### Collection:
eScholarship Research Centre Research Reports and Publications

### ESRC Publication Number:
ESRC00006

### Title of document:
Shaping the Context for an Integrated Knowledge Hub for the Dairy and Grains Industry Project – Managing Knowledge in the Public Sphere – ‘Lessons Learned’

### Authors:
Michael Jones and Gavan McCarthy

### Date of release:
2011/12/09 (submitted to the Victorian Department of Primary Industries)

### Abstract:
In 2011, the Victorian Department of Primary Industries (DPI) undertook a “proof of concept” project related to the design and development of two integrated knowledge hubs for the dairy and grains industry sectors. The University of Melbourne’s eScholarship Research Centre (ESRC) was engaged to provide advice on how structured online knowledge could contribute to the provision of persistent, authoritative information to farmers and industry service providers.

For more than 25 years, the ESRC and its predecessors have operated as both academic centres and focal points for infrastructure design, testing and deployment. The Centre has been a key collaborator in more than twenty online knowledge resources dating back to the earliest days of the web, all of which remain accessible in some form or another to this day. In delivering this report, ‘Managing Knowledge in the Public Sphere – “Lessons Learned”’, the authors draw on these experiences to present findings for consideration by DPI.

### URL:
http://repository.unimelb.edu.au/10187/15873

### Date deposited in UoM Digital Repository:
2012/08/07
Shaping the Context for an Integrated Knowledge Hub for the Dairy and Grains Industry Project

MANAGING KNOWLEDGE IN THE PUBLIC SPHERE - ‘LESSONS LEARNED’
(for December 5th deliverable)

Prepared by: Michael Jones and Gavan McCarthy, for the Department of Primary Industries

NOVEMBER/DECEMBER 2011
This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unsupported License.

To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/
or send a letter to Creative Commons, 444 Castro Street, Suite 900, Mountain View, California, 94041, USA.

November/December 2011

Communication to be directed to:

Michael Jones
Research Archivist and Project Manager:
eScholarship Research Centre
The University of Melbourne
m.jones@unimelb.edu.au

Gavan McCarthy
Senior Research Fellow and Director:
eScholarship Research Centre
The University of Melbourne
gavan.mccarthy@unimelb.edu.au
Foreword

The domain of knowledge management (KM) is very much in its infancy and there are not widespread agreements as to what it is all about. In this document, readers are encouraged to think about the implications of managing two different types of knowledge namely “evidential knowledge” and “anecdotal knowledge”. In simple terms, anecdotal knowledge refers to hunches, best guesses or conversations that create a ‘capacity to act’. Much anecdotal knowledge can be communicated via social media distribution channels. Evidential knowledge, in contrast, is based on peer reviewed authoritative knowledge that is derived from the national or international science literature or that emerges via DPI project and service evaluation systems and the like. Evidential knowledge aims to improve the quality of decision making, innovation and this ‘capacity to act’ – at any type of level, including a farm, catchment, regional, policy or political level. At the present time, the distribution channels of evidential knowledge are quite different from those of anecdotal knowledge. But even these channels are changing - because the underlying business models of peer review and publishing are being disrupted by the rise of digital technologies, which includes new approaches to the management of copyright.

This report forms part of a wider ‘proof of concept’ project related to DPI’s overarching approach to knowledge hubs. It has been funded by the FSV KM project and also forms part of the Systems for Enhanced Farm Services (SEFS) Program. The overarching rationale for implementing this proof of concept project is to ensure DPI at the very least considers the technical aspects of emerging national information infrastructures and standards, such as those associated with the National Library’s Trove infrastructure. But the potential learnings from this material go much wider than this narrow focus.

In making lessons learned arising from knowledge hubs from non-agricultural sectors this can only help DPI navigate a pathway forward in the on-going design and implementation of knowledge hubs. The matters raised in this report have significant implications as to how DPI might manage its project and service-orientated knowledge, including the development and deployment of packaged information sourced from the international literature. It is expected that this report will be useful to personnel with interests in information and knowledge management, policy, enterprise and solutions architecture, evaluation, practice change and communications.

I would like to thank Tim Ada, Traci Griffin, Ron Harris, Stephen Northey, Philip Jones and Shaun Ashdowne for their support in making it possible to document, consider and evaluate this material. I would also like to thank the University of Melbourne and the eScholarship Research Centre for preparing this report in such a short period of time.

Richard Vines
Knowledge Management Specialist
Farm Services Division
Department of Primary Industries
Nov 2011
Executive Summary

Background
The Department of Primary Industries is undertaking a “proof of concept” project related to the design and development of two integrated knowledge hubs for the dairy and grains industry sectors. These knowledge hubs are to focus on the needs of farmers, farm groups and related service providers relevant to Victoria’s agricultural industries.

How should knowledge hubs be best designed? How can they contribute to the “branding of DPI” as a provider of authoritative knowledge, advice and information to both farmers and industry service providers? And, how can DPI do this within the context of the DPI’s commitment to the Primary Industries Standing Council’s National Research, Development and Extension and knowledge management framework? This report provides a summary of background information relevant to DPI as it grapples with these significant challenges.

Why the ESRC?
For more than twenty-five years, the University of Melbourne’s eScholarship Research Centre (ESRC) and its predecessors have operated as both academic centres and focal points for infrastructure design, testing and deployment. During this time, the Centre has been a key collaborator in more than twenty online knowledge resources, encyclopedias and knowledge hubs dating back to the earliest days of the internet, all of which remain accessible in some form or another to this day.

In delivering this report, ‘Managing Knowledge in the Public Sphere – “Lessons Learned”,’ we draw on these experiences and present our findings for consideration by the Department of Primary Industries as it looks to develop effective knowledge hubs for Farm Services Victoria and more widely for DPI itself.

Context – National
The work of the ESRC is related to the emerging notion of ‘national information infrastructure,’ visible in resources such as the National Library of Australia’s Trove. Information infrastructure in this sense can be both a scaffolding for effectively maintaining records through time, and potentially one part of a larger distributed network of knowledge.

Context – Department of Primary Industries
In our interactions with the department we have determined the following:

- The connection between customer-facing activities, services, and business strategy is very difficult to determine, and does not appear to be explicitly documented.
- There is a general awareness in Farm Services and beyond that the current knowledge structures within the organisation need to be reviewed, as they do not fully support either clients or business needs.
- There does not appear to be an authoritative or reliable source for information on past or present organisational structures.
- Key information is often difficult to determine, even for current organisational units.
Many print publications and documents contain detailed cross-references to separate documents, some of which are difficult to obtain.

Department of Primary Industry websites convey primarily information on current services and appear to change regularly.

The registration of projects in the CMI system is highly inconsistent.

It should also be noted that, though this report forms part of the broader integrated knowledge hub agenda, the idea of structured public knowledge spaces as outlined here should not be seen as the totality of this broader ‘knowledge hub’ concept.

Why are commitments to online public knowledge emerging?

Commitments to public knowledge online are emerging in response to:

- a desire for accessible information as part of shared knowledge frameworks;
- problems caused by the enormous quantity of often complex information available online (and offline);
- the emergence of new online systems and structures based on shared knowledge and a more democratised notion of ‘authority’.

The results of emerging online public knowledge, if harnessed effectively, are as follows:

- Clients and service providers can become ‘instant experts’ in a particular domain.
- Service providers, companies and governments are made more accountable.
- Organisations can better support continuous improvement activities.
- All stakeholders can hold discussions and make decisions based on the same information.
- Administrative burden is reduced for service providers and clients.
- Stakeholders can more readily identify possible causes for breakdowns or failures in service delivery.

Issues with existing forms of online knowledge

Many current approaches to online knowledge have value; however, with particular reference to stakeholder websites, wikis and online repositories, there are also limitations:

- Stakeholder websites and wikis are in a constant state of flux.
- Stakeholder websites and repositories generally rely on hierarchical navigation.
- Stakeholder websites (and sometimes wikis) do not clearly distinguish between anecdotal and evidential knowledge.
- Repositories provide many records with little or no contextual information.
- Stakeholder websites provide only current contextual information, often with few associated records.
- Stakeholder websites and wikis respond to change by changing, replacing, moving or removing existing content.
- Many stakeholder websites, and some wikis and repositories, have inconsistent or unstable URL structures.
Authority and sustainability online

In contrast to the majority of stakeholder sites, wikis and repositories, public knowledge spaces achieve authority and sustainability through the following:

- structured, stable content which does not need to be changed to remain accurate;
- the presentation of knowledge from multiple perspectives, which allows more effective browsing and navigation through complex knowledge systems;
- the use of information-rich relationships in place of basic hyperlinks;
- the association of each page to an evidence base;
- the provision of comprehensive contextual information;
- the use of simple, unique and persistent URIs.

In addition, all recent public knowledge spaces published by the ESRC are compliant with Web Content Accessibility Guidelines (WCAG) 2.0.

The benefits of structured, standards-based content

The notion of ‘context’ as referred to throughout this report is based on the idea of a structured way of presenting knowledge which can be used as a scaffolding to which records and data can be attached. This provides a sustainable and authoritative structure through time.

Using a highly-structured, standards-based approach has a number of key benefits:

- knowledge is more discoverable, and can be cited more effectively;
- knowledge is independent of the system used to capture or store it;
- knowledge can be shared with other systems using the same standards; and,
- knowledge systems using different standards have the potential to interoperate.

Centralisation versus Interoperability

A key distinction needs to be made between ‘centralisation’ and ‘interoperability’. Attempts at centralisation create an over-reliance on single systems, and mash together disparate types of information and knowledge (including anecdotal and evidential knowledge, contextual information, records and data). In contrast, the end goal of standards-based systems is a mesh of flexible, modular systems as part of a de-centralised, non-hierarchical network where each part has a distinct but complementary role to play.

Data Harvesting, Aggregation and Ingest

As well as servicing the target community, well-structured information allows the harvesting and aggregation of metadata and standards-based content from public knowledge spaces. This facilitates engagement with emerging national information infrastructure such as the National Library of Australia’s Trove discovery service.

Data harvesting and aggregation across standards-based systems can also allow users to:

- generate reports and resource lists;
- distribute research material and data through national channels;
- aggregate information from other standards-based systems for ingest;
• supplement local information with related material in other public knowledge spaces; and,
• mark-up structured, semi-structured or unstructured material for ingest.

Stakeholder Engagement

Defining the scope of a public knowledge space is important to ensure that development occurs with a specific audience and purpose in mind. An important component of working with stakeholders is the development of agreements or memoranda of understanding. (Two examples are provided in the attachments to this report.) Additionally, effective governance – including the involvement of independent parties and key stakeholders – is essential to ensure the sustainability of public knowledge spaces over time, and to ensure multiple perspectives or positions are managed without passing judgment on or privileging any particular position.

The Impact of Structured Online Knowledge

The Agreements, Treaties and Negotiated Settlements (ATNS) site has influenced the way in which all stakeholders engage with the evidence; and, by providing a shared knowledge space for all parties, has impacted on the way those stakeholders engage with each other.

Similarly, Pathways has had a demonstrable impact on practice, invigorated public interest – it is used by journalists, genealogists, researchers, care leavers and their families, heritage workers, and case managers in child and family services – and organisations managing heritage collections have reported an increase in inquiries with most citing Pathways as their source of discovery.

Shared public knowledge spaces such as this should be seen as interventions in that they can (if developed effectively) change the way people work – as a starting point, simply by bringing together diverse, dispersed public knowledge relevant to a particular community together through a single, structured resource; and by providing sufficient clear contextual information for users to understand how specific pieces of knowledge fit into the ‘bigger picture’.

Many of these public knowledge spaces draw their strength from the fact that they are not managed solely by government for communities, or by industry as part of industry consultation. Rather, they are equal collaborations between government, communities, industry and research organisations, all working in a space which sits outside (or between) those domains.

Published Resources and Research Outputs

Knowledge with associated evidence – evidential knowledge, as opposed to anecdotal knowledge – lies at the heart of all the successful and sustainable public knowledge spaces developed by the ESRC. This contributes to the authority of the space; and the registration of published resources, research output and other records in a standards-based system means this information can be exported as XML, harvested between systems, or aggregated at a local, state or national level as required.
**Capability Requirements**

Public knowledge space development is based primarily on conceptual and process-based rigour, with very few specific technology or system-based requirements. Some additional staff skilling is required as part of both establishing and maintaining effective knowledge spaces. However, if effective public knowledge spaces become online focal points for new or pre-existing offline communities, the community surrounding the public knowledge space generate feedback which greatly reduces the burden of this work.

In addition, while some new resources may be required, highly-structured knowledge can lead to commensurate reductions in resource requirements elsewhere, by assisting with the analysis and evaluation of complex inter-linked business processes with the aim of reducing unnecessary complexity. And the use of ‘demand driven development’ can ensure knowledge space development is as cost-effective and resource-efficient as possible while still meeting the requirements of the designated community.

**Benefits and Challenges**

To outline the benefits of implementing an authoritative knowledge space at the core of the Department’s proposed knowledge hubs:

- Farmers, service providers and other key stakeholders will have access to a shared, authoritative source of information about the Department, services and service providers, projects, research, publications, and other key information.
- Organisational knowledge will be developed and preserved in a structured way.
- Knowledge (including research outputs) will be stored in a standards-based system supporting interoperability with other systems and integration with emerging national information infrastructure.
- Farmers and other clients will have improved access to information, supporting a better understanding of the Department and its services and initiatives (including emerging concepts such as wholesaling).
- The Department and other relevant stakeholders will develop an evidential base for its activities, and for ongoing service development and continuous improvement activities.
- The broader knowledge hub agenda, with a focus on community engagement, anecdotal knowledge, social media, events, client tools, and related concepts, can draw on and interact with a stable, authoritative base.

If these benefits are to be realised, a number of questions will need to be answered, including:

- Can the required capability be developed within necessary timeframes?
- Are sufficient organisational resources available?
- Are there sufficient skilled resources to support capability development at the required levels?
- Are key stakeholders from outside the Department willing to enter into collaborative public knowledge space development?
Future Discussions

The eScholarship Research Centre provides this ‘Lessons Learned’ report in the interests of knowledge sharing, and to promote the development of sustainable online knowledge resources for the public good. We are happy to discuss any of the learnings outlined in this report with the Department or its designated representatives.
Contents

Foreword ................................................................................................................................. 3

Executive Summary ................................................................................................................. 4

Contents .................................................................................................................................. 10

1 INTRODUCTION .................................................................................................................. 12
   1.1 Background: the eScholarship Research Centre .............................................................. 12
   1.2 Context, Records and Data .............................................................................................. 13
   1.3 National Context: Information Infrastructure, Open Data and Open Government ......... 14
   1.4 Terms of Reference ......................................................................................................... 15
   1.5 Department of Primary Industries Victoria ...................................................................... 16

2 ONLINE PUBLIC KNOWLEDGE SPACES AND KNOWLEDGE HUBS ................................. 17
   2.1 What are public knowledge spaces and knowledge hubs? .............................................. 17
   2.2 Why are commitments to public knowledge emerging? ............................................... 18
   2.3 Types of knowledge – anecdotal and evidential ............................................................ 19
   2.4 Types of knowledge online ............................................................................................ 20
   2.5 The limitations of generic approaches to online knowledge ........................................ 21
   2.6 Authority and sustainability on the web ......................................................................... 22
   2.7 Content formats, web policy and accessibility standards .............................................. 26
   2.8 Knowledge preservation, records management and web publishing ............................ 27

3 STANDARDS AND STRUCTURED KNOWLEDGE THROUGH TIME .................................. 29
   3.1 Maintaining knowledge through time ............................................................................ 29
   3.2 Context as a network structure ...................................................................................... 30
   3.3 Structuring knowledge and evidence ............................................................................ 32
   3.4 Relationships between knowledge objects ..................................................................... 35
   3.5 Standards based knowledge .......................................................................................... 36
   3.6 Distinguishing between centralisation and interoperability ........................................ 38
   3.7 The potential of data harvesting and aggregation ......................................................... 38
   3.8 Content markup and ingest ........................................................................................... 39

4 STAKEHOLDER ENGAGEMENT AND MANAGEMENT ..................................................... 40
   4.1 Defining audience, scope and intent .............................................................................. 40
   4.2 Engaging and working with stakeholders .................................................................... 42
   4.3 Memoranda of Understanding and Governance ............................................................ 42
   4.4 Collaborative approaches to knowledge development .................................................. 43
   4.5 Usability testing ............................................................................................................ 43
   4.6 Managing multiple perspectives .................................................................................... 44
   4.7 Authority registers as interventions ............................................................................. 45
   4.8 Structured online knowledge and impact on service models ....................................... 46
   4.9 Examples of mixed (private-public) governance models .............................................. 47
5 EVIDENCE AND SOURCE DOCUMENTS ................................................................. 48
  5.1 The centrality of evidence ......................................................................... 48
  5.2 Effective management of documents and source material ...................... 48
  5.3 Maintaining information about records (including research) ................. 50
  5.4 Managing online and offline source material .......................................... 51

6 STRUCTURED AND UNSTRUCTURED CONTENT ............................................... 53
  6.1 Structured and unstructured content....................................................... 53
  6.2 Standards-based knowledge, user generated content and social media .... 54
  6.3 Metadata and data – online knowledge production .................................. 55

7 DEVELOPING KNOWLEDGE HUBS .................................................................. 56
  7.1 Capability development: establishing a public knowledge space .............. 56
  7.2 Capability development: expanding and maintaining a knowledge hub .. 57
  7.3 Capability development: technology ....................................................... 58
  7.4 Managing organisational complexity ...................................................... 58
  7.5 Demand driven development .................................................................. 59
  7.6 Authority registers and knowledge hubs .................................................. 60
  7.7 Defining scope and boundaries ............................................................... 61

8 CONCLUSIONS ............................................................................................... 63
  8.1 Knowledge hubs and the Department of Primary Industries .................. 63
  8.2 Benefits of an authoritative knowledge space ........................................ 63
  8.3 Challenges in implementing an authoritative knowledge space .............. 64
  8.4 Conclusion ............................................................................................... 64

ACKNOWLEDGEMENTS .................................................................................. 65

BIBLIOGRAPHY ............................................................................................... 66

ATTACHMENTS

Attachment 1 – eScholarship Research Centre: Key Resources ...................... 70
Attachment 2 – ABS: Information for Visually Impaired Clients .................... 72
Attachment 3 – eMelbourne: Dublin Core Metadata (Crime, Law and Order) ... 73
Attachment 4 – Who Am I? and Pathways Partners ........................................ 74
Attachment 5 – National Library of Australia: Memorandum of Understanding .. 75
Attachment 6 – Memorandum of Understanding (Extracts) .......................... 78
Attachment 7 – Core principles underlying the Pathways website ................. 81
Attachment 8 – Sample Bibliographic Listing ............................................... 89
1 INTRODUCTION

1.1 Background: the eScholarship Research Centre

For more than twenty-five years, the eScholarship Research Centre (ESRC) and its predecessors – the Australian Science Archives Project (ASAP) and the Australian Technology and Heritage Centre (Austehc) – have operated as both academic centres and focal points for infrastructure design, testing and deployment at the University of Melbourne.

The ESRC collaborates with researchers in the use of digital technologies to extend their research capabilities; works with the University of Melbourne and others to enhance their digital archive and knowledge preservation infrastructure; and participates with the community in the creation and dissemination of information to address societal needs.

Gavan McCarthy (Director of the ESRC and co-author of this report) was amongst the first humanities scholars to receive Australian Research Council funding to support information infrastructure development (1992-1994) and has been consistently successful in the years since.

The Centre’s outputs over this time include:

- in-house software tools – in particular the Online Heritage Resource Manager (OHRM) and the Heritage Document Management System (HDMS) – with well over fifteen years of continuous development and numerous instances in use throughout Australia and overseas;
- more than twenty online knowledge resources, online encyclopedias and knowledge hubs produced in collaboration with other people, dating back to the earliest days of the internet, all of which remain accessible in some form or another (Attachment 1);
- more than fifty online archival guides published by the Centre, with several more generated by publishers other than the ESRC using the HDMS.

Many of these outputs are regarded as exemplars of sustainable digital scholarly practice.

Among numerous other achievements, the ESRC has recently been awarded a three-year, multi-million dollar Federal government contract to deliver national, state and territory online knowledge resources as part of the national Find and Connect program providing support for Forgotten Australians and former child migrants.¹

In delivering this report, we draw on these experiences and present our findings for consideration by the Department of Primary Industries as it looks to develop effective knowledge hubs for Farm Services Victoria and beyond.

1.2 Context, Records and Data

A particular conception of formal knowledge shapes much of the thinking in this report, and is illustrated in Figure 1.

![Figure 1: Context, Records and Data](image)

**Context** here is rich, structured metadata about the key actors, creators and agents, or ‘entities’ – people, organisations, events, places and more – and the complex network of relationships between them. This information is often found embedded in records, in people’s minds and experiences, and in the physical fabric of the world. When extracted and documented separately from those records a robust scaffold is created which can be used to structure knowledge about the past, support knowledge management in the present, and sustain knowledge into the future.

‘Records’ is used very broadly, referring to the ways in which context and data are preserved – in documents, files, publications, photographs, audio and video recordings,
spreadsheets, web pages and more. Records are the evidence of activity by people and organisations in the world; and records are how a society stores or remembers information.

**Data** are the information, facts, figures, and other content utilised for analysis, aggregation, decision-making, planning, evaluation and related activities. While often stored in records, data increase substantially in their utility when they can be extracted from records and filtered, sorted or otherwise manipulated.

Ideally these ‘layers’ or sectors of knowledge should have some independence; however, throughout much of society (including in governments and organisations) context and data are combined with and locked into records. While this creates some stability, the consequence is that contextual information is widely dispersed, unstructured and often unconnected, making it difficult to draw together or comprehend the broader context in which a record (or decision, event, project or similar) exists. Relevant information is often stored in people’s heads and embedded in work practices rather than exposed for more general use and understanding, and data become difficult to extract and manipulate.

In contrast, many of the ideas contained in this report are based on the notion that context, records and data – while always working in combination – can be managed more effectively by understanding the different uses and requirements of each.

### 1.3 National Context: Information Infrastructure, Open Data and Open Government

The work of the ESRC is also related to more general notions of national information infrastructure. That is to say, the ‘context layer’ outlined above can be both a scaffolding for effectively maintaining records through time and part of a larger distributed network of knowledge.

An example of ‘national information infrastructure’ in practice is the National Library of Australia’s Trove, which draws on a network of resources across the country to provide a knowledge discovery service aiming to supplement (rather than replace) what search engines provide.\(^2\) As noted on Trove’s ‘About’ page, the service is designed to:

- provide a single point of access to the resources of the deep web
- facilitate access to a significantly greater range of resources from major sources, including selected digitised material freely available online
- support searching of, and access to, full-text content
- enhance ease of discovery by providing improved relevance ranking, refinement by facets, grouping of all editions of the same book (this is known as FRBR-like grouping) and exploitation of thesauri
- engage with communities and individuals through annotation services

---

• ensure that relevant information is not missed in a search by reducing the need to search material-specific discovery services separately
• provide a platform for niche services to query a vast resource of Australian metadata and adapt if for their own needs.³

Linked to the increasing importance and utility of such services, there are calls nationally and internationally for more open government⁴ and open data, which requires the creation of stable public information networks and an engagement with more flexible, transparent and accessible ways of operating, both internally and in dealings with clients and customers.

1.4 Terms of Reference

As outlined in the Terms of Reference, ‘Pre-scoping study: Shaping the context for an integrated knowledge hub development for the dairy and climate change sectors’, issued by the Department of Primary Industries, Victoria, in August 2011, topics and themes for consideration include:

- Systematic involvement of end users and roles of end users in the knowledge hub framework
- Involvement of industry groups that have interests in identifying and adopting practice change reforms
- Identifying and developing relationships with key stakeholders, to support the objectives of the knowledge hubs
- Establishing shell agreements with stakeholders to support the objectives of a knowledge hub
- Documentation of agreements and decision making about resource allocations and strategy
- Experiences arising from the development and adoption of publishing standards, content quality assurance protocols and the like
- Management of content formats for past published resources and archival resources in relation to the Web-publishing policy framework and Accessibility standard as promoted by the Department of Treasury and Finance.⁵

The project team has also been asked to consider ‘balances between the need for [a] rigorous standards based approach to content and metadata and content created via the use of social media’.⁶

⁵ Department of Primary Industries, “Pre-Scoping study: Shaping the context for an integrated knowledge hub development for the dairy and climate change sectors,” Request for Quotation – Terms of Reference, 11 August 2011, p. 3.
These topics and themes are addressed throughout this report, drawing on the context outlined in Sections 1.1, 1.2 and 1.3.

1.5 Department of Primary Industries Victoria

The draft ‘Lessons Learned’ report is being prepared and delivered mid-way through the Pre-Scoping Study. Therefore, the ESRC has met and worked with several areas of the Department of Primary Industries, with particular focus on Farm Services Victoria. The context for this report has been shaped by that engagement.

The ESRC’s involvement to date has included:
- an all-day planning meeting, including representatives from Dairy Services, Grains Services, the Horticultural Industry Network, and the KIT Division;
- presentation of a ‘Lessons Learned’ workshop, with follow-up discussion; and,
- an all-day knowledge hub workshop, including representatives from Dairy Services, Grains Services, Service Design, FFSR and the KIT Division.

We have also consulted a broad range of publications, documents, websites, and other digital and hard copy resources to develop a ‘proof-of-concept’ knowledge register which conforms with many of the key concepts outlined in this report.

Through this process we have discovered that:
- While it is possible to extract some basic information on current context entities from the material available, there does not appear to be an authoritative or reliable source for information on past or present organisational structures.
- Key information, such as establishment dates, is often difficult to determine, even for current organisational units.
- Many publications and documents contain cross-references to sections, clauses or phrases outlined in full in separate documents.
- Department of Primary Industry websites convey significant quantities of information on current services, with related goals, strategies and reports, with very little historical information.
- The connection between customer-facing activities, the provision of services, and internal business requirements and strategies is very difficult to determine and in most cases does not appear to be explicitly documented.
- The registration of projects in the CMI system is inconsistent and does not readily allow for connections to other knowledge structures within the organisation.
- There is a general awareness in Farm Services and beyond that the current knowledge structures within the organisation need to be reviewed, as they do not fully support business needs or clients.

---

Additional findings will be presented in our final project report.

2 ONLINE PUBLIC KNOWLEDGE SPACES AND KNOWLEDGE HUBS

2.1 What are public knowledge spaces and knowledge hubs?

We refer throughout this report to two concepts – ‘public knowledge spaces’ and ‘knowledge hubs’.

The former has emerged from many years of practice in providing access to structured public knowledge and information on the public record, from a variety of sources and periods, through an online site (or space) with a particular intent or focus. To provide two examples of public knowledge spaces:

- *Pathways* brings together resources relating to institutional ‘care’ in Victoria, including documents and images about institutions, organisations that managed children’s institutions, policies, public figures, and legislation. All information on the site is already published and/or in the public domain.7

- The *Encyclopedia of Australian Science* is a register of over 3,000 people and the many industries, corporations, research institutions, scientific societies and other organisations that have contributed to Australia’s scientific, technological and medical heritage, including references to archival materials and bibliographic resources about them.8

These sites, and other public knowledge spaces like them, provide access to public information without restriction. All content is therefore written for the public domain, with all sources cited, and without privileging a particular viewpoint or perspective. The notion of ‘public knowledge’ in this instance is not only predicated on the accessibility of the information included, but also reflects the fact that these spaces are for and should reflect a broad public without bias or exclusion.

In addition, public knowledge spaces in this context are developed, extended and maintained in collaboration with the public – including through the provision of user feedback and engagement – without allowing direct modification or adaptation of the content by the user.

Finally, public knowledge spaces, in embodying these qualities – knowledge based on cited sources, from and in the public domain, without privileging any particular perspective,

---


developed and maintained in collaboration with the public – become a source of authoritative information.

The idea of an online or web-based ‘knowledge hub’ can (and, we believe, should) include an authoritative public knowledge space, but may also involve other elements – rolling news or events listings, blogs, discussion forums and social media, topical articles, opinion pieces, access to other complementary tools and systems, and more – provided these elements do not impact on the authoritative knowledge and stakeholder equality central to the public knowledge space.

While the majority of this report – with its focus on ‘managing knowledge in the public sphere’ – is centred on the idea of the public knowledge space, where appropriate we will explore the potential connections between this idea and the broader idea of knowledge hubs.

2.2 Why are commitments to public knowledge emerging?

The emerging world of shared public knowledge spaces online is a complex subject which could itself be the focus of a full report. Here, we summarise the ESRC’s perspective on this topic.

From the earliest days of the printed book, people have made countless attempts to develop and present large amounts of structured knowledge in a useable form, through encyclopedia, compendiums, catalogues and directories. While there are many examples of such texts making significant contributions to knowledge all were constrained by the flat, fixed nature of print-based technology.

Similarly, libraries and archives have worked to collect, catalogue and make accessible large amounts of information – formally published and unpublished – to researchers, scholars, writers, and the general public. These activities reflect a deep-seated need for human knowledge and shared frameworks of understanding for the present as well as the past.

With the advent of the internet, web technology and the online world, millions – then billions – of people could communicate and interact in shared information spaces. But, at the same time, the amount of available information exploded. Societies have access to more knowledge than can possibly be processed; many people feel swamped by data and information, and the rate of change online is so great that this has created uncertainty around relevance and authority.

Parallel to these developments, researchers discovered that structuring contextual information, records and data in an online environment allowed them to explore and express information, concepts and knowledge in new ways which the constraints of traditional narrative and print-based technologies did not. And, though many felt swamped by the ‘data deluge’, many others saw this as a democratisation of information. Notions of ‘top down’ authority – fixed information delivered by governments, organisations and other
traditional seats of power down to societies and communities – are beginning to change, and shared networks of complementary resources and interactions involving all stakeholders are being developed in their place.

Commitments to public knowledge online are emerging due to the complicated interplay of all these factors, and the key ideas outlined above are embodied in the structured public knowledge spaces referred to throughout this report. These knowledge spaces:

• meet the human need for accessible information as part of shared knowledge frameworks;
• make large quantities of often complex information available in more stable, authoritative, discoverable and navigable ways; and,
• support the emergence of new online systems and structures based on shared knowledge and more democratised notions of ‘authority’.

The results of emerging online public knowledge, if harnessed effectively, are as follows:

• Clients and service providers can rapidly understand and become conversant with a particular domain, based on large amounts of clear, navigable information at their finger-tips.
• Service providers, companies and governments are made more accountable, as the basis for their decisions is as visible as the outcomes of those decisions.
• Organisations can better support continuous improvement activities, as changes in complex systems can be evaluated by all stakeholders, and the impact of implemented changes assessed.
• All stakeholders can know with more certainty they are basing their discussions and decisions on the same information.
• Administrative burden is reduced for service providers and clients by building a bridge between the citizenry and the bureaucracy.9
• When breakdowns or failures in service occur or when clients are not aware of what is available to them it will be more evident that this is due to flawed processes or gaps in service provision, rather than due to missing, inaccessible, or problematic information.

2.3 Types of knowledge – anecdotal and evidential

The distinction between an authoritative public knowledge space and a knowledge hub is related to distinctions between types of knowledge – in particular, anecdotal and evidential knowledge.

‘Anecdotal knowledge’ is based on the particular experiences and observations of individuals or localised groups, and is often not documented (or not formally documented). While extremely valuable in everyday interactions with others and when considering the

---

feelings and sentiment of people and groups, anecdotal knowledge is not a robust or stable foundation on which to base long term planning, evaluation or claims to truth.

‘Evidential knowledge’ is contained in formal, agreed documents, and in the shared agreement of multiple stakeholders independent of any particular vested interests. Evidential knowledge can be tested and verified (or disproven) and provides a robust and stable foundation for claims to ‘truth’ and for long-term planning and evaluation.

An authoritative public knowledge space contains evidential knowledge, and maintains this knowledge separately from anecdotal knowledge. For example, The Australian Women’s Register includes events and blog posts on its home page, but these posts, which include individual opinions and perspectives, are maintained separately from the authoritative biographical entries and references in the Register.

Similarly, Pathways includes news posts such as ‘Call to include Forgotten Australians in the national curriculum’, which discusses and quotes from an article in The Australian newspaper. The post includes links to two authoritative entries in Pathways, but is not part of those entries. To include current (and possibly transient) public debate in the authoritative register of Pathways would introduce the anecdotal into the evidential space, thereby compromising the authority of the latter.

While knowledge hubs, as with these examples, may contain a combination of anecdotal and evidential knowledge, the two should be kept and maintained separately to ensure the authority of the public knowledge space is maintained.

2.4 Types of knowledge online

The authoritative knowledge spaces outlined here exist in contrast to (and in conjunction with) other types of online knowledge. Here we provide three representative examples: stakeholder websites, wikis, and repositories.

First, sites produced by single stakeholders have a key role to play, but are also clearly focused on current messages and issues. At the time of writing, the Department of Primary Industries home page includes the following sections:

- Current Issues
- Quick Links
- Media Releases
- What We Do

---


feature boxes for:
  o Victorian Fox and Wild Dog Bounty
  o Subscribe - Queensland Fruit Fly e-Newsletter
  o Solar – Feed-in Tariffs

Elsewhere on the site, annual reports from the past three years are available, but earlier reports are not; and, though it is possible to locate details about the Department’s current structure, it is not possible to ascertain how long this structure has been in place, or details of the previous structure. Instead, the site is (justifiably) focused on current issues, current services, current structures and current publications.

Second, sites built on Wiki technology can contain hundreds, thousands, or (in the case of Wikipedia) millions of articles. These articles are developed by community census and can be extremely useful, but are not generally considered truly ‘authoritative’. While developed by multiple stakeholders, wikis still present a snapshot of the world as it is today without effectively incorporating past states and structures; and as the general community can edit content, content with little or no evidence can exist unchecked for long periods of time.

Additionally, the wiki model includes an inherent lack of stability, with the potential for content (particularly around topical or contested issues) to change frequently and substantially. As an example, the Wikipedia page on the site’s own reliability has been the subject of well over 500 edits this year alone, by over 320 different users. This constant state of flux does not provide the ‘stable foundation’ for long term planning and evaluation noted above.

Third, databases and repositories of documents and other content can provide access to collections of publications, articles, reports, images, video, audio, or other records. The University of Melbourne’s Digital Repository contains collections of records, each with associated catalogue metadata and other key words. Users can browse a hierarchical catalogue or search for material; however, with reference to Section 1.2 of this report, the context of these records – who created them, when and why they were created – is buried within the records themselves.

2.5 The limitations of generic approaches to online knowledge

As noted, all of the approaches to online knowledge outlined above have value; however, there are also limitations, including the following:

  • Stakeholder websites and wikis are in a constant state of flux.

---

- Stakeholder websites and repositories generally rely on hierarchical navigation, limiting browsing to single paths or perspectives.
- Stakeholder websites (and sometimes wikis) do not clearly distinguish between anecdotal and evidential knowledge.
- Repositories provide records with little or no contextual information.
- Stakeholder websites provide current contextual information, often with few associated records.
- Repositories contain primarily fixed records and represent change by adding new records, often to existing categories.
- Stakeholder websites and wikis represent change by changing, replacing, moving or removing existing content.
- Many stakeholder websites, and some wikis and repositories, have inconsistent or unstable URL structures due to system setup and regularly moving or changing content, making citation difficult.

The list above contains some uncertainties and qualifications, due primarily to a final limitation: the lack of standardised or standards-based approaches to the creation and structure of online knowledge. As a result, these resources exist in domain-specific information silos and cannot interact or interoperate with other relevant information resources.

By operating in conjunction with existing web resources, authoritative public knowledge spaces add considerable value to online communities by overcoming these limitations, using the concepts and ideas outlined in this report.

2.6 Authority and sustainability on the web

The authority and sustainability of the information contained in public knowledge spaces is based on carefully structured information and carefully structured web pages. We will unpack individual components over the following sections; however, to introduce the key concepts underpinning online authority and sustainability we will unpack a single page from the *Pathways* public knowledge space – the entry for Child and Family Services Ballarat.\(^{15}\)

First, every entry has its own citable HTML page, with a simple, stable URI containing a unique identifying number – in the case of Child and Family Services Ballarat, E000005: [http://www.pathwaysvictoria.info/biogs/E000005b.htm](http://www.pathwaysvictoria.info/biogs/E000005b.htm)

Second, looking at the first section of the page we see the following.

---

The entry is for an organisation, has a fixed title, is placed in time by a start date, and has been assigned functions which can be used to find organisations of similar types elsewhere in the system. Alternative names (including acronyms) are also registered, and an external link to the organisation’s own website has been recorded.

The summary note which follows is clear, precise, factual, and written in a way which will ensure it remains a valid description for as long as this entry is available online. (For example, there is no use of the present tense, and no statements such as ‘for nearly 15 years...’) Detailed descriptions (not shown here) are similarly structured to ensure accuracy and sustainability.

From this page the user can also see other entries in the system related to Child and Family Services Ballarat, as well as records managers, related people and projects, and published resources.
Two features are evident here: first, we are looking at the knowledge space from the perspective of Child and Family Services Ballarat, so see the predecessor organisations and other entries directly related to the page we are on; and second, the connections between this entry and other entries are information-rich ‘relationships’, rather than simple hyperlinks. They include dates and descriptive information which provides meaning to those relationships.

And, looking at a predecessor organisation – Ballarat Orphanage – multiple sources are cited, clearly showing the evidence base for the knowledge contained on the page:
In contrast to the majority of stakeholder sites, wikis and repositories, public knowledge spaces achieve authority and sustainability through the following:

- Each page contains structured, stable content which does not need to be changed to remain accurate.
- Each page presents knowledge from the perspective of that entry, which allows browsing and navigation through a complex knowledge network rather than a hierarchy or flat catalogue structure.
- Information-rich relationships are used in place of basic hyperlinks.
- The evidence base for each page is clearly presented.
- Relationships and textual information creates context for each entry, including predecessor organisations, and related people, projects, resources and more.
- Change can be represented by creating new entries with appropriate information-rich relationships to pre-existing entries.
- URIs are simple, unique and persistent.

For further detail on structured information and the use of standards see Part 3 of this report.

---

2.7 Content formats, web policy and accessibility standards

All recent public knowledge spaces published by the ESRC are compliant with Web Content Accessibility Guidelines (WCAG) 2.0.\(^{17}\) In addition, for resources such as *Pathways*, particular care has been taken to ensure the language and terminology used throughout the site are clear, inclusive and appropriate.\(^{18}\)

With regard to the use of PDFs and other document formats, the ESRC acknowledges these can present a barrier to accessibility and do not yet fully conform to WCAG 2.0. However, it is also true that many significant documents are currently available only as PDFs, and removal of these documents is an impediment to access across the board.

To address these issues, we institute a demand-driven policy whereby PDFs are made available online with accompanying structured metadata so that all documents and records (PDF and other) are discoverable by all users. Then, if the document itself does not meet the needs of a particular user, we (or our collaborators) will take all reasonable steps to provide the information in an alternative format.

This policy is in line with organisations such as the Australian Bureau of Statistics (see Attachment 2), which states the following:

The ABS operates in accordance with the Australian Government Information Management Office (AGIMO) guidelines relating to accessibility for visually impaired users and is working to ensure that our web site meets the requirements of the World Wide Web Consortium’s (W3C) Web Content Accessibility Guidelines.

The ABS is making an effort to ensure that our web site is accessible by visually impaired users. However, due to technological limitations, it is not possible to make the web site entirely accessible in a cost effective manner. This limitation means that some tables, products or parts of the web site may be less accessible to some visually impaired users.

Where any of our web products are not suitably accessible, the ABS will be pleased to make arrangements for the Royal Society of the Blind to translate the product into a more appropriate format. This service is provided at no additional cost to the user.\(^{19}\)


2.8 Knowledge preservation, records management and web publishing

Preserving knowledge in a digital world presents many difficulties. Contributing to the complexity is the idea that the strengths of working digitally – production capability, accessibility, manipulability, speed, continual innovation – are in themselves also dangers.

In our experience as archivists, developers of public knowledge spaces and specialists in information management, the Open Archives Information System (OAIS) model provides the most useful conceptual framework through which organisations can develop capability in this area.\textsuperscript{20} Central to the OAIS are the linked but separate processes of submission, preservation, and dissemination.

To provide a brief summary:

- **Submission** involves preparing documents, data or other digital knowledge, including relevant contextual information and evidence, for submission to a preservation process.
- **Preservation** involves preserving, checking and maintaining digital knowledge over time (from relatively short periods of time to indefinitely).
- **Dissemination** involves provision of digital knowledge (and the contextual information needed to understand and use that knowledge) to a user.

Importantly, what is created cannot be effectively preserved without additional work; and what is preserved is not the same as what is provided (or disseminated) to a user.

Built into this model is a useful distinction between records management and web publishing. Effective records management over time can be considered part of a basic preservation process – documents are maintained in useable formats, with relevant contextual information – whereas what is provided through web publishing is part of the dissemination process. The latter must involve different copies of digital material, and could also involve different formats, contextual information and metadata, depending on the users’ requirements.

The OAIS model is also a useful conceptual framework when considering the sustainability of authoritative knowledge spaces over time, and reflects the underlying thinking evident in the ESRC’s online resources. The data which make up each of the public knowledge spaces detailed in Attachment 1 are stored in separate relational databases. This ‘intentional siloing’ as part of a preservation strategy maintains the integrity of each dataset and ensures any issues with a single resource are localised to that resource.


\url{http://www.abs.gov.au/websitedbs/d3310114.nsf/51c9a3d36edfd0dfca256acb00118404/6c261aa94523e539ca256c0f00042759!OpenDocument}
(It is worth noting, with reference to OAIS thinking, that networked, inter-linked information should reside in the dissemination space, not the preservation space; and that ‘intentional siloing’ is only an effective preservation technique if the same data can also be readily disseminated – rendered, exported, harvested, or aggregated – as and when required, as outlined in the subsequent sections of this report.)

Similarly, the web output from each resource consists of HTML pages which are generated from the data but have no real-time connection to that data or the database. The web pages represent the dissemination copy of the data only, as do any documents provided online – these are not ‘original’ or source documents; they are dissemination copies of documents, with the preservation copies held on fully-backed up offline servers.

In short, data and files are managed completely offline, and what is seen online is an independent dissemination copy of offline data and records. A sustainable knowledge system requires that the two be managed and controlled separately.
3 STANDARDS AND STRUCTURED KNOWLEDGE THROUGH TIME

3.1 Maintaining knowledge through time

Effective use of standards and structured knowledge (or informatics) is essential if knowledge is to be maintained for even relatively short periods of time.

From 2002-2007, Gavan McCarthy and Ian Upshall carried out work for the International Atomic Energy Agency on strategies for managing information about radioactive waste over time. In their report, published by the International Council on Archives, they write:

Information is always created in a context delimited by both time and space. It is not an absolute quantity and it always needs to be assessed in relation to a variety of parameters that will influence the meanings that can be derived. With regards to radioactive waste information these parameters or contexts will include the administrative structures, the governance framework, the financial arrangements, the regulatory environment, the status of scientific and technological knowledge, the evolution of the physical environment, the attitudes of special interests groups and the concerns of the community as a whole.

It is argued in this report that the systematic management of contextual information is currently the most likely means by which the risks arising from the failure of intergenerational knowledge transfer can be mitigated. Open network public information infrastructure technologies such as the Internet and the World Wide Web, provide a means by which a global framework of radioactive waste information can be built. This framework would utilise critical contextual knowledge to link related but distributed information and greatly assist the community in meeting its objective of creating a sustainable process of information preservation and transfer to future generations.21

Notable here, and reflected throughout this report, is the idea that structured public information is the most effective means by which information and knowledge can be maintained over time. This is a conceptual solution to the problem, without recourse to specific technologies, systems, hardware or software.

To make this idea explicit: to maintain knowledge through time, that knowledge must be independent of any particular system or technology, as these have limited lifespans. And, as a general rule, the lifespan of any particular system will be shorter than the utility of the information contained within that system.

The means by which this independence is achieved is through the use of structure and standards, and these concepts bring additional benefits in the present as well as over time.

### 3.2 Context as a network structure

The notion of ‘context’ as referred to throughout this report is based on the idea of context as a structural element within an information or knowledge system. As seen in the ‘Context’ image at the top of Figure 1., context is a network of information, structured through the use of information-rich relationships (as shown, for example, in Figure 3).

Context distributed across records may be preserved and maintained across an organisation, but in this form it is dispersed and cannot play a structural role in a knowledge system. Conversely, structured context, once effectively documented, can be used as a scaffolding to support records and data management, discovery and access, and provides a sustainable and authoritative structure through time.

The structuring of this data (or metadata) is quite different from the simpler, more rigid structures found either on common websites, or in library catalogues or resource lists. Whereas the latter creates a hierarchical or ‘tree’ structure, context networks are best represented with more detailed, organic graphs.

The following two figures (see pages 31 and 32) are included to illustrate this difference. Figure 5A shows the top section of the Sitemap from the Department of Primary Industries website, which has a fixed hierarchical structure similar to that found on many other websites, and in many catalogues and repositories.

In contrast, Figure 5B shows a contextual information network, drawn from structured metadata collected as part of the University of Melbourne’s ‘Seeding the Commons’ project, initiated and funded by the Australian National Data Service (ANDS). Though much more visually complex, when viewed as HTML output this structure provides considerably more navigation options for the user and allows the exploration of complex knowledge structures with relative ease.

The Seeding the Commons data are highly structured and standards-based, utilising the same concepts as the other public knowledge spaces described in this report. It contains information on datasets, research projects, researchers and organisational units within the University of Melbourne, and has been created to produce transformable XML data which will be harvested into the University of Melbourne’s Research Data Registry and the national Research Data Australia resource being developed by ANDS.
Figure 5A:
Department of Primary Industries – Sitemap (Detail)²²

3.3 Structuring knowledge and evidence

A brief example from the *Encyclopedia of Australian Science* illustrates how unstructured knowledge can be transformed into structured knowledge with attached evidence.

An ‘unstructured’ biography of a scientist such as John Madsen (1879-1969) could consist of a paragraph or two of text outlining his career and positions, as contained in the encyclopedia:

---
John Madsen was Lecturer in Physics, University of Adelaide 1901-1909 and Associate Professor and Professor of Electrical Engineering, University of Sydney 1909-1949. He was Chairman of the Radio Research Board (1926-1957) and a great many other bodies and boards including the National Association of Testing Authorities. Madsen is featured on the ATERB Medal, which is awarded under the auspices of the Australian Academy of Technological Sciences and Engineering. ATERB (Australian Telecommunications & Electronics Research Board) was formerly the Radio Research Board, of which Madsen was founding chairman.

However, unless the user wants information only on Madsen, this block of text is of limited use; and it cannot easily be used as a structural element within a knowledge resource.

Looking at the same block of text, we can see there are several organisations mentioned, including the Radio Research Board. To create a structured context layer, we can create a separate entry for this organisation, and connect it to Madsen using an information-rich relationship. On Madsen’s page, this appears in the ‘Related entries’ section:

We can see Madsen is related to the Electrical Research Board, because he was Chairman; and, by following that relationship, we can go to a description of that organisation.

Madsen and the Electrical Research Board are now separate but related structural elements in our system. We can relate Madsen to other entries; and we can relate documents, other entries, or anything else to the Electrical Research Board as a separate ‘thing’. By continuing this process, a structural network, or scaffold, is developed.

Also attached to Madsen’s entry is the evidence for the details provided, along with links to other documents and resources (including an image of Madsen as a digital resource):
Published resources

Book Sections

Journal Articles

Online Resources

See also

Digital resources
- Title: John Percival Vissing Madsen
- Type: Image

Figure 7:
Encyclopedia of Australian Science — John Percival Vissing Madsen (1879-1969) — Published Resources

Each of these resources is also registered independently of Madsen, becoming structural elements themselves. As resources are often evidence of more than one organisation, person, activity, or other entry, this creates an evidential structure which is linked to our structured contextual information network.
3.4 Relationships between knowledge objects

To return to a point made above, the distinction between relationships and hyperlinks is an important one. While a series of hyperlinks (such as those found throughout Wikipedia) connect two pages or two online locations this is a non-specific link. If, for example, a hyperlink is created between the page of Person A and Person B, the link itself does not contain any information about the nature of their connection, or when that connection existed. Hyperlinks are therefore closer to pointers than structural elements in a knowledge network.

By contrast, the use of information-rich relationships allows for the creation of well-defined contextual structures which are located in a particular time and (if required) place. Taking an example from Pathways, the ‘care’ provider Winlaton had three predecessor organisations, and two successor organisations. These relationships have the type ‘previous’ and ‘subsequent’, creating an information structure through time:

Related Entries

Timeline
1926 - 1927 The Horseshoe
1926 - 1927 Ramoth
1927 - 1951 Fairhaven
1951 - c. 1991 Winlaton
1991 - 19937 Nunawading Youth Residential Service
1999 - Melbourne Youth Residential Centre

Figure 8:

In addition, due primarily to restructures within the State Government of Victoria, Winlaton was run by seven different organisational units over its history:
Run By

- Children's Welfare Department, State Government of Victoria (1924 - 1960)
  Date: 1953 - 1960
- Community Services Victoria, State Government of Victoria (1985 - 1992)
  Date: 1985 - 1992
- Department of Community Welfare Services, State Government of Victoria (1978 - 1985)
  Date: 1978 - 1985
  Date: 1992 - 1993
- Mission of St James and St John (1919 - 1997)
  Date: 1951 - 1953
  Date: 1960 - 1970
  Date: 1970 - 1978

Figure 9:

The relationship type here is ‘run by’, and each relationship contains a date to indicate when that department ran Winlaton.

As seen in this example, use of information-rich relationships allows the development of detailed structural connections which have a type (previous, subsequent, run by, etc.) and are located in time.

3.5 Standards based knowledge

Using a standards-based approach to knowledge has a number of key benefits:
- Knowledge is more discoverable, and can be cited more effectively.
- Knowledge is independent of the system used to capture or store that knowledge.
- Knowledge can be shared with other systems using the same standards.
- Knowledge systems using different standards have the potential to interoperate.

Here we look at each of these points in turn, using examples from the ESRC’s own practice.

First, embedding standardised knowledge into public web pages makes those pages more discoverable and understandable to search engines such as Google and means the information required for automatic or manual citation is readily accessible at the top of the page.
Every page created by the ESRC has its own set of unique Dublin Core metadata. This includes details such as the title of the page, the creator, the publisher, and rights information associated with the page, and other information identifying the source and content of the information. Search engines and indexing software increasingly utilise this information to generate accurate results. Embedding unique metadata in every page header also ensures every page of a site can be indexed as a distinct piece of content, enhancing discoverability.

Incorporating standards-based Dublin Core elements also means this information can be easily shared and understood by other users and systems. Information can be harvested from across sites, and features such as ‘Cite this’ buttons or automated citation and reference management software becomes significantly more easy to implement as Dublin Core contains all the information required for a full, formal citation in any style. And, as a fall-back, users with sufficient skill levels can view the page source and quickly prepare a formal citation manually.

Second, standards-based knowledge is independent of the system used to capture or store that knowledge as it can be exported, or can exist, as structured information independently of that system. The Online Heritage Resource Manager (OHRM), which produces our Centre’s public knowledge spaces, can export ‘raw’ XML, or XML which conforms to the EAC-CPF XML schema and export functionality to allow production of RIF-CS XML is close to completion. Data from the OHRM has also been transformed into RDF, the form preferred by the Open Linked Data community and the so-called ‘Semantic Web’.

XML export functionality means structured information about people, organisations, events and other contextual entities, as well as information-rich relationships and details of published resources and other records, can be extracted from the system for preservation in a standardised format which is not reliant on particular software or hardware. The data can then be analysed, re-used, harvested, or imported into updated or replacement systems when and as required.

The logical extension of this is that the data can also be used or shared with other systems. For example, The Australian Women’s Register and the Encyclopedia of Australian Science

---


have OAI-PMH\textsuperscript{28} repositories, from which data is regularly harvested by Trove, the National Library of Australia’s national discovery service. This is facilitated through the system’s EAC-XML data export capability.

Finally, two or more systems that are standards based – even if using different (but well-structured) standards – can interoperate through the use of ‘transforms’ (converting from one schema to another) or by aggregating information from multiple standards-based systems as required.

### 3.6 Distinguishing between centralisation and interoperability

A key distinction needs to be made between ‘centralisation’ and ‘interoperability’. Attempts at centralisation – the production of a single system or resource which will contain the aggregated knowledge and tools required for a sector, community or other group – create an over-reliance on single systems, and mash together disparate types of information and knowledge (including anecdotal and evidential knowledge, contextual information, records and data).

In contrast, the end goal of standards-based systems is a mesh of flexible, modular systems as part of a de-centralised, non-hierarchical network of distributed capability, where each part has a distinct but complementary role to play in contributing to a common goal.

### 3.7 The potential of data harvesting and aggregation

Beyond the scope of the immediate target community for a knowledge hub, the harvesting and aggregation of metadata and standards-based content from public knowledge spaces facilitates engagement with national information infrastructure such as the National Library of Australia’s Trove discovery service (as noted above).

In addition, data harvesting and aggregation across standards-based systems can be used to: generate reports and resource lists; distribute research material and data through national channels; aggregate information from other standards-based systems for ingest; supplement domain-specific information with connections to related material in other public knowledge spaces.

Attempts to integrate other tools and functionality will also benefit from well-structured information. For example, to a human user working in Victoria ‘East Gippsland’ is easily recognisable as a place name, and ‘Mike Jones’ as a person. But, unless the former is in a

http://www.openarchives.org/pmh/
designated ‘location’ field or geographical field, spatial tools or mapping systems cannot easily distinguish a place name from the name of a person.

Extending this example further, if data is extracted from one system (such as a knowledge hub) for use in another system (such as a mapping overlay system) the place name needs to be extracted as a place name, not as ‘generic’ or unstructured data to maintain the utility of this information in other systems.

Finally, by exposing structured, standards-based knowledge and making it available to emerging national information infrastructure, requirements of open government, open data and the availability of publicly funded research and data for discovery and re-use (wherever appropriate) can be met without significant manual intervention.

**3.8 Content markup and ingest**

An additional advantage of a highly-structured public knowledge space is the ability to markup structured, semi-structured or unstructured material for ingest. This method was used in preparing content for the establishment years of *The Australian Dictionary of Biography Online*, when the ESRC’s Online Heritage Resource Manager (OHRM) was used as the base technology (2004-c.2007).
4 STAKEHOLDER ENGAGEMENT AND MANAGEMENT

4.1 Defining audience, scope and intent

Moving away from the technical aspects of structured knowledge, the other key focus area is stakeholder engagement. As with web design more generally, this often begins with a definition of the target audience.

Returning to Pathways, the audience is described on the ‘About’ page:

Pathways is a resource for people who as children were in out-of-home 'care' in Victoria, including people known as 'care' leavers, Forgotten Australians, foster children, wards of the state, adopted children, 'Homies', child migrants, and members of the Stolen Generations ...

Pathways is designed to help 'care' leavers understand more about their past and the historical context of child welfare. We hope that this knowledge of the broader context will be helpful to 'care' leavers and members of their families who are in the process of finding and telling their stories and coming to terms with the past.

Everyone affected by the history of institutional care will have their own story to tell - we hope that you can use this website to find your own pathways to information and resources that will help you make sense of your past and to see where your own story fits in to the broader context.29

As should be clear from this description, the purpose of defining an audience is not to second guess what information may be desired or necessary; nor is it to significantly alter the underlying knowledge structures for that audience. The Pathways site still presents highly-structured, standards-based contextual information, linked to evidence, and is intended to provide users with the ‘broader context’ of their own story, not the story itself.

However, Pathways caters to the target audience in two ways: the ‘look and feel’ of the site (including colours, fonts, menu layout and so on) was designed with ‘care leavers’ in mind, to ensure information on support services was accessible from every page; and the scope and boundaries of the world mapped by the site’s networked knowledge structures was in part determined by the target audience.

This latter point is worth reinforcing. When creating a relation-based knowledge network such as Pathways, or any other public knowledge space, we have found the efficacy of the resource is increased if the scope of the ‘world’ being mapped is understood and (at least loosely) defined. To provide some examples:

• *Pathways* brings together information for people who experienced out of home ‘care’ in Victoria, and thus includes any organisations, people, legislation, events, documents and other material in the public domain which is relevant to fully understanding that world. For example, entries from other states are only relevant if they had a discernable impact on ‘care’ in Victoria, and the internal details of government are not relevant if there is no evidence those details had an effect on ‘care leavers’.

• The *Encyclopedia of Australian Science* defines its scope as: “a register of the people and the many industries, corporations, research institutions, scientific societies and other organisations that have contributed to Australia's scientific, technological and medical heritage, with references to their archival materials and a bibliography of their historical published literature.”

• The *Australian Women’s Register*: “The searchable-on-line Australian Women’s Register is a valuable and growing source of biographical data about Australian women and their organisations, with hyper-links to the archival repositories and libraries where their records are held and to other sources of information. Women and women’s organisations are listed alphabetically. You'll also be able to search by functional classification, for example, ‘P’ covers physicists, politicians, pharmacists, pacifists and many more.”

• *eGold*: “This website is a living resource for those interested in family or local history, technology or material culture, and is tailored to the needs of students, scholars, enthusiasts, visitors and the general public. Telling the story of gold through images, stories and multimedia interactives, it connects individual stories to the wider historical themes of global gold rushes, global migration flows, building the Australian nation and democratic change during the gold rushes.”

As all these examples show, the scope of these public knowledge spaces is defined and clear. This ensures that – while context can often be expansive and complex – entries in each public knowledge space are entered with the target audience and purpose in mind, and with an understanding of the relevance of that entry to the world being mapped.

It is also worth noting that none of these resources makes any claim to being comprehensive – *eGold* and *The Australian Women’s Register* in fact openly acknowledge they are living, growing resources. Context is always changing, is always a matter of opinion, and the boundaries of any particular world or community will always be uncertain.

---


Most importantly, whether context is relevant or not cannot be determined by any single stakeholder group, and must involve an ongoing, collaborative approach.

### 4.2 Engaging and working with stakeholders

*Pathways* was developed as part of the Australian Research Council funded project ‘Who Am I?: The Archive as Central to Quality Practice for Current and Past Care Leavers (Forgotten Australians).’ The project, which commenced in 2009, was conducted by the University of Melbourne and the Australian Catholic University, in partnership with 15 other organisations, and in consultation with consumer support and advocacy groups (see Attachment 4).

All these stakeholders, as well as ‘care leavers’ and government representatives, were involved in the project from day one, through ongoing workshops, site visits, regular meetings, usability testing, invitations to events, and collaborative decision-making processes.

Feedback indicated all stakeholders felt engaged with the development process. The *Pathways* site itself, launched in the first year of the project, became a key component of this engagement and a focal point for interactions with stakeholders.

### 4.3 Memoranda of Understanding and Governance

An important component of working with stakeholders is the development of agreements or memoranda of understanding. Two examples are provided in the attachments to this report:

- Attachment 5 is a publicly accessible Memorandum of Understanding used by the National Library of Australia and its collaborators to formalise the contribution of data for national discovery services such as Trove. It includes details of intellectual property and obligations for each signatory.
- Attachment 6 contains a small number of clauses extracted from a Memorandum of Understanding between the University of Melbourne and a collaborative partner and includes project history, a broad outline of roles and details of intellectual property rights.

Included in the defined roles of each party in the second example is that the party ‘provide[s] a representative for the project governance committee’. Effective governance – including independent parties and key stakeholders – is essential to ensure the sustainability of public knowledge spaces over time.

---

33 Australian Research Council-funded project – Linkage LP0883232. Professor C.F. Humphreys; Professor S.L. Swain; Mr G.J. McCarthy; Dr A.J. Brown May; Ms C. Clare; Mrs M. Bamblett; Ms C. Asquini: ‘Who Am I? The archive as central to quality practice for current and past care leavers (Forgotten Australians)’.
In line with the ideas expressed above, it is also important that no particular stakeholder group is over- or under-represented on governance or steering committees. This would compromise the authority and broad utility of the public knowledge space.

4.4 Collaborative approaches to knowledge development

Another feature of the Who Am I? Project was the use of the ‘knowledge diamond’ (an action research methodology developed by Professor Cathy Humphreys, lead Chief Investigator on the project):

![Knowledge Diamond Diagram]

**Figure 10:**
The Knowledge Diamond

The key to this approach is that no type of knowledge is given precedence over the other – research evidence, consumer experience, practitioner wisdom and policy perspectives are given equal weight and equal input. ‘Authority’ here is not something imposed from above. Instead, this approach ensures the authority and utility of the knowledge space emerges over time through a process of engagement and collaboration.

4.5 Usability testing

Having defined an audience, these users should then become key participants in usability testing to ensure the public knowledge space meets their needs. This helps test whether relevant information is included, if pages are well structured and easy to navigate, and whether the resource is meeting the needs of the target community. It also aids engagement with the user community and provides an evidential base for decision making about future directions for the site.
Attachment 7 shows a sample outline of the initial usability sessions held for the *Pathways* website in October 2009. The Australian Government also recommends usability testing for online service delivery and outlines the quantifiable benefits of doing so:

- increase in productivity
- decrease in user training requirements
- decrease in calls to the Help Desk and need for technical support
- decrease in user error rate
- decrease in programming costs associated with late design
- decrease in maintenance costs.\(^{34}\)

### 4.6 Managing multiple perspectives

The purpose of all the steps outlined above – defining the audience, stakeholder engagement, agreements, collaboration and usability testing – is to ensure all relevant stakeholders engage with, support and contribute to the development of a public knowledge space; however, it is not to try to remove, conceal or resolve differing viewpoints and perspectives.

In fact, a key strength of a successful public knowledge space is in its ability to manage and acknowledge multiple perspectives or positions without favouring any particular position. A clear example of this can be found in the online resource *Agreements, Treaties and Negotiated Settlements*.\(^{35}\) (Though this resource no longer uses the Online Heritage Resource Manager – OHRM – earlier versions were developed and managed in collaboration with the ESRC, and the site still broadly reflects the OHRM’s structured informatics approach to public knowledge.)

The project partners give an indication of the diversity of interests being managed:

- The University of Melbourne
- Jumbunna Indigenous House of Learning
- Australian Research Council (Australian Government)
- AIATSIS (Australian Institute of Aboriginal and Torres Strait Islander Studies)
- ATSIC (Aboriginal and Torres Strait Islander Commission)
- Office of Indigenous Policy Coordination (Australian Government)
- National Native Title Tribunal
- University of Technology Sydney
- Rio Tinto
- Minerals Council of Australia

---


And, as the resource itself states, the 2005 project ‘The Implementation of Agreements and Treaties with Indigenous and Local Peoples in Postcolonial States’:

examined the special legal, governance, economic development, land/heritage, and environmental management issues that arise in the interface between indigenous societies, governments and corporations in an agreement context and will focus on the role of implementation in the creation of robust local and regional economies with the consequent benefits for indigenous and local communities.36

These apparently competing interests are brought together in this public knowledge space through a shared context. By concentrating on evidential knowledge (current information, historical detail, and published material including agreements, legislation, and other formal documents) the multiple perspectives of the diverse stakeholder group are not removed or negated; but opinions, anecdotal evidence, and personal or emotional responses – while they can be developed based on the material found here – are not themselves included in the public knowledge space. Therefore differences of policy, philosophy and world view are simply allowed to exist through a collective connection with evidential knowledge.

4.7 Authority registers as interventions

The Agreements, Treaties and Negotiated Settlements (ATNS) site has had an impact on the way in which all stakeholders engage with the evidence and, by providing a shared knowledge space for all parties, ultimately impacts on the way those stakeholders engage with each other. ATNS was acknowledged for this work, and for its global reputation, with a University of Melbourne Vice-Chancellor’s Knowledge Transfer Award in 2008.37

Similarly, Pathways has had a demonstrable impact on practice and received a University of Melbourne Knowledge Excellence Award in 2010 as an outstanding example of knowledge engagement between the University and external partners. The nomination stated:

since the website was launched the Pathways team have received consistent positive feedback from ‘care leavers’ about Pathways, and the sensitive, user-friendly and accessible way that the content is made available. Pathways has already become a vital tool in the daily work of service providers like Open Place, and the Adoption and Family Records Service (within DHS).38

Feedback from ‘care leavers’ and other users includes:

- “this is a great website – invaluable and complete”;
- “Your web site is ... excellent on information and very easy to access”; and,
- the site is a “wonderful resource, because care leavers would have options about how they used these materials. ‘If at first you don’t find what you are looking for, there are other ways of searching ... Having access to this rich online database will speed up the process’”\(^{39}\).

Since 2010, the project team has seen the impact of the resource increase. *Pathways* has had a demonstrable impact on practice and has invigorated public interest; it is used by journalists, genealogists, researchers, care leavers and their families, heritage workers, and case managers in child and family services. Organisations managing heritage collections have reported an increase in enquiries, and most of those enquiring have cited *Pathways* as their source of discovery.

Shared public knowledge spaces such as this should be seen as interventions, in that they can (if developed effectively) change the way people work simply by bringing together diverse, dispersed public knowledge relevant to a particular community together through a single, structured resource and by providing sufficient clear contextual information for users to understand how specific pieces of knowledge fit into the ‘bigger picture’.

As further validation of the impact of *Pathways*, the resource and the ten principles which underpin its success were considered the model for proposed national Find and Connect web resources. The ten principles underlying *Pathways* are applicable across all public knowledge spaces and reflect ideas expressed throughout this report. They are outlined in detail in Attachment 7.

The Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) has since engaged the ESRC and its collaborators on a large-scale project (2011-2014) to produce similar structured, standards-based public knowledge spaces for each state and territory, linked as a federated resource through a National Find and Connect site.

### 4.8 Structured online knowledge and impact on service models

Structured online knowledge has the potential to significantly impact service models by providing a single, authoritative point of reference for those providing service as well as for those to whom services are being provided.

Taking *Pathways* as an example, as noted above, organisations providing services to care leavers have incorporated the public knowledge space into their everyday work as the key reference for historical information about ‘care’ in Victoria to provide options for ‘care

---

leavers’ looking for information about their personal histories and records. Inquiries to these service providers have also increased as a direct result of Pathways.

The result is two-fold: first, service providers are more responsive and able to answer questions faster and more accurately as they have all the necessary information regarding the history and context of ‘care’ in Victoria at their finger-tips; and second, ‘care leavers’ are more aware of what services are available, and better able to identify and contact service providers directly relevant to their particular case. This leads to increased satisfaction in the responses received and fewer referrals.

Impact on service as a whole has been achieved primarily through the careful and structured use of information already in the public domain – by bringing information together as part of a unified resource for a defined audience, providing detailed context, and developing an authoritative contextual network of evidential knowledge which is not focused on government, individual ‘care’ providers or other stakeholders.

4.9 Examples of mixed (private-public) governance models

The list of partners for the Agreements, Treaties and Negotiated Settlements public knowledge space is outlined in Section 4.6 (above). It is worth noting that here the public knowledge space has been produced in collaboration with government, universities, and private industry. But the resource itself is not a government website, and is not hosted on a government, university or industry domain. The resource has an identity independent of private or public interests.

The same is true for Pathways (www.pathwaysvictoria.info) and other public knowledge spaces. Feedback received during the development of Pathways indicated that information on a site which was not domain-specific was considered more credible and authoritative than information on a government domain. This is not necessarily related to the actual information provided; more to the fact that, due to people’s general experience with websites and online knowledge, a particular domain is associated with a particular message from a particular stakeholder.

Independence and balance is also required in governing these resources. As noted above, a site for diverse stakeholders (particularly split across public-private domains) requires a governance model balancing these interests. Agreements, Treaties and Negotiated Settlements draws much of its strength from the fact that the projects which led to its development are not projects managed by government for communities, or resources produced by industry as part of industry consultation. Rather, the projects and related governance structures are equal collaborations between government, communities, industry and research, all working on a public knowledge space which sits outside (or between) all these domains.
5 EVIDENCE AND SOURCE DOCUMENTS

5.1 The centrality of evidence

Authoritative information requires more than independence and effective governance. It also requires evidence.

As outlined in the ‘Core Principles Underlying the Pathways website’:

The framework underpinning Pathways was conceived to make possible the continued evolution and enhancement of public knowledge and the associated evidence related to knowledge claims through time.

Pathways is an authoritative and reliable source of information about the key organisations, people, places, events, legislation and policies related to the history of ‘care’ in Victoria. The content is developed using research methods and sound infrastructure based on the principles of the scholarly ideal. In other words, references to the source of information and corresponding citations are always given. The content in Pathways can be explored further, verified or disputed by users.40

Knowledge with associated evidence, based on this model, lies at the heart of all the successful and sustainable public knowledge spaces developed by the ESRC.

5.2 Effective management of documents and source material

With the centrality of evidence comes a requirement to ensure that evidence – documents, publications and source material – is accessible to users. The final statement from the Pathways principles (above) is an important one: content “can be explored further, verified or disputed by users.” To allow for this process, wherever possible the evidence used to develop content needs to be accessible to the user.

Sites like Agreements, Treaties and Negotiated Settlements develop much of their authority by not only summarising and providing the context for treaties and settlements, but by providing links to the actual settlements themselves. The screen shot in Figure includes a direct link to a PDF of the Deed of Settlement in question:

40 eScholarship Research Centre, “Core principles underlying the Pathways website,” eScholarship Research Centre, The University of Melbourne [unpublished].
Important here, and for any public knowledge resource, is that wherever possible links are made to evidence that is accessible, not behind subscription walls or contained within internal systems. Furthermore, sustainability is improved if the evidence being linked to is managed by significant national or state-based cultural and heritage institutions – such as State Libraries, the National Library of Australia, or Public Record Office Victoria.

Alternatively, copies of evidential documents can be contained within the system itself, as seen throughout the resource *Reason in Revolt: Source Documents of Australian Radicalism*. The example below shows a resource page where the evidence is available either through a built-in image viewer or as a PDF:

---

Correspondence

Title
Collection of Government Documents Relating to the Aboriginal Tent Embassy of 1972

Imprint
Unpublished, 1972

Abstract
Includes internal government memos, press releases, and correspondence, all relating to the Aboriginal tent embassy protest of 1972.

Related Entries

People
- Foley, Gary (1950 - )
- Whitlam, Edward Gough (1916 - )

Subjects
- Black Power
- Indigenous Australia
- Indigenous Australia - 1950-1975
- Indigenous Australia - Embassy (1972 - )
- Indigenous Australia - Land Rights

Figure 12:

*Reason in Revolt: Source Documents of Australian Radicalism* – Collection of Government Documents Relating to the Aboriginal Tent Embassy of 1972

With reference to Section 2.7 (above), it is important to note this is a dissemination copy of the document only, provided to users of the site. Systems for disseminating records through public knowledge spaces must remain separate from authoritative document stores or internal document and content management systems to maximise the flexibility of the former and ensure the security and sustainability of the latter.

5.3 Maintaining information about records (including research)

Where evidence is a formal publication, recording full citation information allows for the maintenance of data and metadata about records (including research). Figure 12 shows an example of publication metadata from the *Encyclopedia of Australian Science*:

---

Registering these resources as structural elements in their own right means relationships can be created to people, organisations or other entries (or to other published resources, or to digital documents, or other related material), creating significantly more flexibility than a traditional catalogue or publication list. However, these resource details can still be used to compile more traditional bibliographic lists (see Attachment 8 for an example from the Encyclopedia of Australian Science).

Beyond this, the registration of published resources, research output and other records in a standards-based system means this information can be exported as XML, harvested between systems, or aggregated at a local, state or national level as required.

5.4 Managing online and offline source material

While some of the examples provided refer specifically to digital evidence, it remains true that a significant quantity of material is still stored and produced as print documents and hard-copy publications. And, in the context of producing a public knowledge space,
digitising significant quantities of evidence in advance is resource intensive and impractical (see Section 7.5 – Demand driven development).

Citation of offline material (whether held in libraries, archival collections, or elsewhere) will be required, in line with standard scholarly practice. As above, wherever possible evidence should be used which is accessible to the general public should they wish to see it, even if accessing the material requires visiting a physical collection held by a state library or similar institution.
6 STRUCTURED AND UNSTRUCTURED CONTENT

6.1 Structured and unstructured content

The development of online communities, user-generated content and social media present a significant shift in the way knowledge is presented and consumed online. Social media pages, blogs, Tweet-streams and other forms of interaction and engagement are relatively unstructured, fluid areas of knowledge transfer. And, as noted in the early stages of this report, this type of online interaction is extremely valuable in the development and maintenance of online (and, increasingly, offline) communities.

However, allowing significant unstructured content of this type into highly-structured environments can complicate the key characteristics of public knowledge spaces: that they be authoritative, sustainable, independent and evidential.

Therefore, while unstructured content is a requirement of online communities, this content – as with the stakeholder websites, wikis and repositories already discussed – should exist alongside and in conjunction with public knowledge spaces, not integrated directly with those spaces.

Examples in the ESRC’s practice can be found on Pathways, which includes a news blog alongside the public knowledge space, and on the homepage of The Australian Women’s Register (where events and blog posts can be accessed from the same page as browse and search functionality for the authoritative register).

Pathways does not allow comments on the site. In part, this is due to the sensitivity of the area in question. But also, Pathways is not designed as a single, ‘one-stop’ solution to all the needs of Forgotten Australians and those who have been in ‘care’. Sites maintained by organisations such as the Care Leavers Australian Network (CLAN) provide support services, forums, community news and updates, and members of the Network have been actively involved in the development of Pathways as an authoritative source of knowledge.

Thus, Pathways contains highly-structured, sustainable and authoritative knowledge for all stakeholder groups, and CLAN’s strength lies in its presentation of unstructured, topical or anecdotal information produced by a single stakeholder group for a single stakeholder group. The two resources work alongside each other, and both are required to service the target community.

---

6.2 Standards-based knowledge, user generated content and social media

Though it does not have an open or public comment section, *Pathways* does openly request feedback to the web team on every page:

![Image of Pathways website with feedback link highlighted](image)

**Figure 12:** Pathways – ‘Feedback to the web team about this page’

On clicking this link, users are directed to a form where they can provide feedback. Each email received includes the unique identifying number of the page (and therefore the entry) in question. Feedback through this form – while often unstructured – has been invaluable in confirming the validity and completeness of the resource.

*The Australian Women’s Register* has also experimented with a ‘pre-register’ where experienced users of the site and remote collaborators could provide structured or semi-structured content which, once checked, could be ingested into the site itself. This can provide a useful way of collecting content from a select range of users without the multitude of small (or large) edits conducted on wiki sites over relatively short periods of time.

A primary reason behind both approaches – feedback forms and pre-registers – is that (as outlined above) knowledge spaces require highly structured, standards-based approaches to ensure discoverability, sustainability and interoperability. While users can be trained in developing this content, the introduction of unstructured or poorly-structured content from untrained users can disrupt this functionality.

Finally, interactive social media tools serve little purpose in the specific context of public knowledge spaces. ‘Like’ buttons, for example, can help spread opinion-based pieces, topical articles or current event information, but have no discernable function when looking at formal, evidential knowledge. Similarly, forums provide spaces where users can express opinions, debate issues, and share anecdotal knowledge but, while feedback should always
be welcomed, opinion-based debate adds little to a formal evidential space. These are more effective when implemented for specific communities, with specific intent, in knowledge hubs which work in conjunction with authoritative public knowledge spaces, rather than as part of those authoritative spaces.

6.3 Metadata and data – online knowledge production

When discussing public knowledge spaces – and knowledge online more generally – the distinction between metadata and data is sometimes problematic. It is worth noting that metadata is itself a type of data, and should be treated as such. In particular, structured metadata can be used as data to analyse and draw out key concepts for text analysis, or as part of structured or semi-structured qualitative datasets. Metadata can also be used to generate quantitative data (citation counts and more), allowing for the statistical analysis of structured knowledge.

But beyond this, rich metadata as found in public knowledge spaces such as those produced by the ESRC (see Attachment 1) is itself knowledge. Detailed, structured and authoritative descriptions of contextual entities (people, organisations, events, etc.) requires the discovery and evaluation of evidence and source material (research), and the synthesis of this source material into sometimes very detailed descriptions.

These entries are themselves contextualised in carefully constructed, information-rich relationship networks, creating structured knowledge networks. The result is more than a library catalogue or list of resources. As a necessary part of acquiring, preparing, structuring, preserving and disseminating knowledge in context we are (or should be aiming at) ‘producing’ knowledge and understanding about the world being described.

All of this is not to say that resources like The Australian Women’s Register, the Encyclopedia of Australian Science, Pathways and Agreements, Treaties and Negotiated Settlements are not also discovery tools through which users can locate (and – where digital copies are available – access) detailed records, publications and archival material. This is one of their key purposes. But these resources are not only discovery tools. They are also citable sources of authoritative knowledge in their own right.
7 DEVELOPING KNOWLEDGE HUBS

7.1 Capability development: establishing a public knowledge space

Establishing a knowledge hub comes with specific capability requirements, some of which (such as working with social media modules, managing service provider contact directories, or integrating geographic and mapping tools) fall outside the scope of this report. However, over the next few sections we can outline some considerations for capability development with regard to authoritative public knowledge spaces in particular.

To provide some concrete examples of establishing knowledge spaces, the Pathways resource was first published online around 10 months after project commencement. This was preceded by stakeholder engagement activities, workshops and steering committee meetings, as well as a significant amount of work by a dedicated historian and an archivist and informatics expert from the ESRC.

The length of time before first publication can, however, vary considerably for three reasons (without considering budgetary constraints):

- The highly structured nature of the knowledge presented means that, provided key elements (titles, unique identifiers, dates and evidence) are in place, the fundamental components of a structured knowledge space can be brought together relatively quickly.
- Public knowledge spaces are never, and never claim to be, complete or totally comprehensive, and can have considerable impact while still in development.
- All knowledge included in a public knowledge space is (or has been) in the public domain, and all sources are cited, so initial development does not need to involve deep research and content discovery, or negotiations around private or confidential content (though these can be included if required by the defined scope).

Therefore, individual state, territory and national public knowledge spaces – nine in all – for the National Find and Connect project will be launched around five months after formal project commencement. This significantly shorter timeframe is due to increased funding, an existing content model (Pathways), and the availability of readily accessible semi-structured information for each state and territory already in the public domain.

In the case of the Department of Primary Industries, a detailed proof-of-concept public knowledge space will be available for review after two months, though further development of the data and knowledge structures is recommended before making a proof-of-concept ‘live’. Having said this, the ESRC’s experience suggests that useful contextual networks and information structures start to emerge once around one hundred entries and a few hundred information-rich relationships are recorded.

As for skill sets and other capability considerations, the highly-structured, authoritative, evidence-based approach used in public knowledge spaces means training and quality checking by experienced staff is required. The ESRC has trained staff from the university and community sectors in the writing of structured content, and continues to do so for
projects such as the National Find and Connect resources and for data capture projects undertaken for the Australian National Data Service.\textsuperscript{45}

Alternatively, skilled staff from a centre such as the ESRC can take primary responsibility for establishing a sustainable public knowledge space, provided sufficient access is given to the required knowledge; or key stakeholders can receive some training, after which content can be submitted through a pre-register or semi-structured feedback forms for checking, editing and ingest.

All these methods have been used at various stages of the development of Pathways, The Australian Women’s Register, the forthcoming Find and Connect resources, and more.

### 7.2 Capability development: expanding and maintaining a knowledge hub

A key characteristic of an authoritative public knowledge space is that the content is written and structured in a way that ensures the information is timeless (as outlined in section 2.5 of this report). This means that, if established effectively, all information published as part of a public knowledge space will remain technically accurate with no maintenance.

Having said this, we have also noted that no public knowledge space can be considered ‘complete’ and – particularly when dealing with current knowledge – changes in organisations, careers, projects, governments and other key contextual structures means public knowledge spaces benefit from continual maintenance, revision and expansion.

The low-maintenance approach (effective when staff and budget resources are limited) is to leave the site publicly available with clear feedback mechanisms. Experience demonstrates users will notify the publisher of the site relatively promptly as soon as key structures or details change. As an example, the Encyclopedia of Australian Science is based on data which has been publicly available online for around twenty years and is an exemplar of sustainable digital knowledge in practice. For the majority of this time the site was maintained with virtually no regular funding and very few resources using nothing but user feedback. While additional work is now required to update some aspects of the site, and some information could be considered ‘missing’, none of the information available online is incorrect as a result of lack of maintenance.

Linking a public knowledge space to an active community provides significantly more feedback for maintenance and expansion. Pathways, for example, receives feedback on missing homes, factual inaccuracies, and previously overlooked evidence.

The more public knowledge spaces are used, the more they will need to be expanded and maintained to remain relevant; however, increased use also effectively reduces the amount

of dedicated resources required to check, update and validate data on an ongoing basis, as the community surrounding the public knowledge space will assist with this work.

In addition, dedicated time for updating public knowledge spaces can be incorporated into general web publishing and publication distribution requirements, provided sufficient training and support is provided to staff. Much of this updating and expansion work can be demand driven (see section 7.5).

### 7.3 Capability development: technology

The technology requirements for public knowledge space development are not complex. Tools used to develop these spaces are often based in relatively rudimentary database systems, and the resulting web pages have a very low footprint. In addition, the lack of any active connection between published online output and backend databases means server load is minimal.

Also worth noting is that, as will be clear from this report, the effective development and maintenance of a public knowledge space is based more in strong conceptual frameworks than any particular technology solution. And the strong standards base advocated in Part 3 of this report is based on the notion that knowledge and data should not be tied to any particular technology.

However, creating a public knowledge space which is interoperable requires a system to interoperate with. Therefore, within a government or organisational context, some development of other related technologies to support common standards and interoperability can greatly increase the impact of a public knowledge space within a knowledge management context.

### 7.4 Managing organisational complexity

Though some capability development is required to effectively implement and maintain a public knowledge space for a particular domain, highly-structured knowledge can have commensurate benefits, such as the ability to assist with the analysis and evaluation of complex inter-linked business processes with the aim of reducing unnecessary complexity.

As part of work carried out for the Office of the Community Sector, looking at reducing the burden of standards in the community sector, the ESRC wrote the following:

> cross-mapping the full complexity of standards as they currently exist provides a useful analytical tool which could be used to guide the process of alignment and consolidation by highlighting areas of commonality between standards in both the organisational and the practice areas. Due to the high level of complexity visible in the current system, cross-mapping to highlight emergent
concepts and emergent patterns can potentially provide areas for alignment, consolidation and change which may not otherwise be easily recognisable.\textsuperscript{46}

Areas for alignment and change are not always visible because of the dispersed nature of complex relationships and cross-references in print-based documents. This makes it difficult for a single individual or group to retain all the connections in their mind. By presenting this complexity in a structured, standards-based form organisations can use tools for analysis and visualisation to more fully understand the complexity of their operating environment, leading to improved business processes and evidence-based continuous improvement.

Additional information on this capability can be provided on request, including in the final project report.

\section*{7.5 Demand-driven development}

While initiating and maintaining knowledge hubs and public knowledge spaces requires capability development and some allocation of resources, the ESRC has also produced successful outcomes with relatively limited resources. In many instances this has been based on demand-driven development.

First, with a public knowledge space such as \textit{The Australian Women's Register}, it is clear that the resource will never be complete, nor should it ever be considered complete. And the stated aim of the resource – to be a “growing source of biographical data about Australian women and their organisations” – effectively describes a scope, but it is a large scope which clearly cannot be achieved in a short space of time.

However, over the course of more than ten years the \textit{Women's Register} has continued to grow and expand, developing and entering new content based on specific projects and on demand from particular women’s groups and organisations. One result of this has been a series of exhibitions: on ABC Radio Australian Women of the Year; Women Philanthropists; Australian Women and Journalism; and many more.\textsuperscript{47} These draw on content from the site, but also represent specific phases of content entry initiated and funded by individuals, community groups and organisations.

Digitising work is also often demand driven. Though there is widespread interest in large-scale digitisation, this is resource-intensive and can produce large volumes of material for which there is no current or pre-determined need. Also, the cost of digitisation has been shown to decrease over time, while the quality to cost ratio increases, both due to ongoing


technological development. Therefore, waiting until there is demand for material is the most practical and cost-effective option, ensuring work and resources are targeted and purpose driven; and, once digitisation has occurred to meet a specific demand, the resulting material can remain available more generally for future users.

An example of this can be found with the records of Pigment Manufacturers of Australia Ltd (PMA Ltd), an archival collection held by the State Library of Victoria, with a digital guide to records written, published and hosted by the ESRC. From the ‘About the Records’ section of that guide:

In 2005, IT Environmental (Australia) Pty Ltd (pursuant to a Cleanup Notice issued by EPA) did an environmental audit of the former PMA Ltd site at Laverton. As part of their investigation the company wished to view the records of PMA Ltd and contacted Austehc [now the ESRC], resulting in the digital imaging of 573 records from 26 inventory items.

In June 2006 a further 1,993 records from 18 different inventory items were imaged as part of work for the University of Sydney's School of Business.

All the digital images produced as a result of Austehc's interaction with these organisations are attached to the relevant inventory item descriptions in this guide.48

This provides an example of demand-driven digitisation in action.

And, with reference to Section 7.2 (above), updating and maintaining public knowledge spaces based on demand is also a viable way of ensuring ongoing work is not excessively or unnecessarily resource intensive.

### 7.6 Authority registers and knowledge hubs

Returning to a distinction made throughout the sections above, public knowledge spaces or authority registers are not the totality of knowledge hubs; and knowledge hubs are not (necessarily) authority registers.

Many elements of broader knowledge hub development – around the effective incorporation of social media modules, mapping capability, or multi-media tools – are outside the scope of this report. Below, we look briefly at combining these two ideas – public knowledge spaces and knowledge hubs – with suggestions about the potential contents of each.

---

7.7 Defining scope and boundaries

Whereas authoritative knowledge spaces benefit from a defined scope, audience and intent (see Section 4.1, above), knowledge hubs include internal and external boundaries. Of particular relevance here is a decision about what information should be included in the authoritative public knowledge space and what should be included elsewhere.

Based on the concepts already covered, we suggest the following:

<table>
<thead>
<tr>
<th>Public Knowledge Space</th>
<th>Broader Knowledge Hubs</th>
</tr>
</thead>
<tbody>
<tr>
<td>- evidential knowledge</td>
<td>- anecdotal knowledge</td>
</tr>
<tr>
<td>- organisational structures</td>
<td>- news and event listings</td>
</tr>
<tr>
<td>- publications and authoritative documents</td>
<td>- stakeholder-specific information</td>
</tr>
<tr>
<td>- shared or agreed formal knowledge</td>
<td>- forums and discussion spaces</td>
</tr>
<tr>
<td>- defined context networks</td>
<td>- social media tools</td>
</tr>
<tr>
<td>- evidence and source documents</td>
<td>- user generated content</td>
</tr>
</tbody>
</table>

Using Farm Services Victoria as an example, the report authors presented the following to Department of Primary Industries staff at the ‘Knowledge Hub’ workshop on 18 October 2010:

Figure 13: Possible model for integrating authoritative knowledge
This hypothetical model shows industry networks (or ‘broader knowledge hubs’) around the ‘edge’ with a common or shared authoritative public knowledge space in the centre. This would constrain the scope of the knowledge hub and allow social media, stakeholder-generated material on current services and other unstructured content to be targeted to specific audiences, while still recognising a larger structural and organisational basis for these groups. The model presented also reduces the need for the duplication of authoritative common content across multiple industry networks.

The red squares around the authoritative register represent ‘boundary objects’; entries which may have an authoritative, evidence-based description (such as projects) which are also client-facing. These could provide a useful connection between unstructured or community generated content, and the authoritative public knowledge space.

Specific recommendations regarding the integration and utility of an authoritative public knowledge space in the specific context of the Department of Primary Industries and Farm Services Victoria will be provided in our final project report in December.
8 CONCLUSIONS

8.1 Knowledge hubs and the Department of Primary Industries

The purpose of this report is not to suggest that all online knowledge needs to be developed, structured and presented in the ways shown here. Nor is the intention to replace or supersede any current systems used by the Department of Primary Industries. Instead, the purpose here is to outline the concepts behind a structured contextual network which would work with and between existing systems.

Due to this, in examining the issues highlighted in Section 1.5 (above) with regard to knowledge and the Department of Primary Industries, and drawing on the ESRC’s experience, we believe a shared, structured, authoritative knowledge space at the core of the Department’s proposed knowledge hubs will provide substantial benefit to the Department.

8.2 Benefits of an authoritative knowledge space

The benefits of implementing an authoritative knowledge space at the core of the Department’s proposed knowledge hubs include the following:

- Department staff and other stakeholders will have access to a shared, authoritative source of information about the Department, related services and service providers, projects, research, publications, and other key information.
- Organisational knowledge will be developed and preserved in a structured, standards-based way now and into the future.
- Knowledge (including research outputs) will be stored in a structured, standards-based system supporting interoperability with other systems and integration with emerging national information infrastructure.
- Farmers, service providers and other clients will have improved access to information on the Department, its services, projects, research and other key information.
- Farmers and other clients will develop a better understanding of the Department and its services and initiatives (including emerging concepts such as wholesaling).
- All stakeholders will have access to structured information to analyse and evaluate emerging patterns and concepts, and through which to evaluate business processes.
- The Department and other relevant stakeholders will develop an evidential base for its activities, and for ongoing service development and continuous improvement activities.
- The broader knowledge hub agenda, with a focus on community engagement, anecdotal knowledge, social media, events, client tools, and related concepts, can draw on and interact with a stable, authoritative base as required.
8.3 Challenges in implementing an authoritative knowledge space

A number of points will need to be addressed to ensure the benefits of an authoritative public knowledge space can be fully realised, including:

- whether the capability of existing staff to prepare and maintain structured, standards-based knowledge through time can be developed;
- whether sufficient organisational resources are available for public knowledge space development;
- whether the highly skilled resources (from the ESRC, or elsewhere) required to support capability development are available;
- whether the rapid development and deployment of a public knowledge hub, in line with the broader knowledge hub agenda, is feasible or advisable; and,
- whether key stakeholders from outside the Department (including farmers and other service providers) are willing and able to enter into collaborative public knowledge space development with the Department.

8.4 Conclusion

The eScholarship Research Centre provides this ‘Lessons Learned’ report in the interests of knowledge sharing, and to promote the development of sustainable online knowledge resources for the public good.

As the Pre-Scoping project is currently at its mid-point, and as this report is intended to present lessons learned when working with other sectors, we are not providing specific recommendations as part of this document, beyond the fact that the document as a whole recommends a particular approach to the management and presentation of formal, evidential knowledge online. We believe this approach would be beneficial to the Department now and in the future.

A full list of recommendations will be included in our final report. In the meantime, we will gladly discuss any of the learnings outlined in this report.

In line with the 2 November 2011 deliverable, this is a draft report; a final copy of this document will be presented on 5 December 2011. Requests for amendments to this draft report prior to final submission should be made to the eScholarship Research Centre in a timely manner to allow delivery of the final document on the date specified.

Michael Jones and Gavan McCarthy, 2 November 2011
ACKNOWLEDGEMENTS

The authors would like to acknowledge all the Department of Primary Industries staff who attended the planning, lessons learned and knowledge hub workshops. Their contribution and input has contributed to the scope and focus of this report.

We would like to thank Dr Antonina Lewis for her ongoing work on the project, and for her thoughtful comments on the initial draft of the document.

Finally, we would like to acknowledge Richard Vines, whose dedication, rigour and ongoing intellectual contributions have been invaluable.
BIBLIOGRAPHY


Department of Primary Industries, “Draft Project Implementation Plan for the Knowledge Hub Sub Project: Shaping the context for an integrated knowledge hub for the dairy and grains industry sectors,” 14 September 2011.


Department of Primary Industries, “Pre-Scoping study: Shaping the context for an integrated knowledge hub development for the diary and climate change sectors,” Request for Quotation – Terms of Reference, 11 August 2011, p. 3.


eScholarship Research Centre, “Core principles underlying the Pathways website,” eScholarship Research Centre, The University of Melbourne [unpublished].


http://www.openarchives.org/pmh/


Reason in Revolt Project, Reason in Revolt: Source Documents of Australian Radicalism, Reason in Revolt Project, September 2011. Date Accessed: 2 November 2011.  
http://www.reasoninrevolt.net.au/


Attachment 1 – eScholarship Research Centre: Key Resources

Here is a selection of key resources produced by the eScholarship Research Centre in collaboration with other people. These publications have been produced using the Online Heritage Resource Manager (OHRM) and are ordered by their year of publication, starting with the most current:

- **Encyclopaedia of Australian Science** - A register of over 3,000 people and the many industries, corporations, research institutions, scientific societies and other organisations that have contributed to Australia's scientific, technological and medical heritage including references to archival materials and bibliographic resources about them.

- **Colonial Australian Popular Fiction** - An online bibliography and digital archive that gathers together for the first time a wide range of vibrant colonial writing that has previously been difficult to access.

- **Pathways** - A resource for people who as children were in out-of-home ‘care’ in Victoria. Pathways tells the story of institutional ‘care’ in Victoria from its beginnings in the 1840s through to the present. It includes stories and images that describe key institutions and auspicing agencies, public figures, legislation and policies, events, with links to significant publications and record holdings.

- **Australian Women's Archive Project** - An online register containing biographical data about Australian women and their organisations, with links to the archival repositories where their records are held and to other sources of information. Since the establishment of the register, a number of exhibitions have been developed that further enrich this fascinating resource.

- **eMelbourne** - An A to Z reference work covering the Melbourne’s history from pre-European settlement up to the present day. eMelbourne contains the full text of the *Encyclopaedia of Melbourne*, published in 2005 by Cambridge University Press, with additional text and digital resources.

- **World History of Science Online** - The WHSO project will create a free sustainable online resource for the worldwide community interested in the history of science and technology in all its richness and diversity.

- **Australian Dictionary of Biography, Online Edition** - The online publication of the *Australian Dictionary of Biography* uses the OHRM to manage the entries and relationships to archival and published resources. It has customised display templates and search functionality.

- **eGold A Nation's Heritage** - Telling the story of gold through images, stories and multimedia interactives, eGold connects individual stories to the wider historical themes of global gold rushes, global migration flows, building the Australian nation and democratic change during the gold rushes.

- **Post Office Mauritius** - A research companion with biographical and bibliographical information about the Post Office Mauritius stamps and subjects related to them. It is based on Helen Morgan's research for the book *Blue Mauritius: The Hunt for the World's Most Valuable Stamps*.

- **Chinese-Australian Historical Images in Australia** - A catalogue of historical images of Chinese, Chinese immigrants and their descendants held in Australia. It primarily draws on the photographic holdings of the Chinese Museum but also includes photographs from other online archives, publications and private family collections. Built into the database

---

is the beginnings of an encyclopaedia of Chinese-Australian history, complete with bibliography, which provides contextual information about the images in the database.

- **Reason in Revolt: Source Documents of Australian Radicalism** - A collaborative project with scholars at Monash University and the University of Melbourne using the OHRM to map, register and digitise key documentary resources relating to the history of Australian radicalism.

- **A Guide to Australian Business Records** - A gateway to Australia's business heritage which draws together historical information on Australian businesses and business people (business entities). It links business entities with information on extant archival records created by the entities and held in archives and libraries, together with citations of published works about the entities. Where business entities are known to be related these relationships have been included as hypertext links.

- **Australian Venom Research Unit Compendium** - A resource for the general public, students, research scientists and clinicians which describes Australia’s most venomous creatures, envenomation treatment regimes (current and historical), symptoms and causes of envenomation, published resources, a glossary of terms and more.

- **Gateways to the History of Medicine at the University of Melbourne** - Gateways to the history and archives of Medicine, Dentistry and Health Sciences at the University of Melbourne. Includes Faculty of Medicine, Dentistry & Health Sciences - A Historical Compendium; Johnstone-Need Medical History Unit; Online Medical and Dental History Museum Catalogues; Australian Nursing History Project and Witness to the History of Australian Medicine.

- **Faculty of Science at the University of Melbourne: A Historic Compendium** - A historic register of the people, departments, scholarships, prizes and bequests, research centres and affiliated organisations that make up the Faculty of Science at the University of Melbourne, with references to archival materials and a bibliography of historical published literature.

- **Australian Trade Union Archives** - A gateway for researchers and scholars of labour history, designed to link together historical detail, archival resources, published material and current information about Australian industrial organisations, mainly including trade unions and also employer bodies.

- **Lost Lives** - A website commemorating the Second World War in the islands of New Guinea. Uses the OHRM data structures for managing the data but presents the information in a customised template.

- **Victorian Patents and Patentees 1854 to 1904** - A digital database and website containing 21,500 patent applications lodged in Victoria from 1854 to 1904.

- **Federation and Meteorology** - A Centenary of Federation publication on the emergence of Australian meteorology as a science and the formation of the Bureau of Meteorology in 1908, paralleling the story of Australian Federation.

- **Science and the Making of Victoria** - The online publication of the inaugural speeches of the Royal Society of Victoria’s first presidents, visionaries who in their public life set the foundations for the Society and for the broad and deep scientific infrastructure that supports modern Victoria. R. T. M. Pescott’s history of the Society reviewing the years 1854 to 1959 has been republished from the Proceedings, while the rich resources held within the Society’s records have revealed further writings of past presidents, such as Hills, Leeper and Garran, as they reflect on the role of the Society and science in Victoria.

- **Technology in Australia 1788-1988** - The online edition of this bicentenary study by the Australian Academy of Technological Sciences and Engineering of the men, women and organisations involved in the development of technology in Australia.
Attachment 2 – Australian Bureau of Statistics: Information for Visually Impaired Clients

Information for Visually Impaired Clients

The ABS operates in accordance with the Australian Government Information Management Office (AGIMO) guidelines relating to accessibility for visually impaired users and is working to ensure that our website meets the requirements of the World Wide Web Consortium (W3C) Web Content Accessibility Guidelines.

The ABS is making an effort to ensure that our website is accessible by visually impaired users. However, due to technological limitations, it is not possible to make the website entirely accessible in a cost-effective manner. This limitation means that some tables, products or parts of the website may be less accessible to some visually impaired users.

Where any of our web products are not suitably accessible, the ABS will be pleased to make arrangements for the Royal Society for the Blind to translate the product into a more appropriate format. This service is provided at no additional cost to the user.

For further information about having products translated, or if you are experiencing difficulties accessing this site for any reason please contact the National Information and Referral Service.

Telephone 1300 135 070
Fax 1300 135 211
Clients outside Australia telephone 012 9268 4909
Email: client.services@abs.gov.au

Client Services
Australian Bureau of Statistics
GPO Box 796
SYDNEY NSW 2001


Managing Knowledge in the Public Sphere (Jones, McCarthy)
Managing Knowledge in the Public Sphere (Jones, McCarthy)
Attachment 4 – Who Am I? and Pathways Partners

- The University of Melbourne
- Australian Catholic University
- The Salvation Army
- Wesley Mission Victoria
- Anglicare Victoria
- Berry Street
- Centre for Excellence in Child and Family Welfare
- Child and Family Services Ballarat
- Department of Human Services (Victoria)
- Glastonbury Child and Family Services
- Good Shepherd Youth and Family Services
- Kildonan Uniting Care
- MacKillop Family Services
- Orana Family Services
- St Luke’s Anglicare
- Victorian Aboriginal Child Care Agency Co-operative
- Victorian Adoption Network for Information & Self Help
- Wesley Mission Victoria
Attachment 5 – National Library of Australia: Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

CONTRIBUTION OF DATA FOR NATIONAL DISCOVERY SERVICES

PARTIES

This is a Memorandum of Understanding (MoU) between the National Library of Australia (the Library) ABN 28 346 858 075 and [INSERT NAME OF CONTRIBUTOR] (the Contributor) ABN [INSERT CONTRIBUTORS ABN].

BACKGROUND

- The Library currently operates a range of collaborative online discovery services and from time to time redevelops and extends those services (the Project).
- The Contributor possesses certain data (either metadata or full text data) which would enhance those discovery services, and is willing to contribute that data to the Library’s Project.

STATUS AND TERM

This MoU is not legally binding, but is intended to acknowledge that the parties will cooperate in good faith. The MoU will take effect from the later of the dates of signing below, and will continue indefinitely until one party terminates the MoU by providing 20 working days notice in writing (including e-mail) to the other party.

If the MoU is terminated, the two parties will discuss and agree on whether the Library should delete the previously contributed data from its discovery services.

INTELLECTUAL PROPERTY

This MOU does not affect the ownership of any intellectual property in the Contributor’s data. Intellectual property that exists or is created as part of this relationship remains with the creator. Each party grants the other a non-exclusive license to use the intellectual property for the purpose of the Project.

EXPENSES

There is no fee to join the Project. Both parties acknowledge that their participation in this MoU will incur expenses. Each party will meet its own expenses incurred during the Project.

OBLIGATIONS OF THE LIBRARY

The Library will:

- Harvest the Contributor’s data in a manner which avoids or minimises any disruption to the Contributor;
- Provide advice to the Contributor on the Library’s requirements with respect to technical and data standards;
- Include the Contributor’s data in its services, thus referring additional traffic to the Contributor’s site;
- Use reasonable measures to discourage any third party modifying the Contributor’s data without the Contributor’s permission.
- Make its best efforts to ensure that the Library’s discovery, harvesting and other relevant automated services are available reliably (target average availability: 99.5%) and with satisfactory response times;
- Consult with the Contributor about planned improvements to the Library’s discovery services; and
- Support effective communications with other contributors and with the Library itself.

OBLIGATIONS OF THE CONTRIBUTOR

The Contributor will:

- Make arrangements which facilitate the harvesting of its data by the Library;
- Conform to the Library’s technical and data standards to the maximum extent practicable;
- Use its best efforts to contribute the data as soon as possible after it is generated by the Contributor;
- Provide the Library with any technical and explanatory information about the data which the Library requests;
- Allow the Library to reproduce, publish, modify and otherwise use the Contributor’s data in its programs including in its discovery services and machine-to-machine interfaces;
• Allow the Library to use information about the Contributor (including its logo where applicable) in its discovery services;

• Acknowledge that users of the Library’s discovery services will be able to retrieve and download the data; and

• Inform the Library if any links from the data will need to change because of relocation of content on the Contributor’s website.

DESCRIPTION OF DATA TO BE CONTRIBUTED

[INSERT HERE A BRIEF DESCRIPTION OF THE METADATA OR FULL TEXT DATA WHICH WILL BE CONTRIBUTED].

WARRANTY

The Contributor warrants that the provision of this data to the Library and the use of the data in the discovery services will not infringe the Intellectual Property Rights or Moral Rights of any person or organisation.

CONTACT INFORMATION

<table>
<thead>
<tr>
<th>The Library</th>
<th>The Contributor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose Holley</td>
<td>[INSERT DETAILS]</td>
</tr>
<tr>
<td>Manager, Trove</td>
<td></td>
</tr>
<tr>
<td>National Library of Australia</td>
<td></td>
</tr>
<tr>
<td>Parkes, ACT 2600</td>
<td></td>
</tr>
<tr>
<td>Phone: (02) 6262 1224</td>
<td></td>
</tr>
<tr>
<td>E-mail: <a href="mailto:rholley@nla.gov.au">rholley@nla.gov.au</a></td>
<td></td>
</tr>
</tbody>
</table>

EXECUTION

<table>
<thead>
<tr>
<th>SIGNED on behalf of the LIBRARY:</th>
<th>SIGNED on behalf of the CONTRIBUTOR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of person signing and position:</td>
<td>Name of person signing and position:</td>
</tr>
<tr>
<td>IN THE PRESENCE OF:</td>
<td>IN THE PRESENCE OF:</td>
</tr>
<tr>
<td>Name of witness:</td>
<td>Name of witness:</td>
</tr>
<tr>
<td>Date:</td>
<td>Date:</td>
</tr>
</tbody>
</table>
Attachment 6 – Memorandum of Understanding (Extracts)

[EXTRACTS ONLY]

Memorandum of Understanding
The University of Melbourne
ABN 84 002 705 224
Partner A

1.8 **History of the relationship between Partner A, the ESRC and the School of Historical Studies**

Partner A and the ESRC (and its predecessors) have an effective collaborative relationship that dates back to 2000 based on the creation, development and support of the Australian Women’s Archives Project, now the Australian Women’s Archives Program. The AWAP has undertaken research under the leadership of the School of Historical Studies into Australian women’s history for publication on the world wide web of information that will assist people understand, locate and use resources documenting the lives of Australian women. The ESRC and its predecessors have provided the technical platform (the OHRM) to enable the scholarly web-publication of this information. The ESRC and its predecessors have also provided physical accommodation and infrastructure to house the staff of AWAP. The result is the information available in the Australian Women’s Register located at [www.womenaustralia.info](http://www.womenaustralia.info)

Over the ten years of this relationship, the Register has developed into a significant cultural collection and the most comprehensive resource relating to Australian women’s history in the country. It has outgrown the capacity of the volunteer members of Partner A to manage it.
1.9 **Description of AWAP Website Management Project**

For the duration of this Memorandum of Understanding, the ESRC will commit to manage the AWAP website in order to ensure a sustainable and reliable web publishing service. This will involve the following general tasks:

- Provision and maintenance of the OHRM software
- Provision of data storage and disaster recovery facilities for the AWAP data and related electronic documents
- Provision of an appropriate public-facing web-service capable of dealing with the web-traffic and usage needs of womenaustralia.info

2. **ROLES OF EACH PARTY**

2.8 **Role of Partner A**

Partner A will:

- Participate in the implementation of this Memorandum of Understanding;
- Provide a single point of contact (representative) for the project;
- Provide a representative for the project governance committee; and
- Perform duties and meet obligations as specified in the accompanying schedules and as agreed by the project governance committee.

2.9 **Role of The University of Melbourne eScholarship Research Centre**

The University of Melbourne eScholarship Research Centre will:

- Participate in the implementation of this Memorandum of Understanding;
- Provide a single point of contact (representative) for the project;
- Provide a representative for the project governance committee; and
- Perform duties and meet obligations as specified in the accompanying schedules and as agreed by the project governance committee.

3. **PARTIES TO ACT IN GOOD FAITH**

From the date of this document, each Party is to co-operate with the other Party in good faith. To avoid doubt, acting in good faith means:

(a) acting honestly;
(b) cooperating in the performance of this Memorandum of Understanding;

(c) doing all things necessary to enable the other Party to have the benefit of this Memorandum of Understanding in accordance with its terms;

(d) acting reasonably in the exercise of powers and discretions under, and the performance of obligations in relation to, this Memorandum of Understanding; and

(e) not impairing the basis of this Memorandum of Understanding.

4. INTELLECTUAL PROPERTY RIGHTS

(a) This Memorandum of Understanding does not affect the ownership of Intellectual Property in any pre-existing material and any customisation or enhancements thereof.

(b) Each Party grants to the other Party a world-wide, irrevocable, royalty-free, transferable, non-exclusive licence (including the right to sublicense) to:

(i) use, reproduce, communicate, publish, modify and adapt the Register content in accordance with the Creative Commons copyright licence as established by the AWAP for the Australian Women’s Register and associated web publications

(ii) allow its contractors to exercise the licensed rights.

for the sole purpose of performing the tasks contemplated by this Memorandum of Understanding.

(c) In granting the licence referred to in Clause 5 (b), The ESRC represents and warrants that:

(i) it has and will at all times during the Term maintain the requisite authority to grant such a licence to Partner A

(ii) Partner A’s exercise of its licensed rights in respect of the Register Content and OHRM will not infringe the Intellectual Property rights of any person.

(d) The ESRC grants Partner A a non-exclusive licence to use the Online Heritage Resource Manager (OHRM) software.

(e) The licence set out in Clauses 5 (b) and 5 (d) will continue in force during the Term.
Attachment 7 – Core principles underlying the *Pathways* website

Core principles underlying the *Pathways* website

*Pathways* ([www.pathwaysvictoria.info](http://www.pathwaysvictoria.info)) is a website providing access to historical resources relating to the history of out of home ‘care’ in Victoria. The website is an outcome of the ARC Linkage grant-funded Who Am I? Project, and was produced with technology developed by the eScholarship Research Centre at the University of Melbourne.

This document outlines the core principles underlying *Pathways*. These principles have been the basis of project design and planning from the very outset. The system underpinning *Pathways* has been designed so that the website meets the needs of our target audiences and addresses many of the challenges associated with publishing ‘public knowledge spaces’ on the web. The aim has been to produce a resource that is useable and reliable now, and one that has been designed to stand the test of time.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unsupported License. To view a copy of this license, visit [http://creativecommons.org/licenses/by-nc-nd/3.0/](http://creativecommons.org/licenses/by-nc-nd/3.0/) or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.

**August 2010**

Communication to be directed to:

Gavan McCarthy
Senior Research Fellow and Director:
eScholarship Research Centre
gavan.mccarthy@unimelb.edu.au
The Ten Core Principles

The foundations and principles on which Pathways is based

1. Standards Based
   ➢ A content management system founded on international standards for recordkeeping and for archival description.

2. Evidential
   ➢ An authoritative and reliable source of information based on the principles of the scholarly ideal.

3. Persistence and Meaning through Time
   ➢ The gathering and presentation of content in a clearly structured, explicit and consistent way, informed by robust and resilient informatics.

4. Resilient Content Management
   ➢ The separation of the authority database from the web publication – or presentation from structured content – a necessary component for long term data preservation.

5. Multiple Access and Reference Points
   ➢ Every primary object (publication, archival source, person etc.) is represented by a uniquely identified web page – all pages indexed by major web search engines and directly accessible.

6. Human to Human Knowledge Sharing
   ➢ All information is presented in human readable forms to aid analysis, discovery, citation and sharing.

7. Computer to Computer Data Sharing
   ➢ Selected key information is available in machine readable forms (i.e. Dublin core and EAC-CPF XML) for systematic harvesting and use by other information services, i.e. TROVE.

8. Public Knowledge Focus
   ➢ A public knowledge space designed to meet community needs and help communities function effectively.

9. Network Science Foundations
   ➢ A system capable of representing the complexity of society, and presenting it in a way that is clear and meaningful, creating opportunities for new discoveries and further knowledge.

10. Coherent Interface Design
    ➢ A purposeful interface design that is coherent and meaningful to the target community, and encourages community engagement.
1. Standards Based

*Pathways* utilises a content management system founded on international standards for recordkeeping and for archival description, specifically:

- ISAD(G) General International Standard Archival Description.
- ISAAR(CPF): International Standard Archival Authority Record for Corporate Bodies, Persons, and Families.

Also, guidelines that specifically address the Australian context have been the basis for the archives descriptions in *Pathways*. For example, *Describing archives in context: a guide to Australasian practice*, (2008) by the Society of Archivists Committee on Descriptive Standards.

There are various web standards and protocols that play an important role too, such as:

- each web page has embedded AGLS Dublin core metadata (AGLS is Australian based)
- web content interoperability according to OAI-PMH\(^5^3\)
- WCAG (2.0) for accessibility.

These standards, guidelines and protocols were developed from the substantial body of knowledge and experience gained from practice in Australasia and internationally over the past forty years. They encourage standardised descriptive practice and enhance discoverability (by Google and other online search engines). They facilitate the sharing of data:

- within *Pathways* via relationships between organisations, people, families, events etc.
- with external data sets such as the National Library of Australia’s Trove (www.trove.nla.gov.au).

The way information is captured in *Pathways* adheres to these standards, protocols and guidelines both structurally and in the use of language.

2. Evidential

The framework underpinning *Pathways* was conceived to make possible the continued evolution and enhancement of public knowledge and the associated evidence related to knowledge claims through time.

*Pathways* is an authoritative and reliable source of information about the key organisations, people, places, events, legislation and policies related to the history of ‘care’ in Victoria. The content is developed using research methods and sound infrastructure based on the principles of the scholarly ideal. In other words, references to the source of information and

\(^5^3\) The Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) is a low-barrier mechanism for repository interoperability. *Data Providers* are repositories that expose structured metadata via OAI-PMH. *Service Providers* then make OAI-PMH service requests to harvest that metadata.
corresponding citations are always given. The content in *Pathways* can be explored further, verified or disputed by users.

### 3. Persistence and Meaning through Time

The *Pathways* project has been driven by the need to document key information about people, organisations and events in the history of child welfare in Victoria, in a way that can be understood through time, and preserved over time.

It is essential that *Pathways* is a reliable source of information that can be linked to with confidence now and into the future.

*Pathways* entries are compiled in a highly structured and consistent way, informed by robust and resilient informatics.

Underpinning technologies must support:

- a resilient and robust network of space and time based ‘relationships’ – this contextual richness may result in some of duplication or even redundancy, but this may be necessary to provide enough information to make the information meaningful over time.
- highly structured, standards based content.
- consistency and quality of content.
- systems to link.

Any method used for collating information should include:

- enough contextual information around the ‘record’ to create meaning, and make it meaningful through time.
- a layered approach, starting with core identity or ‘authority’ data, i.e. name/title, dates and place of existence, summary note. More and more layers of details are possible from this basic authority data.
- scholarly content, that is, quality, evidence based content.
- highly structured content – standards based, built on practice, ensuring consistency and quality.

The language in *Pathways* is written, as far as possible, as statements that will retain meaning through time. For example, rather than writing in the present tense ‘The Broadmeadows Family Centre is based in Glenroy’, *Pathways* states: ‘In 1974, the Broadmeadows Family Centre was established in Glenroy at the former site of St Agnes’ Girls’ Home.’

Also, we have strived to disambiguate the language. See for example this text from the “About” page on *Pathways*:

> *In Pathways, we have strived to use inclusive and non-derogatory language. We know there is no single term that is able to describe the wide and varied experiences ... In most cases, we have fallen back on the terms ‘care leavers’, or “people who were in ‘care’ as children”. Where
we are describing experiences specific to Indigenous people, we use the term 'members of the
Stolen Generations'... Sometimes, we have reproduced the original language from our
historical sources... such sources sometimes use language to describe people in derogatory
and offensive ways that are totally unacceptable today. We use such terms in order to
demonstrate the language (and thus, the thinking) of the time... we apologise for any offence
or distress reading such language might cause... Pathways contains a Glossary, where we go
into more detail about common terms and concepts in this field, and try to put them into
context.

4. Resilient Content Management
The separation of authority database from the web publication (i.e. separating structured
content from presentation) is an important aspect of the long-term preservation of
knowledge. It means that the content can travel through systems as technologies change. In
Pathways the web pages are created by harvesting data from the authority database. This
brings a number of significant productivity gains, i.e. an entity is registered once, and can be
utilized (via relationship mapping) in an unlimited number of ways.

This means that:
- there is scope for a number of different outputs to be generated (html, XML, EAC,
  print/PDF etc.) without compromising the integrity of the master data.
- there is greater flexibility in migrating the ‘master data’ to new technology platforms
  as they arise (the idea of an ‘exit strategy’ for the content is related to standards
  compliance and needs to be built into the project and the technology from the very
  beginning).
- the encyclopaedic world you build can be called upon to tell any number of stories;
  these different stories can meet different needs of different communities at
different times but the foundations (i.e. the database, the encyclopaedia) are not
  compromised.
- there is scope for the development of themed stories and separate web publications
  that draw on subsets of data from the ‘encyclopedia’, without compromising the
  encyclopaedic foundation.

5. Multiple Access and Reference Points
The technology behind Pathways constructs a network comprising digital, referable entities
(known in informatic circles as ‘first class objects’). Each entity or web page in Pathways is
represented with a unique and persistent URL. Each entity (person, organisation,
publication, etc.) becomes a potential access or reference point.

Individual pages and all of the content in Pathways can be indexed by search engines like
Google, enhancing the discoverability of the database content.
6. Human to Human Knowledge Sharing

*Pathways* is fundamentally the result of human knowledge and wisdom, a purpose-driven system designed to make specific information accessible to a specific community in order to meet their needs. The goal is to create a system which enables knowledge about the past to be shared between people.

*Pathways* is set to work in a way that reflects how people share knowledge, on a person to person basis. People can cite with confidence and as needed to specific sources of information within *Pathways*, e.g. put a URL to a first class object page in an email and send it to someone.

The entities within *Pathways* and the relationships between them are the work of a team of scholars and experts, who have collaborated to map the range of public domain sources relating to the history of ‘care’ in Victoria, and to capture the contextual information about these sources. The authority of the information in *Pathways* is the result of human interpretation and judgement by members of the *Pathways* team.

The relationships between entities are decided on by members of the *Pathways* team in consultation with community service organisations, Forgotten Australians and government agencies. This results in ‘relationships that are contextually meaningful, historically valid and evidentially defensible’.

7. Computer to Computer Data Sharing

*Pathways* is a public knowledge space comprising information that has been structured to facilitate data sharing with other public knowledge spaces. *Pathways* is a node that can interconnect with other digital, persistent, referable resources. Some useful properties would include:

- automatically creating citations and links to pages
- enabling sites to harvest data from each other
- creating as many citation points (i.e. nodes) as possible, so others can link to it – enhancing interconnectibility (rather than creating a silo).

Other sites which are built according to similar principles as *Pathways*, and which comply with the relevant standards, are able to harvest data from *Pathways*, adding to the public knowledge about a particular entity, enhancing ‘discoverability’ and adding richness and meaning.

Each web page in *Pathways* has embedded AGLS Dublin core metadata. The AGLS metadata standard was developed by the National Archives of Australia so that Australian government agencies could improve the visibility and accessibility of their web services.

---

54 Gavan McCarthy, ‘Mapping the past: building public knowledge places to meet community needs’, p.4.
Pathways has been designed to interconnect with other important web resources in Australia, particularly the National Library of Australia’s Trove. Pathways can draw on newspaper articles, books and archival collections listed in Trove to enhance the entries in Pathways. Trove can harvest information from entities in Pathways to enrich its knowledge space.

8. Public Knowledge Focus

Pathways is committed to the sharing of knowledge in the public domain. The ‘knowledge commons’ has always played a critical role in enabling communities to function effectively. The web has profoundly transformed the quality and availability of information in the ‘public domain’. Public knowledge spaces like Pathways enable the effective transfer of well-structured and navigable information about the past and the present, to meet needs now, and for communities in the future.

Pathways contains information about resources that are publicly known. This includes information about publications, archival collections, photographs, newspaper articles, museum objects, legislation, and submissions to government enquiries. Importantly Pathways points to the archival collections of public and non-government agencies where records of vital importance to the community are held. Also, the collection descriptions on Pathways are created for public consumption. In Pathways, we have tried to present a profile of each organisation’s record holdings to the public.

The technology used to create Pathways supports the fundamental principle of freely sharing information in the public domain. It is vital that the system be a non-proprietary, open source technology, designed to keep up with and adapt to innovation and new ways of using and sharing data that may become possible in the future. The use of non-proprietary, standardised technologies such as relational or SQL databases and XML - and the avoidance of proprietary products and formats - is a necessary component for long term sustainability.

9. Network Science Foundations

The system underpinning Pathways has its foundation in what has come to be known as network science, which has links with ‘complexity theory’. Network science is about the study of collections of interacting parts (‘from atoms and molecules to bacteria, pedestrians, traders on a stock market floor, and even nations’), and how to represent and understand the complexity of such systems. This study of complex networks leads to the creation of new ‘jumping-off points’, and potentially to further understanding.55

The Pathways website is generated from a relational database. This system is capable of representing the complexity of the public domain sources of knowledge about the history of ‘care’ in Victoria. It manages to capture and describe the complex relationships, and make sense of the fragmented, dispersed sources of information that are in the public domain.

The contextual relationships between entities in the database are fundamental to the entities’ meaning, evidential value and accessibility through time. Relationships are an important element of archival descriptive standards, providing the public with the necessary information to be able to select, use, understand and trust archival records.

The Pathways website shows each entity’s relationship to other entities in the database. These relationships are different to the hyperlinks between related entries in a resource like Wikipedia. In Pathways, the relationships are able to be controlled and defined, they can usefully capture relevant contextual information about time, place. For example, Pathways shows that Melbourne City Mission (1854–) ran (is related to) the Elizabeth Fry Retreat (1884-1986) from 1943, when it took over from the Quakers.56

The use of a relational database to create web pages leads to significant productivity gains. In the database, information only needs to be entered once. Any changes to other related entities are made automatically when the information is uploaded to the web.

The relational database sitting behind Pathways, and the information it contains about the relationships between different entities and resources makes it possible to publish comprehensive, rich, authoritative information on the web.

10. Coherent Interface Design

The interface of Pathways is designed to meet informatics, user and usability needs. It is the result of years of research and experimentation, and testing various iterations, to come up with a system design for a public knowledge space that is useful, welcoming and unthreatening to the primary target audience.

56 http://www.pathwaysvictoria.info/biogs/E000339b.htm
Attachment 8 – Sample Bibliographic Listing from the *Encyclopedia of Australian Science*57

**Browse Published Resources - A**

- The 50th Anniversary Annual Orations, the New South Wales College of Nursing. The College, Sydney, 1999. © Details
- Abbie, A. A., 'Sir Gerald Elliot Smith', Bulletin of the Post-Graduate Committee in Medicine, University of Sydney, 1949, pp. 101-111. © Details
- Acton, Arthur Peter, 'Phonetics in Australia to 1945, R.W. Home, with the assistance of Paul J. Needham, Australian Science Archives

---

Author/s: 
JONES, MICHAEL; MCCARTHY, GAVAN

Title:
Shaping the context for an integrated knowledge hub for the dairy and grains industry project: managing knowledge in the public sphere – ‘lessons learned’

Date:
2011

Citation:

Publication Status:
Unpublished

Persistent Link:
http://hdl.handle.net/11343/32680

File Description:
Shaping the context for an integrated knowledge hub for the dairy and grains industry project: managing knowledge in the public sphere – ‘lessons learned’

Terms and Conditions:
Terms and Conditions: Copyright in works deposited in Minerva Access is retained by the copyright owner. The work may not be altered without permission from the copyright owner. Readers may only download, print and save electronic copies of whole works for their own personal non-commercial use. Any use that exceeds these limits requires permission from the copyright owner. Attribution is essential when quoting or paraphrasing from these works.