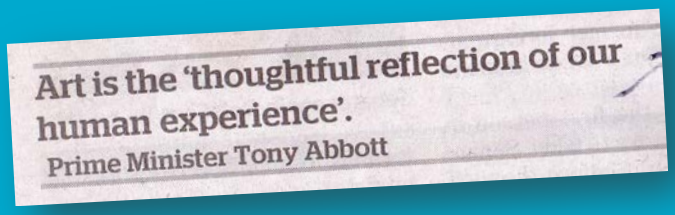
Australian Centre for Broadband Innovation (ACBI)
CSIRO and the Smart Services CRC

Innovation Study:

Challenges and Opportunities for Australia's Galleries, Libraries, Archives and Museums

September 2014


Art is the 'thoughtful reflection of our human experience'.
Prime Minister Tony Abbott

The Sydney Morning Herald, Thu 19 June 2014

CSIRO

AUSTRALIAN CENTRE FOR BROADBAND INNOVATION

An Australian Government Initiative

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Access, feedback and further discussion

This report and a standalone executive summary is available from CSIRO at www.acbi.net.au

Reports and a list of additional reading is available from the study website:

https://sites.google.com/site/glaminnovationstudy

To ensure accessibility and enable this study to continue, Museums Australia will take on the role of custodian for the GLAM Innovation Study and its reports. For any questions, discussion or to add to this resource site please contact manager@museumsaustralia.org.au.

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Foreword

Let's say I'm passionate about the photographer Frank Hurley. I want to build my own picture of the man and his work, and I know the originals of his photographs and much of his equipment is held in many cultural institutions, including major galleries, libraries, archives and museums (or GLAM for short). I want copies of his photographs, excerpts from his notebooks, and 3D images and some 3D prints of his equipment, and I want them without leaving my own house, now.

The technology to fulfil this request exists now in many people's homes (computer, high speed internet connection, a photo printer and a 3D printer), but the capacity of the GLAM sector to meet this request, in human and technology terms, is patchy indeed. I believe strongly that the more we give people virtual access to collections, the more they are going to want to make their own stories around those collections, and their own facsimile collections, and they really should be able to do this!

The digital revolution, from web to mobile devices to 3D printing to social media, has enormous capacity to turn the GLAM sector on its head, to change the sector in ways we never imagined, and to demolish the boundaries between galleries, libraries, archives and museums, whether we in the industry want this or not. The GLAM Innovation Study, "Challenges and Opportunities for Australia's Galleries, Libraries, Archives and Museums", is a key step in enabling the sector to embrace digital, rather than being engulfed by it.

In my capacity as National President of Museums Australia I had the pleasure of opening a key workshop that was part of the study and in doing this I looked at where we are now digitally in key facets of the operation of our GLAM businesses.

Think first about collections, for many the heart of what we do. We bring material in, maintain it, access and use it, and keep or dispose of it. Collections range from tens to millions of things, intangible and born digital to solid, human created to naturally occurring. But the technology we use to manage our collections ranges from books and card indices to fully digital, sometimes with virtual access over the web, sometimes with no digital access at all. While there is dialogue between museums and galleries in this area, there is little collection management and access discussion across the broader GLAM sector. If we are to meet our stakeholder needs, that has to change.

Let's think about how our stakeholders engage with us, the "visitor" experience. The popular perception and visible aspect of this is the visitor through the front door, who goes to see permanent or temporary exhibitions, or read documents or search archives. In so doing they will encounter and use some digital technology, and increasingly bring and use their own digital devices. But the increasing reality is that substantially more visitation to large GLAM organisations is entirely virtual, from anywhere in the world at any time. We can meet some of this demand now through websites and aggregators like the Atlas of Living Australia and Trove, but virtual access to smaller institutions and to archives is patchy and difficult.

One of the key roles of GLAM organisations is to enable people to learn, formally (think school programs) and informally. Our capacity to enable this is also extremely patchy. At the progressive end of the sector we have interactive distance learning through video and web conferencing, and extensive use of digital devices from tablets to interactive digital tables. At the other end we are still with paper and whiteboards, and students have to physically come to the institution. There is of course an ongoing role for this, but we have to meet the interested students' needs on their (digital) terms too.

What are the current digital downsides, the risks and the elephants in the rooms? Copyright and intellectual property rights remain problematic when we enable production of copies. And the better the copies get the greater the risk of forgery and fraud, and the substitution of real things with copies. We need to enable say the creative industries to use our collection materials as resources, as the Rijksmuseum has done in the Netherlands, without crashing into the downside issues, but more work needs to be done.

If that's where the sector is, where is the community at, the people we exist to serve, in their digital expectations of us? Our visitors, through-the-door and virtual, have no need of the increasingly artificial distinction between galleries, libraries, archives and museums, indeed such distinctions are a hindrance for many. They are a 19thC artefact and make increasingly less sense to our stakeholders when what they want extends across the sector (viz my Frank Hurley example). New GLAM institutions are doing their best to avoid this, as their names suggest, for the example M+ in Hong Kong and the Humboldt Forum in Berlin. Our very own Australian Centre for the Moving Image cleverly avoided styling itself as gallery, library, archive or museum.

So, the GLAM Innovation Study is very timely and will help the sector move towards embracing the digital age, rather than the current mix of resistance, ignorance, piecemeal adoption, and in some cases wholesale embracing of digital. But we in Australia are stuck with this increasingly artificial distinction between the pieces of the GLAM sector. So what do we need to do?

First, we need to be at least talking across the sector. This is beginning to happen more between the galleries and museums (for example, through the recently formed Nation Alliance of Galleries and Museums) but not nearly enough across all four domains. This will be a personal priority for me in my Museums Australia role.

Second, we need to be exploring and discussing opportunities and issues in the digital realm. The USA has the annual Museums and the Web conference, and New Zealand has the increasingly successful annual National Digital Forum. What are the pros and cons of such a gathering for Australia?

Third, we need to acknowledge that the GLAM sector in Australia ranges from the very large to the very small, from capital city to remote settlement, from well resourced to no resources, from paid to volunteer. Equity of opportunity and access to the potential of the digital world needs to be addressed if we are to meet the needs of Australians for access to their cultural heritage.

This GLAM innovation study is an important step in the ongoing development of our sector. Together we represent the cultural memory of Australia and our part of the world. Let's give everyone the chance to use that heritage to shape their future.

Frank Howarth, President, Museums Australia

Executive Summary

The GLAM (Galleries, Libraries, Archives and Museums) sector in Australia is a diverse group of public interest organisations collecting and exhibiting cultural and environmental material. The GLAM sector currently spends approximately $2.5 billion, around 80% of which is provided by government (local, state and federal). The combined collections contain over 100 million objects (e.g. natural and human-crafted objects, records, books, artworks, recordings etc. but excluding archive material). Around 5% of this is on-display at any one time and 25% of it is digitised. The organisations that constitute the sector are charged with preserving this material as well as facilitating public access to it for research, education and inspiration.

The sector is undergoing profound shifts driven by a number of trends, chiefly those arising from the dramatic changes in how people access, share and engage in digital services and social media enabled by broadband and mobile networks. This is creating new forms of competition for the GLAM sector, challenging the sector's traditional positions of authority and expertise and driving fundamental changes in people's interactions with GLAM organisations and their collections.

While the study identified many examples of innovative practice from Australian organisations, Australian initiatives tend to be isolated, episodic and difficult to sustain in the long term. There were also areas where Australia is trailing international best practice, specifically concerning the digitisation and access to artworks, books and audio-visual collections, most of which require new approaches to managing copyright and other clearances.

The study identified that only a few Australian GLAM organisations have made fundamental changes to their planning, structures and operations to place innovation and digital services at the core rather than as add-on activities. While nearly all GLAM organisations in Australia have started to make this sometimes-difficult transformation, most are yet to complete this process.

The innovation study team consulted with the people from state, national and local galleries, libraries, archives and museums, researchers and international experts – people actively involved in either sponsoring or managing innovation projects – to ask what are the key transformations this sector needs to make to thrive in the emerging digital environment of the next two decades?

Recommendation 1: Four Strategic Initiatives

MAKING THE PUBLIC PART OF WHAT WE DO

This initiative aims for a deep transformation, both in the professional disciplines in the GLAM sector and in the organizations' relationship to the public. While participants acknowledged a profound rhetorical shift in GLAMs to address the needs of an active, informed public, especially through the use of social media, many felt a deep reluctance within the sector to let go of the traditional position of authority among curators, librarians and archivists and a simultaneous reluctance for organisations to become genuinely more porous to outside contributors and collaborators. This initiative, involving a fundamental shift to open access, open sharing and greater collaboration with the public aims to effect this shift.

BECOMING CENTRAL TO COMMUNITY WELLBEING

Take the acknowledged role that GLAM institutions play in the wellbeing of individuals and communities and make it a deliberate and central part of each organisation's purpose and vision. The focus is on both the value of the physical spaces as community centres, but also on the role the collections can play in fostering community memory, sense of self and pride, to the economy, and to community health and resilience as our population both ages and becomes more diverse.

BEYOND DIGITISATION – CREATIVE REUSE

Shift the conversation from the difficulties of digitisation to possibilities of creative reuse. Much of the sector is caught between the massive scale of the collections and the expense of digitisation, on the one hand, and the varied difficulties around copyright, moral rights, cultural rights and orphan works on the other. Many participants perceived the need to transition from a "push" to a "pull" model where publics are engaged from the beginning and help pull through digitised content based on specific needs, which shapes the form of digitisation and allows for creative reuse. Digitisation is about preservation, use and reuse to build cycles of creativity in which new or reshaped digital objects join the 'collection'.

DEVELOPING FUNDING FOR STRATEGIC INITIATIVES

With the expected constraints in support from government, there is a need to transform the basis of funding towards philanthropy, partnerships with the corporate sector and direct support from the wider community. While government must continue to play its part and fund basic infrastructure, the sector critically needs to find ways to fund big, strategic initiatives that reposition organisations for the digital era. Corporate support is likely to be tied to short-term projects with specific outcomes, but there are also opportunities for greater use of philanthropic foundations to support longer-term strategic and collaborative initiatives.

Recommendation 2: A National Framework for Collaboration

The growing expectation from the public for easy and seamless access to Australia's distributed national collection, the pressures of the operating environment and similarities in the digital practice of GLAM organizations make cross-sector collaboration more obviously crucial for innovation, resource and knowledge sharing. Specifically in the areas of:

DIGITISATION AND ACCESS

Sharing skills, standards and approaches for digitisation and collaborating on linking and aggregation initiatives like Trove, the Atlas of Living Australia and Linked Open Data.

DIGITAL PRESERVATION

Preservation of "born digital" material urgently requires a coordinated, national, cross-sector, standards-based approach to avoid losing access to digital heritage.

NATIONAL APPROACHES TO RIGHTS

A more unified approach to the digital environment in which copyright enables preservation, which handles "orphan works" (the owners of which are unknown), which more effectively maintains the rights of the traditional owners of Indigenous material and which both stimulates creativity and supports creators.

SKILLS AND ORGANISATIONAL CHANGE

Closing the gap between leading practice and the national mainstream in digital skills and organisational transformation.

SHARED INFRASTRUCTURE

Sharing capability, storage and networks between organizations in the sector, exploiting the potential of AARNet and the NBN for connection and collaboration.

TRANS-DISCIPLINARY COLLABORATION AND RESEARCH PARTNERSHIPS

Learning how to communicate and collaborate between professional disciplines within the sector, with academics and researchers and with different communities of identity and culture.

Recommendation 3: National Leadership & Collaboration Forum

To move any of these ideas forward requires a common forum for conversation and in which to express leadership. Some minimal, cross-sector governance arrangements beyond the existing professional and industry associations would provide direction without the constraints of discipline or history.

Grounding such a national digital forum in practical projects and concrete initiatives is essential as is approaching funding for these new initiatives in a more integrated way.

The sector should also consider creating a charitable foundation to support cross-sector strategic initiatives along the lines of Europeana, the Public Catalogue Foundation of the UK and the Digital Public Library of America.

Conclusion

The GLAM sector faces enormous challenges in the next decade arising from the massive pace of change in its operating environment; challenges it can only face effectively by collaborating across the sector, beyond organisational and disciplinary boundaries.

This innovation study outlines some of the innovative work already underway in the sector, but draws out an emerging consensus on four specific strategic initiatives and a broader collaborative framework to enable the sector to step decisively into the future.

1 Background

1.1 Study Brief

This innovation study examines the opportunities and challenges for the Galleries, Libraries, Archives and Museums (GLAM) sector created by new broadband and digital services. The study is based on an iterative series of consultations with key stakeholders and leading practitioners in this sector. It identifies innovative and influential technology and social developments that will impact the GLAM sector, current leading practice and initiatives that are working well, examines potential future scenarios for the sector (both positive and negative), and identifies practical actions that will help the sector realise new opportunities and desirable outcomes.

Throughout this report we use the acronym GLAM – standing for Galleries, Libraries, Archives and Museums – to describe what is often called "the collections sector". We have chosen to employ the acronym tactically in order to focus attention on the ongoing shift in identity of these institutions as they face greater financial pressure, higher expectations around their use of technology, diminishing government support, and slow but steady shifts in audience attention as the demographic profile of the nation shifts.

We have taken an iterative approach to the study composed of three main stages of consultation. After each stage the team reflects preliminary findings back to representatives of the sector for further feedback:

1. Feb-April 2014 – we informally consulted with senior staff from the sector in-person and by telephone;
2. May 2014 – we gathered leaders from the GLAM sector in Sydney for a two-day futures workshop based, in part, on the informal consultation;
3. June 2014 – we took the results of that workshop to local and international leaders in the sector who were unable to attend the workshop to gather their views.

This final report documents all three stages. The final edition will be presented to key GLAM agencies as well as the relevant Australian, state and territory government agencies and other key stakeholders. The intended outcomes for the study are to:

- Strengthen innovation and collaboration across the GLAM sector resulting in the identification and resourcing of strategic initiatives.
- Exchange information and consider the opportunities presented by new broadband and digital services.
- Create awareness of existing and emerging digital platforms developed by the Australian research sector – including CSIRO, Smart Services CRC and NICTA – and influence their priorities as well as encourage participation in future research projects.

1.2 Sector Overview

DEFINITION

The GLAM (Galleries, Libraries, Archives and Museums) sector is a term used in Australia to describe the diverse group of public interest organisations collecting and exhibiting cultural and environmental material. In Europe and North America, the term LAM (Libraries, Archives and Museums) is used to describe this sector including galleries as a subset of museums.

The majority of institutions in the GLAM sector are publicly funded and accountable institutions (covering government, educational and community sectors) but there are also privately funded and operated organisations open to the public. The GLAM sector typically excludes for-profit commercial organisations that acquire and sell cultural and/or environmental material (e.g. commercial art galleries, etc.).

> *We are about experiences with knowledge.*
>
> Janette Wright,
> State Library of Queensland

The different constituents within the GLAM sector have traditionally self-identified within their own domains of galleries, libraries, archives and museums rather than across the sector. However, this is changing with the impact of shared challenges and opportunities arising from issues such as reductions in government funding, the changing nature of audience interaction due to the Internet and social media and the task of digitising collections.

There are a number of common functions across the different domains of galleries, libraries, archives and museums. Each organisation will usually perform a different combination of functions. The functions include:

- Collection
- Conservation
- Access
- Research
- Education
- Facilitation

GLAM DOMAINS

Galleries

The term ‘galleries’ or 'art galleries' refers to organisations “mainly engaged in the acquisition, collection management, conservation, interpretation, communication and exhibition of visual arts and crafts on the basis of their aesthetic and historic value. Visual arts and crafts include paintings, murals, drawings, cartoons, prints, photographic works of art, digital works of art, art installations, sculpture, ceramics, pottery, jewellery, woven or printed textile art, clothing and wearables, carvings, furniture, glass craft, metal craft and leather craft.”[1] There are approximately 160 art galleries operating in Australia. This includes ten major national, state and territory galleries, as well as many regional, local and specialist galleries.[2]

1 Australian Bureau of Statistics (ABS), Australian Culture and Leisure Classifications, 2008 (cat. no. 4902.0)

2 ABS 8561.0 - Public Libraries, Australia, 2003-04

Libraries

Libraries are organisations whose "main activity is the acquisition, collection, conservation and loan of materials such as books, magazines, manuscripts, musical scores, recordings, maps or prints. Libraries also perform an information service role. Information and materials may be stored and accessed electronically or otherwise."[3] There are about 500 local public library services and 9 national, state libraries operating in Australia. The local public libraries operate from over 1,500 locations, while the national and state libraries have a total of 17 locations. There are over 10 million active registered borrowers in local public libraries.[4] There are also many other libraries including those in universities, TAFE and schools, as well as research and specialist libraries in federal and state/territory government organisations, health libraries, law libraries and libraries in corporations and other non-government organisations. These libraries deliver services to a defined user group rather than providing universal public access and so are outside the scope of this report.

Archives

An archive is an organisation whose "primary function is the permanent (or long term) preservation of unique records, selected because of their administrative, financial, legal, evidential or other information value, which are generally no longer required for the conduct of current activities by government agencies, non-government organisations or private individuals". Archives provide a range of services including the description and preservation of archival material and the provision of archival research and reference facilities and assistance. Archives differ from libraries in that library material is usually published, with multiple copies in existence whereas archives hold original records, which are often unique and usually irreplaceable.[5] There are 8 national, state and territory archive organisations operating in over 20 locations.[6] There are many other archive organisations associated with educational institutions, businesses, and cultural and special interest organisations.

Museums

Museums are organisations that are "mainly engaged in the acquisition, collection management, conservation, interpretation, communication and exhibition of heritage objects and artefacts". This includes institutions with either cultural and/or natural history collections, as well as heritage sites with historical buildings and/or collections.[7]

There are approximately 1,000 museums operating from over 1,200 locations in Australia, with about 60% being social history museums, about 33% being historic properties and sites, and about 6% being other museums.[8]

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3 Australian Bureau of Statistics (ABS), Australian Culture and Leisure Classifications, 2008 (cat. no. 4902.0)

4 ABS, Public Libraries, Australia, 2003-04 (cat. no. 8561.0) and National and State Libraries Australasia (NSLA), Australian Public Libraries Statistical Report 2011-12, prepared by Regional Access and Public Libraries, State Library of Queensland, July 2013.

5 ABS Australian Culture and Leisure Classifications (ACLC) (cat. no. 4902.0)

6 Results published in Public Libraries, Australia, 2003-04 (ABS cat. no. 8561.0)

7 Australian Bureau of Statistics (ABS), Australian Culture and Leisure Classifications, 2008 (cat. no. 4902.0)

The Museums Australia defines a 'museum' as an institution that '... helps people understand the world by using objects and ideas to interpret the past and present and explore the future. A museum preserves and researches collections, and makes objects and information accessible in actual and virtual environments. Museums are established in the public interest as permanent, not-for-profit organisations that contribute long-term value to communities.'

8 ABS, Museums, Australia, 2007-08 (cat. no. 8560.0)

ECONOMIC ACTIVITY AND REVENUE SOURCES FOR THE GLAM SECTOR

There are no consistent and detailed surveys of the economic output of the GLAM sector or its contribution to national economic activities. A number of ABS surveys have been undertaken on different parts of the GLAM sector and at different times. However, a high level estimate of the GLAM sector's revenue for 2012/13 is approximately $2.5 billion based on adjustments to earlier surveys.

Galleries, Libraries, Archives & Museum Sector:
Revenue, staffing and volunteer resources, 2012/13

	Galleries (1)	*Museums (1)*	*Libraries (2)*	*Archives (2)*	*Total*
Revenue	$470 m	$710 m	$1,220 m	$140 m	$2,540 m
% Govt funding	65%	66%	93%	90%	80%
Employees	2,510	5,150	12,470	811	20,945
Volunteers	3,740	22,975	6,730	120	33,571

Notes

1) ABS Cat 8560.0 Museums, Aust 2007/08, Table 2 (High relative standard error (RSE) for number of admissions & volunteers). The sector's revenue has been adjusted for Consumer Price Index (CPI) to 2012/13 using RBA calculator.

2) ABS 8561.0 - Public Libraries, Australia, 2003-04 (High relative standard error (RSE) for number of volunteers). The sector's revenue has been adjusted for Consumer Price Index (CPI) to 2012/13 using RBA calculator and (NSLA), Australian Public Libraries Statistical Report 2011-12,

This analysis shows that:

- Galleries account for approximately 19% of expenditure by the sector and have the highest level of non-government funding at approximately 35%.
- Libraries account for approximately 48% of expenditure by the sector with the highest level of government funding at 93%.
- Archives are the smallest part of the GLAM sector and account for approximately 5% of expenditure with a high level of reliance on government funding (approximately 90%) and services to primarily government clients.
- Museums account for approximately 28% of expenditure by the sector with the highest level of funding from admissions at approximately 9%.

All three levels of Australian governments provide funding for the GLAM sector, accounting for 80% of overall revenue. Local government are the largest source of funding, primarily for local libraries but also local galleries and museums (46% of total government funding). Local government contributes about 80% of funding to local libraries with most of the balance coming from state/territory governments.[9] State and territory governments are the next largest source of funding for the GLAM sector at 38% of total government funding. The Australian Government

9 ABS 8561.0 - Public Libraries, Australia, 2003-04

provides 17% of total government funding, primarily for the large national GLAM institutions with some smaller grant funding for local and regional organisations.

SIZE OF AND ACCESS TO COLLECTIONS

There are over 100 million objects held across Australia's GLAM institutions. Australia's museums and libraries hold the largest documented collections; galleries collections are far smaller. Archives are not included in these estimates as their collections are recorded in kilometres of shelf space, rather than numbers of objects.

It is estimated that about 5% of museums and gallery collections are available on public display in physical form and about 25% is digitised in some form and accessible for viewing online. It should also be noted that about 43% of these collections are not even recorded in electronic form but instead documented in physical records such as catalogue cards and hand-written specimen notes.

Many collection objects such as specimen drawers or nitrate films are complex and time-consuming to digitise at a quality suitable for research and preservation; many of the easy to digitise objects such as photographs and microfiche reels are already converted and made available online. There is still an extremely large and complex task to electronically record and digitise the remainder of the GLAM sector's over 77 million objects that are yet to be converted.

Levels of public access and size of collections,

Items	*Galleries (1)*	*Museums (1)*	*Libraries (2)*	*Archives (2)*	*Total*
Physical visits (m)	12.9	17.8	104.7	1.4	136.8
Online visits (3) (m)	12	51.5			63.5
Archival material (km)			37	629.1	666.1
No of objects (m)	2.9	49.6	52.8		105.3
On public display	5.40%	5.40%			
Accessible online	25.00%	25.00%			
Recorded electronically	46.70%	46.70%			

Notes

1) ABS Cat 8560.0 Museums, Australia, 2007-08, Table 2 Main focus of museum (High relative standard error (RSE) for number of admissions and volunteers)

2) ABS 8561.0 - Public Libraries, Australia, 2003-04 (High relative standard error (RSE) for number of volunteers)

3) Physical visits is the total number of admissions

4) Online visits during the reporting period

Australian galleries held approximately 2.9 million artworks (as at June 2004). There were a total of 54.9 million objects and artworks held by museums including art museums, but only 9.7% (5.3 million) of these were on display for public viewing. During the year ending 30 June 2004, art museums purchased artworks totalling $28.7 million. This made up 83% of the money that all

museums - including art museums - spent on purchasing artworks or objects in the 2003-04 financial year.[10]

In June 2004, libraries in Australia held a total of 52.8 million books and other library materials such as video and audiotapes and discs. About 39 million items were available as lending stock, of which 34.3 million were books. Lending stock is drawn solely from local public libraries, which in 2011–12 reported 181 million loans, were lent to 10 million library members.[11] In addition to their book collections, Australia's national and state/territory libraries also have about 7.6 million heritage items (historic books, photos, artworks, maps, etc.) and about 37 kms of archival holdings.

Australia's eight national, state and territory archive organisations held as at June 2004, archival holdings that totalled 629 kilometres.[12] The National Library of Australia has also attracted a large online user base with the Trove service having almost 70,000 unique daily users.[13]

Australia's museums held approximately 50 million museum objects as of June 2008. Museum objects include historic or ethnographic objects (textiles, ceramics, furniture, transportation vehicles), natural science specimens (zoological specimens, botanical specimens, paleontological specimens) and also include cultural photographs, films, tape recordings and digital images. In 2007-08, there were 308,781 acquisitions of museum objects with a value of $29.3 million and a total of 1,897 special exhibitions/displays held.[14]

There are significant variations between the level of use of museums and art galleries in different parts of Australia with the highest use recorded in the ACT and the lowest in Tasmania (approximately 30% less). There is also greater use of art galleries by people with higher income, higher levels of education, part-time employment, who were born overseas in a primarily English-speaking country and by women.[15]

10 Based on Museums, Australia, 2003-04 (cat. no. 8560.0) – refer to Art Galleries Fact Sheet, ABS 4172.0 - Arts and Culture in Australia: A Statistical Overview, 2008 (First Edition)

11 ABS 4172.0 - Arts and Culture in Australia: A Statistical Overview, 2008 (First Edition). See also See National and State Libraries Australasia (NSLA), Australian Public Libraries Statistical Report 2011-12, 2013 for latest information for public libraries.

12 ABS, Public Libraries, Australia, 2003-04 (cat. no. 8561.0).

13 National Library of Australia correspondence, August 2014.

14 Museum Fact Sheet, ABS 4172.0 - Arts and Culture in Australia: A Statistical Overview, 2010

15 ABS Perspectives on Culture, March 2011, Cat 4172, March 2011)

It's about distinction, the thing that is interesting and provocative about museums. Part of that is the experience created either onsite or online. The other part is distinction that comes from our mission - we're a space, or Theatre, for Australian Ideas, we're not a theatre of what it's like to live in another part of the world. It's also about the distinctiveness of how we communicate while not abrogating the fact that our collections already make us distinctive, and that's a major point of differentiation in this market.

I heard recently a colleague talk about a museum collection, how uneven in quality it was and how much of it wasn't interesting. I was somewhat surprised because, ultimately, if you prefer other forms of engagement rather than relying on your collection, the distinctive characteristic of the museum is lost. I suspect that's a road to perdition. You have to be mindful of the competitive advantage you already have in the market. Unless you know that advantage is lost, you've got to hang on to that, as well as allowing yourself to be transformed by opportunities that present themselves.

That would be my caveat about being very digitally focused, that you have to work to enhance your digital engagement, without losing your distinction as a museum in the market for audiences.

Mathew Trinca, National Museum of Australia

Among other things, I think [cultural collections are] very useful for the health and wellbeing of society. They represent accumulated achievements and are places for exercising creativity – out of creativity comes invention and innovation. They also provide a humanistic interpretation of our world, which we desperately need.

Prof. Sarah Kenderdine, Museum Victoria

Books have been the primary means of conveying our knowledge and our civilisation for thousands of years and particularly, in the last four hundred years, printed books and libraries are an important part of that process – so we are always going to be the museum of the book. People regard the book as something spiritual. It is not just another means of communicating; it is an artefact in itself, which people regard as something special.

Janette Wright, State Library of Queensland

What I often say is that it's about interrogating our past, understanding our present and imagining our future. That means the stuff that we deal in provokes that interrogation, that understanding and that imagination. That's really what we're about. One of the challenges for us – which we've always had in an inchoate sort of way – is to be part of that cycle of transformation. I talked earlier about those photographs [of service men and women going to World War I] – we're trying to identify them and know more about them but it's also the conversation we're having with people. In the process, those photographs really become something else – rather than just an image of somebody who sat in a studio 100 years ago, they become part of contemporary people's lives – the people who connect directly with them but also the people who just read the story around it. Having that conversation puts us into that cycle. It's not just us projecting stories out in the broadcast model, but it's actually having a conversation, being receptive to stories in new ways.

Alex Byrne, State Library of NSW

2 Preliminary Consultations

The study team brought to this project significant background experience with the GLAM sector drawn from previous collaborative projects. In addition, during the early phase of the project, team members reviewed trends and current practice in the sector globally and began informal conversations with key leaders in the sector.

From this preliminary work, the team has drawn the following (Section 2.1) list of significant, immediate, noticeable trends and a further list of innovative projects (Section 2.2 on page 9). This informed the team's design of the innovation workshop described in Section 3 on page 15.

2.1 Trends impacting on the GLAM sector

There are several major trends that are directly impacting on the GLAM sector.

CHANGING CONSUMER EXPECTATIONS

People increasingly demand experiences ahead of products and place an increasing importance on social relationships. There is also a growing expectation of personalised services that meet an individual's unique needs and wants yet delivered *en masse*. These expectations are beginning to impact the Australian GLAM sector. Trend research suggests that expectations for more personalised, better and faster services and more well-designed experiences will continue to increase.[16]

NEW FORMS OF PUBLIC INTERACTION ENABLED BY DIGITAL SERVICES

The increasingly ubiquitous and diverse use of Internet and mobile enabled digital services has led to a fundamental change in public engagement with GLAM institutions and their collections. A greater number of people are accessing, using and contributing to cultural and environmental content online, irrespective of whether the source is from an Australian GLAM institution or a diverse range of alternative sources. The revolution in social media has allowed people to more easily interact with each other, comment on, share and contribute to information and content. This has challenged the traditional positions of authority and exclusivity for Australian GLAM institutions, as they are now competing with a wider range of both international and domestic providers of information and services.

CHANGES IN THE LEVEL AND SOURCES OF FUNDING

Government funding, that currently constitutes approximately 80% of the GLAM sector's revenue, has been static or reduced in real terms over the last decade for many GLAM organisations. This situation has been compounded by rising costs of operations due to increases in labour costs, building maintenance and depreciation and costs of managing and displaying collections. This has

16 CSIRO, *Our future world: Global megatrends that will change the way we live*, 2012

led most GLAM organisations to seek to diversify their sources of revenue through sponsorship and related fundraising, special admission charges and other fee-for-service activities.

ENVIRONMENTAL CHANGE AND RESOURCE DEPLETION

Many of the world's natural habitats, plant species and animal species are in decline or at risk of extinction. The actions taken by human beings in the coming decades will set the scene for global biodiversity over coming millennia. Parts of the GLAM sector have an important role in recording, collecting and interpreting these environmental changes. The sector also has a role in helping inform how society responds to this challenge.

AGEING POPULATION AND CHANGING DEMOGRAPHICS

Australia and many other OECD countries have an ageing population. Elderly citizens provide a wealth of skills, knowledge, wisdom and mentorship. The GLAM sector has relied heavily on older Australians as volunteers, loyal supporters and users of their services. The nature of support and engagement from younger Australians will be different and this will force the GLAM sector to respond with new methods of engagement. This challenge will become more acute as the current cohort of older Australians ages and dies.

GLOBALISATION AND THE RISE OF ASIA

Coming decades will see the world economy shift from west to east and north to south. The powerhouses of the new world economy are China and India. This economic shift will build new export markets, trade relations, business models and cultural ties for Australia. Tourists, funds and ideas will increasingly flow out of Asian countries and into Australia's economy and society. The GLAM sector has been and will increasingly play an important role as Australia transitions into "the Asian Century".[17]

2.2 Innovation and best practice in the GLAM sector

As part of the consultations and research for this study, a number of examples of innovation and best practice were identified. These initiatives are a response to the challenges and opportunities presented by the trends impacting on the GLAM sector. While there are many examples of Australian based best practice, there are also noticeable gaps in the scale and scope of adoption by the wider GLAM sector in Australia. There are also some examples of international innovation and best practice with no equivalent initiatives in Australia.

OPEN ACCESS TO COLLECTIONS

Several Australian institutions such as the Powerhouse Museum were leaders in making parts of their photographic collections available on an open licensing basis (e.g. release of their historic photo collection using Creative Commons on Flickr). This has greatly expanded their level of use and allowed the public to contribute information regarding the collections. However, the

17 CSIRO, "Our future world: Global megatrends that will change the way we live", 2012

publishing of high quality images with open licensing has only been implemented in an ad hoc manner across the GLAM sector, with little adoption in some domains such as the galleries.

FEDERATED DISCOVERY

The National Library of Australia (NLA) has been a leader in developing federated discovery services such as Picture Australia and its successor Trove available to the public. The NLA and the wider library sector have been able to work together successfully to share information about their collections to make it easy for the public to search and discover relevant content from participating institutions.

LOCATION BASED DISCOVERY FOR MAPS AND APPS

The Atlas of Living Australia has developed a platform that federates collection information about Australia's plants and animals and allows location-based searching and browsing. This has allowed for a more complex understanding of the relationships between different living things and their environments. The Atlas has been able to provide powerful location based services such as web based maps and mobile apps for researchers, amateur observers (such as bird watchers), and the general public to discover and record information.

INTERPRETIVE INFORMATION

The emergence and popularity of Wikipedia has demonstrated strong public interest in general interpretative and reference information that traditionally has been a comparative strength of the GLAM sector. Some Australian institutions have established informal partnership arrangements with Wikipedia (such as appointing a Wikipedian-In-Residence) to both contribute their own expertise and to train the public in publishing this information. Other initiatives have developed complementary encyclopaedia-style sites about specific places and subjects (e.g. About NSW, Encyclopedia of Melbourne Online, Dictionary of Sydney, Queensland Places, etc.). There are similar national initiatives for countries like Canada and New Zealand but no equivalent national initiative in Australia.

PUBLIC CONTRIBUTIONS

There are numerous examples of best practice enabling the general public to contribute to information about the collections of GLAM institutions. The Australian Newspapers Online service managed by the NLA has generated a strong community of editors that correct text while services such as Bowerbird by the Museum of Victoria and Atlas of Living Australia allow the public to contribute plant and animal sightings. There are also third-party websites and apps like Historypin[18] that allow the public to more easily tag and contribute content.

[18] http://www.historypin.com/

DIGITAL LIBRARIES

International book digitisation projects such as Google Books and the Internet Archive have made the content of large book collections searchable and accessible online to the public for the first time. Many North American and European libraries have collaborated in this initiative, however there are no Australian partners. As a result, many books about Australia and published in Australia are now only searchable in digital form from a copy held by an overseas library. Norway has embarked on an interesting initiative to digitise all Norwegian books and make them available to Norwegian residents supported by a mechanism to compensate copyright owners. In the US, the Digital Public Library of America (DPLA) is attempting to provide improved public access to digital book holdings held across different libraries and digital book collections.

DIGITAL ARTWORKS

There are several initiatives to digitise and provide online access to important art collections. Through its Digital Excellence Program the State Library of NSW is digitising its heritage collections – a mixture of documents and objects – for access online. In the United Kingdom, the Public Catalogue Foundation[19], a charitable foundation, has digitised the nation's complete collection of oil paintings in public ownership and provided online access to the public through the Your Paintings website[20]. The Rijksmuseum, the Dutch national museum of arts and history, has recently released a large part of its art collection in high-resolution images for public reuse complete with digital image editing tools[21]. The Google Art Project managed by the Google Cultural Institute has helped digitise and host high-resolution images of artworks provided by gallery and museum partners[22]. Six Australian institutions including the National Gallery of Australia, the Art Gallery of New South Wales, the Museum of Contemporary Art, the National Gallery of Victoria, the Melbourne Museum and Griffith University's Rock Art Research Centre have joined this initiative to provide selected artwork.[23]

DIGITAL AUDIO-VISUAL COLLECTIONS (ARCHIVE.ORG, BBC CREATIVE ARCHIVE)

Audio-visual collections of films, video and sound recordings are some of the most challenging collections to digitise due the complexity and costs of the conversion, storage and copyright processes. In Australia, some initiatives such as Australian Screen Online have made short segments from important Australian films available to the public and students. Other more ambitious projects such as the BBC's Creative Archives have made a selection of entire programs available with an open licence for reuse by the public.

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[19] The Public Catalogue Foundation, see www.thepcf.org.uk
[20] BBC Your Paintings, see www.bbc.co.uk/arts/yourpaintings
[21] Rijksmuseum Digital Collection Project, Museum-iD magazine, no13. http://www.museum-id.com/magazine-detail.asp?id=385
[22] "Masterworks for One and All", Nina Siegal, The New York Times, 28 May 2013. http://www.nytimes.com/2013/05/29/arts/design/museums-mull-public-use-of-online-art-images.html
[23] ABC Online News, Six Aussie galleries join Google Art Project, 5 Apr 2012. http://www.abc.net.au/news/2012-04-04/google-art-project-australia/3932000

VIRTUAL ACCESS TO PHYSICAL EXHIBITIONS AND COLLECTIONS

There are a number of initiatives that allow the public to visit and engage with an institution's exhibitions and collections in an immersive manner. One example is the Museum Robot services developed by the National Museum of Australia and CSIRO that allows remote school groups to visit an exhibition with a human tour guide and a mobile robot that provides a panoramic video and augmented reality service (described in Appendix B.10, page 56). There are other examples of immersive services that allow the public to view and manipulate 3D images of collection objects as well as interact with other people such as Prof. Sarah Kenderdine's projects (described in Appendix B.3, page 38).

REINVENTING PHYSICAL SPACES

Many GLAM institutions have introduced new ways for the public to interact with exhibitions in their physical spaces using digital services. These include apps that allow people to view interpretative information as well as provide game elements to enhance visitor experiences. Wireless networks and tracking systems also allow for institutions to identify the patterns of public viewing of their exhibitions and collections. Some institutions such as the new State Library of Queensland have created physical spaces that have become popular places for broader cultural events and social interaction.

SHARED TECHNICAL AND LEGAL PLATFORMS

Developing out of the digitization of the BBC Archives in the UK, the Digital Public Space is a

> *"…visionary plan for the nation's shared cultural history [… the] project centres on a shared technical platform for indexing, searching and publishing material in partnership with other UK cultural organizations […which includes] reconciling rights for content owners, resolving legal issues about content use and linking up multiple, incompatible systems."*[24]

The project is built from a long-term, national, cross-organisational collaboration to discover, discuss and resolve any barriers to connecting the collections, led by a very long-term vision for the nation's cultural heritage.

2.3 Relevant Technology Research

During the preliminary consultations the study team spoke to several academics researching the use of digital technologies, which are relevant to innovation in the GLAM sector. Appendix B on page 36 records those consultations in more detail, while this section gives a brief summary.

[24] "BBC makes Space for cultural history", Jemima Kiss, The Guardian, 6 Jan 2013. http://www.theguardian.com/media/2013/jan/06/bbc-digital-public-space-archive

2.3.1 DIGITISATION

"Digitisation" has usually referred to scanning flat documents, producing digital versions of analogue video or audio recordings, photographing objects or creating electronic versions of catalogue data. Researchers are focusing on the next challenges: methods of digitising objects and spaces in three dimensions.

Prof. Sarah Kenderdine who holds positions at Museum Victoria, UNSW and City University of Hong Kong, focuses on high resolution 3D modelling and image capture using specialised equipment to enable the rendering of immersive, interactive environments based on spaces inaccessible to the general public such as the Mogao grottoes at Dunhuang in China (Appendix B.3, page 38).

Assoc Prof. Wanqing Li at University of Wollongong focuses on the fast capture of 3D models and the textures of surfaces using low-cost equipment such as a Kinect camera from an Xbox (Appendix B.7, page 49).

Dr Jonathan Roberts and his colleagues Belinda Ward and Christian Richter at CSIRO Autonomous Systems Lab have developed a handheld scanner for rapid mapping of large and complex environments such as the Sydney Opera House, the Endeavour replica or Jenolan Caves (Appendix B.10, page 56).

2.3.2 DISCOVERY

Public expectations of digital access reach beyond search queries to find known items – users wish to explore collections to discover things they might not know. Discovery systems need to support context, relationships and browsing over huge numbers of items and several researchers are exploring ways to do so.

Assoc. Prof. Mitchell Whitelaw at the University of Canberra partners with GLAM organizations large and small to develop *Generous Interfaces* – rich, browsable views of large collections which support a better understanding of context and relationships in digital collections (Appendix B.2, page 36).

Dr Mike Bain at UNSW introduces "common-sense reasoning", based on inductive reasoning and general knowledge, into machine algorithms. His work creates new possibilities for exploring the huge amount of data in a collection: *recommendation systems* use these algorithms to uncover material from unexpected places based on a user's prior browsing; *visualisation systems* use them to construct networks of relationships between objects to support richer browsing; *analytics* help archivists, curators and librarians more effectively understand how users are using the collection (Appendix B.4, page 43).

Dr John La Salle at CSIRO is director of the Atlas of Living Australia, an online database of Australia's flora and fauna co-developed by 17 organizations and administered by CSIRO. The Atlas provides a case study of shared infrastructure, common standards for data sharing and a single point of access to 45 million specimen and observation records, images, conservation status and geospatial data, all accessible to the public and researchers (Appendix B.9, page 55)

2.3.3 INTERACTIVE EXPERIENCES AND ACCESS

Contemporary exhibition design focuses on creating experiences for visitors, a focus which meshes with the focus on experience design emerging in technology research over the last decade. As

physical and digital experiences merge, researchers explore techniques to facilitate new interactive modes for experiencing collections.

Dr Daniel Johnson at Queensland University of Technology researches the intersection of videogame design and wellbeing – in particular how to motivate and engage people by building "*playful interaction*". This approach recruits ideas from games and play into the design of online and immersive experiences to help connect and encourage users (Appendix B.6, page 47).

Dr Jonathan Roberts and his colleagues, in addition to the handheld scanner described above, have partnered with the National Museum of Australia to develop a mobile telepresence robot to allow remote visitors to tour museums and galleries and interact with a human educator at the museum (Appendix B.10, page 56).

Dr Anthony Collins at the University of Sydney builds novel forms of interaction based around interacting with multiple surfaces. "*Surface computing interfaces*" integrate multi-touch tabletops, interactive wall screens and tablets so that documents and other data can move seamlessly from one device or surface to another using natural gestures. Multiple users can interact with these interfaces to exchange, share and work together on information. He has worked with the Australian Museum in Sydney to apply these approaches to education in the museum environment. Dr Collins also heads Cruiser Interactive, which is commercialising these technologies (Appendix B.5, page 45).

In addition to her work on high fidelity 3D modelling, Prof. Sarah Kenderdine develops *interactive immersive and augmented environments* to produce "post-cinematic digital applications stimulating new types of cultural experiences". Prof. Kenderdine's research is deeply informed by Critical Theory and asks what a "post-Cartesian collection" – grounded in understandings not based around classic dualisms – might be (Appendix B.3, page 38).

Prof. Farzad Safaei and his team at the University of Wollongong work on how to integrate physical and virtual presence into what he calls "*integrated presence*" in which the real and the virtual blend seamlessly into mixed visual and auditory environments. This approach raises many possibilities of having blended online and physical exhibition experiences bridging multiple venues and collections (Appendix B.8, page 52).

The study team provided the summaries from these researchers (shown in Appendix B) to everyone consulted in the course of this innovation study as a stimulus to the ongoing conversation.

3 Innovation Study Workshop

The GLAM Innovation Workshop was held in Sydney on 5-6 May 2014. Twenty-nine participants attended from galleries, libraries, archives and museums at the local, state and federal levels, research organizations and related commercial organizations. The group mostly consisted of people actively involved in innovation projects – representing leading-edge practice in the sector. To review organisations represented please see Appendix A.2 Workshop Attendees on page 34.

3.1 Overview

The aim of the workshop was to create an environment and provide context that would enable participants to reach beyond everyday thinking and toward longer-term priorities for the sector. To support the strategic nature and focus of the study, the format of the workshop encouraged participants to consider a broad range of issues facing the sector over the next two decades – issues that will provide the social, economic and political environment in which technological change will be shaped. This focus on what may seem a distant future enables participants to engage more innovative thinking than is possible in a regular discussion or brainstorming session.

For two weeks prior to the workshop, intending participants were led through a preparation process that enabled initial engagement with a futures perspective via a brief survey and some reading, including emerging technological possibilities.

The workshop itself was composed of two, broad, day-long arcs:

The first day led participants to

- Discuss emerging issues in the present day,
- Imagine and create future scenarios for 2035,
- Consider how their institution might adapt to these diverse futures.

Day two led them through a process of

- Discussing themes, commonalities and differences in the sector's future,
- Finding specific ideas for strategic initiatives that span multiple futures,
- Exploring the path to realise that initiative,
- Starting with concrete actions in the present.

A fairly complete account of the workshop is available in Appendix C (Innovation Workshop In-Depth). The following sections summarise relevant results of the process.

3.2 Issues in the Sector

Part of the preparation for the workshop was a survey that, among other things asked participants to rate the importance of nine present day issues to their institution. These issues emerged during stage-one consultations with leaders in the sector.

The results (Figure 3.1 on page 16) revealed a paralysing strategic landscape – most organisations regard all of these issues as high priority, making it difficult to decide where to focus effort. These responses demonstrate one reason why traditional strategic planning so often fails in times of rapid change, because choosing a strategic focus is very difficult.

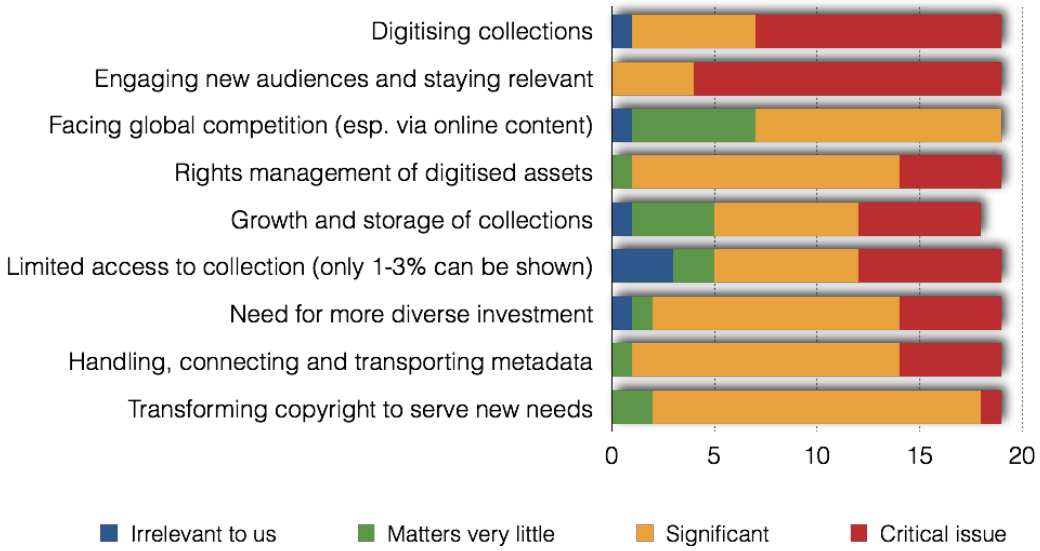

Figure 3.1 Strategic Landscape

3.3 Outcomes and Elephants

A discussion during the latter half of the workshop generated a list of key issues as well as "elephants in the room" – unpleasant realities rarely discussed. Some of the key issues discussed were:

- What role do (or could) GLAM institutions play in community wellbeing?
- What new roles do GLAMs play in an increasingly culturally and linguistically diverse country? What old roles might become marginal?
- How can GLAMs proactively draw the public into the centre of the institution through funding, partnership, soliciting challenge, opening to outside authority?
- How to develop funding for strategic initiatives, rather than just for digitisation?
- Learning from and connecting with the current eResearch initiatives like the National Collaborative Research Infrastructure Strategy (NCRIS)[25] and the Australian National Data Service (ANDS)[26].
- Fostering an active, ongoing, cross-sector conversation at a senior level.
- The need to prioritise digitisation initiatives according to end-user needs and preservation urgency as the task is massive. Several related issues were discussed: some organisations have digitised many things but there are many will not be in the near future, things that should be digitised and are not being addressed, the need to articulate digitisation purpose and not just outcomes etc.
- Strong interest in initiatives to enhance the experience of audiences in the physical spaces through the use of digital systems. This includes tracking the location of visitors, providing

[25] https://education.gov.au/national-collaborative-research-infrastructure-strategy-ncris

[26] http://www.ands.org.au/

location specific information and interactions, new visualisation systems, creating virtual environments and using augmented reality, etc.

- Moving beyond "discoverability" of the collection to seeing the relational and personal nature of artefacts in people's lives and heritage – connections which go between collections and beyond single institutions; a recognition that audiences will continue to use third party search and discovery tools. The discussion showed interest in the functionality of services like Atlas of Living Australia and Trove to help show connections between collections and support public participation.

Some significant "elephants" which generated discussion:

- Copyright, moral rights, cultural rights and orphan works – while several barriers were discussed there was also discussion that there are many examples of innovative initiatives in other countries and that Australian GLAM institutions were not taking an active position in developing new solutions for the Australian context.
- The longer-term shift in funding from government sponsorship to private philanthropy and the consequent shift in priorities. This could include various forms of industry sponsorship and funding, commercial models and community support. Crowdfunding and similar innovative ways of generating support have only started to be explored.
- Institutions compete with each other, it's not all cooperative – there was discussion about the need to develop a more robust framework and engagement between different institutions that acknowledges that they can both collaborate and compete with each other on different activities.
- There is a hierarchy among GLAM institutions in terms of funding and status – there was discussion about different levels of interest from government, corporate and public stakeholders in the different domains within the GLAM sector – archives being the least visible.
- Big gaps between leading edge practice and the mainstream in Australia – despite the many examples of innovation, discussion noted that large parts of the GLAM sector were far behind leading edge practice – this is not widely acknowledged or addressed. Participants suggested a need to develop ways of benchmarking the capability and maturity of institutions to innovate, as well as ways of mentoring and assisting smaller and/or less capable organisations.

3.4 Strategic Initiatives

From the longer list of issues, the attendees collectively decided to explore four strategic initiatives as self-selected teams. Each team used the same process, called “backcasting”, to discuss in detail how these initiatives could emerge over the next ten years. The initiatives were designed to address some of the strategic challenges and opportunities facing the broader GLAM sector and provide a timeline for concrete action that could be adopted. The detailed discussions and long-term plans developed by backcasting are reported in the Appendices (C.3.2), but the following summarises the four initiatives:

3.4.1 MAKING THE PUBLIC PART OF WHAT WE DO

This initiative aims for a deep transformation, both in the disciplines in the GLAM sector and in the organisational relationship to publics. While participants acknowledged a profound rhetorical shift in GLAMs to address the needs of an active, informed public, especially through the use of social media, many felt a deep reluctance within the sector to let go of the traditional position of authority among curators, librarians and archivists and a simultaneous reluctance for organisations to become genuinely more porous to outside contributors and collaborators. This initiative aims to effect this shift.

3.4.2 BECOMING CENTRAL TO COMMUNITY WELLBEING

This initiative is designed to take the acknowledged role that GLAM institutions play in the wellbeing of individuals and communities and make it a deliberate and central part of each organisation's purpose and vision. The focus is on both the value of the physical spaces as community centres, but also on the role the collections can play in fostering community memory, sense of self and pride. There is a need to collect evidence and examples of best practice about these benefits to personal and community wellbeing. What can GLAM institutions contribute to mental and physical wellbeing, to the economy, and to community health and resilience as population both ages and becomes more diverse?

3.4.3 BEYOND DIGITISATION – CREATIVE REUSE

As one participant commented, "we've been having the same conversation for 20 years about digitisation". The sector is caught between the massive scale of the collections and the expense of digitisation, on the one hand, and the varied difficulties around copyright, moral rights, cultural rights and orphan works on the other. This tension leaves many institutions, governments and the public unsure of the value of digitisation. Many participants perceived the need to transition from a "push" to a "pull" model where publics are engaged from the beginning and help pull through digitised content based on specific needs, which shape the form of digitisation. This initiative aims to shift the conversation from the difficulties of digitisation to possibilities of creative reuse – so the collection is digitised and we haven't perished: now what?

3.4.4 DEVELOPING FUNDING FOR STRATEGIC INITIATIVES

One participant forecast that in ten years, there will be only 25% of current government funding available, whilst reliance on philanthropic and corporate sponsorship money will quadruple. This private money is likely to be tied to short-term projects with specific outcomes. At the same time, the sector critically needs to find ways to fund big, strategic initiatives that transform how GLAM institutions work. This initiative is about this transformation in funding both from philanthropy, the corporate sector and the wider community.

CROSS-INITIATIVE ISSUES

These four strategic initiatives represent the collective intelligence of the workshop attendees, emerging as they did from a rigorous, collaborative, grounded process. While each of the initiatives has a distinctive focus, they overlap and interconnect in terms of some of the issues being addressed, specifically:

1. Openness, porous boundaries, physical, informational and knowledge connections across:
   a. Institutions
   b. Outside of institution to publics: visitors and volunteers
   c. Sector silos (galleries, archives, libraries and museums)
   d. Outside of sector to research and community organisations
2. National leadership for the whole sector – a cross-sector conversation at a senior level.
3. Adjusting funding priorities - living in the new reality
4. Focus on non-traditional benefits of the sector - specifically community wellbeing

Interestingly, various initiatives took account of several of the significant "elephants in the room":

- Rights and orphan works,
- Shifts in funding sources,
- Competition among GLAM organizations.

The report presents a wealth of ideas and possibilities that synergise with Education Services Australia's work in the Australia schools education sector through National Online Learning Services. We applaud the focus on innovation, particularly in the digital learning and virtual visitation spaces. We see significant opportunities for building productive partnerships with the GLAM sector to benefit schoolteachers and students with ideas and experiences.

Raju Varanasi
Education Services Australia

3.5 Other Workshop Findings

A significant issue, which emerged from the workshop, but not from preliminary conversations, was large disparities in status, funding and innovation across the sector. The difference between the funding and visibility of those at the top of the perceived status hierarchy and those at the bottom seems significant. The gulf between the innovation and technology initiatives at leading edge institutions and the majority of the sector is also significant.

While many of the present day issues canvassed in the pre-workshop survey (listed earlier in Section 3.2 on page 15) loomed large in the conversation about the long-term future, some did not – indicating they are possibly transient issues – important right now, but not strategic issues in the longer term. Importantly, the initiatives provide novel, creative approaches to addressing the strategic landscape described by those nine issues.

4 Post-Workshop Interviews

A preliminary report, based on the outcomes of the futures workshop was circulated to a list of more than thirty thought leaders from galleries, libraries, archives and museums across state and federal institutions, from academia and some international participants. The full list of interview participants is given in Appendix A.1 on page 33.

The study team met with each of these participants to discuss their responses to the report. Our conversation particularly focused on each person's view of the major issues the GLAM sector faces over the next decade and whether the four strategic initiatives developed in the workshop are both central to addressing those challenges and feasible projects for the sector.

4.1 Strategic Initiatives

The interview participants voiced strong support for all four of the proposed initiatives, agreeing they are core to the future of the sector. While some participants feel that existing initiatives in their institutions begin to address some or all of these possibilities even in a leading institutions like the National Library of Australia, in the words of CEO, Anne-Marie Schwirtlich, "while we're doing all of these things, we still have more to do." Each of these proposals involves cross-sector changes, so collaboration and knowledge sharing between organizations will be required for them to be fully realised.

Tony Ageh, Controller of Archive Development at the BBC described the proposals as "ahead of anything I'm currently aware of in the UK" because they put users so far to the front and clearly express the benefits of collaboration.

4.1.1 MAKING THE PUBLIC PART OF WHAT WE DO

> *There's a change in relationships between museums and their audiences – the traditional relationship was between the museum as an authoritative producer of ideas and experiences, and the public as consumer of the delights offered by the museum. What's happened in the world that we live in is that everyone has become both an expresser, as well as a consumer, of ideas. That goes for our public - they want to be active participants in what they do at the museum, not just passive consumers. That's pretty simple and it's right across the board now. As a result, there's great capacity for us to re-engineer our relationships to the wider public.*
>
> Mathew Trinca, National Museum of Australia

During these interviews, the team encountered many examples of engaging with knowledgeable publics to enrich material in collections. AIATSIS proactively engages with indigenous communities both to enrich the information about materials in the collection and to ensure that traditional rights around those materials are respected and the materials cared for appropriately.

The centenary of World War I is providing many institutions with opportunities to reach out to the families of service women and men to interweave family histories with images and records in the collection. For the Australian War Memorial, this is key to the process of preparing for April 2015, but their aim is also to use the opportunity to get better at bi-directional engagement with local communities all over the country. This drive to engagement fuels the need for digital access to

collections since the relevant people for an institution's collection may be anywhere in the country, or around the world.

The librarian role has moved from guardian to gardener.

Sue McKerracher, Australian Library and Information Association

The curator as facilitator, rather than keeper.

Tim Hart, Museum Victoria

Many interview participants noted the key shift in the digital era from publics as passive audiences of story telling to engaged participants in a conversation and co-creators of new stories and creative content. This shift from a one-way conversation to a two-way conversation is enabled by digital technologies – most obviously by social media – but several participants caution that new skills are also required to facilitate this two-way conversation – skills which are not traditional within GLAM organisations. Leading institutions are both recruiting and partnering with outside media or digital organisations to enhance their skill base.

I'm not here to tell you what your story is. You're going to share the stories that you have, to create the museum that's appropriate to that place. You're facilitators of that story, creating something that people are proud of and they feel part of and then they'll visit, they'll own it, they'll want to change it, they'll want to make decisions about it and I think that's where we have to go. We have to position the public more in the decision-making arena. It's not about being spoon-fed a culture but deciding what your language is and how you want to describe those experiences.

Julie Finch, WA Museum

4.1.2 BECOMING CENTRAL TO COMMUNITY WELLBEING

Seeing the resources as ways of identifying the identity of places, of people, creating context, and thinking about solutions and innovations for the future; so we can learn from these amazing collections, whether digital or the real thing, we can use them for research, we can use them for study, we can use them for shaping lives. Museums are a window on the lives of ordinary folk and places. They're a vehicle for discovering identity. How can we take a more longitudinal perspective of the importance of culture in the context of the economy and global issues? That's a much bigger picture that needs to be considered.

Julie Finch, WA Museum

The point of archives is that that we collect the intellectual property of the nation and the cultural heritage of its people. There is enormous economic benefit to Australia's economy and to the global economy by exploiting the full value of the intellectual property held in the archives and, as cultural heritage, it provides such a rich resource for people to understand their own personal identity within the context of their community identity, their ethnic identity and the national identity. Those two things are the core fundamentals of any civilized society and can only be delivered through the work of archives and the GLAM sector more generally.

David Fricker, National Archives of Australia

I think the purpose is to publicly hold and provide access to important parts of our history and objects of art and culture that the state protects and owns and gives people access to. Those things are hugely important to our identity.

Katrina Sedgwick, TV Arts, Australian Broadcasting Corporation

What seemed common to many conversations about community wellbeing was an understanding that a sense of belonging to a community and to the nation is a hard-won achievement for every new arrival to this land over the last two centuries. A sense of belonging, of one's own story and its interweaving with the national story is central to identity and wellbeing of individuals and communities – a realisation made tragically acute for those indigenous communities displaced from language, story and culture.

Several participants discussed the success of European institutions in taking a central role in developing a shared culture and sense of belonging – due in part to the understanding in smaller countries of the need to protect their language, culture and identity, but also to a European mandate to develop and protect a unified culture for the whole of Europe. Australia, it could be argued, shares similar needs – Australian culture is in ongoing development and GLAM institutions play a central role in both evolving that culture and protecting our sense of shared community. As Professor Sarah Kenderdine paraphrasing T. S. Eliot noted, "tradition cannot be possessed, it has to be rediscovered and reinvented by each generation".

> *The other thing is that we can see very clearly that our citizens, our patrons, our customers' behaviours are changing and the consumption of digital material and the contribution that digital content has in our culture is changing rapidly. If you look at the fields of digital humanities or education there is an important linkage between having information you need to achieve what you want to achieve – as a country we need to consider the impact that access to information has on the whole knowledge creation cycle. There's a whole load of things within that that we need to look – the prioritisation of digitisation and rights and copyright.*
>
> Andy Neale, National Library of NZ

> *One of the reasons that we like the term "infrastructure" or building intellectual or knowledge or cultural infrastructure is because governments are conversant with investing in infrastructure for roads or railways, and we believe that this intellectual infrastructure warrants as heavy an investment as physical infrastructure. So, looking at the four strategic initiatives, one of which is "becoming central to community wellbeing" I wonder whether that strategy ought to be "becoming central to community <u>productivity</u> and wellbeing".*
>
> Anne-Marie Schwirtlich, National Library of Australia

> *There's some really great things coming out of Australia – theatre and the arts are highly regarded across the world, but what are we doing with that talent? Where's it going? How is it demonstrating what Australia has to offer? What are the links to identity? What inspired those people? The material in arts museums, libraries, archives forms the integrity and authenticity for development and research programs within the film and theatre industries. All that information is necessary to inform and create these authentic experiences and without it, it's all at the surface level. There's an opportunity there that isn't fully realised in Australia. What can we do to support those artists, whichever art form they perform in? How can we use our resources to authenticate that whole experience?*
>
> Julie Finch, WA Museum

The community wellbeing initiative as it emerged from the workshop broadens the focus beyond economic measures of the value of GLAM institutions, which often reduce to visitor counts and tourism dollars. Interview participants further broadened the conversation to consider ways in which institutions might play a more central role in economic development – as a part of the amenity and culture that attracts highly skilled creative people to a place, as a source of

authenticity and integrity to local creative industries (film, theatre, literature) and also as a resource for innovative, long-term thinking and invention.

This role as facilitators of innovation is not merely populist, GLAM institutions also foster creativity by provoking the public – exhibiting controversial or unpopular work, asking difficult questions, and engaging in awkward conversations.

> *I'm now a bit sceptical of crowdsourcing, which can start to cede the power of a cultural institution to make and own its own choices, which is what we, as museums are supposed to be good at. It's almost like saying we're not going to make the choice. Actually, the public wants museums to make choices, to curate, to present an argument. The public are saying – and you see this with successful contemporary art museums – "Make choices that provoke me! Don't make choices that placate me". But it needs directors and senior managers who are able to articulate their arguments well, better than I can, and actually redefine a role for their institution that is loved for what it does, not loved because it does what people think it should do.*
>
> Seb Chan, Cooper-Hewitt, Smithsonian Museum

Both wellbeing and economic evidence form a part of the "instrumental" value of institutions, value that is more measurable than the more traditional "intrinsic" value – that the collection is worth maintaining in itself. Participants with experience in the UK sounded a note of caution in focusing exclusively on either instrumental or intrinsic measures as evidence of public value – all these in concert best describe the value of GLAM institutions.

> *I would talk about a series of public goods that are achieved by the museum inclusive of the polarity described by instrumental vs. intrinsic values. I think there is intrinsic value in collections in their own terms, as well as an instrumental utility of those collections. I think that because I believe in the play of ideas and an emotional range, as well as a cognitive range for culture. That's the best way I can understand why I get moved by something, and I think the capacity to be moved by something both cognitively and emotionally, in an ideational sense, is important. So, I think if I were to represent the National Museum's value in those terms, part of my argument would be that there is intrinsic value in these places for what they are in themselves – but I wouldn't leave it there.*
>
> *I would also argue that there are instrumental benefits in a society having such institutions. Part of that might be the economic value that comes from institutions that engage publics in learning and other opportunities, and for their power as an entertainment destination. You can quantify that; you can measure it in a series of appropriate metrics. An indirect economic benefit, I think, comes out of the [Richard] Florida thesis about the capacity that this institution has to nourish an exchange of ideas that ends up having some net return for a creative city. The museum can also contribute to a healthy community in psychological terms, but I'd be more cautious in arguing this kind of instrumental value.*
>
> *My view is that the public good of this institution can be established through a range of indicators about how to evidence value. It's about all of them spoken to in concert – that's probably going to be the strongest argument at any given time. Bringing greater precision and clarity to the argument about the kinds of outcomes that museums achieve - open to the range between the instrumental and intrinsic - is actually where we would want to be.*
>
> Mathew Trinca, National Museum of Australia

4.1.3 BEYOND DIGITISATION – CREATIVE REUSE

> *One thing that has joined us and is the focus of the work here is that we all have collections and our aim is to make them more accessible to the public in order to generate new knowledge.*
>
> Marie-Louise Ayres, National Library of Australia

Interview participants reiterated that creative reuse of collection material, especially when it involves commercial partners or results in commercial content requires a coordinated and clear approach to copyright and orphan works – ideally at the national level. Indigenous material requires particular care, though a common sense approach, as Lyndall Osborne, Director Collections at AIATSIS puts it is, "the starting and finishing points are with the owners of the culture" – successful projects engage with the traditional owners as partners.

> *I often get the comment: 'why don't you just put a photo of everything in your collection online' with the belief that's somehow engaging with the public. Do you really want 160,000 photos of tiny arachnids that are all kept in veils and preserved? But the information in aggregate is really valuable. Being able to open that data up to people who want to investigate climate change or people who want to actually do over-time distribution changes or ecological studies about how things have changed with respect to certain variables – then it's really valuable. So it's targeting the way we get data out there to being actually the way the public value it. That traditional model of just taking photos and just databasing stuff is not as valuable as targeted digitisation that actually has a purpose and that can be reused for the public.*
>
> Morgan Strong, WA Museum

Several participants point to engagement projects based around reuse as drivers of digitisation priorities. All institutions have a priority queue for digitisation based on preservation needs and demands for use – these could be linked to creative or commercial projects to both motivate and help fund digitisation, and also inform why and how to digitise.

> *The fundamental shift is in thinking that says that we're all serving the customer. Previously it seems that there has been a tendency in some quarters to serve the collection. I think that's why perhaps there has been some disconnect between government and the agencies, because they've been using the same language but serving different constituencies. Once they line up, then you start getting collections that are surfaced to present an experience to the customer, rather than simply captured to protect the collection.*
>
> Peter McMahon, State Library of Victoria

Apart from digitisation, the other major enabler for creative use is access, exploration and discovery – obviously if creative people are unable to find prospective material in collections, they will not imagine uses for it. While all institutions have long history and core skills in finding material when a client knows what they want, enabling unguided exploration and discovery places new demands on search and browsing interfaces. There are also great opportunities to link collection items and information together in innovative ways that can reveal new associations and meanings for users.

> *The emerging problem with digital image collections is, it seems to me, the very thing that museums and libraries are good at: finding what you want. Creation of the images in digitisation is a solved problem, but the ability to discover those images using new*

methods is an unsolved problem […] Computer vision and all these other methods are yet to have interfaces for them to make all that available.

Seb Chan, Cooper-Hewitt, National Design Museum, Smithsonian Museum

4.1.4 DEVELOPING FUNDING FOR STRATEGIC INITIATIVES

The focus of this initiative was to augment public funding with private philanthropy – a core competence of the art galleries. Workshop participants proposed this initiative because the demands on the sector for digital engagement aren't matched by available public funds.

A theme in some of the interviews was that the structure of public funding for GLAM institutions has led to increasing competition between institutions in different states and, to some extent, different types of institution in the same state. As competition increases, it tends to make organizations more reluctant to share knowledge and information which might help improve engagement for institutions overall – this outcome seems inefficient and contradictory to collaboration. Collaboration should be promoted and reinforced by funding structures, which in turn may optimise the use of existing resources and provide better services to the public.

Another theme in interviews was alignment in sources of public funding. For example, many GLAM institutions serve educational or research users, but may be funded exclusively out of Arts portfolio budgets; others may be restricted to education budgets, despite providing creative content supporting the arts. If it is desirable for GLAM institutions to service multiple user contexts, then funding guidelines should reinforce that aim rather than impede it.

During the interviews we heard many examples of institutions developing funding for collaborative projects with commercial partners, for example:

- The Australian National Maritime Museum collaborated with Roar Film, NBN Co, ABC and UTas on a project about the early years of "Van Diemen's Land";
- AIATSIS has partnered with Desert Pea Media and the Colli Crew on creative projects;
- Museum of Australian Democracy is producing an exhibition titled "The Power of One" in collaboration with researchers at ANZSOG and Canberra University, a commercial survey company and SBS.

Commercial collaborative projects also connect to the issues and ideas already mentioned in Creative Reuse.

The study team discussed crowdfunding with many interview participants – at this stage there seems to be widespread interest, both from institutions and from government, for the exploration of crowdfunding, but we did not discover active projects. The National Library of Australia is exploring a 'pilot' crowdfunding exercise with a magazine publisher later this year to test how viable crowdfunding is for the NLA. Simon Wright, Assistant Director, Programming at Queensland Art Gallery and the Gallery of Modern Art (QAGOMA), discussed an innovative international example – the Mori Art Museum in Japan engaged a controversial artist to produce a "difficult" work which the artist self-funded using a crowdfunding platform with his existing base of public supporters. The work was successfully funded prior to opening.

4.2 Cross-Sector Collaboration

The premise of this study is innovation across the GLAM sector and hence, the initiatives developed from the workshop are all cross-sector initiatives.

Each type of collection (to give some examples, natural history specimens, technological or anthropological artefacts, artworks, manuscripts, books, newspapers, photographs, archival records, film and video, audio recordings, software, even buildings and spaces like Old Parliament House, Aboriginal rock art or ships, which are in some cases submerged) has its specific needs in terms of preservation, scholarship and cataloguing and these specificities are the origin of the many disciplines in the sector. In addition to differences in the collections, some institutions have exhibition space and some do not, they vary widely in funding, staffing, public visibility and whether their typical purpose has been for the public, research, education or statutory use.

Despite all these specific differences, with the emergence of the internet, digitisation efforts, online exhibits, efforts to connect and expose catalogues and collections, and the penetration of digital media into everyday life, staff in each institution are finding similarities with each other in the new demands placed on their practice. The tools available for this work: websites, mobile apps, social media, data services – are largely the same. In addition, all institutions face the common pressures described in Section 1.2: changing customer expectations and shifting demographics, funding pressure and globalisation. These emerging similarities seem to demand greater coordination, collaboration and knowledge sharing across the sector.

> *We have a repository here for specific, heritage-related, visual art material, but also a collections library for all of our art resource material: artist's files, books and publications, catalogues, periodicals.*
>
> Simon Wright, Queensland Art Gallery I Gallery of Modern Art

The team visited several institutions that seem to house galleries, libraries, archives and museums under one roof, notably the Australian Institute for Aboriginal and Torres Strait Islander Studies, the Australian War Memorial and the Museum of Australian Democracy. Several state libraries also hold substantial museum-style collections, artworks and archival records; museums often have library collections and so on. There are even examples at the local level, Hurstville City Council has built an integrated library-museum-gallery, for instance. The apparent boundaries between the four styles of institution already seem more porous than one might think.

> *People shouldn't have to walk into four silos. People want a more seamless experience.*
>
> Morgan Strong, WA Museum

The study team directly asked interview participants to comment on opportunities for collaboration across the sector. Some collaborative themes emerged which crosscut the four strategic initiatives – while not exhaustive, these themes provide some good places to begin:

1. Digitisation and access
2. Digital preservation
3. National approaches to rights
4. Skills and organisational change
5. Shared infrastructure
6. Trans-disciplinary collaboration, Digital Humanities and eResearch

4.2.1 DIGITISATION AND ACCESS

While digitisation is very well advanced in this country, each institution takes its own approach to both prioritising and methods of digitisation – informed by disciplinary conversations with peer institutions. The study team uncovered localised expertise, which may not be widely known, but which could be more widely shared – work at State Library NSW with crowdsourcing manuscript

transcription, for instance, or AIATSIS expertise and equipment for digitising very old film and video resources.

Running alongside the digitisation process as its primary driver, institutions should collaborate to afford greater public access to what the team heard described by participants as the Distributed National Collection via Trove, the Atlas of Living Australia and more distributed initiatives emerging through the use of Linked Open Data[27]. This is essential to extend the knowledge, creativity and cultural benefits of the collection to citizens in regional and remote areas, to under-resourced local schools, to citizens who may not be comfortable visiting the physical buildings because of disability or perceptions of status.

These linking and aggregation initiatives may feel threatening to each institution's brand and individuality – an issue that must be discussed and worked through – perhaps the UK's Digital Public Space provides an exemplar in this area (described in Section 2.2 on page 12).

4.2.2 PRESERVATION OF DIGITAL MATERIAL

> *The great conversation in the digital age is about participating, about the community participating in the creation of knowledge and new work. For a thousand years, libraries have, in a much more traditional way, harnessed that community participation because we have collected the books and articles and paintings and manuscripts that arose from people doing research in libraries - so those circles of continuity and of the efflorescence of intellectual and cultural inquiry are circles that continue. The digital world allows us to do it in so many different ways, but I'd say that to-date the digital world hasn't supplanted the physical and so the effort for us is that we're running at least two libraries - others are running two museums or two archives - because it's both the digital and physical that has to keep going.*
>
> Anne-Marie Schwirtlich, National Library of Australia

While the bulk of the conversation thus far has been the digitisation of physical collections, every institution has a growing collection of so-called "born digital" materials – software, electronic documents, interactive media and web sites. As Tony Ageh noted, in a decade or so the amount of born digital material will outweigh the physical material and become the increasing focus of the collection.

Preservation of digital material has some entirely different issues: proprietary physical media (e.g. floppy disks, game cartridges) and data formats, dependence on certain operating systems or programming language environments. Preservation of the physical media is one thing, but – to borrow a simple, but illustrative example from Trish Hepworth, Executive Officer for the Australian Digital Alliance – ensuring that one could continue to open a WordStar file from a floppy disk in two decades, requires a complex mesh of expertise, software and equipment.

Digital preservation urgently requires a coordinated, national, cross-sector approach to avoid losing access to historical digital materials.

[27] http://lodlam.net/

4.2.3 COPYRIGHT, OTHER RIGHTS, PRESERVATION AND REUSE

The study team heard from many participants that copyright legislation as it relates to collecting institutions is urgently in need of reform, in particular as it relates to digitisation for preservation and for public access and unpublished works. The current 200AB Fair Dealing provisions of the Copyright Act have been identified as confusing and difficult to manage and use. Participants were optimistic in light of the Australian Law Reform Commission's recent report on Copyright and the Digital Economy, that reform may be imminent, but the GLAM sector would benefit from a stronger and more unified voice on rights in general.

Different institutions take different approaches to so-called "orphan works" – items with unknown rights owners – but a coordinated, national approach would simplify efforts to make these works available. There are many examples of important films, sound recordings, book and artworks that are not made available to the public due to the perceived challenges of dealing with "orphan works".

National coordination around the traditional rights of indigenous owners would also help more effectively maintain those rights and simplify the work of GLAM professionals.

Further ahead, some of the proposed approaches of the UK Digital Public Space project may prove valuable. As Tony Ageh (BBC) describes it, DPS proposes that materials be freely available, but with local or personal rules about access which are enforced by the sharing infrastructure. This would enable moral rights, traditional protocols or personal preferences for bequests to be honoured without requiring material to be unilaterally locked away.

4.2.4 SKILLS DEVELOPMENT AND ORGANISATIONAL CHANGE

Woven through the conversation has been the necessity for new skills: media and content creation, social media engagement, crowdsourcing and online participation, online development. Across the sector, institutions have met these needs by retraining existing staff, hiring new staff with the desired skills, out-sourcing to outside organisations or partnering. Each approach has strengths and weaknesses and those experiences could be shared more broadly.

Education institutions are responding to new needs, such as Deakin's new Bachelor of Entertainment Production program, but the sector can probably no longer solely rely on tertiary institutions to produce professionals with the right skills – in part because those skills are changing so rapidly. Professionals in the sector need, in the words of ALIA CEO Sue McKerracher, a "change mindset" – proactive about learning new skills as needs evolve.

The GLAM sector can also learn from the way digital technology has transformed other industry sectors – shifting to a client-centred, service-dominant, digital-focused approach is a radical transformation of the whole organisation. Organisations need to become more collaborative, open and expert at partnering to bring in new expertise on-demand. Judging from other sectors, these changes have only just begun for GLAM organizations.

For example, while several of our interview participants clearly understood they needed to focus more on their share of total online access (in effect competing with Facebook or online games) and on how they compete globally, some described competition only among other GLAM organizations locally. The shift to competing online requires new concepts, new measurements and new skills.

Another aspect of this is tracking the gap between leading and trailing practice discussed in the workshop (Section 3.3 on page 16) and finding ways to reduce it. AIATSIS is currently conducting a

benchmarking survey on digital practice in the sector and its results should be available around the same time as this report.

While the study team hope this innovation study provide some directions forward, many interview participants feel the sector needs to be active in sharing the good foresight already being practised in individual institutions. To ask, as Frank Howarth, president of Museums Australia succinctly put it, "what might digital do? How will it transform the GLAM sector?"

4.2.5 SHARED SYSTEMS AND INFRASTRUCTURE

> *Sharing of capabilities is a constant point of discussion among the collecting institutions. For example, the NAA works closely with the NFSA on preservation and systems; we cooperate with the NLA to share storage capacity. As money becomes tighter and our technology and our methods start to converge we need to be doing more collaboration and lining up our investment decisions to make sure that where possible we are purchasing shared capability. It's still quite nascent, there's a lot of logistics to work through in doing this - we each have our separate budgets, we each have our separate Boards, we operate on different investment cycles. But what digital does for you is allow you to standardise on methods of collection management, digitisation, and online delivery and of course it constantly presents new opportunities to find collaborative approaches.*
>
> *David Fricker, National Archives of Australia*

A constant theme through these conversations has been the enormous cost of digital transformation to each institution, requiring staff, equipment, infrastructure and outside services. Tony Ageh (BBC), describing the UK experience, notes that reducing these costs is a primary driver for collaboration. As Janette Wright, Queensland's State Librarian puts it, "we can do a lot of things better if we do them only once". Because the tools of digital assets and media have so much in common, regardless of the nature of physical objects from which they may have originated, collaboration on standard methods and formats, infrastructure and software sharing has the potential for better services for lower cost.

Extending the use of discovery and access portals like Trove or the Atlas of Living Australia is a part of this. Agreements on standards for collection and catalogue information to be made available to all discovery portals through Application Programming Interfaces (APIs) or data feeds are another useful activity.

Participants in the workshop discussed the development of eResearch programs (NCRIS and ANDS, discussed in Section 3.3 on page 16) that were building digital systems and infrastructure to help share research data and enable new forms of collaborative research. These programs have invested in large-scale data storage, discovery and analysis tools across Australia. The Atlas of Living Australia service has been funded through one of the Australia Government's eResearch programs. There appears to be a big opportunity for the broader GLAM sector to leverage these eResearch programs to support discovery, access and analysis initiatives across their collections.

During the interviews, the study team spoke to Chris Hancock (CEO) and Angus Griffin from AARNet, the company that operates Australia's Academic and Research Network, which already connects several GLAM institutions, about the potential for shared infrastructure. A high capacity (gigabit or better) network between at least the national and state GLAM institutions could allow access to shared computing and data storage facilities, rather than each institution needing to provide these facilities for itself. This could be particularly beneficial for smaller institutions with fewer resources.

The same network would permit high quality collaboration – high-definition video conferencing and shared presentation and information systems – across the sector much more seamlessly. As well as reducing costs such a shared data, computing and collaboration infrastructure would assist with collaboration and knowledge sharing.

By connecting to AARNet GLAM institutions would gain improved network access to Australia's universities and other research organisations such as CSIRO and NICTA, which could be used for research and collaboration purposes.

4.2.6 TRANS-DISCIPLINARY COLLABORATION, DIGITAL HUMANITIES AND ERESEARCH

While several GLAM institutions have established successful collaborative projects with research organisations, the sector as a whole benefits from greater knowledge about the broader capabilities and opportunities to work with the research sector.

Participants from CSIRO and other research organisations expressed several key research challenges relevant to the sector: how to automate large scale digitisation programs, how to develop visual recognition software to identify patterns in images and video content to automatically classify and categorise objects, or how to develop new ways audiences can interact with collection objects using augmented reality and natural computing interfaces.

Underlying all these collaborative efforts is the capacity for trans-disciplinary conversations. Conversations within the sector have often historically been difficult because of the disciplinary differences between the professions. Even more complex conversations emerge between the sector and academic researchers, IT professionals and media and content developers. Each discipline has its own terminologies, its own philosophical commitments, roles, standards and so on. Lastly, there is an intrinsic power difference, which arises in conversations between the institution and the general public about the collections.

A key skill for sector professionals to continue to develop is the ability to sensitively and effectively communicate across the potential divides. This skill as a distinct capacity has been emerging in academia in the last decade. Emerging fields such as Digital Humanities involve people from multiple disciplines learning how to communicate and work together effectively. Sector professionals could engage with and learn from these practitioners.

4.3 National Leadership, Advocacy and Collaboration

Despite solid collaboration within each domain at the state and level through organisations like NSLA, CAMD, CAAMD, Museums Australia and CAARA, with the closure of Australian Museums Online, Collections Australia Network and the Collections Council of Australia, Australia currently has no formal gathering of leaders or practitioners across the GLAM sector. The four strategic initiatives and the collaboration themes which emerged in this study's interviews require coordination in the sector and a coherent voice to government, industry and the public about funding, policy and in some cases legislation – both of which strongly suggest that working toward a stronger form of national leadership is essential to the future of the sector. This also emerged strongly in conversations at the workshop. The format for this leadership should build on the existing industry and professional associations and could vary from a loose alliance to a more formal organisation.

As well as leadership and advocacy, interview participants agreed that a gathering based around digital practice would help collaboration in the sector. New Zealand's National Digital Forum (NDF)

provides a model of an annual, cross-sector gathering focused on digital innovation initially led by three national institutions.

> *[NDF] is a network of people and organisations working together to enhance New Zealand's digital interaction with culture and heritage. As a network, [it] connects the people who are shaping our new digital culture, and works closely with museums, archives, art galleries, libraries, government, and the creative sectors to support their initiatives.*
>
> National Digital Forum (http://www.ndf.org.nz/)

Some models for a similar forum in Australia might be for the professional organisations to arrange their gatherings at similar times and create a cross-sector digital gathering to intersect.

A shared view emerging from the interviews is that a national forum needs to avoid abstract discussions and focus on concrete projects with strong impacts, guided by cross-sector, national governance. Seb Chan, Director of Digital & Emerging Media at the Smithsonian, Cooper-Hewitt National Design Museum suggested a different format of gathering in response to the desire for concrete collaborations – rather than listening to presentations, participants could take several days in a more secluded location to work together on starting projects for the following year. He suggested the Salzburg Global Seminar as an example of a different model.

BEGINNINGS

A small group of Sydney-based GLAM leaders have agreed to meet for preliminary discussions about how to begin such a cross-sector gathering so that it augments and complements existing initiatives. The meeting is scheduled for late August 2014.

4.4 Innovation and Access Foundation

Going even further from the proposals in Section 4.3, the study team believes there is an opportunity to establish a foundation to help coordinate, advise and fund how Australia's GLAM organisations can improve how people discover, engage and contribute to Australia's Distributed National Collection. While good leadership and peer conversations are key to the collaborative initiatives discussed thus far, the other key factor is money.

Unlike the existing foundations managed by many of the large GLAM organisations, this proposed foundation would support sector-wide collaborative initiatives, as well as provide support for capability development for smaller organisations. It would seek to complement and extend existing funding and collaboration activities and not to compete.

The concept of an Innovation and Access Foundation for the GLAM sector is modelled on similar international initiatives. These include:

- Europeana Foundation that is funded by the European Community, member states and cultural organisations to support cross-border, cross-domain, user-centred online access to European cultural collections and heritage.
- Public Catalogue Foundation of the United Kingdom established to open up the art in Britain for enjoyment, learning and research and has funded the digitisation and online access to art collections held across different organisations and in private ownership.
- Digital Public Library of America is a program to improve online access to the collections of the United States of America's libraries, archives, and museums through discovery and information sharing platforms. The Alfred P. Sloan Foundation and other charitable

foundations, as well as the US Government's National Endowment for the Humanities fund the program.

An Australian Innovation and Access Foundation could be a vehicle to increase private sector and philanthropic support for online access, digitisation and related innovation initiatives for the GLAM sector. The Foundation could also seek funding support from the Australian Government to match industry funding. The Foundation's remit would be to distribute this funding to support collaborative projects that enhance the wider GLAM sector across Australia.

Appendix A List of Contributors

A.1 Interview Participants

Chris Hancock	CEO	AARNet
Angus Griffin	Manager, Business Development	AARNet
Katrina Sedgwick	Head TV Arts	Australian Broadcasting Corporation
Trish Hepworth	Executive Officer (and Copyright Adviser | Australian Libraries Copyright Committee)	Australian Digital Alliance
Jonathan Wright		Australian Institute of Aboriginal and Torres Strait Islander Studies
Lyndall Osborne	Director Collections	Australian Institute of Aboriginal and Torres Strait Islander Studies
Sue McKerracher	CEO	Australian Library and Information Association
Kevin Sumption	Director	Australian National Maritime Museum
Tim Sullivan	Assistant Director, Branch Head National Collection	Australian War Memorial
Tony Ageh	Controller of Archive Development	BBC
Stacey Campton	Assistant Secretary	Collections and Cultural Heritage Branch
Prof Deb Verhoeven	Project Director, Huni; Chair in Media and Communication, Deakin	Deakin University
Carl Pekin	Director of Organisational Performance	Dept. of Culture and the Arts, WA
Daryl Karp	Director	Museum of Australian Democracy
Tim Hart	CIO	Museum of Victoria
David Fricker	Director-General	National Archives of Australia
Anne-Marie Schwirtlich	DG	National Library of Australia
Deirdre Kiorgaard	Director, Collaborative Services	National Library of Australia
Margy Burn	ADG	National Library of Australia
Marie-Louise Ayres	ADG	National Library of Australia
Andy Neale	Head of DigitalNZ	National Library of New Zealand/National Digital Forum (New Zealand)
Helen Kon	Assistant Director, Audience, Programs & Partnerships	National Museum of Australia
Mathew Trinca	Director	National Museum of Australia
Michelle Glaser	Digital Project Manager	Perth International Arts Festival
Michael Parry	Director Public Engagement	Powerhouse Museum
Simon Wright	Assistant Director, Learning and Public Engagement	QAGOMA
Seb Chan	Director of Digital & Emerging Technologies	Smithsonian, Cooper-Hewitt, National Design Museum
Dr Alex Byrne	NSW State Librarian & CEO	State Library of NSW
Vicki McDonald	Director of Library Services	State Library of NSW
Janette Wright	State Librarian and CEO	State Library of Queensland
Peter McMahon	Director, Digital Strategy	State Library of Victoria
Alison Sutherland	Director, Collection Services	State Library of WA
Prof Sarah Kenderdine	Special Projects	Museum Victoria
Julie Finch	Project Director New Museum Project	Western Australian Museum
Morgan Strong	Manager, Online Services and Web Development	Western Australian Museum

A.2 Workshop Attendees

A.2.1 GLAM SECTOR

Michael Harvey	Assistant Director - Public Engagement and Research	Australian National Maritime Museum
Jennifer Burrell	Manager Library Services	Blacktown City Council
Gabby Shaw	Digital Media Manager	Museum Contemporary Art Australia
Michael Parry	Director Public Engagement	Museum of Applied Arts and Sciences
Jane Smith	Director	Museum of Australian Democracy at Eureka
Timothy Hart	Director, Public Engagement	Museum Victoria
Frank Howarth	President	Museums Australia
Bernice Murphy	National Director	Museums Australia
Zoe D'Arcy	Director, Business Systems and Online Services	National Archives of Australia
Jane Cruickshank	General Manager Access Outreach and Communications	National Film & Sound Archive
Michael Baldwin	Assistant Director - Development, Marketing and Commercial Operations	National Gallery of Australia
Maggie Patton	Manager, Research & Discovery	State Library of New South Wales
Geoff Hinchcliffe	Director, State Records Authority	State Records Authority of NSW
Susan Charlton	Creative Producer	State Records Authority of NSW
Richard Lehane	Project Officer, Digital Archives	State Records Authority of NSW
Rhonda Campbell	Manager Public Access	State Records Authority of NSW

A.2.2 RESEARCH SECTOR

John La Salle	Director	Atlas of Living Australia
Anthony Collins	Product Leader	Cruiser Interactive
Jonathan Roberts	Research Program Leader, Autonomous Systems	CSIRO
Angelina Russo	Associate Dean Research	Faculty of Arts and Design, University of Canberra

A.2.3 NON-GLAM INDUSTRY SECTOR

Damian Kassabgi	Public Policy	Google
Lauren Nemroff	Program Manager	Google Cultural Institute
Mary Jane Stannus	Head, Content Services	ABC

A.3 Researchers

Assoc. Prof. Mitchell Whitelaw	Centre for Creative and Cultural Research, Faculty of Arts and Design	University of Canberra
Prof. Sarah Kenderdine	National Institute for Experimental Arts	University of New South Wales
Dr Mike Bain	Computer Science & Engineering	University of New South Wales
Dr Anthony Collins	Computer Human Adapted Interaction Research Group	University of Sydney
Dr Daniel Johnson	Computer Human Interaction, Electrical Engineering & Computer Science, Science and Engineering Faculty	Queensland University of Technology
Associate Professor Wanqing Li	ICT Research Institute	University of Wollongong
Professor Farzad Safaei	School of Electrical, Computer and Telecommunications Engineering, Faculty of Engineering and Information Sciences	University of Wollongong
Dr John La Salle	Director, Atlas of Living Australia	CSIRO
Dr Jonathan Roberts	Autonomous Systems Lab	CSIRO
Belinda Ward	Autonomous Systems Lab	CSIRO
Christian Richter	Autonomous Systems Lab	CSIRO

A.4 Project Team

Colin Griffith	Director, Australian Centre for Broadband Innovation	CSIRO
Annette Dockerty	Market Development Manager	Smart Services CRC
Chris Winter	Consultant	
Troy Brown	Business Development Manager	CSIRO
Tim Mansfield	Partner	Action Foresight
José Ramos	Partner	Action Foresight

Appendix B Relevant Research

B.1 Introduction

Researchers from University of Canberra, CSIRO, Queensland University of Technology, University of NSW, University of Wollongong and the University of Sydney have provided a general overview of their work as well as their thoughts as to the relevance and impact of their work on the sector. A number of videos demonstrating the technologies referred to have also been provided, the links below will direct you to the playlists.

We hope this glimpse into current areas of research provides stimulus and inspiration for the future.

Research Video Mix:
http://www.youtube.com/playlist?list=PLiaYgg0kz7VG3N5XlzY_Jo7a8C0BzY-tR

B.2 Generous Interfaces

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B.2.1 RESEARCH OVERVIEW

After the era of digitisation, collecting institutions hold vast digital treasure-troves. But the techniques we use to access these collections have been fundamentally unchanged for decades. Search remains the dominant access tool. My research argues for the limitations of search and proposes an alternative approach. Drawing on approaches from data visualisation and information seeking, “generous interfaces” offer rich, browsable views of large collections; provide evocative samples of primary content; and support an understanding of context and relationships within digital collections. In a series of collaborations with cultural institutions including the National Archives of Australia, the National Gallery of Australia, the State Library of NSW and the State Library of Queensland, my work has demonstrated the feasibility of generous interfaces to digital cultural collections.

Projects:

- *The Visible Archive* (2009) – funded by the Ian Maclean award, National Archives of Australia. http://visiblearchive.blogspot.com
- *commonsExplorer* (2010) – rich interface to Flickr Commons collections. http://mtchl.net/cex
- *Manly Images* (2012) – generous interface to the Manly Library Historic Image collection. Project supported by the State Library of NSW. http://mtchl.net/manlyimages
- *TroveMosaic* (2012) - visual interface for Trove image search. http://mtchl.net/trovemosaic
- *Australian Prints and Printmaking* (2013) – three generous interfaces for the National Gallery of Australia’s Australian Prints collection. http://www.printsandprintmaking.gov.au/explore
- *Nolan Explorer* (2014) - generous interface to the Sidney Nolan collection held by Canberra Museum and Gallery. http://nolan-explorer.cmag.com.au/

- *Discover the Queenslander* (2014) – generous interface to 1000 covers and pages from *The Queenslander*. Supported by the State Library of Queensland.

B.2.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

Although digitisation of collections is ongoing, a substantial amount of valuable material is already available – but the interfaces to these digital collections are very conventional and focused on search. To a large extent these interfaces are shaped by the IT systems available to the institution holding the collection and its capabilities.

Modern data visualization and generative interfaces provide richer, more powerful, engaging ways to provide access to collections. While query interface might be appropriate for an information professional who knows that they want, it's not the best interface for many people. Instead, we can represent collections using rich media and visual techniques, providing context, telling you about the collection and encouraging exploration. Rather than persisting with the older, transactional, information retrieval paradigm, which assumes we know what we're looking for, we can create complex, engaging experiences in which what we find out changes what we thought we wanted.

To do this, institutions need to be prepared to go beyond what's available from commercial vendors. There is a tremendous opportunity for change and new systems based around concrete, digital things that promote deeper exploratory experiences. But to take advantage of the opportunity, an in-house team that can experiment needs to be connected to the people who know the value and scale and complexity of the collection.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

The necessary changes are not about responding to new technologies – there are already a lot of new technologies – what we need is better design using the tools we have and a better focus on exposing the rich content in the digital collection.

Visitors want a seamless, integrated technology experience around their visit – seeing amazing work, being able to see high resolution images of related objects or documents, artefacts from the same place or created by the same person, then being able to share high resolution versions with friends on social networks to make them a part of the experience – which may continue long after physically leaving the building as you virtually explore the digital collection.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

The national institutions have a legislated mandate to afford access to the collection. My work thus far has encouraged people to see the value and potential of the collections they have, revealing beautiful artefacts and documents that have been hidden from public view to publics wherever they are. University of Canberra has formed a "Digital Treasures" PhD program in a consortium with some of the national collecting institutions to help build capacity in this area.

Overview of the global environment for your research

The environment for this research involves both academic researchers and innovation in practice within institutions. In general there seems to be something of an "implementation gap" – academic projects tend to scope out experimental techniques, but they are not often implemented at scale. Through close collaborations with institutions, and live prototypes using

real collections, my work aims to close this gap. In the academic context research occurs in disparate disciplines, including computer science, human computer interaction, design, digital humanities, library and information studies and cultural heritage. Disciplinary concerns, rather than the contemporary cultural context of digital collections, often drive research – for example heritage collections are sometimes treated as a "problem domain" for machine learning systems, but these techniques are rarely (if ever) implemented in practice.

Trends towards adoption/utilization related to your area of research

Generous interfaces reflect a broader move towards media-rich interfaces to digital collections. Online retail and commercial media increasingly focus on providing rich, engaging interfaces. In this context GLAM institutions recognize the need to make their collections more richly available, and interfaces are becoming more "generous". However most institutions (especially in Australia) lack in-house capacity in this area, and proprietary vendor-provided solutions introduce significant limitations.

B.3 Immersive Interactive Exhibitions and Data Capture

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B.3.1 RESEARCH OVERVIEW

Prof Sarah Kenderdine researches at the forefront of interactive and immersive experiences for museums and galleries. In widely exhibited installation works, she amalgamates cultural heritage with new media art practice, especially in the realms of interactive cinema, augmented reality and embodied narrative. She is a pioneer in panoramic and stereoscopic display systems and content creation. Working at the intersection of critical theory and practice, recent books include the co-edited, co-authored *Theorizing Digital Cultural Heritage: a critical discourse*, Cambridge: MIT Press, 2007 (third reprint 2010) and *PLACE-Hampi: Inhabiting the Panoramic Imaginary of Vijayanagara*, Heidelberg: Kehrer Verlag, 2013.

In the last 10 years Sarah have produced over 55 exhibitions and installations for museums worldwide and written 37 publications. In 2014, she will co-author a new monograph: Kenderdine, S & Cameron, F 2014, *Theorizing digital cultural heritage for a complex, turbulent and entangled world*, MIT Press, Cambridge, MA (contracted 13 March 2013). In 2013 her work received four awards: International Council of Museum Award (Australia) for the Museum at Kaladham, Karnakata, India; Inaugural Australian Arts in Asia Awards Innovation Award for PLACE-Hampi and the Museum at Kaladham; Tartessos Prize for contributions to virtual archaeology worldwide and; Digital Heritage International Congress & IMéRA Foundation Fellowship (Aix-Marseille University).

Sarah joined UNSW in late 2013, and has established a new laboratory for Innovation in Galleries, Libraries, Archives and Museums (iGLAM). iGLAM researches at the intersection of emerging technologies and tangible/intangible and natural heritage. Through collaboration with GLAM communities, this Lab develops applied outcomes at the forefront of visitor experiences. Through sustainable and enduring collaborations together with Asian GLAM sector, iGLAM is focused on the development of accessible learning environments and transformative visitor experiences. The

Lab advances imaging solutions to support the sector with practical outcomes (collection & site digitization) while pioneering immersive and interactive visualisation systems driving excellence at the forefront of internationally recognized exhibition design. Its mission also includes advancing critical theory that supports the transformation of archaeological, curatorial and archival practices in the digital age and to disseminate this research widely. iGLAM seeks to nurture a group of excellent researchers that sit alongside domain specialists focused on critical theory, embodied and interactive systems, advanced visualization and applications, immersive learning and, analytics.

Specifically, iGLAM focuses on:

- Pioneering exhibition formats through post-cinematic digital applications stimulating new types of cultural experiences
- Reformulating digital narratives, extending interaction and learning in immersive display systems
- Developing new visualisation strategies, based on contemporary challenges of high fidelity data capture and digital displays and immersive systems
- Building capacity for the GLAMs sector related to the development and implementation of new technologies and new ways of thinking about the digital
- Providing tools for co-related evaluative and analytic metrics
- Crafting theoretical frameworks based on the reformulation of Cartesian principles and helping to define new ontologies that are more appropriate for a mobile, digital and interconnected world.

iGLAMs' core activities are:

- **Applications** (the development of new software/hardware/content architectures using immersive, virtual, augmented and mobile technologies)
- **Analytics** (for understanding visitor experiences providing quantitative data from qualitative experience)
- **Critical Theory** (for the future of GLAMs)
- **Immersive Learning** (enactive strategies for immersive teaching and learning using cultural data)
- **Visualisation** (tools & techniques for ultra-high resolution data capture & display; archive visualization; visual analytics; data mining and visualisation)

B.3.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

iGLAM research is focused on creating post-cinematic museum exhibitions, and interactive and immersive experiences of cultural collections and tangible/intangible heritage. This research addresses key challenges of:

Applications: Developing new interpretive experiences using immersive, augmented and mobile technologies to drive emergent narratives (e.g. Kenderdine 2013a; 2013b). These applications also galvanise participation and socialisation as key indicators and motivations for museum experiences. These applications promote kinaesthetic and multisensory engagement for cognitive outcomes (see also Immersive Learning) and are necessarily ultra high fidelity (high resolution; 3D; large-scale displays) and often include 'big data' resulting from different imaging technologies and/or 100,000s of collection records (see Visualisation).

Analytics: Providing GLAMs with new modalities for understanding the visitors in embodied and immersive interactive systems, this research addresses taking a 'pulse' inside the space of that experience (and not after). The analytics concentrate on producing quantitative data from qualitative emotional, sensorial and social feedback through data aggregation, data mining and visualization. This process needs to happen in real-time facilitating data transfer straight from the museum floor to the cloud (Kocsis & Kenderdine 2014);

Critical Theory: GLAMs are enabled, through emerging technologies to become places for a new kind of dramaturgy where traditional Cartesian principles become mediated, entangled, embodied and co-created. The development of these innovative modalities gives society new ways of seeing and creating meaning, galvanizing social memory and fostering original thinking. Critical Theory gives GLAMs a way to discuss and share these concepts among peers, leading to developments from collection management to interpretation (Cameron & Kenderdine 2007);

Immersive Learning: Providing GLAMs with strategies for enactive and immersive learning using cultural data, with important outcomes for all educational sectors. The importance of integrating immersive modes of learning into higher education and life long learning is widely recognised as a fundamental strategy for next-generation learners and long-term sustainability. Underlying its design is the understanding that learning is embedded in doing; unlike traditional forms of learning associated with task and content analysis, the structuring of this immersive learning paradigm involves co-evolving patterns of discovery. Physical, biological and electronic systems are carefully crafted to merge together, resulting in stimulating and responsive learning conditions (Kenderdine 2013b). Immersive environments in museums are at the forefront of immersive learning worldwide.

Visualisation, Audification, Data Mining: Developing tools and techniques for ultra-high resolution data capture and display. Providing GLAMs with strategies for the re-use of digital archives from collection management data through to online archives, as *cultural data sculpting* (Kenderdine & Hart 2014; Kenderdine & McKenzie 2103; Kenderdine *et al.* 2012). In addition, visual analytics and advanced data mining are essential tools is a world of mass digital archives, assets and collections.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

The proliferation of aura:

While digital technologies are revolutionizing the way museums work the most profound issues that face the sector are philosophical. The sector has thought a lot about what digital enables for their visitors (e.g. crowdsourcing; co-creation; democratization) however it is widely assumed that the digital is to be used as a tool to enhance the real. However, we have entered a time where due to its high fidelity the digital object can generate a powerful auratic experience in its own right. We have begun to see a *proliferation of aura* where both digital and real are privileged equally albeit with different levels of cognition and affect (these differences have yet to be adequately described for GLAMs and research in this area is fragmented). If digital technologies and the objects and experiences they produce are perceived to be more than just tools, we have entered a period that will fundamentally challenge the GLAMs investment in real / digital. In a review of *Pure Land: Inside the Mogao Grottoes at Dunhuang* by Washington Post critic Philip Kennicott recognizes the power that virtual, augmented and interactive technologies can now play in relation to real objects and places. He states of the Freer Sackler installation ". . . at last we have a virtual reality system that is worthy of inclusion in a museum devoted to the real stuff of art . . ." (2012). This comment represents that significant shift in the perception of digital technologies and objects/experiences underway by which some of the world's traditionally object-based

organisations take the value of digital beyond the science centres to the world of art. Indeed, we have entered the realms of the 'post digital'. This is one of the most profound philosophical challenges of our times.

Future curators:

GLAMs are early adopters of technology in general. However, GLAMs need to invest in in-house innovators for the creation of new digital content and digital experiences. Third-party organisations such as Google Cultural Institute and Google Art Project are NOT the answer to sustainable innovation for cultural institutions. Inside GLAMs curatorial and creative positions are needed that go beyond the idea of a 'digital curator' (i.e. one that manages digital artefacts and is concerned with conservation and the 'digital life cycle'), towards people who design and envision the tools/systems/applications they need (and get them built in the market to specification) and who design the digital environments inspired by their collections. GLAM professionals must seize the potential to change the nature of the way people see and experience using new technologies. In the world consuming increasingly sophisticated technologies, GLAMs need not be the handmaiden to latest fads (often a trap in the out-sourcing of technology projects), but rather designers of inspirational new technologies, configurations of technology and, experiences. As more and more digital objects/digital devices are created, museums need to distinguish themselves from consumer level digital material, offering horizons that fit their mandate to be custodians and interpreters of significant objects (digital or not).

Post-Cartesian collections:

GLAMs make collection data 'discoverable' to global search through open linked data and semantic web initiatives (such as Trove; Europeana) however all collection descriptions remain defined in Cartesian terms, at the core of museum classification systems. Glenn Lowry, the director of the Museum of Modern Art in New York, offered the following provocation: "*Museums, as we know them, are instruments of the enlightenment, born of an interest in classifying and ordering various forms of knowledge in an almost scientific way. Is that model still viable? Are there different, more effective ones that we should be considering?"* (2013, *Aspen Institute Seminar for international art museum directors*). The digital offers an opportunity to rethink classic dualisms in a complex set of entanglements. Redefinition of dualisms will have a profound effect on the way we not only categorise and create metadata, but also on the way we visualize our collections and in the age of the archive finding humanistic ways of visualizing these voluminous archives for discovery and meaning making is profoundly challenging.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

Visitors: iGLAM develops visionary participatory and educational experiences of culture and collections providing innovative ways to connect history to the present, and people with the past in a dynamic engagement. iGLAM contributes to stimulating learning environments for multiple audiences and provides post-cinematic narrative engagement.

Staff: iGLAM develops new tools for analytics; data capture; preservation; conservation and; exhibition making. These have wide application throughout GLAM organisations, creating new ways of working, conceiving of and caring for collections.

Government: iGLAM provides innovative, internationally award winning, revenue generating IP; through its international reach (especially Asia) it acts as a broker for international cultural relations and forms long-term relationships between researchers, cultural organisations and governments (e.g. see Kaladham Museum, winner of the Inaugural Arts in Asia Innovation Award 2013 and the ICOM Award for International Relation 2013);

Overview of the global environment for your research

Cultural heritage is under major threat. Mass tourism, climate change, conflict, looting and theft put living communities and heritage sites under extreme duress. Simultaneously we are able to image the world at increasing resolutions such as laser scanning which creates billions of points. Trends in display systems move toward unprecedented resolutions (e.g. the 4K and 8K screen, projectors and video formats are proliferating). Turning big data into meaningful narrative is one of our most pressing needs. There is a critical need to converge imaging and display possibilities in the preservation and education about our cultural heritage. This is not a challenge of mimetic replication, but rather engaging people in understanding the past as a dynamic entity so we might imagine the future, better.

The future of museum going experiences is going to be more immersive (what the Horizon Report 2013 refers to as 'natural' interfaces), more participatory, more interactive, with content of much higher fidelity. Ubiquitous computing, the immersive living room and true telepresence once the domain of science fiction is becoming ever more real. GLAMs have an important role to play in defining how culture appears in this world and all have an important role to play in the digital future of culture. One of the projects planned by iGLAM in collaboration with Museum Victoria is a world touring show of nine large-scale immersive and interactive display systems with 18 content applications. *Illuminating Asia* will fundamentally change the nature of how a cultural heritage exhibition is perceived. Its focus on Asian content is timely and its format visionary.

Currently Australia is world-leading in many aspects of digital culture and will continue to proliferate examples for the world. The uptake of Australian innovation is more increasingly widespread in Europe, USA and Asia. However the national recognition of the critical importance of mass digitization of cultural records and fast (and secure) networks is not abreast of the potential Australian GLAM sector has to participate in a global revolution.

Trends towards adoption/utilization related to your area of research

iGLAM is working up to four - five years out before mainstream adoption, accordingly to reports such as the Horizon Report for Museums 2013.

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Inaugural Arts in Asia Innovation Award 2013 <http://arts.gov.au/asiaawards/winnerprofiles>

ICOM Award for International Relation 2013 <http://icom.org.au/site/activitiesiaair2013.php>

B.4 Machine Learning, Knowledge Representation and Reasoning

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B.4.1 RESEARCH OVERVIEW

Mike Bain is currently a Senior Lecturer in Machine Learning and Bioinformatics at the School of Computer Science and Engineering, University of New South Wales. He has published around 80 journal articles and conference papers, mainly in the area of machine learning, that have been cited over 1000 times. He has been involved as a Senior Researcher in the Smart Services CRC since 2008 leading teams on machine learning for personalisation and recommendation.

Most methods of machine learning assume that data are in the form of tables as would be found in a relational database, but there are many situations where this is not the case. One solution to this is to devise machine learning methods which will work on the kind of data that is often found in real-world applications, such as information about networks or in text documents. One field of machine learning in which these problems can be properly formalised to enable algorithm development is formalised is Inductive Logic Programming (ILP). This uses Artificial Intelligence techniques from the area of Knowledge Representation and Reasoning to allow the machine learning system to be equipped with general knowledge about a problem, and introduce an element of "common-sense reasoning" into the algorithms which can both improve the problem solution and make it more efficient.

Mike Bain's principal research contributions have been on how to ensure a level of consistency in ILP using such common-sense principles - a method of doing this correctly, with well-understood properties, had not been done prior to his work. These ideas, and their developments, have found wide applications in areas such as bioinformatics and analysis of social networks. He regularly serves as a reviewer for international journals and conferences in these areas.

Mike Bain's research has recently led to ILP being applied for the first time on big data applications for real-world problems in biology, an area currently witnessing an explosion in the size of datasets. He also has ongoing involvement in research projects with Qantas Engineering n Sydney, and Smart Sparrow, an online eLearning start-up company with offices in Sydney and San Francisco.

Within the CRC, he has worked within the Personalisation group at UNSW, mainly on developing recommender systems for Fairfax Digital and Infosys.

Selected software packages developed by his group for applications in biological domains have been used by groups at Stanford, the Harvard/MIT Broad Institute, Westmead Hospital and the University of Western Sydney School of Biomedical and Health Sciences.

B.4.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

The sector has a lot of material objects that we assume will move massively online via digitisation. Social network technology will be really important in allowing public to access and use this online material. For instance, the Australian Museum could enable public tagging of objects and adding those objects to the user's social profiles (Facebook, Twitter, Pinterest) and sharing them with friends.

Digitisation of documents is one thing, but artefacts are much more challenging. I see three ways technology could help.

First, *Recommendation* – museums and galleries have very large collections. When visiting, what do you look at? A physical visit has advantages in making this decision: walking into the physical space, you see a visual overview and you can decide what you want to walk to.

While one of the advantages with digitizing the collection is that a lot more of it becomes accessible, the downside of that is a real risk of becoming lost in the virtual. One way to address the problem is to use social recommendations:

For example, say I'm interested in early pre-history, early 20th Century literary figures in Sydney, and Chinese artefacts; although this is quite a personal collection of interests, other people may share some or all of them. How do you set up recommendations to suggest genuinely interesting objects? When do you go with the expected (like most commercial online recommendation engines) and when do you suggest the unexpected (e.g. looking at Chinese artefacts, I discover Tibetan poetry) ?

Throwing in a curve ball – something unexpected, but still interesting to the person – makes the experience richer and less annoying than the common experience of large, online retail sites. Museum and gallery visitors are often spending their precious downtime, rather than money, so how do you help them explore massive collections and give them the cultural experiences they seek that will enrich their lives?

Second, *Visualisation* – It's well known that no one goes past the first page of Google results. In collections, you want to represent the interesting aspects of what they're looking at – video clips, audio – but also make that experience more interactive.

How would you go about linking objects for visitors? For example, in a museum in Christchurch, you are looking at a Maori artefact. The museum has all this other structured information – dates, cultural information, and provenance. Behind the scenes, the museum makes deep connections between artefacts. Imagine making visible to visitors that Maori drinking cup inscription may link to ocean navigation artefacts, then to people travelling in other ways – across the desert, on the Silk Road and so on.

Structured data creates a massive linked data structure using metadata (what we would technically term a "Formal Concept Lattice"). Related items might pop up for the user when they indicate interest or hover over things. You could then combine this with machine learning to model personal passions and recommend interesting things. Visitors could zoom up to higher level of generality, or zoom across to related items at the same level.

In a way, this is about making the deep structure of curation information available to visitors, but hiding the details so they can simply follow interesting paths.

Third, *Analytics* – Starting with the easy stuff you can deduce from being able to track what people access: What is the most viewed thing? What is the most searched thing? Going deeper we might

go in the direction of user modelling. Individuals leave digital trails as they traverse the collection, so we could let them save profiles of where they were up to and what they were doing, then they could come back to the same point on a later visit.

How can you capture this kind of information? How can you represent it to curators to give them a better sense of what's working and what isn't? How can technology assist curators in working out what to display?

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

Museums are bringing technology more into the physical museum experience, but I think they also need to be much more active online. For instance, by linking collections via mobile apps so that you could get access to a collection before you visit and extend the connection afterward; essentially merging the online and physical experience.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

Visitors feel more a part of the institution's community by establishing a user profile with the site, and then the systems can start to personalise the user experience. Organisations can create a more seamless visitor experience between online and offline.

Staff benefit from a much richer appreciation of what visitors are engaging with.

Government benefits by getting a higher public profile for institutions, which provides easier evidence on which to base funding applications.

Society benefits when we enrich the cultural life of the nation.

B.5 Pervasive Computing and Human-Computer Interaction

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B.5.1 RESEARCH OVERVIEW

My research is broadly in the space of pervasive computing, but focuses particularly on surface computing and novel forms of interaction with computers.

A key example of a surface computing interface is a multi-touch table, designed for small group collaboration. My research investigates new software interfaces for real-world tabletop applications, encompassing themes such as:

1. digital document access;
2. multi-user collaboration with documents around a tabletop;
3. export and organisation of content at a tabletop;
4. using private devices (e.g. smartphones and tablets) in conjunction with shared collaborative displays;
5. gesture learnability for tabletops in public spaces; and
6. user modelling for personalisation of tabletops.

As a foundation, the research is built upon on a surface computing platform, called Cruiser, that can run across any kind of interactive surface – from multi-touch tables, to whiteboards and gesture controlled wall displays. This has led the research to also delve into gesture control and very large, immersive wall displays.

A large component of my recent research has been working with the education department at the Australian Museum in Sydney, to understand how new surface computing technologies can be applied to their education programs. The research looks at how to structure learning activities to make use of portable smart devices (tablets, smartphones) and collaborative displays (interactive whiteboards and tabletops) in a museum environment.

Most recently, I have been leading the commercialisation/productisation of the research as part of a spin-off venture called Cruiser Interactive, a subsidiary company of Smart Services CRC. The Cruiser surface computing platform, underpinning the research, is available as a commercial product with a range of included apps and functionality.

B.5.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

My research involves using surface computing software as an engaging information presentation tool, particularly for searching multimedia and textual archives in a collaborative way. Instead of having terminals for visitors to search individually, multi-touch screens can be used to make this collaborative, immersive through the use of multiple large screens to present the content, and with seamless information transfer back to personal devices (e.g. for free or by purchase, depending on the information and the institution). This is especially relevant to libraries, as renting digital content (downloading content to personal devices) may become a more common scenario, and novel kiosk/terminals will be needed to support this in a seamless manner.

Education programs can be made more engaging by moving away from the traditional paper-based activities that students conduct around galleries and exhibits, instead using personal carried devices for information collection and then using multi-user surfaces for small group collaboration about a particular theme set by the teacher. For example, this may be part of a brainstorming activity, or an activity where the students need to synthesise the collected information to create a new, shared artefact. My research looks at how to design interfaces to support this kind of collaborative learning, and what kinds of technologies make the most sense (in terms of learning outcomes and cost). Importantly, such activities need to be adaptable to a wide range of ages and exhibits; the research described here can be applied to any particular topic in the GLAM institution, thereby reducing costs for the educational programmes offered.

For my research on gesture-controlled signage, there are also new opportunities for ways to advertise GLAM institutions to the public (e.g. in public outdoor spaces), or to provide novel interactions with content within galleries and exhibits. Importantly, such interactive advertising can deliver personalised experiences to attract visitors and alternative demographics who otherwise wouldn't attend some GLAM institutions.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

Novel interaction technologies such as tables, walls, combined with personal devices, enable many possibilities for personalised information delivery. The GLAM sector needs to deliver information in a personalised experience, one where the museum learns about the customer in order to present them with relevant information on each visit. This has the potential to increase return

visits by tailoring the information presented in exhibits and expanding on this, or giving a different perspective, in future visits. There are many emerging digital technologies that can be used for this, although may privacy and user interaction challenges arise.

Another barrier to adopting these kinds of surface computing technologies is the hardware cost, and this may be difficult to justify for smaller GLAM institutions, or particular departments (e.g. education department vs. funds for 'headline' exhibits). This highlights the need to look at how to exploit devices that visitors already have (phones etc.), and how these can be integrated into the GLAM experience in order to provide personalised information delivery, or for designing education programs around the scenario described earlier (personal collection, collaborative sharing and new artefact creation).

Communication with the target audience for attracting visitors to GLAM instructions is also an area of transformation, looking at interactive signage and other 'digital' experiences that capture potential visitors. This may involve looking at 'pop-up' style exhibits in public spaces that use surface computing (e.g. interactive walls) to attract people's attention and educate them on particular GLAM institutions or special cultural events.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

Leveraging new interaction technologies has the potential to provide highly engaging and personalised experiences for visitors – leading to visitor loyalty by encouraging return visits. At the same time, the GLAM institution can learn more about their visitors, the kinds of information that interest them most (e.g. by capturing stats on what they are looking at with these interactive displays), and adapting the information delivery so that they are presented with different information on each return visit. Furthermore, the younger generation have different expectations on interactivity and the use of personal devices, and so it is timely for GLAM institutions to be looking at different ways to engage their younger visitors, both within gallery/exhibit/library, and outside (at home, school and so on).

B.6 Videogames, Gamification, Engagement and Motivation

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B.6.1 RESEARCH OVERVIEW

Dr Daniel Johnson is the head of the Games Research and Interaction Design Lab, the leader of the Gaming Research Group at the Young and Well Cooperative Research Centre and a Senior Lecturer in the Bachelor of Games and Interactive Entertainment at Queensland University of Technology. Daniel has completed Bachelors and Honours degrees in Psychology, a Graduate Certificate in Higher Education and a doctorate on the psychology of human-computer interactions and video games. Daniel has also worked in the games industry for companies such as NextGenVideos and The Binary Mill. He recently completed a year as a post-doctoral fellow at the University of Cambridge working for the Engineering Design Centre and remains an Affiliate member of the Cambridge University Wellbeing Institute.

Over the past decade, Daniel has undertaken key work exploring the intersection of videogames and wellbeing including leading the production of the report "Videogames and Wellbeing" which

reviewed over 200 papers exploring key issues in the space. In 2013 he was awarded the Vice-Chancellors Performance Award for Excellence in recognition of his teaching and research in the area. He is actively involved in the supervision of over 15 higher degree research students working on videogame, play and wellbeing related projects and has over 70 publications with more than 560 citations of his work. Additionally, he has worked closely with the games industry throughout his career including consulting work with Sega and NextGenVideos and a Research in Business placement with NextGenReality in 2011 and 2012.

Daniel's research interests include:

- The determinants and moderators on the impact of videogames and wellbeing (social, psychological, emotional and physical)
- Exploration of how videogames can be employed to directly improve wellbeing
- The factors that contribute to game enjoyment, flow and engagement
- The development and use of valid and reliable metrics for assessing game play experiences
- The impact and appeal of intuitive physically-controlled game peripherals (e.g., Kinect, Move, Wii etc.)
- The interactions between personality, preferred game genre and game enjoyment

B.6.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

Much of my work is about how to *motivate* and *engage* people by building "playful interactions ". We ask, what makes an activity or experience rewarding and fulfilling? People call this "gamification", but rather than thinking of it as turning things into games, you could think of it as taking what we discover about motivating and engaging people and apply that to non-game settings.

One key aspect is: which rewards motivate people - what works, what doesn't? We have studied this and documented it in a taxonomy of rewards.

We are also interested in how to communicate progress. Designers refer to the process of getting people to engage with a site as "onboarding", which is important, but then once they are engaged, you need to think about how to move people along so they stay engaged in the longer term.

One approach we are taking is discovering how to create interesting social connections for people doing stuff. As an example, lots of games and websites use so-called "leaderboards" – which show who has gathered the most points or completed useful activities. In our view, this is not as interesting as other approaches which are more social and about connecting and encouraging each other.

We think all of this is potentially interesting to organisations in the GLAM sector, especially as they continue to engage online and seek audiences for virtual exhibitions. In a physical space, exhibition designers obviously think about engagement and how to move audiences along, but once the audience is in the building, you have some guaranteed engagement.

With a virtual exhibition, you are competing with every other window on their computer – Facebook, YouTube other websites, video games, and so on. While that may sound challenging, we think it is important to emphasise that game-like environments provide visitors with a new service and people are used to paying for games.

We have done some work on applying these ideas around playful interaction to a library setting and we have published a paper on that work: http://eprints.qut.edu.au/62062/

With respect to the productivity of staff in the organization, it may be interesting to consider crowdsourcing digitisation or working with metadata and connected information about collections. If this seemed feasible, you could use gamification to assist motivation, engagement and even accuracy in volunteer teams. Ample research demonstrates that motivation can assist productivity.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

I should never have to hire a tape recorder at a gallery or museum when I have a smartphone or tablet with me. Why is it not possible to access the audio guide using my existing device, with my own headphones?

It has been so long since I visited a library that I am not sure how to put myself back in that space – the library for me is a website. So since my experience is online, I tend to compare it to other online experiences. For instance why does the library's search capability seem a lot less efficient and effective than Google?

One thing I know I miss from online libraries is the serendipitous encounter with new items on the shelf I recall from being an undergraduate. Perhaps some technology could recapture this experience for online users.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

Visitors would experience better motivation and engagement.

Crowdsourcing could lighten the load for staff to get people to engage in volunteer tasks and incorporating some of these techniques into software used by staff might make aspects of their jobs more engaging. Staff would get better feedback on visitor engagement - where people are sticking, where you are losing them.

Government would see organisations reaching new demographics or new groups with this kind of technology, which would hopefully create a better case for funding.

B.7 3D Modelling

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B.7.1 RESEARCH OVERVIEW

Building 3D models or 3D maps of environments is an important task for many applications like games, augmented reality (AR) and telepresence. Such models are often created through a tedious manual process from a collection of photos or a semi-automatic process involving special and expensive equipment such as laser range scanners. Techniques have also been developed in the past for 3D model reconstruction from stereo cameras, mono cameras and even unsorted collections of photos. However, most of the image-based methods do not provide dense 3D models, which are often required by game and AR applications and often require extensive offline processing with user interactions.

The release of affordable RGB-D cameras, such as Microsoft's Kinect in 2011 and later ASUS's Xtion Pro Live Sensors, together with the increasing capability of the graphic processing unit (GPU)

in processing large sets of data in parallel has made it feasible to construct dense 3D models of scenes in near-real-time by using a single RGB-D camera. However, despite the extensive fundamental research on 3D modelling, there are significant challenges to build a real-time or near-real-time 3D modelling system that uses a single RGB-D camera and can be operated by a person without professional training. In particular, commodity RGB-D cameras like MS Kinect sensors usually have a narrow field of view (600 in contrast to 1800) and low depth resolution (480x640) and precision (~3cm at 3m). In addition, the depth maps often contain numerous "holes" possibly due to the fact that certain materials or scene structure do not reflect infra-red (IR) light used in the RGB-D cameras. When moved fast, the RGB-D camera will also experience motion blur which leads to missing data. The limited field of view can cause serious problems to the estimation and tracking of the camera pose, which is a core component in the processing pipeline of building 3D models. In addition, the commodity RGB-D cameras often produce low-resolution RGB images which consequently results in low-resolution texture.

With the support of Smart Services CRC, the Advanced Multimedia Research Lab, ICT Research Institute at University of Wollongong, has recently developed technology that addresses the problems associated with the RGB-D camera and creates quality 3D models with high resolution texture using commodity depth sensors, either time-of-flight (ToF) based or structure light based, together with a high resolution RGB camera. The system is easy for a person to use without special training and constructs the 3D model and texture in real-time. Typically, a 3D model with the colour texture of an isolated object, such as an item or human body, is obtained by pointing a RGB-D camera toward it and moving around the object. For an indoor scene, its 3D model is constructed by swiping an RGB-D camera around the scene if the size of the scene is within the working range of the RGB-D camera.

B.7.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

The purpose of 3D modelling is to create a model as well colour textures (images mapped onto the surface of the model) of an object or a scene – either closed space (like a room) or an open scene (like a landscape). 3D modelling used to need expensive equipment and was a tedious, costly process – only a few years ago a 3D model of the Sydney Opera House was reported to cost $1M.

Then in 2011 Microsoft released a low-cost depth camera as a part of the Kinect add-on for the XBox. Several other companies have followed the lead and produced stand-alone cameras, and add-ons for mobile devices at very low cost.

This is great, but low cost typically means low accuracy – these cheaper cameras produce quite noisy data. Our research is about discovering how to build a good geometrical model, as well as capturing high quality textures from this noisy data from cheap cameras. Our other focus is on creating easy-to-use software to do all this.

3D modelling technology provides a way to digitise all kinds of physical artefacts. The display of the model can be adapted to the capabilities of different devices: a big 3D HDTV might show a high-resolution, detailed model, a smartphone might show a low-resolution version.

We could imagine that if we put 3D models of a collection online, it could improve access. To start with, we could digitise items while on display, giving easy access to collections online to get access to more of the collection – especially artefacts that are usually kept in storage. Over time, more and more of the stored collection could be modelled.

With these models and textures, staff could then create a virtual exhibition. We could provide mixed reality environments, blending digital and physical artefacts on-site at the institution. We could organise personalised displays based on an individual's interest, rather than solely by theme.

You might imagine more engaged users using these models. Imagine end-users being able to use simple 3D modelling for themselves. Some institutions[28] allow people to take a photo and send it to ask, "I don't know this tree". Imagine taking a 3d model! What is this object? Museums and libraries could provide more accurate information and vouch for trusted information instead of people having to guess or rely on random forums on the Internet.

To go a little further, imagine a "layered mixed reality" where a visitor could look at an artefact as it physically is, or look through a translucent 3D display or 3D goggles to see a model of a restored version of a damaged artwork (e.g. a broken sculpture) layered over the physical object or to layer conjectured muscles, skin etc. over physical skeletons of people or dinosaurs.

One other concept might be to use 3D printing to create on-demand replicas. Rather than having only some replicas available, visitors could select artefacts they want to take home and collect a printed 3D model from the gift shop on the way out. With personal 3D cameras, visitors could take 3D snapshots of items or displays they like and print them at the venue for a fee. Museums or archives could charge for higher resolution models or parts of the archive for universities or business.

Of course, all this raises rights questions: Are there rights on the model or on the original? Who owns the model? This is an area in which the legal system may need to catch up.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

So many new technologies are developed but they seem to be quite rare in GLAM venues. I think they are well positioned to be more experimental and adopt new technologies more quickly than many other organizations. Visitors to museums and galleries are predisposed to be curious and explore, why not explore that? Visitors often will not need 100% reliability, so venues could provide them new technologies to play with.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

Staff would be better able to manage the collection, because they would get access to more of it digitally. It becomes easier to create and share virtual exhibitions, potentially integrating digital 3D items from various museums. From a government's perspective this extends the interconnection and power of each institution and allows them to more easily extend access to rural and remote citizens.

What we are suggesting could change the role of GLAM institutions from looking at the past, to educating people about new things and change. Online 3D exhibitions would build awareness and demand for the collection using online access. All this would attract new audiences.

28 For example, Smithsonian's Leafsnap app – http://leafsnap.com

B.8 Immersive and 3D Multimedia

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B.8.1 RESEARCH OVERVIEW

Advanced multimedia is poised to reshape our society in the coming decade with a profound, transformative and disruptive impact on many sectors. Thanks to significant advances in the last few decades, the capability to generate, process, transmit and store multimedia content is now commonplace. In addition, our current immersive multimedia research shows that the technology is mature enough to create new modes of engagement. For example, augmenting real multimedia with context-specific virtual content (referred to as augmented reality), creates new avenues for consuming news or online shopping; and utilizing a common virtual environment augmented with real content, such as spatially accurate audio and videos of a dispersed group (referred to as augmented virtuality), provides a compelling service delivery platform for remote education, distributed workforce and socialization. The latter category is likely to have wide applicability in many domains and our research output is now in the process of commercialisation (iseevc.com).

Our research has also laid the foundation for the next major challenge for multimedia engagement: creating a seamless integration of the real and the virtual. For the purpose of elucidation, we provide two possible examples, which are now actively pursued by our team. Please note that example services or use cases are presented merely to clarify the concept. However, it is not implied that these examples will be viable services.

Free Viewpoint Multimedia

Free Viewpoint Multimedia may be the basis of the next major development in television after digitization. The desired scene, such as a football match, will be captured by a number of cameras arranged around the scene. The viewer is then free to select any arbitrary viewpoint, which will be synthesized from the information obtained by the cameras. The multimedia content of the scene (its so-called sound field and light field) can, therefore, be experienced from any viewpoint and the viewer feels immersed, i.e., virtually present, in a real scene with the ability to roam. The key research questions for this strand are:

- Optimization of the scene acquisition, i.e., determining the minimum number and arrangement of cameras to capture the scene.
- Real-time synthesis of sound field and light field for the desired viewpoint at the requisite output quality.
- Efficient compression of captured data for the purpose of transmission to viewers.

We have already made some progress in laying the foundations of this research. For example, we have proposed the concept of Effective Sampling Density, which is an analytically tractable metric to model the intricate relationship between acquisition, view synthesis and output quality. We have also introduced the Correspondence Field function, which is a new mathematical representation of multi-camera geometry for acquisition optimization.

Integrated Presence

The seamless integration of the real and the virtual will provide a new and unique capability: enabling people to experience an event, receive a service, or consume multimedia (e.g. entertainment or news) together even when physically apart. This research strand focuses on the challenge of providing a convincing experience for users to feel close to each other and also 'really there'. The key research questions are:

1. Human-centred investigation of how to bridge the gap between physical and virtual presence
2. How to communicate the nuances of the presence of another person within the constraints of sensory experience created by mixed reality
3. Study the impact of sound and soundscapes for creating the sense of presence

B.8.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

To lay out a sequence of possibilities from what is available now to what is only at the concept stage:

Augmented Reality (AR) – looking through goggles or a handheld device, a visitor's view of the physical room is overlaid with digital information. While most physical galleries, for example, have fixed text on cards, AR can give more fluid and dynamic information about exhibits. This technology is available in the current market.

Augmented Virtuality (AV) – a virtual world with real-time, physical content, including video and audio of people. This allows organizations to make content available, not just as flat web page, but in an environment with interaction, teachers and groups of people walking around artefacts together. The environment can provide access to supplementary information and additional channels easily. This exists outside the lab and is becoming commercial now[29].

Free Viewpoint Video is one step further from AV – the environment is not just a graphical model, but also a real-time 3D representation of the physical environment. Useful when the environment is a featured item itself, not merely a box. This is feasible now, but still in research.

Integrated Presence – seamless integration of physical and virtual. My room is mixed physical and virtual, I'm at home, but also in the remote space with other people who may be physically present there or virtual. This is a theoretical concept but we have the building blocks.

This all integrates with Associate Professor Wanqing Li's work on 3D modelling and faster capture methods.

Basic, physical access to collections may not be appealing to new generations and the gap will likely grow. My children are not interested in visiting physical locations like museums and galleries and I do not think that is unusual. For reasons of accessibility and cost, remote, older and disabled people will find it easier to visit virtual collections. In general, these technologies provide new opportunities to think about new business models, not limited by physical locality. It takes less effort to reach out to more people.

29 Like the iSee system – https://www.smartservicescrc.com.au/products/market-ready/isee-video-collaboration

As this technology becomes commonplace, imagine being able to look at the actual object, look at it as it might have been originally before it was damaged or decayed, look at it in its original context (in Pompeii or in Ur) and to put objects in relationship to each other. Curators could recover buildings and objects from different museums around the world and recreate the original settings of lives as they are thought to have been.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

As an IT person, I want better access to information than a plaque with text on it. Big museums seem to have huge collections but not much information gets through to audiences.

Museums inaccessibility troubles me – you have to actually go to Berlin to see the Pergamon. Interesting artefacts seem so scattered across different institutions, I think audiences need cohesive, holistic experiences integrating global collections.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

For visitors we are talking about a completely different experience which is much more accessible. Better accessibility and browsing creates interest in the non-visiting public who may become at least virtual visitors.

Staff are freed from limitations about space and location. They can showcase the collection however they want to, not limited by physical architecture. These approaches will eventually not replace the physical architecture with a simplified virtual space, but augment it. Curators can get feedback and discover what people actually look at and what they want to know about at a much more detailed level.

Stress on budgets should be reduced, perhaps the private sector might contribute more – when they can see “measurable eyeballs”, the kind of viewing data they get from digital advertising. This might create more opportunities for public-private partnerships to support development of collections.

I can imagine crowdsourcing and mashing up collections – imagine a “make your own exhibition of Ur” event. Schools could have competitions: “Best Exhibit Of Ur” based on information the students can gather and 3D artefacts from all over the world, composed in life-like settings they create based on their research. Imagine school plays inside the virtual environment with authentic monuments.

We don’t know what the creative public will do with the world’s collections if they are accessible.

B.9 Atlas of Living Australia

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B.9.1 RESEARCH OVERVIEW

The Atlas of Living Australia is an initiative to improve access to essential information on Australia's biodiversity by providing tools for researchers and others to access, combine, map and analyse data on Australian species.
The Atlas was initiated by a group of 14 (now 17) organizations – our partners. The intent was to create a national database of all of Australia's flora and fauna that could be accessed through a single, easy to use web site. Information on the site is used to:

- improve our understanding of Australian biodiversity
- assist researchers to build a more detailed picture of Australia's biodiversity
- assist environmental managers and policy makers develop more effective means ofmanaging and sustaining Australia's biodiversity.

Funding for the Atlas was provided by the Australian Government under the National Collaborative Research Infrastructure Strategy (NCRIS) and the Super Science Initiative (SSI), part of the Education Investment Fund. The Atlas partners have provided considerable in-kind contributions. Development and administration of the Atlas has been undertaken by the CSIRO on behalf of all the partners and the funding organisation.

In developing the Atlas, strong relationships have been created for sharing biodiversity data, resources and experiences with related international organisations such as the Global Biodiversity Information Facility, Encyclopedia of Life and Biodiversity Heritage Library. The Atlas has also worked closely with other NCRIS funded projects to develop common approaches and standards and to share application development where possible. These projects include Terrestrial Ecosystem Research Network (TERN), Integrated Marine Observing System (IMOS) and Australian National Data Service (ANDS).

Record data in the Atlas represents either:

- a specimen – an organism, photograph, sound or other multimedia file of a species that has been collected by, and managed in, a natural history collection – a museum or herbarium; or
- an observation – a record of the sighting of an organism by an individual or member of an organisation such as a community environment group. Observations may be supported by a photograph, sound or other multimedia file.

These data are supplemented by images, information about the species, identification keys, conservation status and geospatial data (to produce maps of species occurrence data). A number of information processing, analytic tools and standards have been developed or adopted to help with the integration of records and associated information.

The Atlas of Living Australia and its partners have done a remarkable job in making their collection data available and integrating it into a federated information system. This shared system allows users to search across collections to discover information and associations with other data. This information has greatly increased the use of the member's information sets, as well as giving access to insights about biological data.

The Atlas of Living Australia currently has (as of August 2014)

- 50 million records
- 900 data sets
- 105,000 occurrence downloads
- 2.72 billion records downloaded

The Atlas has also created systems to allow the public to input occurrence and related records (e.g. Bird Life Australian has contributed 12.6m records) as well as for volunteer annotations and transcription of non-digital records (e.g. 100,000 volunteer transcription events).

B.9.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the key challenges for the GLAM sector?

The Atlas of Living Australia provides an important common infrastructure for institutions with biological and environmental collections to share their information with each other and a wider group of users. The Atlas can also provide a case study for the development of similar capability and systems for the wider cultural collections sector.

The Atlas demonstrates the value of open data, development of APIs (automated data sharing systems), geotagging collections information and the use of new analysis tools and systems. The example of a mapping interface and mobile-based app to integrate collections information by location also provides an opportunity to reach new audiences in new ways.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

There is value in developing shared common systems that can enhance use of distributed collections and open up new audiences. Some common challenges remain regarding the funding for digitisation and related initiatives.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

The Atlas of Living Australia has improved both researcher and public access to national collections, and this investment can be leveraged to provide tools and platforms for other countries and the GLAM sector.

B.10 Telepresence and 3D environments

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CSIRO Autonomous Systems Lab

B.10.1 RESEARCH OVERVIEW

CSIRO has developed a number of systems that allow for new ways people can interact and collaborate with remote people, environments and objects. These systems use a variety of video, scanning, computer vision and robotic systems to support these immersive environments. The main systems include:

Zebedee: handheld 3D mobile mapping tool

CSIRO has developed Zebedee, a scanner that allows for rapid three-dimensional mapping of large and complex environments that were previously difficult to survey. The hand-held device can be

walked through internal and external spaces, automatically recording information that can be used to create an accurate 3D model.

The system has been used to map:

- buildings such as Sydney Opera House, Leaning Tower of Pisa
- historic sites such as Peel Island, Queensland,
- historic objects such as the Endeavour replica, a WW1 tank
- underground cave systems such as Jenolan and Koonalda Caves

The 3D models created by Zebedee can be used to create life-like virtual environments that can be used for a variety of purposes. It can be used to allow users to explore a remote or difficult to access building, object or environments. It can also be used to create accurate surveys for environments to assist with recording and conservation of buildings and objects. It can also be used to track variations in environments over time.

The Zebedee system won the 2013 Australian Museum ANSTO Eureka Prize for Innovative Use of Technology. The technology is now commercially available through CSIRO's commercial partner, 3D Laser Mapping.

Further information can be found at:

- http://www.csiro.au/Organisation-Structure/Divisions/Computational-Informatics/Zebedee-3D-mapping.aspx
- http://csironewsblog.com/2013/04/13/using-futuristic-technology-to-delve-into-the-past/
- http://www.csiro.au/Portals/Media/3D-mapping-is-a-Pisa-cake-for-Aussie-scientists.aspx
- Delving into the past with Zebedee - www.youtube.com/watch?v=HWFUPYXsQyU
- Melbourne's Shrine of Remembrance scanned in 3D - www.youtube.com/watch?v=YDi47AMf_n4

Mobile Telepresence Robot for Museums

CSIRO has also developed a mobile telepresence robot to allow remote visitors to go on a tour of museums, galleries or similar institutions. The service provides people with life-like and immersive interaction with a remote environment including tour guides, experts, other remote visitors and exhibitions.

The mobile telepresence robot system was developed with the National Museum of Australia (NMA). The robot, via a high-speed broadband connection, allows the remote visitor to interact with a human educator in the museum. The human educator leads the robot whilst the remote visitors use the panoramic camera to look around and explore items in the exhibit. Apart from listening to the educator and looking around the museum, the remote students will also be able to see and interact with information about each of the objects on display for example exploring images of objects in their original settings or during restoration.

A key feature of the system is the interactive nature of the experience. The museum educator will be able to engage and challenge the students by posing multiple-choice questions, polling and viewing the student's responses in real-time.

Further applications of this system are being investigated with other institutions including the ability to conduct tours on difficult to access exhibitions such as submarines, regional exhibitions, and outdoor and underwater locations. The system also has the ability to display and leverage augmented reality information from an institution.

- http://www.csiro.au/Organisation-Structure/Flagships/Digital-Productivity-and-Services-Flagship/Smart-secure-infrastructure/MuseumRobot-Case-study.aspx

- http://www.nma.gov.au/engage-learn/robot-tours
- Museum robot - www.youtube.com/watch?v=Dv22iu4H3V4

B.10.2 POTENTIAL IMPACT FOR THE GLAM SECTOR

1. How does your research area address some of the for the GLAM sector?

A combination of the Zebedee and Remote Telepresence system provide new ways for the GLAM sector to improve public access, use and participation with their exhibitions and collections.

For example, the Remote Telepresence system could be used to allow remote visitors to go on tours of their collection repositories where it is difficult to allow public access. It could also allow access to an exhibition after hours by connecting to remote visitors from different time zones.

The Zebedee system can be used to create accurate 3D models of an institution's buildings, exhibitions and remote facilities. These can then be converted into 3D immersive environments that allow remote visitors to inspect and interact with their collections.

CSIRO is keen to work with the GLAM sector to further enhance these capabilities and develop new models for how they can be used to enhance engagement with collections.

2. Based on your own experiences engaging with galleries, libraries etc. what are your thoughts on how this sector needs to transform to embrace new emerging digital technologies?

One of the key issues CSIRO has experienced working with the GLAM sector, is the challenge for the GLAM sector to establish sustainable funding models to support innovation and the adoption of new digital services. Part of this challenge, is both the attraction of new sources of funding but also the reallocation of internal resources to support both physical and digital services.

3. How might your research benefit the various GLAM Sector stakeholders i.e. visitors, staff, government, public?

The systems have the ability to increase access for remote visitors, allow visits to difficult to access locations, and provide new ways to interact with GLAM sector staff, collections and information.

Appendix C Innovation Workshop In-Depth

C.1 Pre-Workshop Preparation

Participants in the Innovation Workshop were sent:

- An initial briefing paper summarising examples of leading edge local technology research and its relevance to the GLAM sector (this research is summarised in the Appendix "Relevant Research");
- A list of reading material relevant to the future of the sector (Appendix "GLAM Workshop Reading Material");
- A survey about future issues.

All three preparation items were intended to be informative and provocative, but the survey was deliberately interactive to begin the process of drawing attendees into engagement with a futures perspective. The survey asked two main questions:

- An invitation to rate nine issues (which emerged in initial consultations as significant across the sector) on a Likert scale.
- A forced-choice ranking of twenty-one emerging issues – early stage trends that may have significant impact on Australian society over the next twenty years.

C.1.1 ISSUES IN THE SECTOR

The first question revealed a paralysing strategic landscape (Figure 2) – a set of significant or critical issues with little to choose between them. These responses demonstrate why traditional strategic planning so often fails in times of rapid change – most organisations regard all of these issues as high priority, making it very difficult to choose a strategic focus.

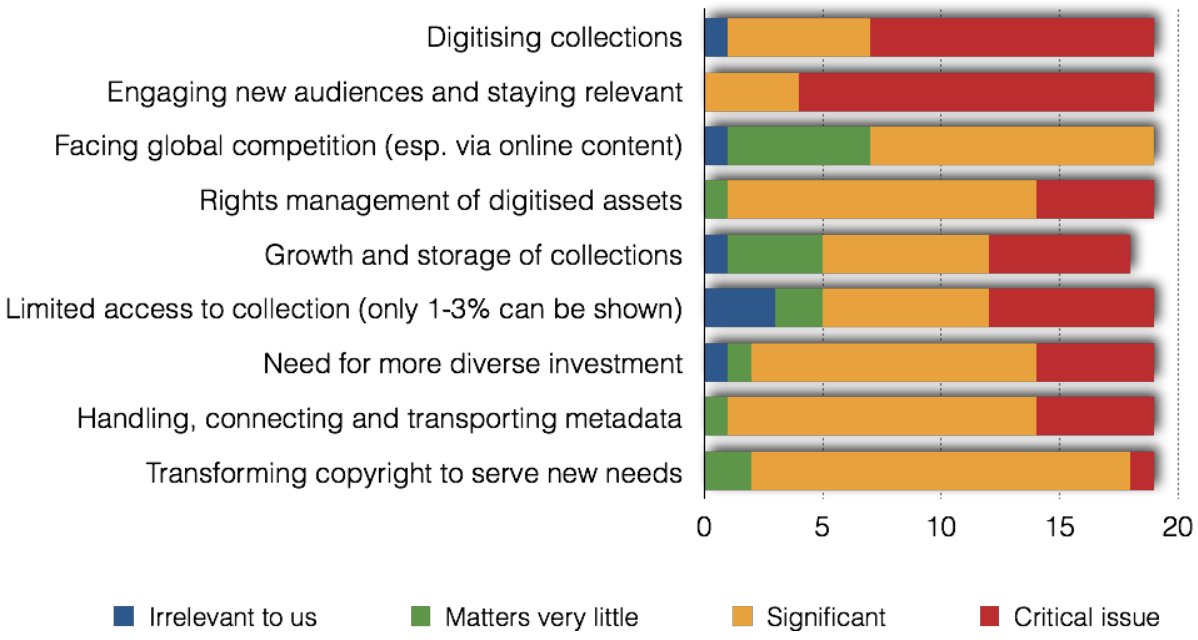


Figure 2 Critical Issues in the Sector

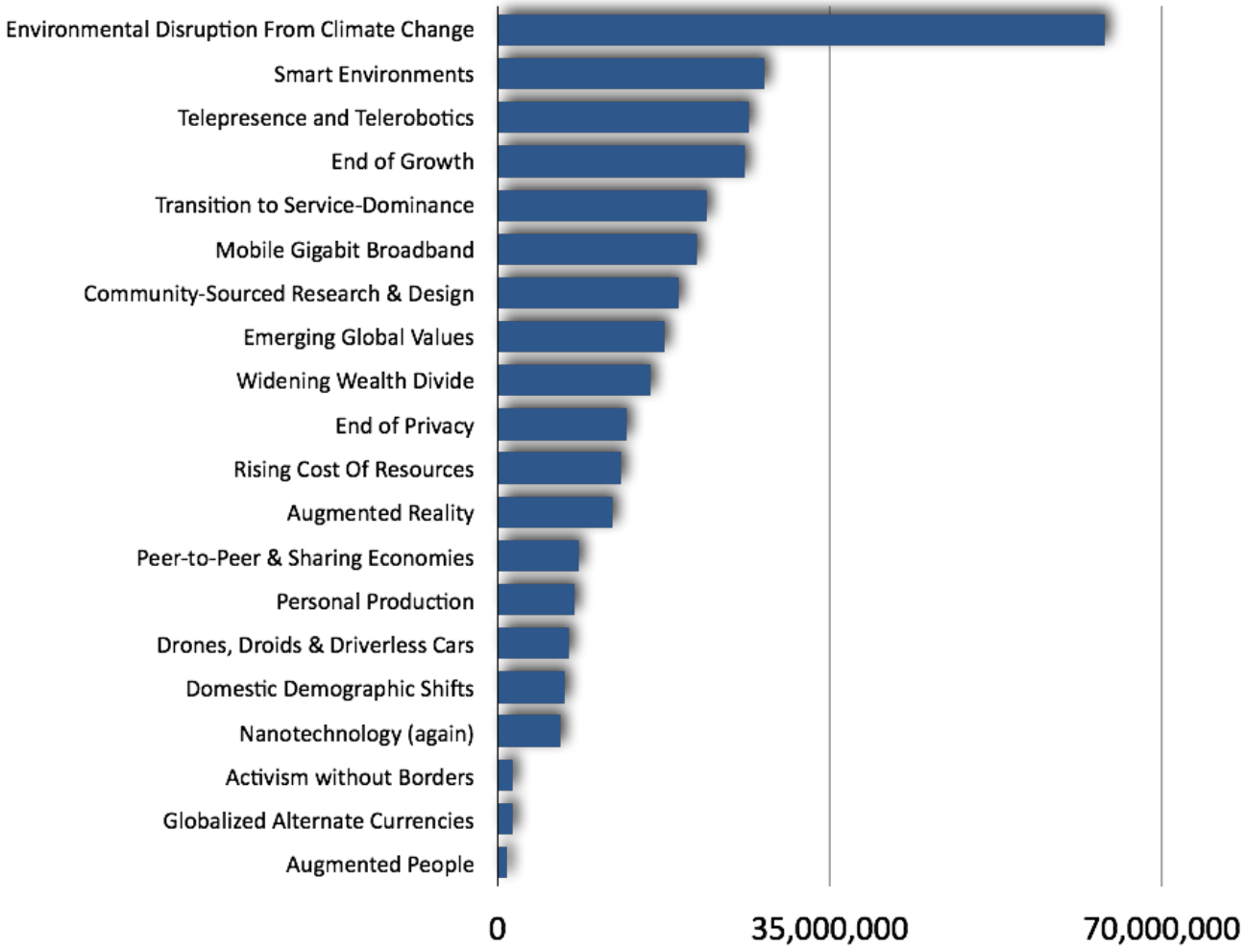


Figure 3 Emerging Future Issues

C.1.2 EMERGING FUTURE ISSUES

The second question asked participants to rank the importance of a set of emerging issues by asking them to play a game of investing fixed amounts of money into R&D to figure them out. A graph of the responses (Figure 3) mostly reveals the workshop participants' overwhelming unanimity about the significance of climate change. If we exclude that dominant issue, a clearer picture (Figure 4) of other priorities emerges. The survey is not intended to canvas participants' views of the probable outcome of these issues, only of their significance and, to some extent, their uncertainty. By priming the attendees to sensitivity about these issues, the process coaches them to begin thinking beyond the immediate institutional demands of the first question. The results of the survey were presented back to the attendees at the start of the workshop.

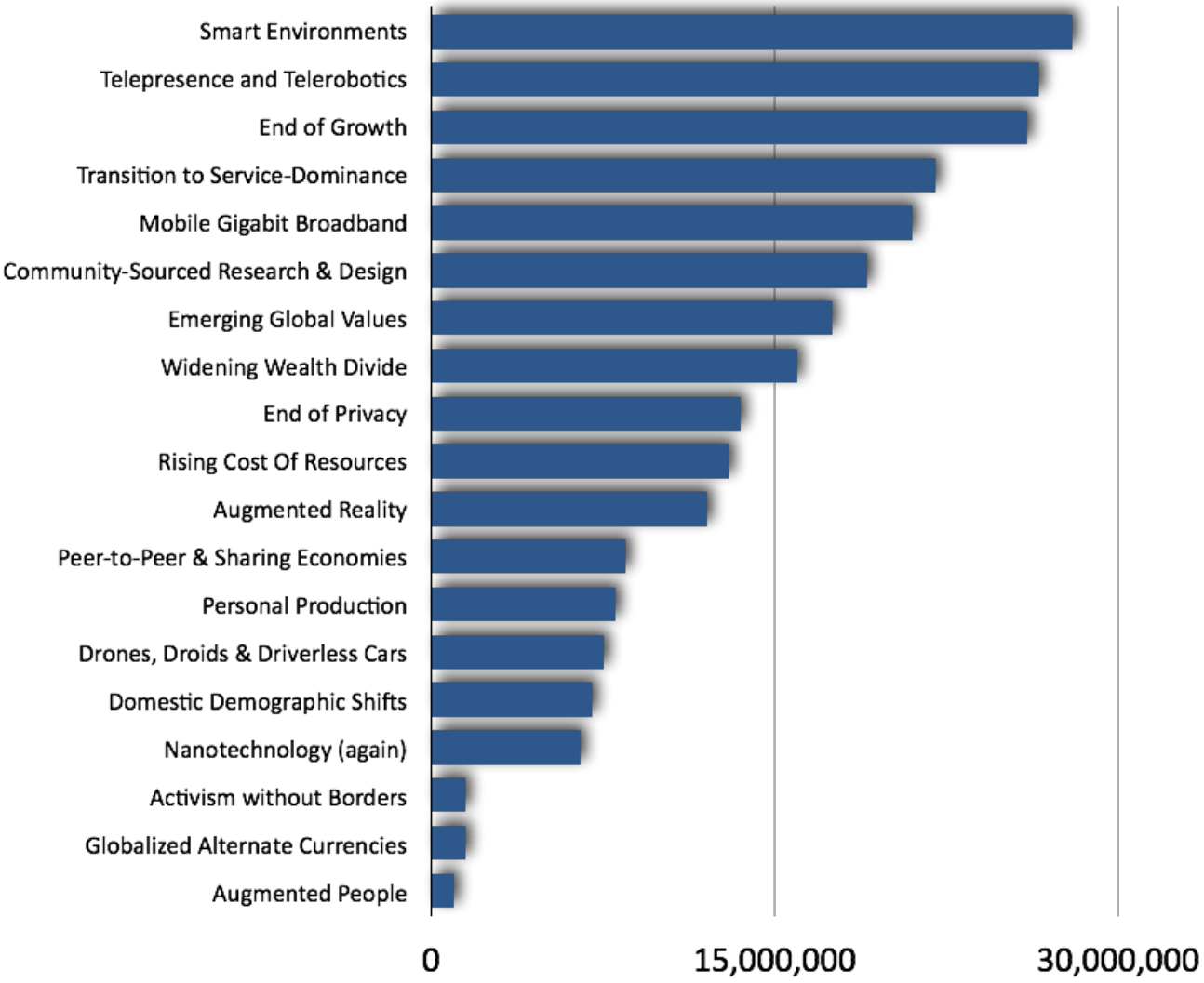


Figure 4 Non-Climate Emerging Issues

Emerging Issue Descriptions

Rising Cost Of Resources The gradual exhaustion of easily accessible deposits of oil and other key industrial resources leads to rising costs, lowered availability and the need to conserve, recycle and reuse at a massively increasing scale.

Environmental Disruption From Climate Change The current, early trends towards global temperature changes, wilder weather, rising sea levels and widening deserts continue and worsen with often-disastrous consequences.

Transition to Service-Dominance Academic research and business reality in the last two decades indicate a shift away from thinking about business and economic activity in terms of the production and consumption of *goods* and towards *ecosystems of service providers* offering their knowledge and expertise to assist customers in creating value.

Smart Environments Public and private spaces become increasingly augmented by ambient and mobile displays and ubiquitous computers, sensors and interactive devices.

Augmented Reality Driven by mobile networking, cloud computing and unobtrusive heads-up displays, ordinary citizens view the world through ICT-enriched perception – visual, auditory and kinaesthetic.

Personal Production A resurgence of handmade craft meets increasingly flexible personal fabrication techniques like 3D printing and CAD-driven forges and cutters. Designs from anywhere can be fabricated locally in personal versions adapted by local craftspeople. Is this the end of mass manufacturing?

Emerging Global Values As the Internet and communications technology allows us to see ourselves as a planet, we are increasingly developing empathy that is non-local and values that are less about fitting in with our tribe or society and more about being a citizen of the planet.

Community-Sourced Research and Design It once seemed that good R&D was the domain of universities, cashed-up think tanks and big corporates. As the global network connects communities of funders with scientists, creatives and designers new modes of open, peer-to-peer research and design begin to emerge.

Domestic Demographic Shifts Australia's population is aging, growing ever more ethnically diverse and living overwhelmingly (more than 90%) in cities and the emerging megalopolises of South-East Queensland and the Sydney region. The demographic make-up of the country will shift radically over the next few decades – deep changes that bring profound challenges.

End of Growth In the modern era, economics has always used growth as an indicator of economic health and governments have increasingly used it as a surrogate for success. As our understanding of the constraints of a finite planet becomes more immediate and tangible many thinkers are arguing for alternative measures of social health.

Telepresence and Telerobotics As telepresence suites attain ever higher standards of video and audio definition and telerobots allow remote participants to move around the office or factory, how might this affect our ability to share knowledge and expertise and build teams without accumulating air miles?

Widening Wealth Divide While the popular imagination once believed in the end of poverty, many industrialised nations now are experiencing ever-widening gaps between rich and poor and a slow atrophy of the middle class, re-emerging poverty, social unrest, generational disharmony, citizen insurgency and political stagnation.

End of Privacy A future in which everything we do, say and write is logged, tagged, mined and sold.

Mobile Gigabit Broadband Mobile broadband uptake has overtaken fixed line broadband. Broadband facilitated the rise of ubiquitous video like YouTube with its treasure trove of philosophy lectures and funny cat videos. In ten years, mobile ultra-high-speed broadband will be with us – what might we do with it?

Applied Neuro-Psychology As marketers, games designers and potential employers apply more and more of the results of neuro-psychology to making us tick the way they'd like us to, do we have less choice or more fun?

Nanotechnology (again) In "Engines of Creation" (1986), Eric Drexler promised us a world of tiny machines, which would transform life as we know it. Nanotechnology looks a little different from Drexler's predictions, but the transformative potential remains rich and the risk remains significant.

Augmented People The torrent of genetic, chemical and cybernetic enhancements set to appear as products over the next ten years may make our children's lives unrecognisable.

Activism Without Borders Citizen networks agitating for social change have classically been local groups focused narrow issues. As these networks use a meshwork of ICT networks to spawn, connect and merge globally, activism and movements for change (both progressive and traditionalist) transcend geography.

Drones, Droids & Driverless Cars Autonomous robots become a feature of everyday life in the 21st Century. Flying drones of various sizes compose delivery networks over cities and survey traffic flow. Cars drive themselves and form a collective networked view of traffic and obstructions. Robot trucks drive all day and all night. Personal assistants help the elderly and ordinary families.

Globalized Alternate Currencies BitCoin was first, but several different schemes for alternate currencies for global commerce, each operating independently of the classic monetary systems, governments and banks using cryptography and a range of exotic algorithms to create new economies, operating side-by-side with the classical economy.

Peer-to-Peer & Sharing Economies People all over the planet are using online services to connect with each other to accomplish significant tasks, often without any money changing hands. Led by sites like Sharehood, AirBnB, Airtasker and hundreds of others, individuals are using each others' resources, skills and property to get more done for less.

C.2 Day One - Stretching Out

The focus of the initial arc of the workshop was to encourage and support participants in extending their imaginations and critical faculties beyond the immediate demands of their institutions. The target timeframe chosen for this first day was twenty years in the future.

C.2.1 EMERGING ISSUES CONVERSATION

After some opening presentations, participants were shown the aggregate results of the future survey and invited to discuss and explore their favourite emerging issues in more depth. Reflections and explorations were documented on the walls of the room to begin building a futures context for the ongoing conversation.

- End of Growth
  - Measuring and monetising value in terms of purpose: education, research, passion/hobby work, entertainment, status/trivia
- Personal Production
  - Making our own products will change the commercial business models
- Telepresence and Telerobotics
  - Will drone automated museum guides solve the multi-language issue
  - How to provide physical experiences to whole nation?
  - Love to see GLAM sector use drones - unsure of application, but I'm sure there's something…
- Community-Sourced Research & Design
  - Higher Purpose in our work
  - Public things as a "commons"

  - Digital paradigm about collaboration "crowd…" shift from competition in the analogue world
  - Cultural knowledge equal to Academic / Corporate R&D / Knowledge
  - Community based services: traditional curating is changing, provides the community the opportunity to participate & contribute
  - If originals start digital, how does this alter the value of digital originals?
- Transition to Service-Dominance
  - Service delivery creates new opportunities for industry which will grow and develop the digital economy
  - New sources of wealth & investment
- Domestic Demographic Shifts
  - Cultures: how do we talk about objects independent of language?
  - Will future generations value original collections?
  - People moving around, changing jobs and locations vs. staying in one organisation / place
  - Will future generations value original collections?
  - Cultures: how do we talk about objects independent of language?
- Emerging Global Values
  - Capitalism, Multinationalism vs. Value of Culture, Heritage, Free Access
  - What will increasing religious extremism mean for GLAM?
  - How to be move from pleasure to passion to higher purpose?
  - Higher purpose to guide what we do
  - Will globalisation and technology make values more universal?
  - Effect transnational where only value is $ (e.g. Enron)
  - Will locked up collections have any perceived value?
  - Our markets are boundless; no longer are our audiences contained within traditional boundaries
  - Australian GLAM institutions as global ambassadors
- Peer-to-Peer & Sharing Economies
  - AirBNB example is interesting, as it's not even about price - people preferring to stay in a home and not a hotel. Fascinating!
  - People peer-producing their own museums
  - Sharing vs. competitions???
  - Repatriation of cultural collections for indigenous and other groups
- Smart Environments
  - Novel interaction for multilingual access to digital collections
  - Experiencing the past through technology - absolutely!!
  - DNA for hyper-personalisation of information delivery
  - Cultural heritage can be preserved with technology and innovation - relevance & user access
  - Challenges in exhibiting digital art
- Widening Wealth Divide
  - Impact of Thomas Piketty's book (Capital in the 21st Century)
  - Will wealth divide lead to more or less philanthropy?

- Activism Without Borders
  - Recognition and respect of difference and distinction must exist alongside openness and inclusiveness
  - What will we do about hacking of digital GLAM collections - deliberate corruption
  - How will digital activism alter / change what institutions do?
  - GLAM as purpose producers
  - Are museums really built around inclusiveness? Does digital divide preclude this?
  - Need for international legal framework to support local cultural identity
- Rising Cost of Resources
  - How do we go from 2% of public collections on view with the digital technologies
- Augmented People
  - Brain plug-ins - a new divide between haves and have-nots
  - Will digital question the nature of “expert”?
  - AR as museum of the streets
- Augmented Reality
  - Ability to inspire, educate, inform, stimulate
  - AR for group experiences rather than individual
- Mobile Gigabit Broadband
  - Potential need to reframe facilitation institutions (e.g. lending libraries)
- End of Privacy
  - Has the internet reduced privacy
  - Will privacy matter as much to future generations as it seems to matter to current generations?
  - Opening up archival collections vs. privacy issues
  - Transition – individual vs. organisational response

C.2.2 FUTURE SCENARIOS

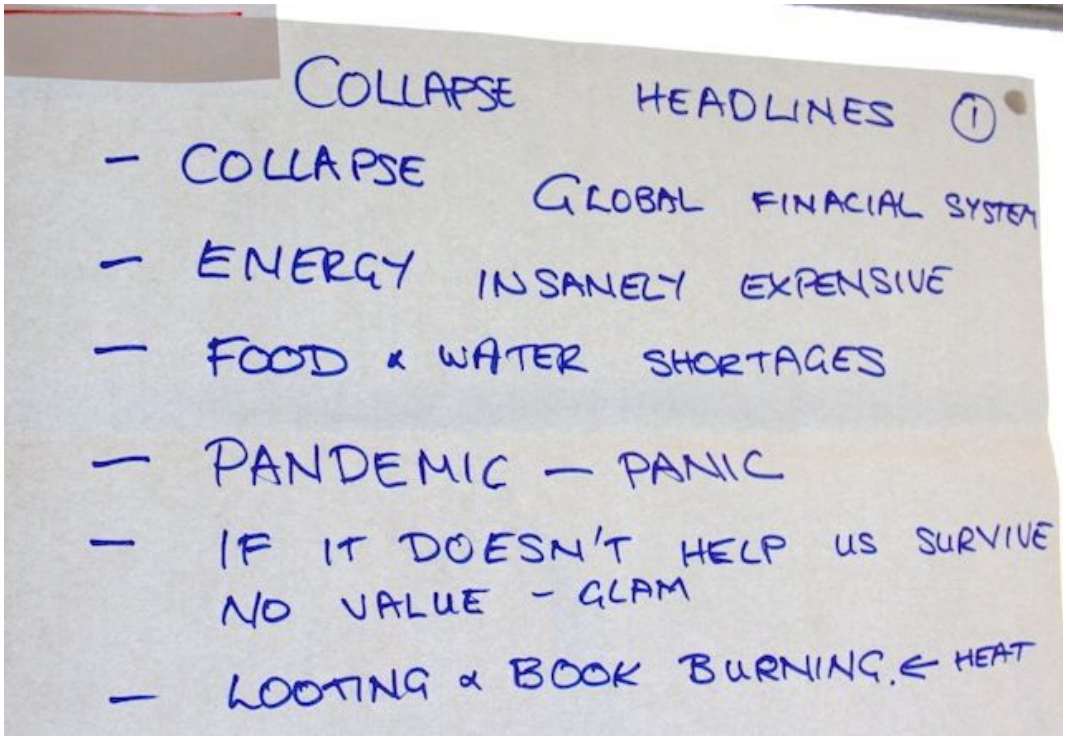
Participants developed the Emerging Issues into a conversation about future scenarios. Scenarios are a commonly used device in future studies projects; a set of 3-6 scenarios depicts the story of several possible futures. The set considered together – each considered more or less equally likely – express the team's understanding of the possible space of the future. Because the intent of this first day was to encourage attendees to think creatively, the approach was to use the data already in the hands of the attendees to develop four scenarios and to emphasise "stretch" over plausibility.

The workshop design was based on four archetypes of the future, developed by Foresight researcher James Dator. Dator's research suggests there are only four classic stories told about the future. Each of these archetypes appears in fiction and popular culture, each has a research around it and a community of "true believers" who put their faith in it.

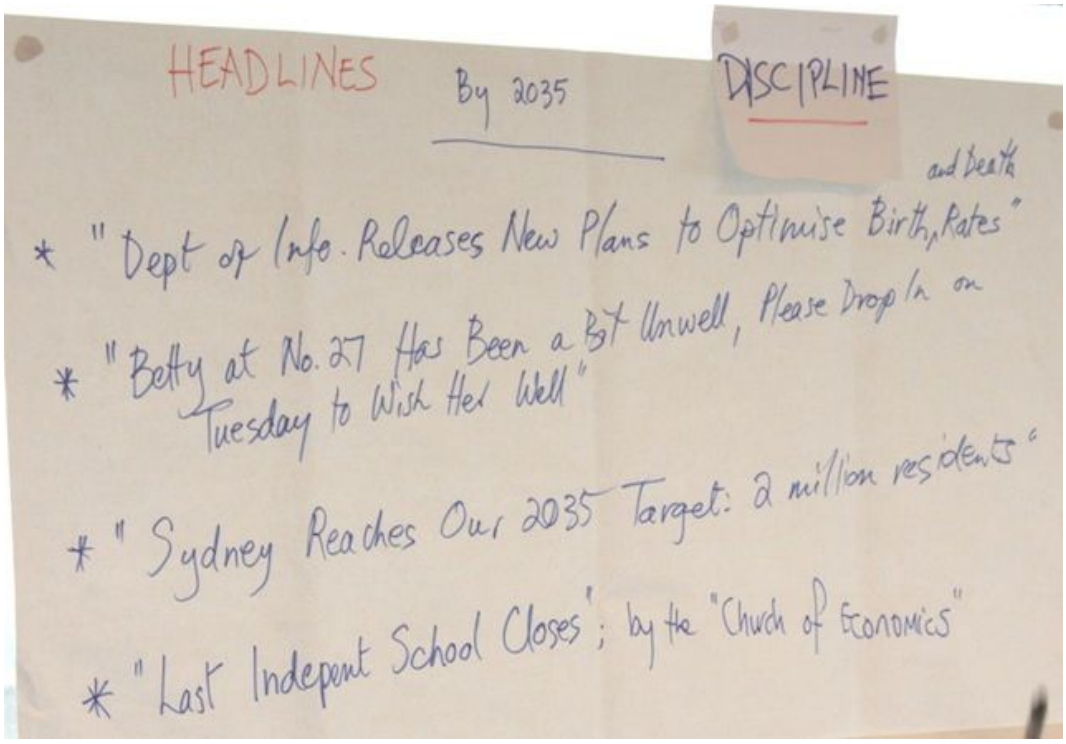
The attendees broke into groups, each discussing and developing a scenario modelled on one of Dator's archetypes. After attendees had time to talk over the shape of their nominated scenario, they were asked to document their discussion in detail and create a set of headlines depicting life in that future as a summary. Both the detailed notes and the headlines were added to the growing futures context on the walls of the room.

These scenarios may seem a little “far out”; their purpose is not to predict or even forecast a likely future, but push the thinking of the group into a very creative space. The following photographs show just the headlines for each of the four futures, not the more detailed notes.

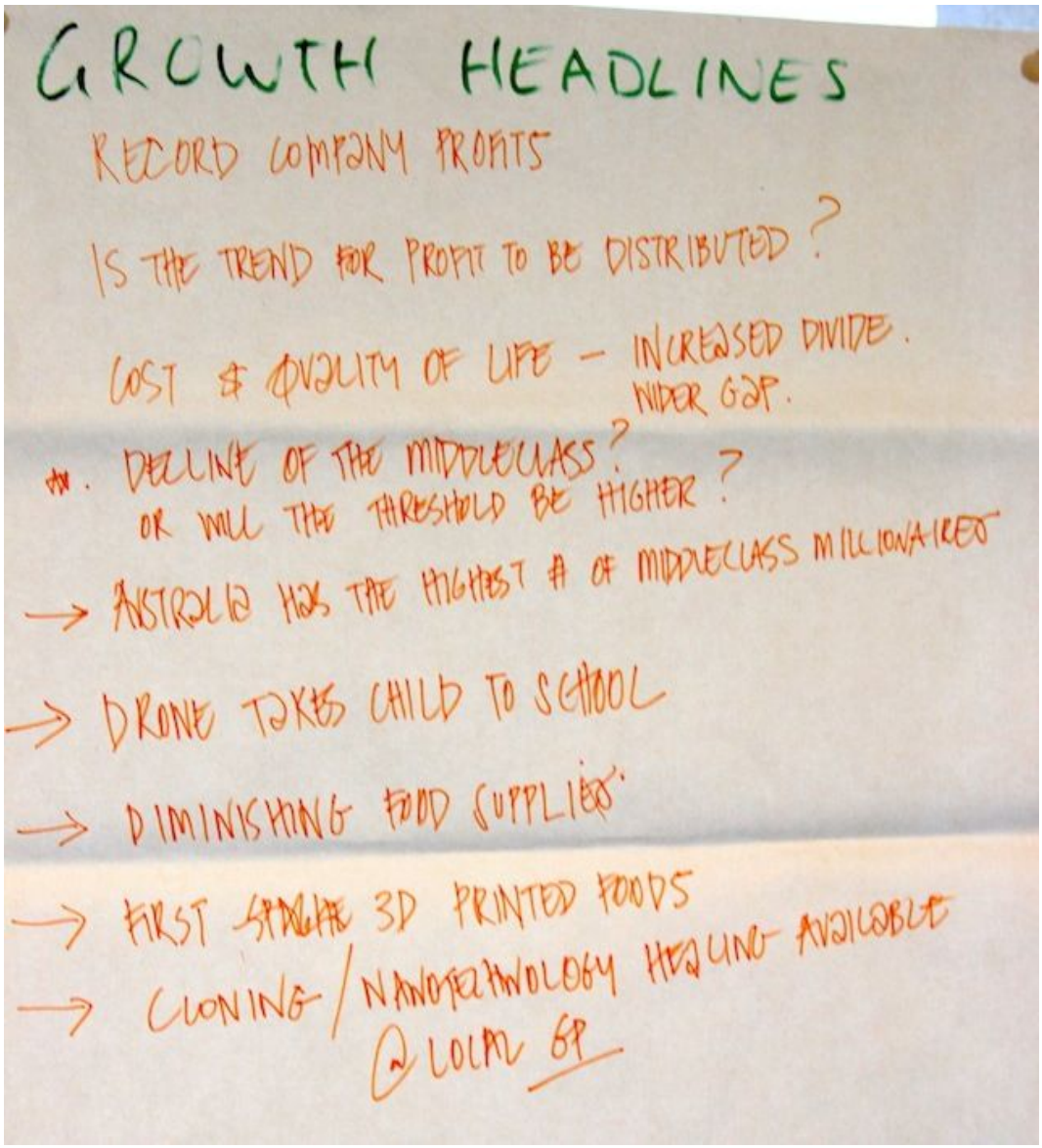
Collapse



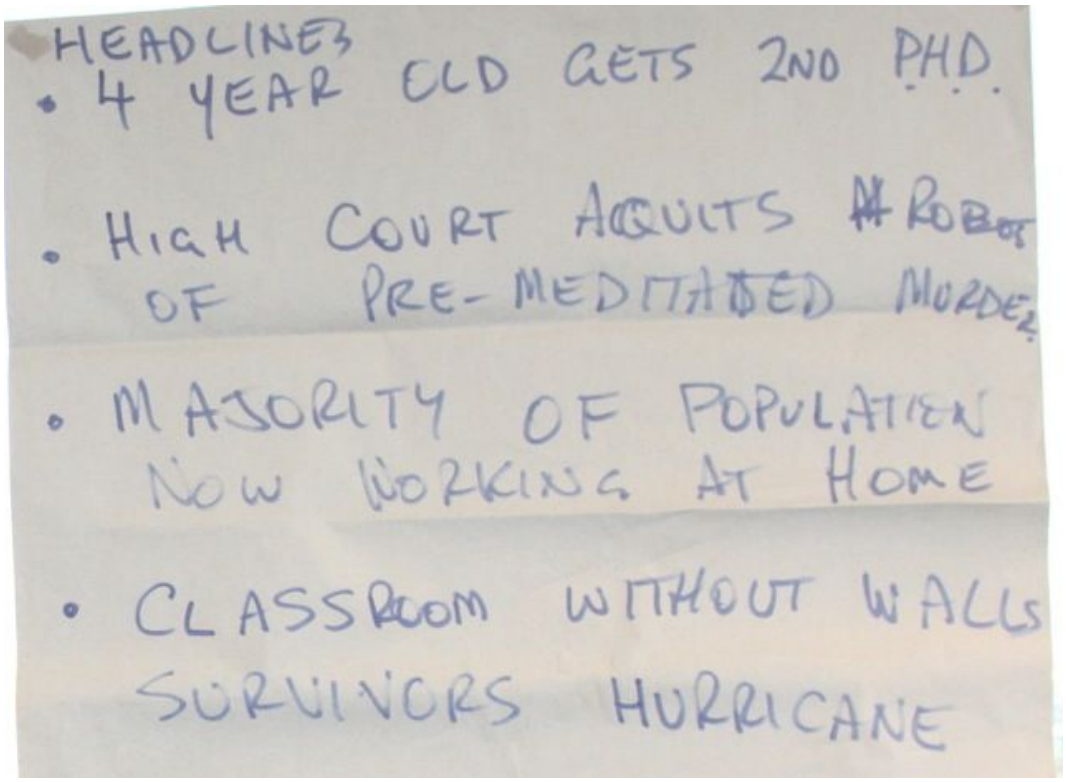
Discipline



Growth


GROWTH HEADLINES
RECORD COMPANY PROFITS
IS THE TREND FOR PROFIT TO BE DISTRIBUTED?
COST $ QUALITY OF LIFE – INCREASED DIVIDE. WIDER GAP.
DECLINE OF THE MIDDLECLASS? OR WILL THE THRESHOLD BE HIGHER?
→ AUSTRALIA HAS THE HIGHEST # OF MIDDLECLASS MILLIONAIRES
→ DRONE TAKES CHILD TO SCHOOL
→ DIMINISHING FOOD SUPPLIES.
→ FIRST 3D PRINTED FOODS
→ CLONING / NANOTECHNOLOGY HEALING AVAILABLE @ LOCAL GP

Transformation



C.2.3 TAKING THE SECTOR TO THE FUTURE

In small groups, participants from each institution represented were led through a process of documenting a one-page abstraction of the key aspects of their institution. This exercise had two aims: one was to facilitate a conversation between different organisations in the sector about similarities and differences, the other was to allow attendees to step back from the complexity of their institution and their role within it for a few hours by focusing on an abstracted depiction.

Working in groups, participants walked around the four future scenarios one by one and discussed how their organisation would need to change in each future, focusing on four critical dimensions:

1. Practices and behaviours
2. Knowledge and culture
3. Systems and structures
4. Actors and leaders

C.2.4 WRAPPING UP

The one-page organisational summaries and their adaptations to the four futures were all documented and added to the futures context on the walls of the room. Attendees were encouraged to wander the room and read each others' work, to look for themes and commonalities through the assembled information. Day one ended with some social time at dinner.

C.3 Day Two - Coming Home

The focus of the second arc was to gently ease attendees from the imaginative space of possible futures back into the possibilities for long-term strategic activities and ultimately into realistic next actions in the present day.

C.3.1 OUTCOMES AND ELEPHANTS

The second day began with a deep conversation exercise to look for threads and commonalities through the futures context built on the first day. After some time talking in pairs and rotating from one partner to another several times, the whole group convened into a broader discussion about what strategic outcomes might make a difference by 2035. This broader conversation included a session on the "elephants in the room" – unpleasant realities rarely discussed.

Some of the key issues discussed were:

- What role do GLAM institutions (or could they) play in community wellbeing?
- How important is the physical space of the institutions?
- What new roles do GLAMs play in an increasingly culturally and linguistically diverse country? What old roles might become marginal?
- How can GLAMs proactively draw the public into the centre of the institution through funding, partnership, soliciting challenge, opening to outside authority?
- Moving beyond "discoverability" of the collection to seeing the relational and personal nature of artefacts in people's lives – connections that go between collections and institutions.
- How to develop funding for strategic initiatives, rather than just digitisation?
- Learning from and connecting with the current eResearch initiatives like NCRIS and ANDS.
- Fostering an active, ongoing, cross-sector conversation at a senior level

Some significant "elephants" which generated significant discussion:

- Copyright, moral rights, cultural rights and orphan works – while several barriers were discussed there was also discussion that there are many examples of innovative initiatives in other countries and that Australian GLAM institutions were not taking an active position in developing new solutions.
- The longer-term shift in funding from state-sponsorship to philanthropy and the consequent shift in priorities – one scenario discussed was that the level of state funding would continue to reduce over the coming decade and eventually represent a significantly smaller part of the sector's overall revenue.
- Institutions compete with each other, it's not all cooperative – there was discussion about the need to develop a more robust framework and engagement between different institutions that acknowledges that they can both collaborate and compete with each other on different activities.
- There is a hierarchy among GLAM institutions in terms of funding and status – there was discussion about different levels of interest from government, corporate and public stakeholders in the different domains within the GLAM sector – archives being the least visible.

- Big gaps between leading edge practice and tailing practice in Australia – despite the many examples of innovation, discussion noted that large parts of the GLAM sector did trail leading edge practice and this is not widely acknowledged or addressed. Participants suggested a need to develop ways of benchmarking the capability and maturity of institutions to innovate, as well as ways of mentoring and assisting smaller and/or less capable organisations.

C.3.2 STRATEGIC INITIATIVES

The attendees collectively decided to explore four key initiatives as self-selected teams:

a. Making the Public A Part Of What We Do
b. Becoming Central To Community Wellbeing
c. Beyond Digitisation – Creative Reuse
d. Developing Funding For Strategic Initiatives

Other initiatives from the list of issues identified are listed below. While these were not fully developed through the smaller team session, there was general discussion on these initiatives throughout the overall workshop.

- Reinventing the physical space of GLAM institutions
- Leveraging eResearch initiatives.
- Fostering leadership and collaboration

Each team used the same process, called “backcasting”, to discuss how these initiatives could emerge:

- An initial conversation discussed a point ten years in the future (2025) at which the initiative was already a complete success. What does this look like. Participants were encouraged to use the four critical dimensions from the first day (see “Taking the Institution to the Future”).
- Next, the team discussed what had to be happening (using the same four dimensions) in 2020 to enable the people, knowledge, practices and systems of 2025.
- Finally, repeating the exercise at two years into the future – what has to be happening in 2016 to enable 2020?
- The final challenge to each team was to prepare a pitch to be given to a present day audience about a next action, which would trigger the shift the team has envisioned.

The strategic initiatives are detailed in the main text. This ended day two and the workshop. Once each team had made their pitch, attendees participated in a brief reflection and closing discussion and the workshop closed.

MAKING THE PUBLIC PART OF WHAT WE DO

This initiative aims for a deep transformation, both in the disciplines in the GLAM sector and in the organisational relationship to publics. While participants acknowledged a profound rhetorical shift in GLAMs to address the needs of an active, informed public, especially through the use of social media, many felt a deep reluctance within the sector to let go of the traditional position of authority among curators and archivists and a simultaneous reluctance for organisations to

become genuinely more porous to outside contributors and collaborators. This initiative aims to effect this shift.

Ten Years

By 2025...

- Expertise is routinely sourced from outside GLAM institutions - it is the assumed, expected norm.
- Content is driven by social interest and current end-user needs – with the role of curators and experts changing to increasing engage and co-create with end-users.
- Users are brought into the difficult conversations before we solve the problem rather than after.
- Majority of collections are available on a Creative Commons basis.
- A network of community collections has formed – complementary to major institutional collections and interconnected with them in a porous, open exchange.
- Institutions provide infrastructure, platforms, spaces and funds (resources) as much as providing content.
- Strong collaborative skills lead this transformed network, people who are comfortable with multiple options.
- Buildings and systems are routinely open and open-source – museums provide tools.

Five Years

By 2020...

- Methods are in place for open sharing, ensuring creators are compensated (as APRA[30] does for music) where appropriate
  - Government agencies should lead by making a decision to adopt this system,
  - Agreement of all non-government copyright holders is gained,
  - GLAM sector builds community enthusiasm and confidence for the system,
  - GLAM sector builds case for value of shared information,
  - Identify a common framework of criteria for Creative Commons release.
- Museum leaders (both structural and cultural) prioritise, drive and lead collaboration.
- Other skill sets are developed among GLAM staff: e.g. software development, digital content expertise, information architecture, open-source systems management etc.
- Local connections are identified and built – related connected collections are being identified, documented and linked to the larger, more central collections.
- Institutions regularly connect with key user communities, which get benefits of value to them (e.g. Profile, self-confidence, legacy, connections, business opportunities, careers).

Two Years

By 2016...

- Identified other models for GLAMs globally that challenge our norms and assumptions (e.g. MONA).

30 http://www.apra-amcos.com.au

- Public consultation completed on preferred uses of collections (what, how, identify key user communities).
- Participatory models trialled, outcomes identified and shared:
  - Where are common factors in success?
  - Where is it difficult?
- Communities are invited to bring their collections or archives to shared "space" – physical or software platforms.
- Museums accept that they do not have exclusive expertise and authority, understanding when to speak and when to listen.
- Museums prioritise open-source systems that enable more open collaboration
  - Is a sector-wide approach viable? e.g. get the whole GLAM web on a common open-source web content management system such as Drupal,
  - Standard media toolkits,
  - Digitisation kits,
  - Identify economies of scale across sector.
- Wikipedian-in-residence programs become more common.
- External collaboration is prioritised in training, recruitment and especially in leadership roles.

The Pitch

“365 Stories” would be a project involving many institutions to share with the public, via various channels, one story per day for a year drawn from diverse collections all over Australia.

Aims:

- Enabling communities to access their heritage.
- Build collaborative platforms – "co-creation ethos".
- Publicise what's in the collections that may not be visible.

Proposal – National focus for the next twelve months:

- 365 most important stories can be told,
- Daily release of one story from some collection across Australia,
- All institutions collaboratively assist.

Actions and Outcomes:

- More diverse kinds of contents valued & access-enabled
- Needs small, open-source platform, cloud-based (cheap!)
- Invite & enable proposals
- Community input as part of the process

BECOMING CENTRAL TO COMMUNITY WELLBEING

This initiative is designed to take the acknowledged role that GLAM institutions play in the wellbeing of individuals and communities and make it a deliberate and central part of each organisation’s purpose and vision. The focus is on both the value of the physical spaces as community centres, but also on the role the collections can play in fostering community memory,

sense of self and pride. There is a need to collect evidence and examples of best practice about these benefits to personal and community wellbeing. One example mentioned in the discussion is the reuse of the Pacific Island collections held by the Australian Museum for a youth at-risk program. What can GLAM institutions contribute to mental and physical wellbeing, to the economy and to community health and resilience as population both ages and becomes more diverse?

Ten Years

By 2025...

- Maximising valued volunteers from the community
  - Inform and be informed by them
  - Open to influence from volunteers (focus groups, research impact & value to the whole of volunteers' lives (beyond their cultural lives))
  - Content co-creation and reuse
  - Representation at board level
- Established research on impact and value to volunteers lives
  - Through partnership with research organisations (e.g. CSIRO, ABS, Health Dept.)
  - Through wellbeing index
- For visitors
  - Facilitating digital literacy and confidence
  - The institution is established as the "go to" place for introductory knowledge about its area of expertise
  - Collaboration with school education / lifelong learning, meaningful engagements
  - Community tell politicians that we're important
  - Deep engagement for personal enrichment, cultural self-worth, identity and helping connect people to their passions
- Impact on wider community e.g. healthier community and crime reduction, engagement with older people to remain connected to the wider community, reuse of content by specific communities, and flow-on wellbeing and health benefits.

Five Years

By 2020...

- Cultural and skill changes and shifts with the institution
  - Strategic plans
  - Business plans
  - Job descriptions
- Involving staff and participants in transforming the role of the institution
- Advocacy by the GLAM sector – advocacy days around the value of museums
- Advocacy by participants – focus groups, market research on "passions"
- Systems for ratings and recommendations through social media for identifying passions and interests of visitors
- Forming partnerships and collaborations for research on benefits – establish methods and methodology
- Collaborating with teachers and educators to develop meaningful engagement

Two Years

By 2016...

- How do we identify where and how volunteer participants add value without replacing staff roles
- Participant stories connect to value of the collection
- Advocacy by an action team to institutions across the GLAM sector to find innovative ways for volunteers to contribute
- Organisation planning around deeper engagement with community

The Pitch

The team imagined a pitch to governments asking for policy and funding support to help bring GLAM institutions into the core of community life through a range to connections with schools, CSIRO and networks of volunteers.

Audience: Federal and State Governments

Aims:

- Recognition of value of GLAM sector to community wellbeing
- Protection of existing or increased investment to the sector

What we offer:

- Support key challenges for government
  - Ageing population
  - From School education to lifelong learning
  - Digital literacy & confidence
  - Meaningful engagement to grow volunteer sector

What we are asking for:

- Policy changes
  - School / sector engagement
  - Integrated digital literacy framework
  - Recognition of volunteerism as an element of pension / benefit framework
- Partnerships with research agencies (ABS/CSIRO etc.) to establish measures & methodology as part of establishment of wellbeing index
- Support national advocacy

BEYOND DIGITISATION – CREATIVE REUSE

As one participant commented, “we’ve been having the same conversation for 20 years about digitisation”. The sector is caught between the massive scale of the collections and the expense of digitisation, on the one hand, and the varied difficulties around copyright, moral rights, cultural rights and orphan works on the other. This tension leaves many institutions, governments and the public unsure of the value of digitisation. Many participants perceived the need to transition from a “push” to a “pull” model where the public are engaged from the beginning and help pull through digitised content.

This initiative aims to shift the conversation from the difficulties of digitisation to possibilities of creative reuse – so the collection is digitised and we haven’t perished: now what? This team did not complete a ten-year backcast; they started at five years ahead.

Five Years

By 2020...

- Built an attribution engine (a la Shazam[31]) to recognise the source of reused works
- Different licensing systems are available and understood
- Free use is the aim, but payment may be involved to compensate rights owners and we have a national shared framework
- Artist agreement to reuse – it improves the artist's "brand", increases free use
- Industry consultation leads to new framework with artists
- Use a MONA model
- National leadership - create a GLAM Board
- Advocacy role for artists
- Fostering diverse uses: Mash-ups, Story-telling
- Different collaborations - software/IT
- What happens to meaning? Both new meanings and multiple meanings from one work

Two Years

By 2016...

- Symposium & public debate on creative reuse and licensing
- Process to create GLAM board in place
- Case studies of current creative reuse gathered
- Create toolbox to allow others to mash-up some works
- Major exhibition to show experimentation
- Hack-a-thon – 48 hour intensive to generate ideas and new voices
- Public competition to foster new uses, reuses and ideas around reuse
- Relationships with broader group of content creators - musicians, visual artists and technologists,
- Cross-media focus,
- Social media to become marketing channels,
- Key part of digital personality for organisation.

The Pitch

This team developed a specific pitch for an exemplar event inspired by the innovative approach of MONA in Tasmania and one digital musician's approach to reuse. The specificity of the pitch led to a vivid presentation, but participants understood that this concept could be generalised to the wider GLAM sector.

Mashup May @ MONA

Audience: Owner of the Museum of Old and New Art (MONA) in Hobart, David Walsh for venue and branding and Sydney electronic musician, producer and DJ, "Flume" as ambassador.

What we are proposing:

- Watershed moment

31 A mobile app that can recognise a popular music track from a sample. http://www.shazam.com

- Artist-led initiative
- Musicians, visual artists, computer hackers, poets
- Rijksmuseum give a keynote
- Month-long engagement
- Symposium and event
- Month of mash up
- [Culminating in an] Intense weekend of creative output

Outcomes and Transformations:

- Outburst of creativity & escalation of audiences
- Show creative potentials of reuse
- Reconfigure debate around copyright
- Groundswell of support from artists
- Showing how creative reuse works for the artists
- Lessons learnt
- Bring institutions and established artists into the space

To Flume:

- Another opportunity for you to promote creative reuse which is obviously dear to your heart
- You inspired this whole event

To David Walsh:

- Build another generation of MONA visitors
- Launch MONA 2.0
- You're the only one crazy and brave enough to see how this would work

DEVELOPING FUNDING FOR STRATEGIC INITIATIVES

One participant forecast that in ten years, there will be only 25% of current government funding available, while philanthropic money will quadruple. This private money is likely to be tied to short-term projects with specific outcomes. At the same time, the sector critically needs to find ways to fund big, strategic initiatives that transform how GLAM institutions work. This initiative is about this transformation in funding both from the corporate sector and the wider community.

Ten Years

By 2025...

- We have transformed the way we are resourced and funded
- We have discretionary funds for new projects
- We are known as institutions that deliver on commitments to sponsors
- We have a healthy and growing group of supporters
- Our staff recognise a potentially valuable donor
- Government sees us as reliable fund and budget managers

- Established lobby group working on a strategy for GLAM World Domination

Five Years

By 2020...

- CRM[32] in place and tracking engagement, visitation, members
- Training for staff on advocacy and relationship management
- Workshops with successful fundraisers to finesse strategies
- All projects appropriately scoped
- Research completed on the community and wellbeing value of GLAM institutions
- Lobby group in place to influence government on tax laws and private ancillary funds management
- We have established government and private partnership funding for capital projects and new buildings
- New models for philanthropic foundations established to support shared initiatives across the GLAM sector

Two Years

By 2016...

- Skills development in fundraising with staff
- Understand why and how we need a CRM
- New resources with skills in data / intelligence via CRM – learn about our audience, demographics, patterns of interactions, activities beyond the institutions
- Partnership with someone to undertake research into value of GLAM institutions
- Strategies to frame and pitch core business activities for philanthropic money
- Setup lobbying coalition to ensure effective tax laws
- Looking at international best practice to model philanthropy
- Map all potential funding sources
- All institutions have set up foundations
- Increased access to specialist skills e.g. Tax law
- Reporting framework developed for successful projects
- Accentuate the positive - learn to smile in the face of adversity!

The Pitch

This team developed two pitches, one to the sector CEOs asking for a cooperative approach to funding, one to government asking for better tax support for private philanthropy.

Audience: GLAM CEOs

What are we asking for?

- Develop a united view on how we work together about establishing an effective environment for sponsorship

32 Customer Relationship Management software, "a system for managing a company's interactions with current and future customers. It involves using technology to organize, automate and synchronize sales, marketing, customer service, and technical support." – http://en.wikipedia.org/wiki/Customer_relationship_management

5. Develop united view on what tax regime we need
6. Establishing training framework to develop skills in GLAM fundraising and relationship management
7. To set up a lobbying group to approach government on tax laws to enable private sponsorship / funding regimes

Why? To increase the longevity and improve the profile of the institutions they lead.

Audience: Government

What are we asking for?

- Develop a favourable tax regime for donations and philanthropy

Why?

- Offsets community negativity about decreased funding
- Compare us to international best practice regimes that reflect well on government regulatory environment
- Good news story – more potential for funding of community projects & non-core activities
- By-product: wellbeing of the community
- Provides additional non-government funding in tight fiscal environment

Appendix D References and Reading Material

What follows is the beginning of a collection of relevant reading material. These references, along with this Innovation Study, are available on a website which will continue to grow after the report's release.

You can find the GLAM Innovation Study website at:
https://sites.google.com/site/glaminnovationstudy/

This reading list continues at:

https://sites.google.com/site/glaminnovationstudy/reading-material

D.1 Digitise or Perish

Material from last year's "Digitise or Perish" event held by the NFSA and ABC:

- Cultural institutions face ultimatum: Digitise or Perish (NFSA Blog)
- Digitise or Perish: the great cultural challenge (NFSA Blog)
- Digitise or Perish by Andrew Einspruch
- Digitise or perish, museums and galleries warned (ArtsHub)
- Video proceedings of Digitise or Perish (YouTube)

D.2 Conversations

Relevant conversations in Museums and the Web on LinkedIn:

- Why is "game" still a naughty word in museums?
- Call for Entries - Digital Technology Showcase - UMG Conference Digital Dimensions
- MW2014 Welcome Reception - The Baltimore Museum of Art
  "The event will also feature a unique mobile experience by Baltimore-based artist Dan Deacon, who is known internationally for his large-scale participatory music performances. At the conference reception, Dan Deacon will present a site specific performance with the audience as the performers. Please download the Dan Deacon app prior to the performance as it will be used to turn all of the participants' phones into a synchronized spatial light and sound environment. The app is available from iTunes and Google play."

D.3 Institutions notable for being digitally progressive

- New York Public Library
- Technology at the Museum of Old and New Art in Tasmania (Computerworld)
- iGLAM (Centre for Innovation in Galleries, Libraries, Archives and Museums) is a trans-disciplinary applied research effort emphasizing culture and heritage analysis, interpretation and presentation — for public domain, educational and scholastic real-world outcomes. iGLAM creates cutting-edge applications based on the visualization of archives, objects, heritage sites and intangible expressions of culture — contributing new strategies for narrative, interaction and learning in immersive display systems.

- iGLAM is enabled by cross-disciplinary collaborations throughout CityU leveraging its unique resources such as the Applied Laboratory for Interactive Visualization and Embodiment (ALiVE) - (http://alive.scm.cityu.edu.hk/)
- Sarah Kenderdine, the director, has several talks on YouTube, in particular How Will Museums of the Future Look?

D.4 Futures of the sector

- Does the long-term survival of UK arts and culture rely on digital? (The Guardian)
- TrendsWatch 2014 (Centre for the Future of Museums)
- Victorian Public Libraries 2030
- The bookends scenarios : alternative futures for the public library network in NSW in 2039 (PDF 5Mb)
  "The bookends scenarios explore how the future of NSW public libraries might unfold over the next twenty years, specifically examining how longer term developments in the external environment may impact on the provision and perceived value of public library services."
- The Archive in Motion : An Introduction - a project initiated by the National Library of Norway at a conference in 2009
  - Project description
  - 2009 conference schedule
  - The Archive in Motion report [PDF]

D.5 Other reading

- Valuing Australia's Creative Industries (2013) – Commissioned by the Enterprise Connect Creative Industries Centre (CIIC), undertaken by SGS Economics and Planning.
- NASA's CTO predicts which five technologies will invade the enterprise next

Appendix E Interview Quotations

The participants in the interviews gave us a great many interesting and insightful quotes – too many to include in the main body of the text. This appendix lists all the quotes we recorded.

Kevin Sumption, Australian National Maritime Museum

"What's missing from the conversation around digitisation is a sense of audience; it all feels very 'ten years ago'. Without considering the audience – who are we digitising for, what will they use it for – the word digitisation means almost nothing, or it means too many things."

"One of the things we need to have a discussion about is the pedagogical model for collections. EDNA, seven or eight years ago, had a very clear sense that they wanted material made available in a disaggregated form so that teachers and students could put it together in the form that made sense to them in the classroom. It's another question of the presentation of the material and how its contextualised and how useful it is. We need to ensure that our pedagogical approach stays up to date."

"What could come out of the discussion could be the conceptualisation of a new project that brings these disparate organisations and their collections together. In doing that, in a material sense, the discussion has to be live and ongoing. The idea that we just come together in a loose format every few months feels uncoordinated – there needs to be something more practical and ongoing. It doesn't need to be massive – even if it was a channel from the nationals with a couple of other institutions, where we simply take our aggregated collections and try to have some fun, do some experimentation."

"Every time someone says to me 'this is where we're going' – I look at Google Analytics and I'm always kind of excited that they're never right. The Internet always finds a way to disprove you. You think you're going in one direction for this group of people, doing this kind of thing and invariably it does something entirely different and quite surprising. You've got to allow for that and I think we're a sector which should be really encouraging fun and experimentation."

David Fricker, National Archives of Australia

"While we contemplate digitising the items in the archive, it's just as important to digitise metadata and have it available online, so we have a greater public awareness of what is actually in the collection. At the moment we've only described around 25% of what we hold at item level; the remaining 75% is only described at a very high level – for example you'll know we have a series of records of something like 'diplomatic correspondence from 1945 to 1959', and that's about it. Most people think about digitising records only in terms of scanning entire pages of the records – so you can flip through a whole file online and read every page, and apply all sorts of technologies to search for and analyse content. This is a long term goal, but in terms of more immediately building public engagement and encouraging creative reuse of the entire archives we at least need to digitise our indexes, to have a more comprehensive level of item description available online."

"Sharing of capabilities is a constant point of discussion among the collecting institutions. For example, the NAA works closely with the NFSA on preservation and systems; we cooperate with the NLA to share storage capacity. As money becomes tighter and our technology and our methods start to converge we need to be doing more collaboration and lining up our investment decisions to make sure that where possible we are purchasing shared capability. It's still quite nascent, there's a lot of logistics to work through in doing this - we each have our separate

budgets, we each have our separate Boards, we operate on different investment cycles. But what digital does for you is allow you to standardise on methods of collection management, digitisation, and online delivery and of course it constantly presents new opportunities to find collaborative approaches."

"The great glue that binds all this together is 'digital'. Once, we were all to some extent on our own, operating in our own operational environments that demanded particular standards for paper conservation or descriptive standards that varied between institutions. Digital allows you to arrive on a common platform – a common storage platform, a common access platform, a common description platform. So now you've got a business case for making combined decisions. We've already seen some incredible innovation, but still over the next 3-5 years, this transition to digital will be the big game changer."

"The point of archives is that that we collect the intellectual property of the nation and the cultural heritage of its people. There is enormous economic benefit to Australia's economy and to the global economy by exploiting the full value of the intellectual property held in the archives and, as cultural heritage, it provides such a rich resource for people to understand their own personal identity within the context of their community identity, their ethnic identity and the national identity. Those two things are the core fundamentals of any civilized society and can only be delivered through the work of archives and the GLAM sector more generally."

Janette Wright, State Library of Queensland

"I believe that – because books were the primary means of conveying our knowledge and our civilisation for hundreds of years and particularly printed books for the last four hundred years and libraries were an important part of that process – so we are always going to be the museum of the book. People regard the book as something spiritual. It is not just another means of communicating, it is an artefact in itself people regard as something special."

"We are about experiences with knowledge."

Peter McMahon, State Library of Victoria

"The fundamental shift is in thinking that says that we're all serving the customer. Previously it seems that there has been a tendency in some quarters serve the collection. I think that's why perhaps there has been some disconnect between government and the agencies, because they've been using the same language but serving different constituencies. Once they line up, then you start getting collections that are surfaced to present an experience to the customer, rather than simply captured to protect the collection."

"If we all broaden our respective audiences, there's so much overlap, the sector ends up with a broader audience."

Morgan Strong, WA Museum

"People shouldn't have to walk into four silos. People want a more seamless experience."

"I often get the comment: 'why don't you just put a photo of everything in your collection online' with the belief that's somehow engaging with the public. Do you really want 160,000 photos of tiny arachnids that are all kept in veils and preserved? But the information in aggregate is really valuable. Being able to open that data up to people who want to investigate climate change or people who want to actually do over-time distribution changes or ecological studies

about how things have changed with respect to certain variables – then it's really valuable. So it's targeting the way we get data out there to being actually the way the public value it. That traditional model of just taking photos and just databasing stuff is not as valuable as targeted digitisation that actually has a purpose and that can be reused for the public."

Seb Chan, Cooper-Hewitt, National Design Museum, Smithsonian Museum

"The emerging problem with digital image collections is, it seems to me, the very thing that museums and libraries are good at: finding what you want. Creation of the images in digitisation is a solved problem, but the ability to discover those images using new methods is an unsolved problem, because A. we don't have good cataloguing – because we have far too many things to catalogue, we don't employ cataloguers now because we got rid of them in the 90s and the 80s because we ran out of money, so people didn't train as cataloguers as much because there weren't any jobs. And then computer vision and all these other methods are yet to have these interfaces for them to make all that available."

"I'm a bit sceptical of crowdsourcing, which can start to cede the power of a cultural institution to choose, which is what we're actually good at. It's almost like saying we're not going to make the choice. Actually, we want you to make the choices, Museum. Make choices that provoke me! Don't make choices that placate me. What's the point of that?"

Andy Neale, National Library of NZ

"The other thing is that we can see very clearly that our citizens, our patrons, our customers' behaviours are changing and the consumption of digital material and the contribution that digital content has in our culture is changing rapidly. If you look at the fields of digital humanities or education there is an important linkage between having information you need to achieve what you want to achieve – as a country we need to consider the impact that access to information has on the whole knowledge creation cycle. There's a whole load of things within that that we need to look – the prioritisation of digitisation and rights and copyright."

Mathew Trinca, National Museum of Australia

"It's about distinction, the thing that is interesting and provocative about museums. Part of that is the experience created either onsite or online. The other part is distinction that comes from our mission - we're a space, or Theatre, for Australian Ideas, we're not a theatre of what it's like to live in another part of the world. It's also about the distinctiveness of how we communicate while not abrogating the fact that our collections already make us distinctive, and that's a major point of differentiation in this market. I heard recently a colleague talk about a museum collection, how uneven in quality it was and how much of it wasn't interesting. I was somewhat surprised because, ultimately, if you prefer other forms of engagement rather than relying on your collection, the distinctive characteristic of the museum is lost. I suspect that's a road to perdition. You have to be mindful of the competitive advantage you already have in the market. Unless you know that advantage is lost, you've got to hang on to that, as well as allowing yourself to be transformed by opportunities that present themselves. That would be my caveat about being very digitally focused, that you have to work to enhance your digital engagement, without losing your distinction as a museum in the market for audiences."

"There's a change in relationships between museums and their audiences – the traditional relationship was between the museum as an authoritative producer of ideas and experiences, and

the public as consumer of the delights offered by the museum. What's happened in the world that we live in is that everyone has become both an expresser, as well as a consumer, of ideas. That goes for our public - they want to be active participants in what they do at the museum, not just passive consumers. That's pretty simple and it's right across the board now. As a result, there's great capacity for us to re-engineer our relationships to the wider public."

"I would talk about a series of public goods that are achieved by the museum inclusive of the polarity described by instrumental vs. intrinsic values. I think there is intrinsic value in collections in their own terms, as well as an instrumental utility of those collections. I think that because I believe in the play of ideas and an emotional range, as well as a cognitive range for culture. That's the best way I can understand why I get moved by something, and I think the capacity to be moved by something both cognitively and emotionally, in an ideational sense, is important. So, I think if I were to represent the National Museum's value in those terms, part of my argument would be that there is intrinsic value in these places for what they are in themselves – but I wouldn't leave it there. I would also argue that there are instrumental benefits in a society having such institutions. Part of that might be the economic value that comes from institutions that engage publics in learning and other opportunities, and for their power as an entertainment destination. You can quantify that, you can put measure it in a series of appropriate metrics. An indirect economic benefit, I think, comes out of the [Richard] Florida thesis about the capacity that this institution has to nourish an exchange of ideas that ends up having some net return for a creative city. The museum can also contribute to a healthy community in psychological terms, but I'd be more cautious in arguing this kind of instrumental value. My view is that the public good of this institution can be established through a range of indicators about how to evidence value. It's about all of them spoken to in concert – that's probably going to be the strongest argument at any given time. Bringing greater precision and clarity to the argument about the kinds of outcomes that museums achieve – open to the range between the instrumental and intrinsic - is actually where we would want to be."

Katrina Sedgwick, TV Arts, Australian Broadcasting Corporation

"I don't think we're talking about curators and archivists being less important. In a world of infinite choice, those people become more important."

"I think the purpose is to publicly hold and provide access to important parts of our history and objects of art and culture that the state protects and owns and gives people access to. Those things are hugely important to our identity."

"So much of what they've got in their collections isn't Google-able. So much of it is specific and special and particular. It's kind of beyond Google. It isn't for everybody. Isn't part of what you do about being specialist? Is that in fact the point of difference you need to hold onto? You're not hiding it – you're inviting people to come to you and create an interface that allows them to engage with information that isn't on the first page of Google results."

Prof. Sarah Kenderdine, Museum Victoria

"Among other things, I think they're very useful for the health and wellbeing of society. They represent accumulated achievements and are places for exercising creativity – out of creativity comes invention and innovation. They also provide a humanistic interpretation of our world, which we desperately need."

"We must be able to remodel the past! We use it as an element in a creative process of interpretation and also a new construct and that's what's important I think. That appropriation, that remodelling is crucial. You have to be able to change the past to become the future."

Anne-Marie Schwirtlich, National Library of Australia

"The great conversation in the digital age is about participating, about the community participating in the creation of knowledge and new work. For a thousand years, libraries have, in a much more traditional way, harnessed that community participation because we have collected the books and articles and paintings and manuscripts that arose from people doing research in libraries - so those circles of continuity and of the efflorescence of intellectual and cultural inquiry are circles that continue. The digital world allows us to do it in so many different ways, but I'd say that to-date the digital world hasn't supplanted the physical and so the effort for us is that we're running at least two libraries - others are running two museums or two archives - because it's both the digital and physical that has to keep going."

"One of the reasons that we like the term 'infrastructure' or building intellectual or knowledge or cultural infrastructure is because governments are conversant with investing in infrastructure for roads or railways, and we believe that this intellectual infrastructure warrants as heavy an investment as physical infrastructure. So, looking at the four strategic initiatives, one of which is 'becoming central to community wellbeing' I wonder whether that strategy ought to be 'becoming central to community productivity and wellbeing'."

Julie Finch, WA Museum

"Seeing the resources as ways of identifying the identity of places, of people, creating context, and thinking about solutions and innovations for the future; so we can learn from these amazing collections, whether digital or the real thing, we can use them for research, we can use them for study, we can use them for shaping lives. Museums are a window on the lives of ordinary folk and places. They're a vehicle for discovering identity. How can we take a more longitudinal perspective of the importance of culture in the context of the economy and global issues? That's a much bigger picture that needs to be considered."

"Going out, asking, having more controversial debates about how culture can be part of economic development. How the economics of that can make a place more attractive to locate a business. Why you'd attract the highly skilled people to a place. There's something about how institutions see themselves. But it's hard to put your hand up and say – we do need to be part of the fabric of business, we're just not sure how to do it."

"There's some really great things coming out of Australia – theatre and the arts are highly regarded across the world, but what are we doing with that talent? Where's it going? How is it demonstrating what Australia has to offer? What are the links to the identity? What inspired those people? The material in arts museums, libraries, archives forms the integrity and authenticity for development and research programs within the film and theatre industries. All that information is necessary to inform and create these authentic experiences and without it, it's all at the surface level. There's an opportunity there that isn't fully realised in Australia. What can we do to support those artists, whichever art form they perform in. How can we use our resources to authenticate that whole experience?"

"I'm not here to tell you what your story is. You're going to share the stories that you have, to create the museum that's appropriate to that place. You're facilitators of that story, creating something that people are proud of and they feel part of and then they'll visit, they'll own it,

they'll want to change it, they'll want to make decisions about it and I think that's where we have to go. We have to position the public more in the decision-making arena. It's not about being spoon-fed a culture but deciding what your language is and how you want to describe those experiences."

Sue McKerracher, Australian Library and Information Association

"The librarian role has moved from guardian to gardener."

"Professionals in the sector need, a 'change mindset' – being proactive about learning new skills as needs evolve."

Alex Byrne, State Library of NSW

"What I often say is that it's about interrogating our past, understanding our present and imagining our future. That means the stuff that we deal in provokes that interrogation, that understanding and that imagination. That's really what we're about. One of the challenges for us - which we've always had in an inchoate sort of way is to be part of that cycle of transformation. I talked earlier about those photographs [of service men and women going to World War I] – we're trying to identify them and know more about them but it's also the conversation we're having with people. In the process, those photographs really become something else – rather than just an image of somebody who sat in a studio 100 years ago, they become part of contemporary people's lives – the people who connect directly with them but also the people who just read the story around it. Having that conversation puts us into that cycle. It's not just us projecting stories out in the broadcast model, but it's actually having a conversation, being receptive to stories in new ways."

Marie-Louise Ayres, National Library of Australia

"One thing that has joined us and is the focus of the work here is that we all have collections and our aim is to make them more accessible to the public in order to generate new knowledge."

Frank Howarth, Museums Australia

"What might digital do? How will it transform the GLAM sector?"

Tim Hart, Museum Victoria

"The curator as facilitator, rather than keeper."

Lyndall Osborne, Australian Institute of Aboriginal and Torres Strait Islander Studies

"The starting and finishing points are with the owners of the culture."

Simon Wright, Queensland Gallery of Art

"We have a repository here for specific, heritage-related, visual art material, but also a collections library so all of our art resource material: artist's files, books and publications, catalogues, periodicals and it's been under-utilised as a research tool."

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