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<th>eScholarship Research Centre Research Reports and Publications</th>
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<td>Abstract:</td>
<td>In this paper, we discuss the idea of resilient knowledge and how the concept of knowledge-based development might be conceived as scientific discipline, and on what basis. Discussion is presented in two sections. In the first section we explore the idea of the epistemic loss of knowledge. We suggest this type of knowledge loss occurs where there is inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information through time. We provide a brief overview of an emergent approach that could address this problem – an approach called contextual information management. In the second section, we document examples of how this new approach might be harnessed to create a framework for a (national) regulatory knowledge system. We draw upon one particular case study: the conception of quality standards within the Victorian Community Sector. By extrapolation, we suggest these ideas could well have wider applications – for example, the harmonisation of regulatory standards across State and Commonwealth areas of jurisdiction. By extension, it is suggested the focus of regulatory interventions should not be on compliance per se, but on creating a shared context between Government, stakeholders and citizens to support the dynamics of problem solving, knowledge acquisition and what we call evolutionary possibility.</td>
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Cities, human well being and the environment:
Conceiving national regulatory knowledge systems to
facilitate resilient knowledge, knowledge based
development and inter-generational knowing

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We are interested to hear from and work with groups that have commitments to regulatory reforms and public knowledge as outlined in this paper.
Structured Abstract

Purpose – The objective of this paper is to explore the linkages between notions of ‘resilient knowledge’, ‘knowledge based development’ and what we term ‘regulatory knowledge systems’. We claim that building resilient knowledge systems will prove to be critical for the future sustainability of modern day cities. The quality of modern city life is now very dependent upon the use and integration of sophisticated technologies, human service networks and physical infrastructure systems. But such networks and systems require that a knowledge society keeps re-equipping itself so that each generation can manage these assets on a cost effective and sustainable basis. The continued equipping of future generations to manage current and emerging assets, including physical and information assets is what we mean by resilient knowledge systems. Failure to build such systems will see the erosion of the quality of our collective assets in modern day cities. This task, we think, represents an extraordinarily large conceptual and practical challenge – and we argue, requires conceiving new national architectures associated with current regulatory frameworks.

Design/methodology/approach – We progress our investigation as to the nature of resilient knowledge and knowledge based development as an emerging scientific discipline, in two separate sections. In the first section, we explore the idea of the epistemic loss of knowledge. We suggest this type of knowledge loss occurs where there is inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information through time. We suggest this is a serious problem for those that have responsibility for the on-going management of our modern day cities, because inadequate attention is paid to supporting effective knowledge exchange across the generations. We provide a brief overview of an emergent approach that could address this problem – an approach called contextual information management. In the second section, we document examples of how this new approach might be harnessed to create a framework for a (national) regulatory knowledge system. We draw upon one particular case study: the conception of quality standards within the Victorian Community Sector.

Originality/value – We claim that the originality and value of our proposal is that we show how to turn the problem of epistemic knowledge loss on its head. We are interested in how the dynamics of knowledge acquisition can emerge through different type of regulatory network systems that allow Government, citizens and other relevant stakeholders to collaborate in new frameworks of engagement. But to achieve new models of engagement, we think philosophical issues associated with conceptions of knowledge acquisition need to be considered. By extension, therefore, we suggest the focus of regulatory interventions should not be on compliance per se, but on creating a shared context between Government, stakeholders and citizens to support the dynamics of problem solving, knowledge acquisition and what we call evolutionary possibility. We suggest that the approach we outline will be important if effective and sustainable inter-generational knowledge exchange is to be successfully achieved through time.

Practical implications – The outcomes of such an approach involves the creation of resilient knowledge systems. Such systems allow for the continued evolution of knowledge associated with, in principle, any aspect of city life - for example, activities associated with health and community services, infrastructure and waste management.
services, sustainable procurement from agricultural hinterlands and even regulatory pathways to transition towards a post carbon economy. It is no coincidence that the application of contextual information management practices could do much to allow for the emergence of harmonised knowledge systems for example across State and Commonwealth areas of jurisdiction. In this way, this could avoid the turf warfare of top down (political) and bottom up (grass roots) approaches to national reform and regulation. Crucial to the successful achievement of these challenges will be how regulatory knowledge systems are designed to support effective cycling between tacit and explicit forms of knowledge representations, which we discuss in some detail.

We conclude here that the emergent social systems within which tacit – explicit knowledge cycling will be required could spawn the emergence of radically distributed knowledge systems. We refer to these systems as public knowledge spaces. Such models might well be considered radical for now. However, Martin Luther’s spawning of the European centric reformation occurred less than 100 years after the invention of Gutenberg’s printing press. This provides an example of the sorts of radical changes that can be unleashed through new technologies. We are really only about 30 years into the global journey associated with the rise of digital technologies and have only just begun to experience the disruptive effect on all types of social systems across the world. This paper should be considered from within this larger historical context.

**Keywords** – Resilient knowledge, Waste management, Regulatory standards, knowledge networks, archival informatics

**Paper type** – Academic Research Paper / Practical Paper (Both)
SECTION 1:
RESILIENT KNOWLEDGE, REGULATORY KNOWLEDGE SYSTEMS AND INTERGENERATIONAL KNOWING

1.1 Introduction

Javier Carillo, President of the World Capital Institute has been actively advocating for an emergent professional domain of practice called ‘knowledge based development’. In his presentation to the 2009 Knowledge Cities Summit (in Shenzen, China), he has outlined how knowledge based development is emerging as a global field of research and practice. He presents a vision that this domain might follow the trend associated with the institutionalisation of ‘scientific disciplines’ in the 1970’s (Carillo, 2009, slide 8).

In the first section of this paper we aim to explore the idea that regulatory interventions made by governments can contribute to the objectives of what Carillo calls knowledge based development. We also aim to explore some of the deep intellectual issues that might be involved if knowledge based development were to evolve in a way that it might be considered as a ‘scientific discipline’ along the lines that Carillo appears to advocate.

In this era where resources are scarce we suggest that regulatory interventions should aim to contribute to knowledge based development. Our central claim is that the dual imperatives of advancing human well being and safeguarding the environment are so pressing this requires commitments to a public knowledge imperative. The public nature of this imperative is required firstly to ensure that the best type of knowledge possible is used as a basis for designing regulatory interventions in the first place. Secondly, network interactions and reflexive processes allows for the continued evolution and enhancement of public knowledge assets. Thirdly, there is a need to ensure appropriate levels of compliance are evidenced at particular points in time so as to secure and enhance the public interest and the interests of citizen themselves.

At the heart of these challenges is the need to conceive a framework that allows for the evolution of declared theories about what works in the world and the testing of these theories through the collation of an evidence base through time. But before we discuss these matters, we first wish to discuss findings of one research assignment where it has been identified how important knowledge can be lost through time. This topic is of immense importance to cities where knowledge loss can result in catastrophic and expensive system collapse.

1.2 Exploring the dynamics of epistemic loss of knowledge through time

1.2.1 Radioactive waste management as an archetypal knowledge problem

There can be no more important metaphor to evoke the importance of time and its relevance to information and knowledge transfer through the generations, than the
problem posed by the long term storage of nuclear waste (McCarthy et. al., May 2006, p 3).

The length of time for which information relevant to radioactive waste safety may be required is, therefore, determined by a variety of factors. In the short-term, or during the period of direct institutional control, the length of time will be determined by technical, regulatory, operational management and societal needs. In the longer term the primary determining factor could be the longevity of the radioactive waste itself.

In their report to the IEAE, McCarthy et al (ibid, p 8) identify two modes through which failures occur in the preservation and transfer to future generations of information important to the safety of radioactive waste disposal facilities, namely:

- **Epistemic loss** – where there has been inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information; and
- **Physical loss** – where physical changes in or destruction of either the medium or the supporting technology have rendered the information unusable.

The complexity of the time dimension associated with the epistemic loss of information and knowledge has been scoped in some detail (ibid, p 17).

It is epistemic loss which is least evident to contemporary generations but is perhaps the most critical. Interestingly, early preoccupations in both the recordkeeping professions as well as in the nuclear industry were focused on finding solutions to physical loss, whereas it is only recently that the issues of context, structure and meaning started to be addressed. It is the need to sustain knowledge of the elements that comprise both the complex socio-technical framework and the specific circumstances that surround any particular information resource which is at issue here. ... The recorded evidence of the activities of a radioactive waste program is not typically held in scientific publications but in records and other information resources that lack the robust public infrastructure that supports scientific literature.

One of the key claims of our paper is that the management of radioactive waste and the information pertaining to that waste presents as an archetypal knowledge management challenge. We use the term ‘archetype’ in the sense that the models that emerge to address the challenges of information and knowledge preservation and transfer to future generations are likely to pertain to a wide range of other types of application in the management of modern day cities.

McCarthy et al (ibid) spent considerable effort in researching the characteristics of the knowledge challenge associated with a radioactive waste disposal program. Such a program encompasses activities at different points of time in the disposal program, for example, at pre-disposal, emplacement and repository post-closure stages. The time dimension associated with such programs pose challenges for those with conceptual responsibilities for the design of resilient information systems. McCarthy and his team have described some of these challenges (ibid, p 21-22).

**Continuity of responsibility**

Ownership of responsibility for the operation of a nuclear waste facility can change over time and thus result in the loss of management system continuity.

**Changes in the socio-technical framework**
It is inevitable that significant changes in all ancillary organizations and other stakeholders with an interest in safety will occur through time. Changes in these parameters will likely influence the nature and character of the framework that underpins radioactive waste safety. For example, changes will emerge in waste management policy and regulation, societal structures, scientific and technological advancement, evolution of the waste facility, changes in land-use, State and organisational governance, language and meaning and climate change.

*In formation formats and interpretation*
Two other factors that influence potential epistemic loss are the format of the content (information) and the interpretation of the content. The content of an information resource can be expressed in various ways including the spoken word, actions, text, pictures, sound, moving images, ideograms, computer codes, and as physical objects. These information resources will generally comprise discrete data sets, documents, publications and samples, many of which are produced in vast quantities.

*Implicit and explicit knowledge*
In broad terms, the knowledge resources created during the course of a radioactive waste program comprise of two types. First there is the knowledge created through people’s direct experience and preserved in living (human) memory. Second there are the explicit knowledge artifacts that are captured through the creation of records, including objects, samples and other documents. Knowledge commonly drawn up at a social level (referred to as common knowledge) provides the contextual framework in which work is undertaken. McCarthy and his colleagues suggest that some of this context needs to be documented and made explicit if the records created are to be understandable in the future. Information custodians need to ensure that they have the capability to link their explicit information resources into larger information networks. To achieve this they will need to ensure they maintain relevant contextual information in a form that enables interlinking or citation between systems. Furthermore, individual custodians may have to manage a broad range of information resource types and ensure that their resource management and contextual information registers (metadata) meet the appropriate international standards. A significant knowledge risk is that insufficient attention is paid to creating an information resource that documents the common knowledge of the time and leaves associated records open for misinterpretation.

*Selection of information for future use*
Ownership of responsibility for the operation of a nuclear waste facility can change over time and thus result in the loss of management system continuity. An effective waste management program involves identifying the factors influencing the selection of which records are to be preserved on an on-going sense and for how long. The relevance of each information object can change with time and circumstance and it is not possible to predict, with absolute certainty which records will be required in the future.

*Capture of contextual information*
Records are never generated in isolation but occur within a multi-layered contextual framework that extends beyond the local waste disposal operations in which they
were created. The extended contextual framework is defined by a number of factors including the individuals and organizations involved; the regulatory framework; governmental structure; the geographical environment; the international community; climate change; major events; and the scientific basis for the industry. Records therefore cannot be accurately interpreted in isolation but must be understood in a broader context. Contextual information provides insight to the waste disposal operations and is essential for the accurate interpretation of the detailed waste records.

1.2.2 Reframing the focus away from the problem of knowledge loss

We suggest that the learnings derived from McCarthy’s several year investigation into the epistemic challenge of knowledge loss in relation to radioactive waste management has much wider application than the domain and interests of the IEAE. Indeed, we are suggesting that the potential impact of knowledge loss is becoming so widespread that this issue should in itself become the subject of knowledge orientated interventions. The recent catastrophe in the Gulf of Mexico has highlighted just how fragile the world is becoming with respect to human impact on our environment. Thus, the disaster indicates that managing for environmental sustainability must now surely be an exceptionally high public policy imperative for all Governments – indeed for all communities – and especially those that participate in modern city life.

Within this overall context, in tackling the problem of knowledge loss we suggest a broader, yet to be realised conception of this challenge needs to be developed. As we are suggesting, it is imperative that a time dimension is taken into account to enable the sustainable and effective knowledge transfer across generations. But, we contend that an objective of intergenerational knowledge transfer will in of itself not suffice. We are suggesting in this paper that instead of focusing on this objective of knowledge transfer and the problem of epistemic loss of knowledge, in contrast the imperative is to design systems that are built upon the dynamics of knowledge acquisition and what we later call ‘evolutionary possibility’.

1.3 The dynamics of knowledge acquisition

Having described what we consider to be an archetypal knowledge management problem, we now wish to suggest there can be an archetypal solution. Because we suggest there can indeed be an archetypal solution we suggest this approach could apply equally in the health, public utilities, community services and natural resource management portfolios as it might do in the realm of radioactive waste management. Thus our central claim will be that regulatory interventions should not aim to exclusively focus on risk mitigation. They should also aim to enhance the dynamics of knowledge acquisition and evolutionary possibility.

In moving towards our proposed archetypal solution, we suggest there is a need to develop dedicated and publicly orientated knowledge spaces and knowledge-network systems. The logic of this argument needs to be advanced incrementally, and thus we first focus on the nature of knowledge itself. We understand knowledge to be an emergent property of evolutionary systems.
1.3.1 Knowledge as an emergent property of evolutionary systems

The foundation for our ontology of knowledge has been outlined in detail in Vines et. al. (2010a). To some extent this work builds upon and is complementary to McCarthy’s et. al. (2006) earlier work. We have been influenced by Karl Popper’s theory of knowledge (1972). Popper suggested that knowledge is solutions to the problems of life – or at least claims towards solutions. As outlined in Vines et. al. (2010a) we choose to adopt this approach because it is grounded in an idea called an ‘evolutionary epistemology’ (“EE”). Donald T. Campbell (1974) first coined this term. However, Campbell credits Popper with its origination and with expressing its fundamental perspective in Logik der Forschung (1935). Both Campbell (1959, 1960, 1991) and Popper argued that knowledge emerges in living things as they adapt to the world. In his most complete explanation, Popper (1972 p. 241-5) referred to this as his ‘general theory of evolution’.

![Figure 1. Popper's 'general theory of evolution' (From Hall 2005, after Popper 1972: pp. 243).](image)

In this theory outlined in Figure 1, \( P_n \) is a ‘problem situation’ the living entity faces and \( TS_m \) represents a range of ‘tentative solutions’, ‘tentative hypotheses’ or ‘tentative theories’ the living entity may propose or act on. EE (‘error elimination’) represents a process by which tentative solutions are tested or criticized to selectively remove solutions or claims that don’t work in practice. Popper and Campbell are slightly different in their perspectives of EE in that Popper sees the selective forces of reality eliminating the failures, whereas Campbell sees selection leaving behind those tentative solutions that didn’t fail. In either case, \( P_{n+1} \) represents the now changed problem situation remaining after a solution has been incorporated. As the entity iterates and re-iterates the process (the arrow indicating iteration is added), it will construct increasingly accurate representations of and responses to external reality. These interconnected ideas formed the basis of Popper’s (1972) ‘general theory of evolution’ and the ‘growth of knowledge’ that takes place in living entities. This idea of an evolutionary epistemology encompasses what we mean when we say that knowledge is an emergent property of an evolutionary system.
This evolutionary aspect of Popper’s theory of knowledge is hitherto relatively unexplored by the knowledge management domain (with a few exceptions such as Joe Firestone in the US and William P. Hall at the University of Melbourne and for example, a recent collaboration between Vines, Hall, McCarthy and Firestone in Cope, Kalantzis and Magee - forthcoming). But there is a distinct convergence in ideas between the later Popper and Darwin himself. The idea that the emergence of human-centric knowledge itself is shaped by the evolutionary systems of which they are a part and that there is a selection for retention amongst variant kinds of hypotheses is essentially a Darwinian idea (Munz, 2004, p 137):

It was not until the 1960s that he [Popper] began to understand the striking resemblance between Darwinian evolution and his own alternative to positivism. In Darwin’s theory, as in Popper’s alternative to positivism, method did not count. Mutations were as random and unpredictable as the inventions of hypothesis or theories. In Darwinism, what mattered was the selection for retention of a certain kind of mutation; and in Popper’s view, what mattered was the retention of a certain kind of invention – that is unfalsified ones. As in Darwinian evolution, none of the results can be final, and there is continuing revision and criticism.

Popper’s notion that [scientific] ‘method did not count’ in relation to the development of new theories and that developments should be considered as random and unpredictable as the occurrence of mutations in Darwinian evolutionary theory requires further clarification. Thus, we turn our attention to the evolutionary nature of human-centric knowledge systems.

3.2 The evolutionary nature of human-centric knowledge systems

Peter Munz offers a poignant perspective of Popper’s evolutionary theory of knowledge – poignant because he is reportedly the only person in the world to have been a student of both Popper and Ludwig Wittgenstein. Both Popper and Wittgenstein were exceptionally influential philosophers of the 20th Century. Popper became known for his philosophy of science and in particular the theory of falsification. Wittgenstein was more interested in the social theory of knowledge and linguistic philosophy (Magee, 2001 p. 202). As it turns out, both men contributed to divergent streams of thinking in the 20th Century - Popper became influential in the realms of hard sciences and the politics of an open society, where as Wittgenstein became influential in the realms of the social sciences and linguistics, including functional linguistics.

A central thesis of Munz (2004) is that great benefit would have been derived if Popper and Wittgenstein had been better able to engage in critical dialogue between their respective points of view (and areas of incommensurability). We think Munz’s critique of these two great philosophers, and incidentally how they both influenced the rise of influential writers such as Thomas Kuhn (ibid, p 120-129) is relevant because we aim to draw out important principles associated with the evolutionary nature of human-centric knowledge systems. Munz, (ibid, p 203-204) came to the conclusion that a co-evolved philosophy between Popper and Wittgenstein would confirm the view that knowledge is best understood as a Darwinian idea. For example, (Munz, 2004, p 41) states:

The case of Popper’s rejection of induction as a criterion of truth is very similar. When he first formulated it, he had no idea how it would eventually lead him into Darwinism and connect with a whole movement of thought in other spheres.

To frame our further discussion of Popper and Wittgenstein, we first draw upon the philosophy of the American pragmatist Charles Sanders Peirce. Peirce’s pragmatism saw
him advocate views such as ‘knowledge as a form of practical movement’, ‘knowledge is an activity’ and that meaning is derived from taking actions which make a difference (Magee, 2001, p. 186).

Sowa (2009) has neatly summarised aspects of Peirce’s philosophy of pragmatism and in particular the inter-relationships between abduction, deduction and induction. In Figure 2, we have adapted Sowa’s interpretation of Peirce’s philosophy of pragmatism. Of primary importance to our discussion is the role of the inference logic ‘abduction’ in theory making. According to Sowa, abduction involves the activity of extracting, guessing and adapting. A hypothesis (or theory) can be developed through intuitive means by inferring from un-related facts. To this extent Popper and Peirce are very similar. Whereas Peirce talks about abduction as guessing and adapting, Popper’s philosophy involves creating possibilities where-by theories are ‘freely made up’.

Importantly, in both cases, declaring theoretical possibilities does require parallel commitments to considered and responsible judgements. For example, in Peirce’s case (as outlined in Figure 2) theory making is followed by deduction – planning, reasoning and evaluating - to deduce predictions or options for action from the theory. When action is taken, the impact in the world can be assessed through induction, by taking measurements, by articulating observations. Through induction, we draw upon our ability to monitor and measure the impact of our actions in the world.

In Popper’s case, deductive and inductive reasoning can be applied in order to prove theories wrong. By implication, for this theory of falsification to be made possible, theories need to be conjectured in ways that allows for them to be falsified. To this extent, Popper was explicit about notions of objective knowledge because he claimed knowledge was not accessible through the senses, because such knowledge can not be falsified. Munz highlights how Popper’s theory of falsification later became much closer to a Darwinian idea of natural selection (2004, p. 138)

"... When Popper declared that there can be no scientific method because truths are produced by unmethodical, free inventions afterwards subjected to criticism, he was echoing Darwin’s insistence that we do not need a designer to produce a viable organism which looks as if it has been designed. The crucial point is that Popper’s philosophy of science is an extension of Darwinism to the acquisition of knowledge. But decidedly it is not a Darwinian explanation of our ability to acquire knowledge through our sense organs and do science by inductive generalizations of those sense observations.

Importantly, Munz must not be understood as an apologist for Popper. Munz was concerned about how the central tenet of positivism could be refuted by Popper if Popper did not address the problem of the meaning of a theory. He was interested in how meaning can be ascribed to a theory if that theory is freely made up before there is evidence as to its coherence and / or truth. By implication, Munz thought Popper was lacking because he did not think Popper adequately answered the question as to how a theory could have meaning if such meaning could be derived from evidence (or examples). Munz suggests this highlights a weakness of Popper’s approach – he suggests that Popper was not interested in linguistic philosophy in the way Wittgenstein was. Munz suggested that Wittgenstein helps overcomes this problem and thus confirms how Popper should be understood as anti-positivist.

The proposal [of a theory], unlike the genetic mutation, has to be understood before it can be subject to selection, that is, to criticism. Popper’s philosophy of knowledge, for this reason, needs to be amended. There has to be an explanation of how the meaning of a proposal can be ascertained when it cannot be ascertained by
ostensive definition. ..... In Wittgenstein’s later philosophy, the speech community is the be-all and end-all of the source of meanings of what we are saying. He was completely indifferent to the problem that politically, not all speech communities are alike, and took it that as far as the determination of meaning is concerned, the politico-social structure of a community did not matter. In this, he was mistaken. Some allow criticism, others encourage it and others again prohibit it altogether. Therefore, Popper’s argument that only some very special politico-social orders are conducive to the criticism the proposals have to be subjected to world, in turn, have been a welcome amendment to the later Wittgenstein.

This potential for the later Wittgenstein to have been open to the influence of Popper’s argument is of fundamental importance to our incremental argument. We are claiming there is a need to develop dedicated and publicly orientated knowledge spaces and knowledge-network systems. Thus, we now aim to draw out some of the underlying principles of this approach.

1.3.3 Principles underpinning the harnessing of evolutionary possibility

We have laboured through our analysis of Popper and Wittgenstein, because these matters have relevance to our ability to understand the dynamics of knowledge acquisition – of being able to harness evolutionary potential within human-centric knowledge systems. In considering these matters, we now wish to outline some of the cornerstone principles associated with harnessing such possibility. In so doing we again refer to our adaptation of Sowa’s (2009) interpretation of Peirce’s logic of pragmatism as outlined in Figure 2 below.

Figure 2: The logic of pragmatism (Adapted from Sowa, J. 2009)
What follows is a discussion of certain aspects of Figure 2 in turn. These provide an overview of the principles that underpin our understanding of the dynamics of knowledge acquisition and evolutionary possibility.

**Language is a medium for knowledge creation**

The role and appropriate use of language is pivotal in understanding how knowledge is acquired. Language is contextual and plays a generative and functional role in the knowledge acquisition process. Through language there is potential to freely declare what might be possible before there is evidence as to whether something ‘works in the world’. We have discussed this point by referencing the contributions made jointly by Peirce and Popper. Central to this ability to declare what might be possible, are the commitments that allow actors the freedom to freely invent new theories and possibilities in language. Theories are therefore linguistic expressions of declared possibilities, but they are expressed in ways such that they can be shown to be false – that this their linguistic expression allows for them to be falsified.

**Commitments to political openness enable the propensity for possibility**

Specific groups tend to define meanings according to the social norms of the group they belong to. To avoid descent into the closed speech communities outlined in our discussion of Wittgenstein, efforts can be made to sensitively expand the context to include levels beyond the individual professional group. This ensures that constraints are imposed on individual communities to ensure their meaning frameworks co-evolve with the meaning frameworks of other groups and do not become self referential. Thus, knowledge acquisition is accelerated when a shared context is created in order to mediate the meaning frameworks between groups. For this to be achieved, there are commitments required to create opportunities for mediated exchanges between different groups.

**Knowledge claims are context bound**

In unpacking the implications of declared theories and possible causes for action, we suggest that the linguistics used to express theories is set in relation to the context of the problem situation being considered. Thus, predictions or options for action that can be deduced from theories need to be considered within the context of the system complexities within which action is to be taken. For example, some systems might be regarded as deterministic, in which case the impact of actions to be taken might, to some extent be predictable. In other cases, the systems might be in-deterministic, in that there can be no cause and effect relationship between the chosen intervention and the impact. In such circumstances, different options might be evaluated and then implemented. The logic of pragmatism involves commitment to monitoring the impact of any intervention - those interventions that generate desired impact can be amplified and those that generate negative impact are best constrained.

**Knowledge claims are tested and refined through time**

Whilst knowledge is declared as possibilities in language, the potency and currency of these claims are selected through time. Selection can occur by undertaking whole and part system monitoring (for example, at local, catchment, state, national or international levels). Monitoring systems are designed to allow for different types of logic to be applied including abductive, deductive or inductive reasoning (see Figure
2). Surviving knowledge claims are selected through time giving rise to an evolving evidence-base.

**Knowledge claims can be used to establish baseline practice-norms**

Tested knowledge claims can be elevated to establish practice norms or regulatory standards. Standards, even minimum standards, establish what is possible or what can be reasonably expected. We suggest that it is the normative aspects of quality standards that give rise to the regulatory function of these standards. Evidence of action that is in alignment with declared standards arises from evidence artefacts – records of particular action events. In the evidentiary processes associated with compliance, network systems should allow for social reflexivity – to ensure that standards are not reified and exert too much constraint on the emergent properties of the systems in question. Specifically, such standards should not result in diminished opportunities for actors to make free and informed decisions about the application of theory at any particular context – the principles that theories are freely made up apply at multiple levels of focus within any given system.

**Self and external auditing is a form of system constraint (and social learning)**

Attempts to monitor the coherence of any given human system through self or external auditing should be understood as a form of constraint. The level of constraint imposed on the system can vary according to the context. This notion of constraint should not be perceived as necessarily negative, because it also creates an opportunity for social learning across multiple levels of focus. For example, external auditing can assist in ensuring consistency of approach across different parts of any distributed knowledge system.

### 1.4 Enhancing evolutionary possibility through distributed problem solving

Drawing upon our discussion of the epistemic loss of knowledge and the dynamics of knowledge acquisition, we now examine a possible framework for the conception of knowledge acquisition and evolutionary possibility. To do this, we will first return to the ‘archetypal knowledge problem’ of radioactive waste management described in Section 2. We will use this as a starting point for the development of an ‘archetypal knowledge solution’, then we will identify some of the specifics of what this might look like and finally consider the broader principles embodied by such an approach.

#### 1.4.1 Revisiting the problem of radioactive waste management

We have previously highlighted the importance of developing an approach to information management that both captures and describes context. This objective forms the basis of a new type of information management practice which McCarthy calls contextual information management. Such an approach aims to mitigate the risk of epistemic loss through the retention of information about the socio-technical complexity surrounding information resources. In principle, this allows users to understand the meaning of those resources within different contexts that emerge over time.
But the function of contextual information management involves much more than this. McCarthy et al. (2006) suggest conceptions of contextual information have the potential to allow for functional abstractions of the natural complexity that exists in the world itself (ibid, pp. 31-32):

> All human societies have ... invented means of coping with uncertainty and ways of reducing complexity. Street directories, maps, encyclopaedias, biographical registers, dictionaries, glossaries, tourist guides, administrative histories, archival guides, library catalogues and more recently web-based search engines and knowledge networks are all examples of systems of abstracted information that help individuals cope with the complex and sometimes foreign environments in which they find themselves. It is possible to conceptualise these abstracted complex environments as networks of entities (for example: people, organisations, places, concepts, and events) that are linked by defined relationships ...

> It is possible to conceptualise the radioactive waste industry as a complex socio-technical network with the added explicit need to preserve and transfer information over very long periods of time. An information network based on these ideas would appear to be ideally placed to take advantage of the benefits associated with open complex networks, such as robustness, utility, traceability, navigability, universality, sustainability, historical integrity and the ability to evolve through time.

The ability for such abstractions to reflect the complexity ‘out there’ in the world is through the use of surrogates that represent real-life entities. By utilising this idea of surrogates, potential is created for ‘the assembling and interconnecting of information using contextual elements’. This results in (ibid, p. 33):

> an information architecture or framework that mimics the social and operational networks of real life – a contextual information framework”.

These ideas provide the building blocks of our proposed archetypal solution to the challenges of knowledge acquisition and evolutionary possibility. McCarthy et al. go on to describe what a contextual information framework has the potential to look like (ibid, p. 35):

> A contextual information framework, which generally exists within a broader information network, is usually composed of interrelated information objects (or metadata records) that represent entities found in real life. Its framework structure stems from the relationships between these entities. The information entities act as surrogates for real-life entities that could include people, organisations, concepts, ideas, places, natural phenomena, events, cultural artefacts including records, books, works of art and, indeed, radioactive waste disposal facilities. The structure is actually established through the codification and mapping of relationships between these entities. This creates a network or framework that mimics what actually occurs in life and is therefore at the human scale.

1.4.2 Contextual information and the encoded archive context (EAC) standard

This vision of entities and relationships forming a contextual information framework has been a key and evolutionary concept in archival theory over the past decade. The capture of contextual information is a vitally important part of good archival practice as it relates to creators and custodians of records. But more broadly than this, contextual information frameworks can be used to map the socio-technical space in which records were created, used, modified or destroyed. In so doing, the records are contextualised and remain understandable over time. The 2001 ‘Toronto Tenets: Principles and Criteria for a
Model for Archival Context Information’ provides a vision for this notion of context (Pitti, 2003, p. 96):

*Context information is not metadata that describes other information resources, but information that describes entities that are part of the environment in which information resources (i.e., records) have existed.*

But, beyond context information, there is also contextual information. As noted in the quote from McCarthy et al. above, it is also useful for networks of contextual information to be linked, or to intersect, at various points. Context entities can be relevant to more than one set of records; or, to state this in broader terms, an entity relevant in one information framework may also be a relevant entity in another information framework. In other words, contextual information includes both the use of surrogates and relationships between surrogates. Surrogates act as archetypal representations of reality and contextual information encompasses their use and the relationships that exist between them.

The implication of this is very significant. In the print world (in the dictionaries, encyclopaedias and other resources used to map and represent the world in the past) creating relationships between entities was not possible. Resources or descriptions had to be duplicated across different resources. However, as we migrate to the post-print world we have other options: a single entity can become a component in multiple information frameworks; frameworks can be related and linked to each other; or relevant information (including entity information and relationship information) can be ‘harvested’ from one network for use in another network.

The archival community, in preparation for these possibilities and acknowledging the principles outlined in the so-called ‘Toronto Tenets’, saw that a standard for entity and relationship descriptions would be required to facilitate these cross-network relationships and/or harvesting possibilities. Thus there was a move to develop the Encoded Archival Context (EAC) standard. Daniel Pitti, as a member of the working group developing the standard, writes (Pitti, 2003, p. 78-79):

*Markup and relational database technologies are inspiring archivists to envision new systems that use distinct apparatus for each component and then dynamically inter-relate them to form a complete archival descriptive system ... Markup and relational database technologies enable developing flexible and dynamic descriptive systems. By developing dedicated semantics and structures for describing each descriptive component and their complex interrelations, we can build descriptive systems that are far more efficient and effective than those we have realised in print.*

Though we will not go into the specifics of the standard here, EAC was conceived to describe entities in a structured way – with unique identifiers, entity names, dates and date ranges, locations, functions, descriptions, etc. – linked by defined and dated relationships which, once created by people’s interpretative intelligence (Vines and Firestone, 2008) then exist between the entities themselves. The intention of the standard is to be able to create robust contextual information networks which are located in, and persistent through, time.

The vision is therefore one not of fixed stand-alone resources, but of complex descriptive systems built from and using dynamically interrelated components.

*1.4.3 The benefits of using contextual information principles*
Capturing knowledge in a contextual information framework, using EAC or a similar approach, has two broad benefits. The first is that information networks remain open, flexible and inter-operable. As an example, the National Library of Australia – by combining the use of the EAC and the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) framework have been able to effectively harvest records from multiple knowledge networks as part of their People Australia project (2008). This shows the potential that such frameworks can facilitate interoperable and open networks of exchange that allows users to navigate their way across multiple information domains. Further, the use of EAC as an information architecture allows for the import and export of EAC compliant data both forwards into new systems and backwards into older systems. This ensures that the potential for expansive inter-connectivity is continuously available.

The second benefit is that the potentially damaging effects of descent into closed or protected systems and knowledge-communities are minimised. For example, as we have previously pointed out, not all speech communities are alike, and there are differences of language, structures, and socio-political orders which operate within different sectors, communities or groups. Care therefore needs to be taken when attempting to impose a standard, or regulate the operation of disparate information networks. Pitti recognises this (2003, p. 81), suggesting that it is:

*explicitly acknowledged that standards are intellectual and technical products, but also inherently political products. Cooperation and consensus are absolutely essential, and participants require a willingness to collectively create and shape ideas. A successful standard needs to embody agreement sufficient to be generally useful for the development of national and institutional systems … and the exchange of descriptive information between systems. At the same time, the standard must accommodate national and institutional differences.*

A focus on the contextual information framework principles outlined in this paper provides just such a balance. Consensus of approach is required to establish the same or similar frameworks, allowing for interoperability, the harvesting or transfer of information between networks, and the ongoing compatibility of information resources.

This can be achieved without requiring a significant change in the language used within specific sectors. The intrusive impact on social languages and local speech communities can therefore be minimised. Pitti describes this as ‘leaving room for differences that do not undermine shared objectives’ (2003, p. 81). McCarthy et al. (2006, p. 39) says something similar when they state that contextual information management practice complements ‘existing practice as it is a non-invasive technique that builds frameworks that will enable much more to be done with existing information.’ This concept of ‘non-intrusive’ or ‘non-invasive’ approaches to storing and exchanging information plays a vital role in the EAC standard and similar approaches for two reasons. First, it allows for the application of the standard in a wide variety of contexts, organisations, environments or speech communities. Second, it also acts to draw upon the ‘social’ languages that form part of the context being mapped.

1.4.4 Distributed information networks

This utilisation of non-invasive frameworks for capturing and maintaining knowledge within sectors, groups or organisations has great functional utility in other ways as well. For example, it lends itself to the creation of distributed information networks – a network of networks, or networks of contextual information frameworks, each of which utilises
the context and social language of its origins. But, it also allows for ontological expansion of meaning by allowing for the creation of relationships between different information networks.

We use the term ‘ontological’ quite deliberately in that expanded information and meaning frameworks are generated by people. Thus, people use their innate intelligence and sense of being to create relationships, to create meaning, and to solve problems. Such meaning frameworks are not generated by machines but through the use of human interpretative intelligence (Vines and Firestone, forthcoming).

This principle is of fundamental importance in that it underpins why we claim that such a system can only function effectively if it is accompanied by commitments to public knowledge and public knowledge spaces. Such commitments allow people to be free - to be fully expressive and to be able to declare possibilities by expanding meaning frameworks. But equally, drawing upon the use of abstracted entities that act as surrogates for entities in the world, the benefits of a standard framework for contextual information management can be fully realised. Connections or relationships between common entities can be made; information can be harvested from other public knowledge sources where required; and sectors; groups or organisations become both visible and accountable.

The adoption of the principles of contextual information framework achieves these objectives whilst being appropriately respectful to the context of the use of these entities, concepts or ideas as part of each framework. Therefore, connecting knowledge objects across different boundaries to outside institutional or organisational entities does not de-contextualise that knowledge in-appropriately. The process innately is non-invasive or non-intrusive in that there are no expectations that different frameworks would be forced to interact in any way. Public knowledge spaces or distributed information networks do not have a shape or structure into which different types of information and knowledge must fit. Instead, links between parts of the network can emerge over time through human use and as people have such needs and as particular solutions to identified problems emerge.

1.4.5 Knowledge acquisition and the evolution of public knowledge

We propose there will be great utility if knowledge objects are gathered and stored using the guiding principles which underpin standards such as the EAC. We are arguing that the adoption of such a framework will not limit or negate the contextual characteristics of that knowledge or the language with which it is expressed. In contrast, such adoption will allow for the emergence of an expanded and highly distributed network. We are suggesting this can allow for different communities to gradually create a greater sense of shared context as particular pressing problems become better understood and as solutions to complex problems are worked towards.

In generating a greater sense of shared context, we are not suggesting any of this is imposed or mandated by the system itself: social languages are not artificially altered; disparate frameworks are not forcibly brought together; organisations or sectors are not merged ‘against their will’; and contested or specialised areas of knowledge are not made to collide.

Instead, distributed public knowledge spaces encourage evolutionary possibility by not constraining how, when, where or in what way that evolution occurs. Connections and harmonisation can occur at different levels, between levels. No primacy is given to
changes at what are traditionally considered higher levels of hierarchy to those which happen elsewhere.

The resultant distributed network allows for knowledge acquisition throughout all nodes of a complex network, as each node is the centre of its own network of relationships and entities. Knowledge acquisition in this environment does not become bound by hierarchies, instead becoming a more organic process where resources are acquired from the surrounding contextual environment, links and are continually change, and new knowledge can emerge at or through any point in the overall system (van den Nieuwenhof, 2003, p. 245).

1.4.6 Enhanced adaptability and distributed problem solving

The approach we are beginning to scope here is consistent with the key principles underpinning the idea of knowledge acquisition as outlined in Section 1.3. Social languages are understood as contextual, the specifics of language as it relates to varied speech communities is maintained; the openness of the network leads to the possibility of evolution across and through networks, rather than within tightly constrained or closed environments; knowledge is context bound, but it is open to falsification and renewal through time.

None of this is to suggest that standards such as EAC are ready for immediate application in this area, or that they should be adopted or imposed in toto. Like any other aspect of a networked system of knowledge, the framework itself will need to be allowed to evolve and change over time as aspects of the framework are tested and falsified. This approach is also allowed and encouraged – indeed should be designed into the system itself.

What emerges from all of the above is that sectors, groups or organisations can adapt when and as required, with more understanding of how these changes affect the network of knowledge and ideas in which they operate. Rather than attempting to protect against perceived external threats, publicly orientated open networks based on common frameworks allows change to evolve through time.

Possibilities for change can also emerge at various levels of the system, either separately or in conjunction with other parts of the system; and any changes that do occur as the network evolves will be visible through time, as will previous ‘states’ of the system. The effect of changes becomes part of the contextual information framework itself.

Finally, the architecture we are proposing here allows for problem solving to becomes distributed throughout the system (rather than being an activity or response imposed from above) as each part has an increased awareness of their context and the actual or possible effects of change. As knowledge is shared between networks possibilities for problem solving, knowledge acquisition and evolution possibility expand. Our meaning frameworks and our ability to adapt are progressively expanded.
1.5 Towards a regulatory knowledge system

1.5.1 The semantics of existing regulatory standards

In section 2 of this paper, we discuss at some length the objective of regulatory interventions that involve the administration of (quality) standards within the Victorian community sector as a case study. We observe there are certain types of information that are contained within the semantic content of these standards – some of which are outlined in Figure 3. We also show in Section 2 how there is significant variability and lack of coordination in the semantics of these standards across different sectors. For example, we analyse the semantics of the Family Services and Out-of-Home Care, Disabilities and Housing standards and show how each sector has a different interpretation of ‘case management’.

Figure 3: Types of contextual information embedded within quality standards

In presenting the case study as we do in Section 2, our central concern is to highlight how a lack of coordination in semantics and quality frameworks is a major contributor to the problem of burden. We suggest that this problem has emerged because many of the quality systems and the publishing of standard documents are conceived and carried out using a print-based paradigm.

1.5.2 Embracing a vision beyond print

We are suggesting there is a need to establish a bold vision for re-conceiving the very nature of government regulatory interventions. We are not necessarily suggesting that regulatory interventions should be designed to directly focus on the challenges of modern day cities. But we are saying that a distributed and publicly orientated knowledge system would do much to ensure the best solutions for identified problems have the possibility to
emerge through time.

The case study presented in Section 2 provides an example of the benefits that can be derived from publishing quality standards using the EAC framework outlined in this paper. We contend that the gradual adoption of this framework, including its integration with approaches being developed through the National Library of Australia and other institutions like the Public Records Office of Victoria create the potential for the development of public knowledge spaces across a range of different sectors that are of vital interest to the management of modern day cities. These regulatory interventions can encompass traditional approaches to risk and compliance. But beyond this, we contend there is potential to catalyse partnership arrangements that could support the acquisition of knowledge and evolutionary possibilities. For example, the principles of contextual information management could be used to publish:

- Quality standards (and clusters of standards) and modifications to these standards through time;
- A wide range of published resources that form part of the semantics and evidence-base associated with standards, including regulations and legislative documents;
- The mapping of institutional relationships that form part of the governance of these standards;
- The emerging theory and research evidence base that contribute to current practice and positive impacts within the sectors being regulated and upon which the standards are promulgated.

A commitment to an open regulatory knowledge system creates the potential for evolutionary possibility. Different sectors are encouraged to adopt an archetypal information framework, as outlined in this paper. The existing role of the National Library in collating published resources including research reports and other documents is strengthened, because resources can be shared through the EAC – OAI metadata sharing arrangements that are being pioneered through projects such as the People Australia Project (National Library, 2008). Constraints that prevent partnership agreements from being struck - thus allowing contextual information frameworks to be expanded - are minimised. The role of human interpretative intelligence is elevated. Knowledge becomes resilient, because people are located at the centre of these contextual information networks.

SECTION 2:

CONCEIVING A REGULATORY KNOWLEDGE SYSTEM: A CASE STUDY FROM THE VICTORIAN (AUSTRALIA) COMMUNITY SECTOR

2.1 Introduction: Challenges for the Victorian community sector

The delivery of community support-services in partnership with, and on behalf of citizens forms an integral part of the knowledge ecology of any modern-day city. Community expressions of inclusiveness and equity must surely be one of the most sustainable ways of contributing to the security a city’s people.
Since the early 1800’s, Melbourne and the State of Victoria (Australia) in general have enjoyed the benefits of a strong and vibrant community services sector. Indeed Community Service Organizations (CSOs) have played a vital role in the delivery of citizen-centric support services for a very long time. Victoria has a proud heritage where initiative and independent action have historically been encouraged (Stronger Community Organisations Project, 2007, p. 7).

In more recent times, the diversity in the roles played by CSOs has expanded significantly now to the extent that allocations across the state budget are very large indeed.

In 2005-06, the community and not-for profit sector delivered around $2.2 billion in government services. (Victorian Government, 2008).

These government services delivered by CSOs and the inter-relationships between these program areas play a vital role in contributing to community harmony and sustainability. For example, take the experiences of migrant children and their transition into becoming contributory Australian citizens. Difficulties that migrant children experience as they develop emergent personal identities in their adopted country may show up at several different points – for example, through visitations to General Practitioners (GPs) or within primary and secondary schools themselves. These points of contact with mainstream Australia can reveal much about children and their experiences of being child-migrants. The points of contact provide a window into the challenges of adjustment for themselves and their whole family and thus service interventions that aim to facilitate effective integration requires a family systems perspective.

To effectively respond to emergent challenges means that services designed to support positive outcomes for children requires joined up services. By joined up, we mean there is some inter-relationship in service models and communication exchanges between, for example, GPs and schools and community organisations that provide family or housing services, or both. This sense of ‘joined up-ness’ is not for the purpose of surveillance, nor should such networks of exchange undermine privacy laws. The purpose in contrast is to maximise the benefits of early intervention services, to support children and their families and their ability to effectively engage in the productive Australian economy through all stages of their developmental life.

We see these aspirations as very much in alignment with existing ideas of knowledge based development. For example, Carillo indicates that knowledge based development can be underpinned by community values, where he indicates that such an approach involves (2009).

Deliberate, balanced and systematic development of a community’s overall value base.

We claim this aspiration of building a community’s ‘value base’ and the ability of citizenship to develop its capital system is of fundamental importance in the design of human centric service systems. There are, however, many impediments that constrain the development of this type of participatory and democratic approach. One type of constraint is the regulatory burden placed on CSOs in the delivery of government services. In line with the growth of state budget allocations to the sector, so there has been an increased level of regulatory burden placed on CSOs in the delivery of these services. Two Victorian State government reports the Stronger Community Organisations Project (2007); and the Review of Not-for-Profit Regulation led by the State Services Authority.
(2007) confirm that the challenges of regulatory burden is a significant problem for the Community sector.

In this paper, we are specifically interested in the regulatory burden associated with quality standards. The Office for the Community Sector (OCS) has described the nature of this particular problem in the following way (2009).

Over recent years, both the Commonwealth and State Government have introduced a range of service standards, quality improvement and quality assurance/accreditation processes to support and improve service delivery. Generally these have evolved independently resulting in limited mutual recognition, duplication in requirements and inconsistent timing for reviews.

This range of standards, quality improvement and accreditation processes can mean that an organisation delivering a number of differently funded programs must adhere to a variety of processes that often cover a number of similar requirements (e.g. Governance, HR management & development, privacy etc.), but have different reporting cycles, processes, and specific requirements. The compliance burden associated with this can be significant.

2.2 What are quality standards and what function do they fulfil?

In advancing our investigation as to the nature of regulatory burden, it is necessary that we outline what we think quality standards are and the functions these standards play. We claim that quality standards are best understood as formalized information schemas. Thus, in setting the context for discussing the problem of burden, we must first discuss the nature of schemas.

2.2.1 What are schemas?

We define a schema as the semantic and organisational structure of a cognitive process (Vines, Hall and McCarthy, Forthcoming). That is, schemas can be tacit, implicit and / or explicit. For example, we experience the tacit nature of schemas when working in cross-cultural contexts that are unfamiliar, where the ability to understand language and to accurately attribute meaning is far from certain. Tacit schemas cannot be made explicit and thus cannot be represented within documents or database structures. In contrast, the semantics and structures diffusely embedded within documents, for example, can implicitly encode a schema that is representative of a person’s personal knowledge of a particular domain. Such schemas are implicit to the extent that these schemas are not explicitly represented. However, given time, they can be made explicit and this is what distinguishes implicit schemas from tacit schemas.

Increasingly there is importance being placed on publishing schemas in an explicit way. That is, unstructured and semi-structured ways of thinking are increasingly being made explicit because there is significant utility associated with the use of the internet and related technological systems to manage content exchanges. This is particularly the case in relation to quality systems, where there are, for example, increasing demands to monitor and evaluate the impacts associated with different types of program / service-orientated interventions. Automated or semi-automated processing by computers can add value and greatly reduce labour requirements – so that data entered and used for one particular set of purposes can be transferred to a different information system and used for another set of purposes – without any need for re-keying of data.
For such benefits to be maximized information systems need to be harmonized by conforming to agreed standards. To reach negotiated agreements about such standards, reviews are undertaken by industry bodies which define, and then describe, the standard in question. These negotiated agreements are published as schemas. Such schemas ‘express shared vocabularies and allow machines to carry out rules made by people’ (Sperberg-McQueen & Thompson, 2007). The advantage of the process just described is that it allows an agreed body to agree upon a schema which is sympathetic to the needs of that industry (or sector) and declares this to be a standard for that industry.

2.2.2 Normative work practices and regulation frameworks

We regard the types of quality standards published by the Victorian Government (i.e. for sectors including FS-OHC, Disabilities and Housing) as specific types of standards. At this stage, these standards pertain to both practice and organisational management norms. We claim it is the normative aspects of quality standards that give rise to the regulatory function of quality standards. Regulatory frameworks that establish normative work practices can be designed to serve three complementary purposes. First, such frameworks have the potential to moderate excessive behaviours that, in extreme cases, can lead to system collapses (such as those experienced in the recent global financial crisis). Deloitte (2009) in a report for the Department of Human Services indicate something similar when they suggest that standards and quality processes are developed with the intent of defining minimum service levels, defining organisational frameworks that support the provision of quality services, for promoting service consistency and for minimising risk.

Second, Vines et. al., (2009) suggest that quality standards can, in principle, be implemented in ways which serve the wider objective of mediating and facilitating the growth of knowledge within an integrated knowledge society. This is in alignment with Deloitte (2009) when they indicate that standards and quality processes are developed to provide guidance about best practice approaches to support services to achieve organisational goals and to enable the organisation, the department and quality improvement providers to monitor and review performance in a manner that can inform the improvement of services.

Finally, the publishing and review of quality standards can also be established in ways which facilitate partnership between funding bodies and the sectors being regulated. (Vines et al, 2009).

2.2.3 The inter-relationships between schemas and standards

The enforcement of any type of standard as a base-line norm can be very problematic. The reason for this is that the real-world application of any standard needs to be understood within the context of a minimum of three different levels of work-practice norms. These levels relate to the individual practitioner, the organisational level and the sector level. In Figure 4 below, we indicate that these levels correlate to notions of personal schemas, organisational schemas and standards themselves. Thus any standard may not necessarily be in alignment with the tacit, implicit and explicit schemas held at personal and organisational levels and across organizations as well.

The sector level refers to the authority-level at which any quality standards are published. We claim that the web-based publishing and application of quality standards contributes to the fabric and nature of a ‘knowledge society’, also outlined in Figure 4.
We make this connection between quality standards and a ‘knowledge society’ because we think the publishing of quality standards plays a subtle, but important role in the creation and maintenance of what we have called ‘public knowledge’. Thus, we suggest that quality standards need to be understood as public knowledge assets. However, we further suggest that such standards should not be reified. They need to be understood as negotiated and contested public knowledge and that these negotiation processes involve cycling between both tacit and explicit representations of knowledge. We claim this has significant implications for the design of any regulatory knowledge system in that data collection, collation and interpretation can never be fully automated.

![Figure 4. The inter-relationship between schemas and standards](image)

### 2.3 Regulatory burden as a paradigm problem

#### 2.3.1 Quality standards and the emergence of semantic fragmentation

In April 2009, the eScholarship Research Centre (hereafter – eSRC) at the University of Melbourne was engaged by the OCS to investigate particular aspects of regulatory burden. The research aimed to determine whether it would be feasible to address the problem of burden of multiple quality standards by allowing for the efficient re-use of evidence – whereby evidence used for compliance against one particular quality standard could also be tagged as evidence of compliance against other quality standards.

In undertaking the research, five different quality standards were selected for cross mapping. These were:

- Family Services and Out-of-Home-Care Standard (hereafter FS-OHC) which is a Victorian State Government quality standard (Department of Human Services, 2007a).
- Disabilities Standard encompassed within the documents associated with the industry standard and life areas guide and related ‘evidence indicators’ (hereafter...
Disabilities). The Disabilities standard has primarily been a Victorian State Government quality standard (Department of Human Services 2007 b, c, d, e).

- Family Relationship Services Program Standard (hereafter FRSP) which is a Commonwealth Government quality standard administered jointly by the Attorney General’s Department and the Department of Families, Housing and Community Services and Indigenous Affairs – FaHCSIA (data unknown).
- Housing Assistance Services Standard (hereafter HASS) which is a standard relevant to both the Victorian and Commonwealth Governments (Department of Human Services, 2005).
- Home and Community Care Standard (hereafter HACC) which is also a standard relevant to both the Victorian and Commonwealth Governments (HACC Working Group, 2008).

In undertaking this work, one of the objectives was to identify particular components of a number of quality standards where it was deemed that the intent of these particular components was similar. We use the term ‘semantic equivalence’ to highlight that different standards specify similar evidence requirements, but often in quite different ways.

To suite the objectives of the project, a three tiered quality standards publishing schema was imposed onto each of the five standards (see Figure 5).

![Figure 5. A three tiered schema for cross mapping standard sub-sections (Vines et al., 2009)](image)

By cross-mapping at the lowest level of granularity of this three tiered schema (i.e. at the standard sub-sections level) this created an opportunity to establish relationships between standard sub-sections where it was deemed there was some sort of semantic equivalence. The technology platform and informatics architecture developed by the eSRC over many years (eScholarship Research Centre, 2007; McCarthy and Evans, 2008; Australian National Library, 2008; Vines et al, 2009) allows for this type of cross-mapping to be undertaken and is governed by the Australian expression of the EAC archival description standard. A visualization of these relationships is outlined in Figure 6 where these relationships are represented by the lines.

The nature of findings of the first BISQAS-1 project was influenced by the significant levels of fragmentation and complexity (as visible in Figure 6). It was concluded that it would prove impossible to reduce burden by re-using different types of evidence for compliance against different standards. To reduce burden, it would be necessary for the Victorian Government to simplify the quality standards themselves.
Figure 6. Cross mappings of standard sub-sections regarded as having some semantic equivalence across different quality standards. (Note that not all relationships between standard sub-sections identified as having some sort of semantic equivalence have been included in this Figure and thus this represents only a partial picture of the complexity)

2.3.2 Moving beyond a print-paradigm

To understand the reason for our claim that the problem of regulatory burden represents a paradigmatic problem and not just an incremental adjustment, it is necessary to reflect on the nature of change as we continue to move beyond what we call a print-based paradigm. What is the nature of this paradigmatic change? Cope and Kalantzis (Forthcoming) argue that within the context of the transition from the world of print to the world of digital text, the textual representation of knowledge is being transformed in significant ways. They examine six areas of current or imminent change, which they discuss under the headings of ‘the mechanics of rendering’; the rise of a ‘new navigation order’; the trend towards ‘multimodal environments’ and ‘ubiquitous recording’; the ‘change in sources and directions of knowledge flows’; and what they call ‘polylingual potentials’ of the new digital media.

Within the context of these changes, Cope and Kalantzis highlight that even though the text publishing industries are using digital technologies, much of the transition towards digital text has up until now been about digitising what fundamentally remain print-based workflows.

Information is locked up in PDFs which are designed for printing out rather than the functionalities of search, access and reproduction offered by more advanced
Such texts-for-print are not marked up by structure and semantics, [our emphasis] so even the best search mechanisms offer little more than what can be achieved through word collocation algorithms, far less adequate even in some crucial respects than the traditions of indexing and cataloguing from the era of print.

One element of Cope and Kalantzis’ (ibid) overall argument is that this paradigm shift is based on the changes arising from a changed modular unit of manufacture:

The fundamental shift in the elementary modular unit of manufacture of textual meaning—from character-level to pixel level representation—means that platforms for text construction are no longer bound by the character set of a particular national language. Every character is just a picture, and the picture elements (pixels) can be combined and recombined to create an endless array of characters.

They further argue that the shift beyond the limitations of character level to pixel level representation is part of a new paradigm change that is spawning polylingual potentials: whereas the trend in the era of print was towards large, homogeneous speech communities and monolingual nationalism, the trend in the era of the digital may well be towards multilingualism and divergent speech communities which distinguish themselves by their peculiar manners of speech and writing—as defined, for instance, by technical domain, professional interest, cultural aspiration or sub-cultural fetish.

Our central claim in this paper is that we think these matters of paradigm change are at the source of the problem of burden creep. In developing the logic of this argument, we first suggest that the print paradigm does much to reinforce homogenous speech communities. We use the term speech communities in a similar way to Ludwig Wittgenstein (1953) in that professional social languages emerge based on the meanings of words and sentences as they are used and applied in linguistic contexts. Thus, we suggest that quality standards such as those that apply to the Family Services and Out of Home Care, Disabilities and Housing sectors reflect the emergence of particular speech communities that derive from a linguistic context associated with regulatory interventions.

The second aspect of our argument is to make the connection between speech communities and the print-paradigm. Within the print paradigm, including the use of PDF files, text is marked up to reflect only its visual manifestation (i.e. headings be in **bold**) and not to reflect the semantics and the structure contained within the document itself. Thus within the print paradigm there is no opportunity to embed the meanings of words and sentences in a wider linguistic context other than by allowing the reader to make the internal and external connections through the following of references, notes and through the literacy of the readers themselves. Thus, it is only up to readers themselves as to how these documents are interpreted and applied. This re-enforces the closed nature of these speech communities.

The final part of our argument is to highlight why we think the reliance on the print paradigm for publishing these standards contributes to the problem of burden creep. We suggest that whilst there has been an increasing convergence at the CSO level as to the delivery of multiple programs (i.e. CSOs are delivering more and more government services) there has been an ever increasing fragmentation of the semantics contained within the standard documents that pertain to those programs. That is there are no constraints imposed upon the speech communities that give rise to these standards. This lies at the heart of the problem of burden, because there is limited ability to harmonise the relationship between the personal schemas of practitioners and the quality schemas published as industry standards (refer to Figure 4).
We conclude therefore that the challenge of burden creep cannot be addressed through traditional print based exchange mechanisms. There is a need for Government to systematically adopt practices that involves publishing content marked up for both semantics and structure.

2.4 Harmonising variant quality standards

In April 2010, the eSRC was again commissioned to develop a second stage of the BISQAS initiative. The objective was to establish a foundation for the integration of quality standards across the Victorian Family Service and Out of Home Care, Disabilities and Housing sectors. In this project, we proposed a multi-staged pathway to create a foundation for harmonizing these three variant quality standards. The different stages are discussed as follows.

2.4.1 Document analysis and data entry

We first undertook a detailed analysis of the documents that make up the standards for each sector. This became the basis for data entry of the standards in preparation for cross-mapping. This process is described in some detail in BISQAS-2 project report (Vines, et. al., Forthcoming). An approach to mark-up relied in the Australian expression of the Encoded Archival Context (EAC) standard (Contextual Information Initiative, 2001) – a metadata standard designed to richly describe the context of archival records and their evolution through time. Drawing upon the eSRC’s technology and vision (McCarthy, April 1999) we applied this framework to the document standards themselves which allowed us to create three visualisations of the standards that pertain to the three sectors. These are outlined in Figures 7, 8 and 9

Internal cross references made within the standards were highlighted in different colours. In the case of the FS-OHC standard, the Client Record Review Tool (Department of Human Services, 2008a) has been included. Thus cross references from the Client Record Review Tool to components within the Evidence Guide (Department of Human Services, 2007a) are presented in different colours.
Figure 7. Structure and internal cross references within the FS-OHC Standard

In the same way Figure 8 provides a similar visualisation of the Disabilities standard. An interesting aspect of this standard is that it has been conceived as an outcomes standard. This means that within the four different standard documents, cross-relationships are explicitly specified between the different components of the standard. This gives rise to the different coloured lines outlined in Figure 8.

Figure 8. Structure and internal cross references within the disabilities standard

The Housing standard consists of the Housing Assistance Services Standard (Department of Human Services, 2005) and the Performance Standards for Registered Agencies (Victorian Government Gazette, 2005) standards – referred to as RAPS. The
implicit schemas embedded within the Housing sector are again fundamentally different to the FS-OHC and the Disabilities standards.

Figure 9. Structure and internal cross references within the housing sector standards

2.4.2 Selection of generic standards for cross mapping

For this project, we did not use the same methodology for cross mapping as was undertaken in the first BISQAS project (Vines et al, 2009). In the 2009 project we documented a list of emergent concepts that we perceived clustered many of the areas of semantic equivalent and then cross mapped through these emergence concepts. In contrast, in this second BISQAS project we felt it necessary to draw upon the authority of existing standards to cross map through. Thus, as part of the project, we undertook a detailed assessment of current generic standards to identify which would be best to cross map the three quality standards in question (see Figure 10 below). To do this, we developed several criteria that were used to select the standards from which cross-mapping would occur. These criteria are listed as follows.

- There needed to be a level of quality and simplicity about the structure and semantics of the selected standards.
- The standards could provide a simple guide for the identification of practical minimum standards.
- The copyright arrangements associated with the standards would allow the content to be sliced and diced in ways that are required in a post-print environment.
- The standards held the potential to provide an effective pathway for translating and promulgating any necessary changes to legislation and legislative intent, whilst at the same time minimising or eliminating burden creep.

We perceived that the application of these criteria was critical to the possibility of creating an integrated quality-standard across FS-OHC, Disabilities and Housing. In other words, the application of these criteria went to the heart of attending to the dual objectives of achieving effective regulatory interventions, whilst at the same time reducing regulatory burden-creep for CSOs.
2.4.3 Cross mapping heading words

Our proposed harmonisation methodology needs to be understood as a process that involves the creation of a new schema. The technical aspect of this process is described as ontology mapping, ontology merging and ontology creation (Vines and Firestone, 2008). To increase the efficiency of this schema creation process, we proposed to undertake cross-maps using two generic standards (one representing a practice standard, the other a management standard).

Considerable effort was made to select these generic standards and this matter is discussed in detail in the BISQAS-2 project report (Vines et. al., Forthcoming). Ultimately, we selected the National Standards of Practice for Case Management (Case Management Society of Australia, 2008) as a generic practice standard and some components of the Family Relationship Services Program (FaHCSIA, date unknown). The FRSP is an Australian Commonwealth Government standard related to the delivery of Family Relationship Services administered through the Attorney General’s Department and the Department of Families, Housing and Community Services and Indigenous Affairs – FaHCSIA. In selecting these standards, some small consideration was given to the fact these are both national standards – and that the approach adopted in Victoria could influence the national agenda for standards harmonization.

After data entry was completed for all five standards some analysis was undertaken of the project dataset. We provide a breakdown of this in Figure 10.

![Figure 10. Breakdown of project dataset](image)

The percentage of entities associated with the FRSP standard (3.4%) and the NSOPCM (11.7%) with respect to the total number of entities within the dataset (2102) is outlined in Figure 10. This highlights that the structural frameworks associated with these two standards are significantly simpler than any of the three standards in question (FS-
OHC, Disabilities and Housing) and this in principle highlights the merit of the approach we are recommending going forward.

Cross mapping was undertaken using heading words to create relationships between the ‘heading-words’ that appear in the generic standards to identify where these heading-words occur within the three variant standards.

Relationships were established if there was a degree of semantic equivalence between the heading words and other words that appeared in the standards. For example, the word ‘assessment’ as it relates to ‘staff assessment’ is semantically distinct from ‘client assessment’. Thus when cross mapping using the term assessment within the context of care planning, a relationship was only established with the occurrence of ‘client assessment’.

2.4.4 Creation and preliminary analysis of visualisations

After cross mapping, we then prepared a vast array of different visualizations. These visualizations are designed to assist stakeholders who might become part of the community of interest associated with developing an integrated standard.

In the first example, we consider one of the Guiding Principles of the Case Management Standard: *Case Management Advocates for Client Rights* (CMSA, 2008). We were interested to understand the emphasis placed on ‘client rights’ across the three standards. Figure 11 provides a visualisation as to where the term ‘rights’ of the client (or support user) appears in the three standards. What Figure 11 shows is that this principle of ‘advocacy of client rights’ is shared extensively between disabilities and housing, but does not figure so prominently in the FS-OHC standard. We would conclude that in any integrated standard, consideration might be given to the role of ‘rights’ within the context of the FS-OHC sector, including children’s rights.

![Figure 11. Cross-map using the term ‘rights’ (of client or support user)](image)

The second example is FRSP standard number 6: Supervision of Practitioners. In this, it is highlighted that supervision is not specified in the disabilities standard. Thus in
any integrated standard, we conclude that those who deliver disability services could be required to introduce supervision more formally into their organisational work practices.

![Figure 12. Cross-map using the term ‘supervision’ (of practitioners)](image)

2.4.5 Identification of outliers

As part of the methodology for laying a foundation for an integrated quality standard across FS-OHC, Disabilities and Housing, we set out to identify those parts of the standards where no relationships were cross-mapped to either the NSOPCM or the FRSP standards. We have called these entities ‘outliers’. We identified 475 of these and subsequently estimated that around 75 of them did not relate to the two standards and thus would require special consideration.

We also identified standards that were only very weakly represented in the FRSP and NSOPCM documents. One topic we thought worth investigating was ‘Working with the Community’, an area identified within the housing sector standard. What we have identified is that there is no reference at all to ‘working with the community’ in the NSOPCM and there are only very weak links into the FRSP standard, but these are only at the lower levels within the standard. In contrast, there are quite strong linkages into the FS-OHC and Disabilities standards. What we concluded from this is that there would likely be a need to develop a separate module associated with the activities of ‘working with the community’.
2.4.6 Creating a shared context through an on-line and open knowledge space

Going forward, as part of the overall methodology for harmonising the three variant standards, we prepared a fully integrated website that provides details of all research work undertaken as part of the project. In principle, the site allows community representatives to engage with the entire project dataset. This resource includes around 2,500 HTML pages, over one hundred visualisations in both PNG and PDF formats, and all the excel spreadsheet files which formed the basis of data entry.

In principle, the next stage of developing a common standard for the three sectors (FS-OHC, Disabilities and Housing) would involve a lengthy engagement with sector stakeholders. Such consultations are required to begin to reversion the draft common-standard. Iterative cycles of schema construction and review would be based on the continuous testing of the veracity and relevance of different standards and their elements to ensure they assist with the objectives of responding to the emergent patterns within different service systems. The eSRC regards this aspect of the harmonization process as a social learning process which involves the delicate task of ‘knowledge brokering’ between different stakeholder groups. It allows for the harmonization of schemas across the different levels of focus encompassing practitioners, organisational systems management and those responsible for publishing standards as outlined in Figure 14. This same process can also be described as iterative cycling of tacit – explicit knowledge sharing (Vines, Hall and McCarthy, Forthcoming).
2.5 Towards an emergent regulatory knowledge system

2.5.1 Instruments of government regulation

A further aspect of the BISQAS project brief specified by the Office for the Community Sector required the:

Identification of linkages and potential overlap of these service quality standards with other Victorian instruments of regulation and with other jurisdictions.

In responding to this request, we wanted to investigate the role that quality standards have in relation to wider sector planning and development activities. For example, in the case of the Family Services sector, quality standards were recognized as an integral part of the Government’s Strategic Framework for Family Services (Department of Human Services, 2007 p 69).

To support a focus on culture, both A Fairer Victoria and the Growing Victoria Together policy emphasise the importance of working closely with communities and measuring progress, to enable continuous improvement in terms of service responsiveness, effectiveness and outcomes. This focus will be maintained in relation to community, child and family services, with services using the new Standards for Family Services to support compliance, and a culture of innovation, flexibility and continuous improvement in the quality of service provision to children, young people and families.

Therefore, we suggest that the intent and content of quality standards need to be understood within a wide context. It is this concern for the systematic capturing of context that has been at the heart of the emergent standards associated with archival practice over the past 15 years. Thus, we think there is much that can be gained from applying archival
informatics to the publishing of government regulatory information in the ways we described in a previous BISQAS-1 project report (Vines, et. al. 2009)

In our project work we have undertaken an analysis of a wide range of quality standards. There appears to be certain types of information that are contained within the semantic content of the standards. We have summarized these in Figure 15. below.

![Diagram](image)

**Figure 15: Types of contextual information embedded in standards**

In order to determine the extent to which such contextual information is actually contained in some quality standards, we undertook an analysis of the FS-OHC standard as an example. We were able to prepare a visualization of the inter-relationship between the components of the standard and external relationships embedded within the standard (see Figure 16).

What can be seen is that the FS-OHC standard references a large number of Published Resources including a several Acts of Parliament. The standard is also unusual in that it contains explicit reference to other standards within the document itself.
2.5.2 Inter-relationships between instruments of regulation

Upon closer analysis of these matters, what becomes evident is that the publishing of quality standards is not well suited to a print-presentation format. For example, within the PDF file of the Evidence Guide there is reference to the Aboriginal Cultural Competence Framework (Department of Human Services, 2008b) within the FS-OHC standard thirty seven times. This tendency to reference one ‘published resource’ multiple times is problematic, because it does not result in the compilation of a consolidated list of evidence requirements related to the reason why the published resource is referenced. This places an undue responsibility on CSOs to make such interpretative judgments and is an example of the subtle nature of burden creep that can arise as a result of publishing standards exclusively in a print-based format.

We regard this paradigm shift beyond a print-based approach to standards publishing as no small matter. Thus, in Attachment 7, we outline a comprehensive summary of what we think is involved in this paradigm shift and its implications for any regulatory mechanism that requires the collation of evidence in systematic ways for compliance purposes.

In order to address the research brief, we undertook further analysis to assess the extent to which the content of the quality standards adequately and coherently reflect the inter-relationships between the various instruments of regulation. We have interpreted the instruments of regulation to include:

- The referencing of Acts of Parliaments within the standards.
- The referencing of other types of published resources such as practice guidelines and the like that form part of the basis of legislative intent.
- The ability of citizen and industry stakeholders to understand the role and the function of the various corporate bodies involved in the conception, implementation and administration of quality standards publishing and
associated regulatory functions, including the changes to these functions over time.

- The continued evolution through time of the evidence-base that forms the basis of quality standard specifications designed to support the best interests of citizens.

We suggest such matters are essential aspects of burden reduction. The publishing of such contextual information needs to re-enforce coherent, inter-related and simple messages for service stakeholders, the public and citizens in general. Thus, we have been interested to assess whether there were any appreciable differences in the way Published resource materials and Acts of Parliament are cross referenced in each of the three standards. One of the examples we took was the Children, Youth and Families Act, 2005.

What we found was that there is significant cross-referencing of the Children, Youth and Families Act across all levels of components that make up the FS-OHC standard. To a lesser extent some reference is made to this Act in the Housing sector, but interestingly no reference is made to this Act in the Disabilities standard. We suggest that this matter might require some significant investigation because it is not clear why this legislation might not have some influence on the shape of Disabilities standard as it relates to children with a disability.

Figure 17. Cross referencing of the Children, Youth and Families Act, 2005

We were also interested to investigate the variability of external referencing from different standards. We chose to focus specifically on improving the capacity of delivering culturally competent and inclusive services. The examples of the published resources we chose were the Aboriginal Cultural Competency Framework (Department of Human Services, 2008b) and the Cultural Diversity Guide (Department of Human Services, 2006). These visualisations are outlined in Figures 18 and 19.

It is clear that there has been a much greater emphasis on specifying the requirement for culturally inclusive services across the FS-OHC sector than in Disabilities and Housing. Thus, we concluded that any move towards an integrated standard needs to strengthen an approach to such matters across all three sectors.
One of the most challenging parts of this BISQAS project was to understand the myriad of organizations involved in the conception, oversight and administration of the implementation of quality standards across the three sectors. Our experience has shown that not only are the content of quality standards themselves fragmented, but so too are the audit requirements and responsibilities. The standards themselves do not contain this information on a consistent basis. Nor is this type of information easy to access from the public websites across the different Victorian Government Departments.

2.5.3 Can regulatory interventions be framed around reflexive knowledge processes?

In our proposed regulatory knowledge system, partnership frameworks between Government, sector stakeholders and citizens would allow for scrutiny and review of
quality standards— as ‘theories about what works in the world’. This gives rise to a form of collective falsification and review. Thus regulatory systems would be designed to be reflexive, allowing for regulatory interventions to continuously emerge through time. These same networks systems could allow appropriate forms of collaborative monitoring at different levels— State, Regional and local levels as required. Protocols for data sharing that are in line with privacy legislation could be promulgated as part of these oversight frameworks. One example of a network governance model of relevance to the Victorian Community sector is hypothesised in Figure 20.

![Figure 20: Network structure for reflexive knowledge processes: Example of the Victorian Community Services sector](image)

The functions of this human and digital (ICT) network would be to:

- Catalyse the development of appropriate support systems to publish different standards used across the Victorian Community sector;
- Catalyse technology development, brokering and skills transfer to support uptake of appropriate technology solutions, including the integration of different standards into the information systems of individual CSOs;
• Provide the hosting for editorial working groups to ensure standards are constantly reviewed and are in line with up to date research, evidence and reflective practice;
• Provide a forum for the involvement of auditing bodies as part of the overall regulatory framework.
• Catalyse the development of “whole system” monitoring of different catchments in partnership with State and Commonwealth Government initiatives. This could extend to piloting new approaches to impact analysis, including the capturing of consumer and citizen centric narrative capture.
• Facilitate integrated approaches to rural, regional and mega-city knowledge capacity development formation and know-how.

2.5.4 New skill requirements for the promulgation of regulatory knowledge systems

We are suggesting in this paper that the harmonising of disparate quality standards requires a new type of information management skill. We call this semantic publishing and this skill builds upon ideas associated with contextual information management as outlined in Section 1 of this paper. Examples of this type of publishing are observable from the mixture of textual representations and visualisation outputs included in this paper. Through semantic publishing there are opportunities to better understand the network connections between the different instruments of regulation available to all Governments.

We are also suggesting that the rise of semantic publishing activities would be best serviced if there was a parallel commitment to the notion of public knowledge, public knowledge assets and the web publishing space within which these assets are published – what we call a public knowledge space. The creation of a public knowledge space would allow for the emergence of sustainable knowledge ecology relevant to the needs of the Victorian Community sector. We claim that a necessary component of this approach is that the appropriate publishing and application of quality standards remains an important responsibility of Government – whether this be at State or Commonwealth levels. This publishing act creates a shared context within which:

• Citizens can be assured of receiving reasonable and safe services based on their best interests, within the resource constraints associated with policy positions of all levels of Government
• Victorian Government ministers know, on balance, that appropriate practice are codified to the extent that these minimize the likelihood of illegal acts or acts of neglect in the delivery of services to those less advantaged in the State of Victoria.
• CSOs can know what they need to know in terms of quality compliance and auditing requirements.
• Evidence specifications are kept as simple as possible, whilst at the same time ensuring minimum standards are being upheld.
• Multiple stakeholders including competing stakeholder groups can collaborate because of their active interest in the dual objectives of supporting the well being of citizens and the creation and distribution of public knowledge assets.
CONCLUSION

In the first section of this paper, we have cited the emergent domain of practice called knowledge based development. We have also explored the notion of ‘resilient knowledge’ and how such knowledge might be catalysed through the introduction of a regulatory knowledge system. By implication we explore how such an approach to building resilience might offer a way of extending the reach of the knowledge based development domain of practice.

In teasing out this notion of resilient knowledge, we have discussed in some detail the problem of information management and the long term storage of radioactive waste. We suggest this particular challenge presents as an archetypal knowledge management problem because it draws attention to the problem of the epistemic loss of knowledge over time. We explain that this loss occurs where there is inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information through time.

We claim a knowledge based development approach has significant relevance to the management of cities – because there is no turning back once we embark on the journey of a knowledge society. We need to keep re-skilling each generation of custodians of knowledge cities so they are adequately equipped to manage our cities and associated resources on an on-going basis.

In exploring these challenges through the eye of this archetypal knowledge management problem, we sow the seeds of a proposed archetypal solution. Archetypal in that the solution can apply across a wide range of sectors – we think our ideas have merit in relation to health and community services, infrastructure and waste management services, natural resource management and even regulatory pathways to transition towards a post carbon economy. We have shown there are two features of our proposed solution. The first is the gradual adoption of a new type of information management domain of practice – what we call contextual information management. Such a practice involves the use of digital entities to act as surrogates for entities that exist in the world and the ability to create relationships between these entities. Through the use of a contextual information management framework, we suggest what emerges is an information network that allows for the navigation both within the information objects and across the socio-technical networks that surround the creation and evolution of these objects. The second feature involves the idea that we turn the notion of epistemic knowledge loss on its head and focus on the dynamics of knowledge acquisition and evolutionary possibility.

In advancing this approach, we suggest there is potential to reframe current regulatory interventions such as the use of quality standards as part of day to day contractual relationships with Government. Thus, in Section 2 of this paper, we highlight how the combined use of contextual information management practices and what we call semantic publishing can be used to support distributed problem solving and enhance evolutionary possibility. We suggest these regulatory knowledge networks have the potential to evolve across multiple sectors in organic ways through time, because they are in alignment with current policy directions associated with national institutions such as the National Library and the Public Records Office of Victoria (PROV). The National Library is a repository for the nations published resources and can provide a way of systematically harnessing an evolving evidence-base associated with any particular sector.
and its regulatory priorities. PROV has a statutory obligation to ensure appropriate records management protocols are implemented where any agency receives Government funds within the State of Victoria.

Currently, there remain considerable challenges associated with promulgating regulatory interventions across both State and Commonwealth areas of jurisdiction. We claim that this new domain of practice called knowledge based development and the associated use of contextual information management and semantic publishing practices could do much to allow for the emergence of harmonised knowledge systems across State and Commonwealth areas of jurisdiction. We suggest this could do much to avoid the turf warfare of top down (political) and bottom up (grass root) approaches. A focus on regulatory knowledge systems and allowing for the the dynamics of knowledge acquisition and evolutionary possibility could avoid the very worst aspects of duplication of resources across different levels of government. In contrast, such an approach could help fashion our rural and regional centres and our cities and city cultures to realise the benefits of environmental sustainability, human well being and Australian invention – thereby ensuring we can do much more with less.

As we highlight, these matters represent no small challenge. We claim, that in fact they form part of a similar transformation process that occurred in the one hundred year period after the invention of the printing press by Johannes Gutenberg in Strasburg Germany in 1440’s. We are less than thirty years into this significant paradigm shift away from Gutenberg’s era of visual text markup. The Victorian community sector could do much to amplify the positive, democratic, inclusive and vibrant aspects of an open society that is now possible through the rise of semantic web publishing, the emergence of derivative information architectures and the ability to harness and respond to citizen-centric perspectives and interests.
References

(References should be in APA style. Information concerning the APA style is available at the following websites: www.apastyle.org/faqs.html)


Department of Families, Housing and Community Services and Indigenous Affairs – FaHCSIA, date unknown. The Family Relationship Services Program Website. See http://www.fahcsia.gov.au/sa/families/progreserv/FRSP/Pages/default.aspx#1


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