowledge into codified, explicit knowledge. The rationale for the ex situ conservation of indigenous knowledge, with the use of digital technologies, is expressed in terms of the protection of indigenous knowledge and the benefit of the indigenous community (Department of the Environment, Water, Heritage and the Arts (Australia), 2009; Hunter, Koopman, & Sledge, 2003; e.g. Ngulube, 2002; TKDL, 2009). Expectations of what digital tools such as database software can do for indigenous knowledge are often high. This is clear, for example, in this mission statement of the Indigenous Knowledge Management Project[3], a joint initiative of Australian and North American research centres. The software under development in this initiative has to:

- Preserve indigenous knowledge

[2] Polanyi doesn’t use the term tacit knowledge, but rather argues that all knowledge has tacit dimensions (Polanyi, 1966).
[3] See http://metadata.net/ICM/software.html

- Protect indigenous knowledge
- Support cultural protocols, for example to restrict access to photos of deceased persons
- And facilitate and improve cross-cultural communication

Thus while conventional knowledge management practices are supposed to support archiving, organising, and sharing knowledge, Indigenous Knowledge Management, activities also need to contribute to the protection of indigenous knowledges against extinction and external exploitation.

The question of 'How can we manage something that is messy, evolving, heterogeneous, and social' is thus entangled with issues such as ownership, intellectual property rights legislation, cultural protocols, technical issues in the form of choice of media and access; and more mundane issues such as system maintenance, project financing, location of the project, etc. How does knowledge management software deal with this entanglement and high expectations?

A knowledge-centred approach

If we look at early practices, such as the World Bank's Initiative on Indigenous Knowledge[4], the UNESCO database of best practices on indigenous knowledge[5], the Native American Ethnobotany Database[6], and the Tanzania Indigenous Knowledge database[7], we can see that they take a knowledge-centred approach. These initiatives are not different from corporate sector knowledge management initiatives. The technical, social, and legal entanglements were ignored in favour of providing abstracted statements about artefacts or practices. Shiv Visvanathan (2002) calls this the museumisation of local knowledges.

Agrawal (2002) argues that is the instrumental logic of development that informs the design of these databases. Scientisation of indigenous knowledge strips away the detailed, contextual, applied aspects of knowledge that might be crucial in the positive effects claimed for a particular piece of indigenous knowledge. From a system development perspective, we can argue that in the process of "abstracting away" (Blackwell, Church, & Green, 2008) the inconvenient complexity of indigenous knowledge, we end up with systems that are not very useful for indigenous communities.

I experienced this process of scientisation and abstraction during field visits to a local knowledge management project in India. The knowledge of traditional healers was translated from practices to texts written down in a paper notebook. The local names of the plants and their medicinal characteristics where then translated to the language of botany and medicine. The people working at the research organisation that was responsible for the project mentioned that the knowledge of the healers could only be added to the organisation's database when the validity of the healers' knowledge claims was established in a 'proper' laboratory.

A knower-centred approach

There is another, more recent, body of practices in indigenous knowledge management,

[4] See http://www.worldbank.org/afr/ik/datab.htm
[5] See http://www.unesco.org/most/bpikreg.htm
[6] See http://herb.umd.umich.edu/
[7] See http://www.tanzaniagateway.org/ik/

which is not initiated by development agencies or research institutions, but by the indigenous communities themselves. The main motivation for these initiatives is to archive, protect and preserve indigenous knowledge. These initiatives actively involve the community and often employ interactive and participatory multimedia tools based on Web 2.0 applications, which can be used in a web browser. One such initiative is *Ara Irititja*[8]:

> The Ara Irititja approach is community-based and designed at the request of Anangu communities. The communities own Ara Irititja and the Project has conscientiously followed its Anangu brief — 'preserve and give us access to our cultural history'. Unlike many contemporary knowledge bases, the design of Ara Irititja was media driven. At the beginning of the project, we had many thousand of photographs of various formats, hundreds of hours of film and sound, documents, books, magazines, diaries and artworks (both 2D and 3D). The software engineer's instructions were complex: develop a database that handles different media, incorporates cultural restrictions, and is easy to use for an audience with limited literacy and often, failing eyesight.

Brief visits to other websites of similar projects show an equal commitment to enabling the recording and presentation of indigenous knowledges in ways that allow some of the connections and relations and performances to be visible and audible.

4. The role of technology in archiving and protecting indigenous knowledges

How can we keep the relational, performative, and dynamic character of indigenous knowledges 'alive' in the design of knowledge management software? Before addressing the issue of design, we need to look at the role of technology. The discussion in the previous sections may have given the impression that we can create technologies, such as database software, that can archive and even protect indigenous knowledges, even if there are some problematic incompatibilities between knowledge management perspectives, databases, and indigenous knowledges. For example, by quoting Arun Agrawal, who argues that the instrumental logic of western science informs database designs, I may have contributed to the idea that design processes and technology designs are determinist practices: that there are linear causal relations between method, design and use.

The notion of *script* is often used to describe this phenomenon in which technology is perceived as a kind of film scenario in which both the story, the way the technology is supposed to be used, and the actors, the users of the technology, seem to be given by the design:

> "Designers [thus] define actors within specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of "inscribing" the vision of (or prediction about) the world in the technical content of a new object" (Akrich, 1992, p. 208).

Script has proven to be a productive figure to inscribe and analyse users and uses in design. Van der Velden et al. (2008, forthcoming) looked in particular at the

[8] See http://www.irititja.com/

inscriptions of gender and knowledge diversity in design and they identified a tension between the desire to design for gender and diversity and the risk of 'freezing' particular conceptualisations of gender and knowledge in design. They located the discussion of this tension in the dichotomy of 'design-from-nowhere' and 'design-from-somewhere'.

Lucy Suchman (2002) describes the 'design-from-nowhere' as closely tied to the goal of designing technical systems as commodities that can be stabilised and cut loose from the sites of their production long enough to be exported *en masse* to the sites of their use. Connected with this perspective is the 'view-from-nowhere' of the designers, who see their technologies as objects and themselves as neutral designers, denying the possibility for locating responsibility for the design.

In contrast, the 'design-from-somewhere' is based on the 'view-from-somewhere', a partial and embodied knowledge or situated knowledge. As Haraway writes: We become answerable for how we learn to see. Suchman adds that as designers we become answerable for what we learn how to build. Such situated location, design-from-somewhere, is intrinsically connected with our personal responsibility for the design.

An example of a script in a 'design-from-somewhere' context is the Mukurtu digital archive[9], which has developed a so-called Aboriginal Digital Rights Management to inscribe cultural protocols into the database design. The personal information, that a first time user provides to create an account, forms the input for the login-script, which is based on cultural protocols. Depending on the nature of the input, access to parts of the content may be restricted. These protocols are linked to gender, status in the community, but also a person's personal status. If a person is deceased, the users of the system may not be able to access photos of this person. Although this script is part of the 'design-from-somewhere', we can see the risk of scripting cultural protocols in database software. We have created a 'scenario': by setting the boundaries of a knowledge space, we define practices, roles, and responsibilities.

Another example of a script in a 'design-from-somewhere' context is taken from observations during a field trip to Kenya. Here I looked at the classification work of Jonathan, a Maasai knowledge worker from Enkirgirri in southern Kenya. Jonathan's organisation was part of a global network in which local knowledge for local development was shared with a distributed database software programme. There was no central system to which items are uploaded and shared; the global network consisted of smaller databases, which were able to communicate with each other. The software also enabled local classification work. Since the software was supposed to be used in different cultural settings, each with their own local way of knowing the world, the software had a default classification system, which could be adapted to the particular needs of the local communities and organisations. The software was developed by software engineers in New Delhi in India and was perceived as neutral global technology in order to allow for local cultural inscriptions. The global classification did not contain categories such as Maasai or pastoralist and it was up to Jonathan to add those sub-categories to his local version of the classification. Jonathan did not create these sub-categories and therefore he found it difficult to classify his items. When I asked him about it, he responded that he did not see it as his task or responsibility to change something in the software (van der Velden, 2008).

A scenario was thus scripted in the software, in which it was considered the role of the knowledge worker to localise the classification system – to create a 'design-from-somewhere' out of a 'design-from-nowhere'. Jonathan did not see it as his role to add local categories to the classification system. In fact, none of the knowledge workers I

[9] See http://www.mukurtuarchive.org/

met in India and Kenya considered it their role to localise the classification system. Since none of them had been part in the design of the software and its default classification system, they felt it was the responsibility of the designers, and the people higher up in the project hierarchy, to adapt the classification system.

Donna Haraway (1997) discusses the risk of inscription, both in the design-from-nowhere and the design-from-somewhere, with the example of geographical map-making, in which "material, contingent, human and nonhuman liveliness [is transmuted] into maps of life itself" (p.135). The mistake is, according to Haraway, that these maps are then perceived as metaphor-free representations of the real world (ibid.). They become containers in which materialised social practices are frozen in terms of place and fixed identity. In the example of Aboriginal digital rights management we saw that in the form of a technology, a login-script, which freezes the identity and location of the people who use the archive. Thus the question that needs to be addressed here is: How to design when both the 'design-from-nowhere' and the 'design-from-somewhere' carry the risk of working with inscripted or 'frozen' notions of place and identity?

Haraway (1997) and Suchman (2007) propose an understanding of technology as a materialisation of social relations in a particular cultural setting; an assemblage of stuff and meaning into a more or less stable arrangement, which imply particular ways of associating humans and non-humans such as nature and technology. This understanding of technology suggests that we cannot expect the same effects when we transfer the technology to another cultural setting. When people encounter a designed artefact, such as database software, they do not meet the artefact as it was designed – and they don't meet it as 'users'. In other words, they don't exist before their encounter. As Margot Brereton (2009) argues, when people incorporate a designed artefact in their lifeworld, they meet an 'object-as-used'. They give their own meaning to the artefact. We saw that in the example of Jonathan, who gave a different meaning to his role as knowledge worker than the designers of the software had intended.

4.1 CONTACT ZONES

Before the indigenous database becomes a more or less stable arrangement of stuff and meaning and begins it life as an 'object-in-use', we have to look closer to the meeting of knowledges, in this case the indigenous knowledge of the community and the technoscientific knowledge of database technology. Mary Louise Pratt's (1998) notion of contact zone is a figure that can help us think about designing spaces in which knowledges can meet on the basis of cognitive justice. Anthropologist James Clifford (1997) discussed museums as contact zones between indigenous peoples and non-indigenous museum people. Clifford described a contact zone as a space where knowledge systems *not* meet as "sociocultural wholes", but as "systems already constituted relationally, entering new relations through historical processes of displacement" (p.7).

Clifford's notion of relating knowledge systems can also be described as assemblages (Latour, 2005; Watson-Verran & Turnbull, 1995), as webs of interdependence (Tsing, 2005), and as high risk zones (Star, 1991). In a recent book, *When Species Meet,* Donna Haraway (2008), uses the notion of contact zones to discuss overlapping ontologies, the interdependencies of species, and companion species. Haraway warns us that such a space such as the contact zone is not about method, but about communication across irreducible differences (Haraway, 2003, p. 49). Robin Boast, in his work on digital museums and indigenous knowledge, argues that in the 'contact zone': "indigenous communities have ultimate control over not only what they

say and how they say it, but over its performance for an 'outside' community. It is this that is critical, the recognition that the presentation, the performance, of knowledge is as much a part of knowledge as is its content, and that symmetry must be extended to performance as much as to content" (Boast, 2008).

Intra-action

The contact zone is an apt metaphor for the meeting between indigenous knowledges and the technoscientific knowledges of knowledge management software. While the determinist notion of script assumes a particular scenario of events, in which two autonomous entities come together and in*ter*act, the notion of contact zone implies a more open-ended perspective than script. As we discussed above, 'design', 'user', 'indigenous knowledge', etc. do not pre-exist their 'meeting as 'sociocultural wholes'. The contact zone is a space in which subjects become in and through their relations (Pratt, 1998; Clifford, 1997; Haraway, 2008).

Physicist Karen Barad's (1996, 2003) concept of *intra-action* is useful for understanding how two things can already relate before they meet. Barad calls these relations "phenomena", which are ontologically primitive relations (2007, pp. 333-334). In specific intra-actions between phenomena, the characteristics and boundaries of the components of phenomena become determinate. For example, the design process of an indigenous knowledge database is a series of iterations, which Barad would call 'iterative cuts'. In each *cut*[10], the ontological inseparability of 'subject' and 'object' becomes de-entangled and their characteristics and boundaries become determinate. In such an iteration or cut, some possibilities are opened up and others are closed off[11]. Thus a database design does not determine use (nothing else is possible), nor does the database gets meaning through use (everything is possible):

> "Intra-actions always entail particular exclusions, and exclusions foreclose the possibility of determinism, providing the condition of an open future. But neither are anything and everything possible any given moment. Indeed, intra-actions iteratively reconfigure what is possible at a given moment and what is impossible – possibilities do not sit still. One way to mark this might be to say that intra-actions are constraining but not determining. But this way of putting it doesn't do justice to the nature of "constraints" or the dynamics of possibility. Possibilities aren't narrowed in their realization; new possibilities open up as others that might have been possible are now excluded: possibilities are reconfigured and reconfiguring. There is vitality to intra-activity, a liveliness, not in the sense of a new form vitalism, but rather in terms of a new sense of aliveness" (Barad, 2007, p. 234)

I propose the notion of intra-action, a more open-ended perspective than script, to inspire a *not-yet* 'somewhere' or 'nowhere', in which we understand *not-yet* as having meaning, as possibility, but no direction (Bloch, 1986). Intra-action thus refers to the dynamically reconfiguring of subject and object. Indigenous knowledge and database software are entangled in the design process. In each iteration of the design, new agencies in terms of possibilities and constraints emerge. Possibilities for action are not inscribed in a software programme, as we saw in the example of Jonathan, nor restricted

[10] Barad stresses that this *cut* is not a Cartesian cut, based on an inherently distinctive 'subject' and 'object', but a Bohrian cut, effecting a separation between 'subject' and 'object'.

[11] Such becoming is not an unfolding in time, argues Barad, "rather the past and future are enfolded participants in matter's iterative becoming" (2007, p. 234)

to humans; but are enacted in the contact zone where Jonathan and the software meet. Intra-actions create new realities in which new and different possibilities open up (Barad, 2007, p. 235).

4.2 INDIGENOUS DATABASE REQUIREMENTS

With the understanding of a technology as a design from *not-yet* 'nowhere' or 'somewhere', we can have a closer look at the requirements of indigenous knowledge management software. Here is a concrete list of requirements written up by Laurel Dyson and Mike Leggett (2006):

1. Appropriate to Indigenous culture, particularly its oral and graphical strengths;
2. Robust enough to withstand the harsh environments where many remote communities live;
3. Acknowledging Indigenous knowledge protocols, security concerns over who has access to secret or sacred knowledge, and intellectual property issues;
4. Easy to use and navigate (given low computer literacy levels in many communities);
5. Cost-effective (given the poverty of many communities);
6. Allowing for diversity of communities and cultural evolution over time;
7. Able to be placed outdoors at the locus of creative practice;
8. Providing community control over contents and over design, development, implementation and maintenance.

The first requirement, 'Appropriate to Indigenous culture, particularly its oral and graphical strengths', is crucial, as it connects directly with the structures of indigenous knowledges. Here is how the people involved in TAMI[12], an Aboriginal database developed in Northern Australia, dealt with this requirement (Christie, 2004b, p. 10):

- Start with a limited data set, and with the processes of uploading data and creating metadata
- Use the educational uses of digital artefacts as the framework for system development. Who will use it, how, and where?
- Focus on the retrieval and use of digital objects from the database as informing the logic of data structures, search engines and interfaces.
- Minimise the structuration of metadata to facilitate the preparation and upload of data and metadata and to foster the peculiar connectivities of indigenous knowledge practices.
- Explore the database and its development as politically and culturally invested and thus itself in need of a discursive reading. Whose world does its structure and function reflect? Whose practices does it support? How could it be modified to suit our purposes?

We can now begin to explore a design approach for the *contact zone*. We need an approach that is concerned with context and connections as well as with content, a design that is infinite flexible, and a set of tools that enable the ongoing communication and negotiation of differences.

[12] http://www.cdu.edu.au/centres/ik/db_TAMI.html

Meta-design approach

If we look at two 'knower-friendly' design approaches, participatory design and interaction design, we can see that they offer particular roles for user/practitioners in the design process and that they focus on user needs. Designers and user/practitioners work together towards a design that in the end best expresses the visions, needs, capacities, and intentions of both designers and user/practitioners. These design approaches offer important methods for involving indigenous knowers and indigenous knowledge practices in the design process. However, at a certain point the inscriptions, in the form of specifications and abstractions, are made and the design process comes to an end.

Meta-design is an emergent approach, building forth on these design approaches. It is a conceptual framework aimed at defining and creating sociotechnical infrastructures in which new forms of collaborative design can take place (Fischer et al. 2004; Giaccardi 2005). Meta-design creates new demands for participatory design processes by requiring (Fischer 2009):

- the creation of systems that do not consists of a set of predetermined possibilities and functions but are designed for evolution that is being carried out by the users

- a shift of focus from designing a complete system to designing a seed and mechanism for evolutionary growth and reseeding by providing content and a context for transcending the initial content.

In the meta-design framework, sociomaterial assemblages or technologies are understood as living entities. This framework proposes environments and applications that enable ongoing emergent processes of communication, collaboration, and creation within the assemblage.

Laurel Dyson and Mike Leggett (2006) describe a meta-design approach for building indigenous cultural archives:

- User-centred and participatory design techniques;
- Rapid prototyping of coded modules representing the core structure and processes;
- Iterative development;
- Fluid techniques like seeding, building and "tearing down of strawmen";
- Use of APIs for end users to customise and capture their participatory decisions;
- Free tagging processes rather than predetermined metatags.

Most importantly, Dyson and Leggett argue that the authoring system will remain open to participation, evolution and emergence, recognizing that indigenous cultures and needs are not immutable, and that indigenous expectations of what the system can do may well change over time. Meta-design thus proposes to centre on the design of authoring software that enables indigenous practitioners to design their own systems for archiving and preserving their knowledge, creating an open-ended and infinite flexible design process.

4.3 META-DESIGN FOR KNOWLEDGE MANAGEMENT SOFTWARE AND THE STRUCTURES OF INDIGENOUS KNOWLEDGES

The majority of the second-generation indigenous databases are based on conventional systems development, in which the outcome of a design process is an end-product such as an archive. The exception is the already mentioned TAMI database. Although the documentation written around the TAMI database does not mention meta-design, I would argue that both on the level of intentions and on the level of design, it exemplify the meta-design approach. *TAMI*, the Aboriginal database developed by Michael Christie and Helen Verran and their colleagues in Northern Australia, is a database design based on a perception of reality as *not-yet* described in categories. In contrast with more conventional database designs such as the distributed database software Jonathan worked with, there is no metadata set to structure a representation of reality in the database. The so-called *flat ontology* of the database enables practitioners to author community-based and cultural ontologies (Srinivasan, Pepe, & Rodriguez, 2009), also called fluid ontologies (Srinivasan & Huang, 2005), based on the connections they made with the items they upload and organise with the database software.

A second example is *StoryWeaver*[13], a project by Wade Chambers and David Turnbull. Storyweaver works with a similar flat ontology as TAMI and allows practitioners to weave stories together by combining different objects in a frame. Both TAMI and Storyweaver enable dynamic platforms for the ongoing organisation and creation of connections and interrelations between knowledge items. The practitioners can create media-rich representations of objects and their relations and so tell stories. In Michael Christie's words: “Discussions as to which connections are productive and which are to be ignored need to be made as the databases are used, not as they are constructed” (Christie, 2004b, p. 6).

5. Concluding remarks

In this article I have taken a de-centred and localist position in which concerns for dealing with difference differently inspired a discussion of the design of knowledge management software that matters for indigenous peoples. I presented a view in which the structures of indigenous knowledges, and the need for cultivating the diversity of knowledge and cognitive justice, were contrasted with ICT-based knowledge management practices and designs.

In a particular understanding of technology, based on the work of Haraway, Barad, and Suchman, I discussed the risk of scripting particular scenarios in database software. I proposed to understand such inscriptions as *not-yet* from ‘somewhere’ for the practitioner. Out of the intra-action between software and practitioner emerges a new iteration of the software, which gives new meaning and new possibilities. A database can therefore be understood as a living system, which evolves over time and which can provide practitioners authoring tools that recover the possibility for self-representation and self-organisation through self-control. Such a database becomes a contact zone for different ways of knowing the world and different ways of making the world.

Lastly, design for the contact zone brings the politics and ethics in database design to the foreground. Each decision in the design process is an iterative cut, creating new inclusions and exclusions. In this perspective, the accountable of designers does not end

[13] See http://indigenousknowledge.org/tools-and-resources/storyweaver

when their active involvement in the design is completed, but extends to include future iterations of the design. Designers and developers of databases become accountable for the realities they co-create.

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