Australian Academy of the Humanities

AUSTRALIA'S DATA-ENABLED RESEARCH FUTURE: HUMANITIES

A collaboration between ARDC, ACOLA and Australia's Five Learned Academies

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ARDC

Australian Research Data Commons

ABOUT THE PROJECT

This project is the result of a partnership between the ARDC, Australia's five Learned Academies and ACOLA to ensure Australia can undertake excellent data-enabled research across all fields of research. Notably, the project sought to help build a more coherent data policy and strategic data planning environment to uplift national data infrastructure. Five domain reports were developed, and a synthesis report focused on common themes and multidisciplinary opportunities and needs. We hope that this project will transition into an ongoing national data policy and strategic planning capability.

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This report was developed with the support of an Advisory Group – Professor Katherine Bode FAHA, Professor Julian Thomas FAHA, and Professor Joanne Tompkins FAHA – and coordinated by Dr Kylie Brass, Director Policy and Research.

ACKNOWLEDGEMENT OF COUNTRY

The Australian Academy of the Humanities recognises Australia's First Nations Peoples as the traditional owners and custodians of this land, and their continuous connection to country, community and culture.

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Executive Summary

Australia's capacity to undertake and apply humanities research relies on the quality and sustainability of its data and infrastructure, and the robustness of its training and workforce capability. This Environmental Scan provides an overview of the current landscape for humanities data-enabled research and identifies strategic needs and requirements, gaps in infrastructure, and potential opportunities for leadership, advocacy, and planning.

The Australian Academy of the Humanities is invested in ensuring the humanities have the best available national infrastructure to meet both urgent and longer-term research priorities, to create and collaborate at scale, and to facilitate digital and data transformation.

Humanities data capability is dispersed, untapped, uneven, and under-developed. Institutional and project-based infrastructures exist, many of long-term duration, but there is a lack of coordination and limited strategic planning. All of which means Australia is not yet making the most of its public investment in research.

Addressing data and digital infrastructure needs is a focus of the government's national research infrastructure (NRI) planning and investment cycle. Significant new investments at the national level are now supporting the development of a Humanities, Arts and Social Sciences (HASS) Research Data Commons and Indigenous Research Capability program, administered through the Australian Research Data Commons (ARDC), which will be important to build on and leverage.

Australia's future ecosystem is likely to be less oriented around centralised facilities and more focused on distributed and cloud-based infrastructure, data networks, and cyber-resilience. It is also predicated on building multidisciplinary capability in areas of greatest opportunity and challenge. The development of more human-centric technology, for example, addressing entrenched social disadvantage, and preparing public health engagement strategies for future pandemics requires deep HASS expertise, in collaboration with science, technology, engineering, mathematics and medical (STEMM) fields.

This Environmental Scan identifies a set of opportunities for leadership, advocacy and planning for national data infrastructure in the humanities:

- **Sustainable data and digital research infrastructure.** Short-term, project-based funding has been the source of much infrastructure build to date, which makes it difficult to strategise and plan, and to create efficiencies at national scale across institutions. Priority areas include the development of shared tools and services, coordination and sharing of digitisation infrastructure and expertise, and setting standards of best practice for processes and interoperability with international research infrastructures.
- **Training and capability pathways.** Better data management driven by disciplines is needed, including data standards and protocols, data management frameworks, digital and data literacy and skills development, and research training in digital methods. As with other fields, humanities face workforce challenges. There is a lack of national succession planning; loss of early-career talent, as well as senior leadership, during the COVID-19 pandemic; unclear career pathways and opportunities for research infrastructure professionals; and challenges with 'mainstreaming' data enabled research across the humanities – which could learn from leading fields such as linguistics, archaeology, and media studies and communications.

- **Scaling up the application of humanities expertise to the cultural, social, and human dimensions of global problems is essential.** For example, humanities expertise are crucial for issues in health, climate change, living standards, social connection, disinformation and misinformation, and the digital divide. This has a data infrastructure dimension and requires considered planning – for cross-sector and multidisciplinary collaboration and development of translation infrastructure and capability.
- **Strategic networks and industry partnerships** are needed to bring together cultural and research infrastructures to achieve efficiencies for respective stakeholders to address digitisation challenges and opportunities.
- **Building capability in data enabled research**, in areas such as ethical Artificial Intelligence (AI) and automated decision-making, and cultural resilience, need to be prioritised and planned.

Opportunities exist for a more connected infrastructure landscape for data-enabled research to achieve health, social, economic, cultural, and environmental benefits. Collaboration across the Learned Academies can inform a more coherent and strategic data policy and planning environment to uplift capability across all fields of research. The Academies are uniquely placed to collaborate and lead responses to national road mapping and priority setting processes, such as the National Digital Research Infrastructure Strategy (announced in the *2021 National Research Infrastructure Roadmap*).

The Academy of the Humanities commits to:

- Work with the other four Learned Academies to develop and share policies and strategies to improve Australia's data capability, awareness, access, skills, and governance across all fields of research.
- Formalise a research data advisory group to inform policy development, champion ethical and responsible practices (FAIR and CARE)[1] and connect with international counterparts to share advice.
- Consult with Indigenous research leaders within our Fellowship and wider research sector to promote and develop culturally appropriate policies and practices.
- Continue to use our convening power to build and broker relationships with national research infrastructure facilities, and build on our relationship with the ARDC, and cultural and creative sector networks, such as GLAM Peak,[2] for the benefit of humanities researchers.
- Pursue opportunities to support humanities data enabled research and develop better policies for the reward and recognition of non-traditional research outputs in collaboration with the Australian Research Council (ARC).
- Review and improve our own support for data enabled research, including through our grant and awards programs, policy outreach, and events.
- Consult with early and mid-career researchers in the humanities through the newly established SHAPE Futures EMCR Network[3] to inform our policy development to improve career opportunities and develop capability.

[1] FAIR refers to findable, accessible, interoperable and reusable; CARE refers to collective benefit, authority to control, responsibility and ethics.
[2] GLAM Peak brings together representative bodies for Australia's galleries, libraries, archives, museums, historical societies, cultural heritage organisations and research peak bodies. See https://glampeak.org.au/.
[3] SHAPE Futures EMCR Network (2021), https://humanities.org.au/news/shape-futures-emcr-network/.

Introduction and context

This Environmental Scan provides an overview of the current landscape for humanities data enabled research and identifies strategic needs and requirements, gaps in infrastructure, and potential opportunities for leadership, advocacy, and planning.

This project is a unique partnership bringing together Australian Research Data Commons' (ARDC) technical and strategic capabilities in data infrastructure planning and delivery, with the Learned Academies' leadership and insight into the data requirements within and across research domains.

The project comes at an important time in the national research infrastructure (NRI) planning cycle, with the release of the *2021 Roadmap* in April 2022 and the next investment cycle to follow.[4] For the Australian Academy of the Humanities, the project enables:

- a timely consideration of distinctive and strategic infrastructure needs for the humanities;
- an appraisal of the current state of play, including important recent investments through the National Collaborative Research Infrastructure Strategy (NCRIS) for a Humanities, Arts and Social Sciences (HASS) Research Data Commons and Indigenous Research Capability program; and
- strategic discussions between domain areas which have been under-realised to date both in national and institutional planning. As the *2021 Roadmap* emphasises, in the future NRI environment, multidisciplinary capability will be a crucial engine of change.[5]

This report focuses on the humanities, part of the broader HASS sector. Australia's humanities researchers examine human actions, ideas, institutions, and values. The humanities work alongside social sciences and the arts on pressing social and cultural challenges – from maximising the benefits of digital technologies for young people to providing the evidence base for decisions about education, employment, public health, and social and cultural policy.

The humanities data landscape, at a national level, can be characterised as nascent and evolving. There are established infrastructures and concentrations of expertise, but the ecosystem is fragile, and development of infrastructure has been ad hoc with most of the work happening at project or discipline level.

The *2016 National Research Infrastructure Roadmap* identified the need for national-scale infrastructure for HASS research to "drive transformations in the way researchers discover, access, curate and analyse social and cultural data".[6] Subsequent scoping work, as part of an investment planning process, informed the government's investment in the HASS Research Data

[4] Department of Education Skills and Employment, 'National Research Infrastructure', https://www.dese.gov.au/national-research-infrastructure.

[5] Department of Education, Skills and Employment (2022), *2021 National Research Infrastructure Roadmap* available from https://www.dese.gov.au/national-research-infrastructure/resources/2021-national-research-infrastructure-roadmap. See 'HASS and NRI', pp. 68-71.

[6] Australian Government (2017), *2016 National Research Infrastructure Roadmap*, available from https://www.dese.gov.au/national-research-infrastructure/resources/2016-national-research-infrastructure-roadmap-information-development. See 'Platforms for Humanities, Arts and Social Sciences', p. 33.

Commons and Indigenous Research Capability program, administered through the ARDC. A set of pilot projects now underway seek to address some of the challenges in data management and inform approaches to interoperability. Elements of that program include the Australian Text Analytics Platform, the Integrated Research Infrastructure for Social Sciences, and the Language Data Commons of Australia.[7]

The *2021 Roadmap* set out a vision for data and research infrastructure development for HASS and Indigenous research and identified potential 'step change' investments in national digital research infrastructure, a national digitisation capability, research translation infrastructure, and a national approach to collections.

Against this backdrop, in this report we focus on two 'challenge scenarios' to explore and test current and future research data requirements in the humanities touching on infrastructure, assets, policies, and skills needed into the future:

- Ethical Artificial Intelligence (AI), automated decision making, and real-time data: Broadly, this scenario is focused on applications of machine learning across a range of research fields, and the role of automated processes of AI and how they affect society. It also focuses on the challenges of real-time data, specifically social media data, which hold huge potential for research from a broad range of humanities disciplines.
- Australia's cultural resilience: In the context of crises – such as COVID-19, climate change, Australia's increasingly devastating bushfires, flagging faith in democratic institutions – we examine the role of cultural knowledge and identity in building community response. This scenario draws out the gaps and opportunities in the research and data landscape and potential for better strategic capability and collaboration across cultural and research infrastructure.

We outline below the approach to undertaking this Environmental Scan, key phases of research, and working definitions developed for the project.

Working definitions

Humanities

Humanities fields of teaching and research examine human actions, ideas, institutions, and values.

The Australian and New Zealand Standard Research Classification (ANZSRC) divides the *humanities and creative arts* into six broad fields:

- Built Environment and Design
- Creative Arts and Writing
- History, Heritage and Archaeology
- Language, Communication and Culture
- Law and Legal Studies
- Philosophy and Religious Studies.

These codes are a limited lens through which to understand the full scope of activity because humanities fields overlap with the sciences and social sciences. Interdisciplinary areas of

[7] Australian Research Data Commons (2021), 'HASS Research Data Commons and Indigenous Research Capability', https://ardc.edu.au/collaborations/strategic-activities/hass-and-indigenous-research-data-commons/. Full project plans available here https://ardc.edu.au/collaborations/strategic-activities/hass-and-indigenous-research-data-commons/project-plans/.

research with strong humanities overlays do not fit neatly into the ANZSRC taxonomies: until recently these classifications allowed limited visibility for research in Indigenous studies or gender studies, and this continues to be an issue for interdisciplinary areas of research such as environmental humanities or digital humanities. (Appendix A).

Infrastructure

The project uses the definition of infrastructure employed by the Department of Education, Skills and Training (DESE). National research infrastructure refers to the:

- facilities, equipment and resources that are needed to perform research;
- experts needed to run the infrastructure; and
- infrastructure can be physical, like a supercomputer or microscope, or intangible, like a data collection or software platform.[8]

We consider infrastructure generated *within* the university sector by research, and infrastructure *outside* the university sector, which may be public or private-sector or community owned. For many humanities fields, physical infrastructure facilities in the form of cultural and collecting institutions, libraries and archives are vital for advanced research.

Data

Broadly, data for humanities researchers can be defined as *artifact* or *text* or *computer-processable information*.[9] Data may be in digital, text, numerical, image, or sound format, tangible or intangible, and structured, semi-structured or unstructured.

The context and provenance of data matters as much as its content or form. Many humanities researchers, Indigenous and non-Indigenous, work with Indigenous data, defined by the Maiam nayri Wingara Indigenous Data Sovereignty Collective as "information or knowledge, in any format or medium, which is about and may affect Indigenous peoples both collectively and individually".[10]

Skills and capabilities

At the individual level, we distinguish between skills (the ability of individuals to complete tasks) and capabilities (the ability of individuals to apply specific skills and knowledge in different contexts).

In the context of data-enabled research, data capability refers to the range of skills needed to work with data and digital material, and data handling as a specific skillset that enables the capture, cleaning, enhancing, and curation of data using digital tools. It is not expected that every humanities researchers needs to have specialist data handling and analytics capability, but a general level of literacy is valuable.

At a system level (domain or national) capability encompasses: pipelines of talent and expertise; infrastructures and institutions generating skills and capability; and the strength and potential of partnerships and networks.

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[8] Department of Education, Skills and Employment, 'National Research Infrastructure', https://www.dese.gov.au/national-research-infrastructure.
[9] Trevor Owens (2011), 'Defining Data for Humanists: Text, Artifact, Information or Evidence?' *Journal of Digital Humanities*, 1(1), http://journalofdigitalhumanities.org/1-1/defining-data-for-humanists-by-trevor-owens/.
[10] Maiam nayri Wingara Indigenous Data Sovereignty Collective, 'Key Principles', https://www.maiamnayriwingara.org/key-principles.

Approach

This Environmental Scan overviews the strategic research data infrastructure needs and requirements for the humanities.

We established an advisory group to guide the research and test findings. Our initial approach was to align to national and domain-specific developments underway, and then to use targeted consultations and scenario mapping to draw out areas of priority and identify gaps and opportunities.

This baseline will contribute to the broader project's aim to develop a cohesive research data agenda across Australia's Learned Academies.

The research was informed by previous work undertaken by the Academy of the Humanities as follows:

- On the international landscape – *Mapping International Infrastructures for the Humanities, Arts and Social Sciences*, commissioned by the Department of Education in 2019.[11]
- On national needs in an international context – Humanities, Arts and Culture Data Summits in 2018 and 2019.[12]
- On digital and data skills and capabilities – Future Humanities Workforce project (funded by the ARC's Linkage Learned Academies Special Project scheme),[13] key findings of which are at Appendix B.
- On humanities engagement with key research funding programs – jointly convened workshops with the ARC, Australasian Deans of Arts, Social Sciences and Humanities (DASSH), and Academy of Social Sciences in Australia (ASSA) on HASS engagement in the ARC's Linkage program (Centres of Excellence, and Linkage Infrastructure, Equipment and Facilities schemes).

The ARDC's *Humanities, Arts and Social Sciences Research Data Commons Final Report*[14] was also instructive – as one of the three studies commissioned by the Department of Education, Skills and Employment in 2019, which identified several investment-ready programs that would benefit from national research infrastructure funding.[15]

The project's key phases are outlined in Table 1.

[11] Australian Academy of the Humanities (2020), *Mapping International Research Infrastructures for the Humanities, Arts and Social Sciences.* A Report for the Commonwealth Department of Education, https://humanities.org.au/wp-content/uploads/2022/01/AAH-International-HASS-Infrastructure.pdf.
[12] Humanities, Arts and Culture Data Summit papers are available from https://humanities.org.au/our-work/projects/humanities-arts-culture-data/.
[13] Australian Academy of the Humanities (2020), 'Future Humanities Workforce project', https://humanities.org.au/our-work/projects/future-humanities-workforce/.
[14] Alexis Tindall and Ian Duncan (2020), *Humanities, Arts and Social Sciences Research Data Commons Final Report*, Australian Research Data Commons, https://ardc.edu.au/wp-content/uploads/2022/01/HASS-RDC-Final-Report.pdf.
[15] Australian Research Data Commons (2022), 'Background to Investment', https://ardc.edu.au/collaborations/strategic-activities/hass-and-indigenous-research-data-commons/recommendations-for-co-investment-in-humanities-arts-and-social-sciences-research-data-commons-program/.

Table 1 Phases of research

Literature & policy review	Review existing reports, policies, and research to inform the scenario planning process.
Stakeholder mapping	Identify key stakeholders and projects.
Data collection	Synthesise select data to map humanities infrastructure, assets, and research workforce, and identify key areas of activity and potential, including: – Excellence in Research for Australia (ERA) 2018.[16] – National Competitive Grant Program data – specifically the Centres of Excellence and the Linkage Infrastructure, Equipment and Facilities programs.[17] – Projects funded through the National Collaborative Infrastructure Strategy, including via the ARDC. – National cultural collections.
Scenario planning	Develop national challenges where data-driven research is critical to provide context to the Environmental Scan: – Ethical AI, automated decision making, and real-time data. – Australia's cultural resilience.
Consultations	Consult with experts, organisations, and projects to inform and test thinking and scenario development: – Academy Fellows – a 'think tank' convened for the Academy's input to the national road-mapping process. – HASS Research Data Commons and Indigenous Research Capability project leads and teams (ARDC). – ARC Centre of Excellence for Automated Decision-Making and Society. – GLAM Peak members.

[16] Australian Research Council (2019), *State of University Research 2018-18: the ERA National Report*, https://dataportal.arc.gov.au/ERA/NationalReport/2018/.
[17] Collected via the Australia Research Council's 'Grant Search' portal https://dataportal.arc.gov.au/NCGP/Web/Grant/Grants.

Humanities data landscape

Changes in digital technology, 'big data', and associated developments are transforming research practice in the humanities, enabling new ways to answer complex questions about society and culture. To make new discoveries about Australia's cultures, identities, heritage and history and our connections globally, humanities researchers require access to dispersed collections of qualitative and quantitative data and advanced tools to enable data intensive research and analysis.

Humanities data

Data that humanities researchers need to undertake advanced research is a combination of:

- public sector data;
- data collected, managed, and held by collecting institutions;
- data produced by individual researchers and projects;
- data collected by private organisations and platforms; and
- data that is community-generated and owned.

Much of this information is largely 'hidden' from view, or in a variety of 'unstructured' formats – such as texts, maps, artefacts, and audio-visual items – or semi-structured formats in the case of research and field records.

Australia's cultural and social data collections largely reside outside the university sector. These are physical and digital collections, typically in collecting institutions, such as galleries, libraries, archives, and museums (GLAM). Social and cultural researchers also routinely work with collections owned and curated by government departments and agencies. The data is not generated by the research sector, but in ways analogous to biological collections, these are source and 'specimen' data essential for researchers. It is imperative for humanities researchers that there is a research lens on these data collections and a research vision for digitisation – for what is essentially 'dual purpose' data infrastructure with high research value.

Humanities researchers develop their own infrastructures and access or adapt existing infrastructures. These research infrastructures exist both within and outside the university sector, and include:

- Physical collections, including artefacts and larger physical structures such as archaeological sites, and their storage facilities.
- GLAM, including both physical objects and digital artefacts.
- Digital infrastructure, including digital record creation, digital data storage and tool sets.
- Laboratory facilities for heritage science and archaeology.
- Infrastructures for data collection, services, linkage, and analysis, such as public statistics and longitudinal surveys. Data collection may span topic areas, involve long-term multi-generational population studies and surveys, and social media data.

The assemblages of data – data files, datasets, databases, and data streams – collected, generated, and curated by these infrastructures have all the characteristics of 'big data' in that their volume, their variety, and the velocity of their creation pose challenges for many conventional analytical and computational methods.

Workforce capability

The humanities research workforce represents approximately 15 per cent of the entire system. Based on data collected for the ARC's Excellence in Research for Australia most recent audit (2018), the total number of humanities and creative arts researchers (staff with a 'research and teaching' or 'research only' role) is 6,322 full-time equivalent staff (FTE).[18] Largest fields are in language, communication and culture, closely followed by creative arts and writing (Table 2). The largest cohort of humanities and creative arts staff are employed at Level B (lecturer), closely followed by Level C (senior lecturer) (Table 3).

Table 2 University-based research workforce 2017 (FTE) all fields (by two-digit field of research) descending order

FoR code	**Broad Field of Research (FoR)**	**Total**
11	Medical and Health Sciences	9,388.3
9	Engineering	3,715.6
6	Biological Sciences	3,035.3
15	Commerce, Management, Tourism and Services	2,961.3
13	Education	2,537.9
16	Studies In Human Society	2,226.9
8	Information and Computing Sciences	1,666.8
17	Psychology and Cognitive Sciences	1,517.7
20	Language, Communication and Culture	1,359.5
19	Studies In Creative Arts and Writing	1,356.3
18	Law and Legal Studies	1,263.3
3	Chemical Sciences	1,144.7
7	Agricultural and Veterinary Sciences	1,097.1
12	Built Environment and Design	1,069.4
2	Physical Sciences	1,039.2
1	Mathematical Sciences	926.0
14	Economics	921.8
4	Earth Sciences	851.2
5	Environmental Sciences	781.0
21	History and Archaeology	706.8
22	Philosophy and Religious Studies	566.8
10	Technology	515.9
	Total	40,648.9

Source: Australian Research Council, ERA National Report 2018, https://dataportal.arc.gov.au/era/nationalreport/2018/.

[18] Note that this data is more than five years old, from March 2017 – the census date for the 2018 ERA exercise. There is likely to be some flux since that time. The COVID-19 pandemic caused disruption in the university sector with an impact on staffing. For an analysis of some of these impacts see the Rapid Research Information Forum report (2020), 'Impact of the Pandemic on Australia's Research Workforce', https://www.science.org.au/sites/default/files/rrif-covid19-research-workforce.pdf.

Table 3 Humanities and creative arts research workforce by level* 2017 (FTE)

	Level E	Level D	Level C	Level B	Level A	Other FTE + non academic	Total
Built Environment and Design	167.4	150.9	325.0	318.2	92.3	15.7	1,069.4
Law and Legal Studies	292.1	212.8	335.0	347.5	73.2	2.7	1,263.3
Studies In Creative Arts and Writing	133.0	166.8	430.2	510.4	107.6	8.4	1,356.4
Language, Communication and Culture	184.7	207.5	404.3	430.9	120.4	11.8	1,359.5
History and Archaeology	140.9	127.8	189.7	186.1	57.0	5.5	706.9
Philosophy and Religious Studies	108.3	77.5	153.5	176.4	42.0	9.3	566.9
Total	1,026.4	943.1	1,837.5	1,969.4	492.6	53.4	6,322.47

Source: Australian Research Council, ERA National Report 2018, https://dataportal.arc.gov.au/era/nationalreport/2018/.
*NB: Level A equates to tutor, B lecturer, C senior lecturer, D associate professor, E professor.

These data give some sense of the size and breadth of the workforce, but there is of course a broader higher degree cohort to bring into frame. The latest data available on postgraduate (research) enrolments at Australian universities shows that 44,521 students (estimated full-time student load) were enrolled in postgraduate research courses at Australian universities.[19]

Table 4 presents enrolments in 'Society and Culture' and 'Creative Arts' fields, the former of which overlaps with social sciences. It indicates that in 2020 10,044 FTE or approximately 23 per cent were enrolled in research-focused higher degree programs.

Table 4 Postgraduate research student load by broad discipline group 2010, 2015, 2020

Broad Discipline Group	2010	2015	2020
Natural and Physical Sciences	8,904	10,422	10,353
Information Technology	1,633	1,950	2,381
Engineering and Related Technologies	5,156	6,977	7,477
Architecture and Building	582	669	731
Agriculture, Environmental and Related Studies	1,532	1,775	1,855
Health	5,091	6,737	6,859
Education	2,481	2,379	2,202
Management and Commerce	2,632	2,644	2,597
Society and Culture	8,758	9,185	8,113
Creative Arts	2,397	2,518	1,931
Food Hospitality and Related Services	3	2	-
Mixed Field Programs	6	18	23
Total	39,175	45,274	44,521

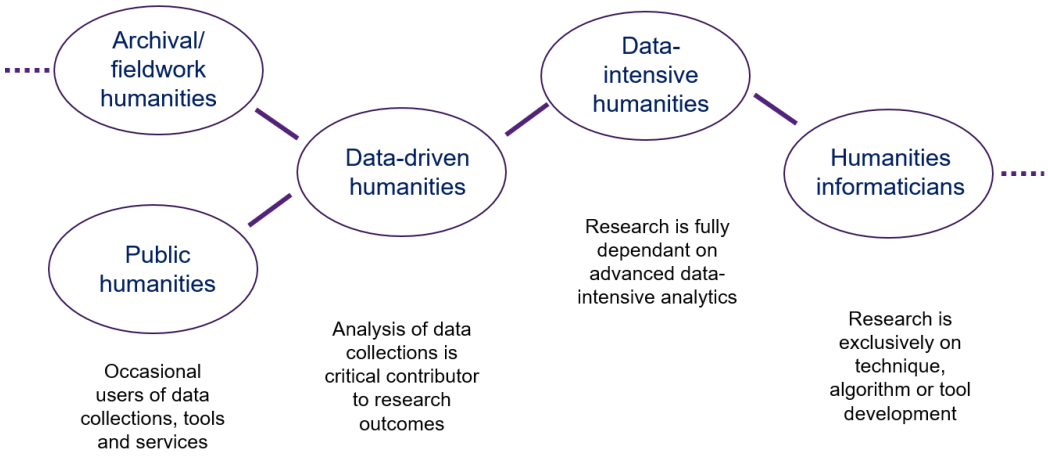
Source: Department of Education, Skills and Employment Higher Education Statistics Collections – data visualisation

[19] This data analysis is based on student load data for Table A providers, using the Department of Education's 'load times series' data https://www.dese.gov.au/higher-education-statistics/student-data/selected-higher-education-statistics-2020-student-data-0. Note it does not map to fields of research. Table A providers are listed in the *Higher Education Support Act 2003* (HESA)

These ballpark statistics indicate the size and range of humanities and related fields at a national scale. It is not possible at this point to determine the extent of data literacy or capability of this workforce with any precision. Some studies have broadly surveyed researchers at discipline level or within institutions.

Work underway as part of the Language Data Commons project has started to characterise the range of data capability into 'broad expertise types' (Figure 1). No work has yet been undertaken to map the workforce across these broad expertise levels or determine threshold or optimum numbers needed in each grouping. It is safe to say that only very limited numbers of researchers are at the 'humanities informaticians' end of the scale. Discipline areas with more well-established data needs such as archaeology, linguistics, and cohorts of research in media and communications studies might be said to be at the 'data driven' to 'data intensive' levels, as is the digital humanities, positioned at the intersection of traditional arts study and computational technologies and techniques.

Figure 1 Broad expertise types in the humanities



Source: Michael Haugh panel presentation at eResearch Australasia 2021 (adapted from the Australian BioCommons mapping of workforce skill levels in the life sciences).[20]

What is driving data-enabled research in the humanities? Work is often prompted by availability of greater variety of large digital datasets for humanities research, which requires both computational and domain knowledge to engage with these datasets and their layers of complexity.[21] (See Spotlight on Language Data Commons of Australia).

Library collections have been foundational, offering large text corpora via digitised newspaper, for example, with data openly available through an Application Programming Interface (API). The same is true for digital image collections where computational approaches allow for the systematic analysis of images on the big data scale: hundreds of thousands of images from Instagram, for instance.

[20] Michael Haugh (2021), Digital Research Infrastructure for the Language Sciences and Computational Humanities, eResearch Australasia.
[21] David Beck (2015), Interim Report for Teaching Digital Humanities at Warwick, available at https://warwick.ac.uk/fac/cross_fac/iatl/sharing-practice/staff/all-projects/beck_interim_report.pdf.

Innovations within specific fields have driven transformations too, such as discoveries and advances in dating methods in the field of archaeology revealing Australia's deep history of Aboriginal occupation (now dating to 65,000 years).

Technological advances have impacted humanities practices (such as, for example, textual analysis or archival research) and shed new light on longstanding research questions (through, for example, data visualisation).[22] It has also been the catalyst for a range of new research questions, objects of inquiry, and methodological strategies.

Spotlight on Language Data Commons of Australia

> "Australia is one of the world's most linguistically diverse regions.
>
> Significant collections of this intangible cultural heritage have been amassed, including collections of Australian Indigenous languages and regional languages of the Pacific, and of Australian English, as well as collections important for cyber-security (AusTalk, Australian National Corpus, corpora of regional languages), for gauging popular sentiment (Australian Twitter Corpus), and for emergency communication (languages of the region and some Indigenous languages).
>
> Many collections remain under-utilised or at risk, and researchers lack the tools and skills to exploit their research potential.
>
> The Language Data Commons of Australia (LDaCA) will capitalise on existing infrastructure to secure vulnerable and dispersed language collections and link these with improved analysis environments.
>
> Establishing an integrated national infrastructure that supports language research will enable researchers and communities to access and use nationally significant collections of written, spoken, multimodal and signed text.
>
> The project will improve researchers' digital skills and raise awareness of best practice in digital research; render valuable collections of national significance more FAIR while adhering to CARE principles; and develop the integrated national technical infrastructure to analyse language collections at scale."

Source: Project Plan, https://ardc.edu.au/wp-content/uploads/2021/11/LDaCA-HASS-RDC-Revised-project-plan-Oct-2021.pdf.

[22] The Alan Turing Institute (2020), *The Challenges and Prospects of the Intersection of Humanities and Data Science: A White Paper from The Alan Turing Institute*, p. 8; Panayiota Tsatsou (2018), 'Literacy and Training in Digital Research: Researchers' Views in Fine Social Science and Humanities Disciplines,' *New Media & Society*, 20(3), pp. 1240-1259; Lisa M. Given and Rebekah Willson (2018), 'Information Technology and the Humanities Scholar: Documenting Digital Research Practices,' *Journal for the Association for Information Science and Technology,* 69(6), pp. 807-819.

Data practice

The humanities share some common data practices with the social sciences and there are also specific disciplinary and sub-sector needs. Data generated in the humanities includes both quantitative, computation, and qualitative data (including documents, open-ended survey responses, interview transcripts, field notes, video, and audio).

A core set of data creation and production requirements is shared across HASS and includes data curation for discoverability, digitisation, and access to machine-readable data. There is some overlap in the tools used to analyse, standardise, harmonise, and access data, between the social sciences and the humanities. Like the social sciences, the humanities need standards and normative ontologies as well as access to secure environments and the social sciences also stand to gain from challenging ontologies and experimental procedures.

Across humanities fields, data management practices are ad hoc, and major challenges exist for the preservation of the results of funded research. Generic best practice guides exist[23] and international humanities infrastructure DARIAH provides a useful humanities-specific 'pathfinder' guide.[24]

There are important ethical and cultural considerations for data practice, in terms of ownership of and access to infrastructure, data generated, and research outputs. The ownership and accessibility of cultural data will often be determined by those groups involved, particularly in the case of Aboriginal and Torres Strait Islander peoples.

The model of a 'data commons' is one way forward, and the basis for work underway through the ARDC for HASS and Indigenous researchers. In the case of the Language Data Commons, while the impetus came from linguistics and languages researchers, its commons agenda has larger remit and application. The Indigenous Research Capability program is setting in train an agenda for Indigenous data governance and sovereignty and the foundation of an Aboriginal and Torres Strait Islander Research Data Commons. (See Spotlight on Improving Indigenous Research Capabilities).

Policies

Data employed in humanities research is often culturally sensitive. Ethical, security and privacy considerations apply with research relating to Aboriginal and Torres Strait Islander peoples, as well as for example age-referenced data (especially relating to children) or health data.

The development of data standards, and policies relating to data sharing and transparency need to work within both FAIR and CARE frameworks.[25] While there has been welcome attention to the importance of data access and sharing, there are limits to fully 'open data' practice, where data can be freely used and re-used by anyone.

In Australia, Indigenous data governance and data sovereignty agendas have emerged "in response to poor data practices, from the conceptualisation of data items through to reporting of

[23] The ARC requires a data management plan as part of its application process and has developed best practice guides, with the National Health and Medical Research Council and Universities Australia, as part of the Responsible Conduct of Research (2018), see https://www.nhmrc.gov.au/about-us/publications/australian-code-responsible-conduct-research-2018.

[24] Erzsébet Tóth-Czifra (2019), 'DARIAH Pathfinder to Data Management Best Practices in the Humanities', Version 1.0.0. DARIAH-Campus, https://campus.dariah.eu/id/yR8mHfs3eW-ibu58LerCt.

[25] Australian Research Data Commons (2019), Making Australia's Research Data FAIR https://ardc.edu.au/resources/aboutdata/fair-data/ and CARE Principles for Indigenous Data Governance https://www.gida-global.org/care.

data about Indigenous peoples".[26] Protocols for the use and re-use of data and data and digital repatriation are vital to the future of humanities research, noting the work already undertaken by organisations such as AIATSIS (*Code of Ethics for Aboriginal and Torres Strait Islander Research*)[27] and drawing on expertise of the Indigenous Research Capability program, the Indigenous Data Network at the University of Melbourne,[28] and the Maiam nayri Wingara Aboriginal and Torres Strait Islander Data Sovereignty Collective.[29]

Spotlight on Improving Indigenous Research Capabilities: An Aboriginal and Torres Strait Islander Research Data Commons

"Representing Aboriginal and Torres Strait Islander researchers, organisations and communities across Australia, this project will review and refine national and international frameworks of Indigenous Data Governance (IDG) and Indigenous Data Sovereignty (IDS) to collectively strengthen the foundations of Aboriginal and Torres Strait Islander data governance principles, which will be translated and applied to Indigenous research data tools and infrastructure. The Indigenous Data Network (IDN) will deliver an Indigenous research capability program that celebrates, supports and enhances the capabilities of Aboriginal and Torres Strait Islander peoples and researchers at the interface of research data science and Indigenous knowledge systems.

The program will achieve this by working with Aboriginal and Torres Strait Islander communities to determine their engagement with, and aspirations for, their data. The program will be delivered by the development of three parallel streams of activities:

1. Development of social architecture: Indigenous data governance and sovereignty
2. Development of technical architecture: Building the foundations for an Aboriginal and Torres Strait Islander Research Data Commons
3. Core National Indigenous Data Assets: Building an Aboriginal and Torres Strait Islander Spatio-temporal Framework

Collectively, the three activity streams will lay the foundation to build national Indigenous research capabilities, framed by a set of agreed Indigenous Data Governance principles that can leverage existing data assets, linking them with new and existing Aboriginal and Torres Strait Islander data assets. This project will generate a detailed account of research data ecosystems, including how research data is distributed and used for the benefit of Aboriginal and Torres Strait Islander people."

Source: Project Plan, https://ardc.edu.au/wp-content/uploads/2021/11/Indigenous-Research-Capability-Revised-project-plan-Oct-2021.pdf.

[26] Maiam nayri Wingara Indigenous Data Sovereignty Collective, 'History of Indigenous Data Sovereignty', https://www.maiamnayriwingara.org/projects-1.
[27] AIATSIS (2020), *AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research,* https://aiatsis.gov.au/sites/default/files/2022-02/aiatsis-code-ethics-jan22.pdf.
[28] Led by Professor Marcia Langton AO FASSA FTSE, https://mspgh.unimelb.edu.au/centres-institutes/centre-for-health-equity/research-group/indigenous-data-network.
[29] See https://www.maiamnayriwingara.org/.

Research outputs

Digital research and datasets are increasingly important research outputs in the humanities, and a way of translating and communicating the value of research. These major digital platforms and data visualisations do not necessarily fit the conventional research publication metrics, nor do they yet have an agreed status as 'non-traditional research outputs' (NTROs). Humanities and creative arts researchers are large producers of NTROs such as original creative works, portfolios, and exhibitions – particularly in areas such as performing arts, visual arts, creative writing, and film and media studies.[30] There is not yet a uniform, recognised approach to this emerging and growing category of data and digital outputs, which also includes software. NTROs have, by and large, tended to be documented less well than critical work published in journals and books, so there is a challenge going forward in recognising the value of data-intensive outputs at both the level of the individual researchers (in performance reviews and workload formula, for example) or at national scale in research assessment exercises such as the ARC's ERA audit.

Focus areas

International investments in humanities research infrastructure have shown pathways for infrastructure investment in:

- heritage research, data, and technologies – building capabilities in characterisation technology and pattern recognition;
- language research, data, and technologies – building capabilities in informatics, semantics, and AI; and
- social and media communications research, data, and technologies – building capabilities in internet of things, civic technologies and precision services.[31]

A summary of Australia's humanities infrastructure and assets is at Appendix C. In our preliminary survey, we also highlighted projects and platforms funded through the ARC's Linkage Infrastructure, Equipment and Facilities (LIEF) scheme, and humanities-led Centres of Excellence, both of which give broader context to the opportunities and potential. The ARC is a major funder of digital and data-intensive humanities and arts research. An analysis of projects funded through the ARC between 2011-18 identified 108 projects, totalling $42.9M, which represented 16 per cent of ARC-funded humanities projects over the period.[32] A large share of these projects was funded through the Discovery scheme (41 per cent of the total). Language, communications and cultures fields have the greatest number of projects (47) followed by creative arts and writing (19), law and legal studies (14), and history and archaeology (11). At a more granular four-digit field of research, media and communications fields have been most successful.

It is also clear in the LIEF data that several humanities infrastructures have been successful in successive rounds. This includes AusStage, Austlit, Design and Art Online (DAAO) (a cluster of

[30] See ERA National Report 2018, 'Section 1 Non-Traditional Research Outputs', https://dataportal.arc.gov.au/era/nationalreport/2018/pages/section1/non-traditional-research-outputs-ntros/.
[31] Australian Academy of the Humanities (2020), *International Research Infrastructure Models for Humanities, Arts and Social Sciences.* A report for the Commonwealth Department of Education https://humanities.org.au/wp-content/uploads/2022/01/AAH-International-HASS-Infrastructure.pdf.
[32] Humanities, Arts and Culture Data summit papers are available from https://humanities.org.au/our-work/projects/humanities-arts-culture-data/.

creative and performing arts and writing infrastructures), and Pacific and Regional Archive for Digital Sources in Endangered Cultures (PARADISEC).[33] (Appendix C).

Scenario planning

Survey reports and data analyses informed our approach to scenario planning. As noted earlier, Australia is piloting approaches to language data in the HASS Research Data Commons program. The development of a Language Data Commons is designed to capitalise on existing infrastructure; secure vulnerable and dispersed collections; improve analysis environments for new research outcomes; and build strategic partnerships, and engagement and training capability.

One of the areas of data priority which currently falls outside the scope of the HASS Research Data Commons but could be part of future phases of development is social media data. We therefore developed a scenario that would test the data needs and infrastructure capabilities in the context of AI and automated decision-making. A second scenario focuses on research and data for cultural resilience, which brings into frame heritage and cultural data collections.

[33] AusStage, https://www.ausstage.edu.au/pages/browse/; Austlit, https://www.austlit.edu.au/; DAAO, https://www.daao.org.au/; PARADISEC, https://www.paradisec.org.au/

Challenge scenario: Ethical AI, automated decision making, real-time data

One of the major challenges of our time is the risks and benefits of new decision-making technologies. This is an area which encompasses big technology, challenges to democracy, and disinformation. It is inherently data intensive, with significant social, political, and economic impacts.

Social and cultural analyses are integral to future projects that develop AI systems. Exploring the connections between an AI's technical design and its cultural and social implications is key to ensuring feasible and sustainable AI systems that benefit society and that people want to use.[34] New data sources including real-time data, such as mobile and social media, allow researchers to "model and understand the circulation of information in ways that were not possible just a decade ago". That data is often "thick" – in a range of types and formats and varying in structure. It requires conversion to "more robust archival quality and open data standards".[35]

Australia has a unique concentration of expertise and research training in the form of the ARC Centre of Excellence for Automated Decision-Making and Society (ADMS). The Centre combines humanities research methods and approaches, with insights from the technological sciences, to make substantial advances in knowledge and address major social and policy challenges. The ADMS' research program is focused on embedding the development of responsible, ethical, and inclusive automated decision-making into four initial industry sectors: health, transport, news and media, and social services.[36]

As part of the consultations undertaken for this scenario, the Academy convened with representatives from ADMS and other AI experts in the humanities and social sciences to meet with the Department of Education's National Research Infrastructure Taskforce to scope and explore issues around the role of AI. The Exposure Draft of the Roadmap, released in December 2021, cited the potential of a landmark investment in an Australian Social Data Media Observatory, which was precipitated by those discussions. The ADMS subsequently developed a concept brief which is being tested with stakeholders.[37]

This is part of 'gearing up' research infrastructure that will be necessary to engage with the complexity of a whole range of issues – social media data is a pressing one – and in the applications of machine learning across a range of domains. The challenge is to support specialist researchers and to enable broader application and uptake across the research system.

This area of research supports inclusive digital transformation and improved health and social outcomes. Important national priorities areas for this research include the Office of the National

[34] Emma Dahlin (2021), 'Mind the Gap! On the future of AI research', *Humanities Social Science Communication*, 8(71), https://doi.org/10.1057/s41599-021-00750-9.
[35] ARC Centre of Excellence for Automated Decision-Making and Society (ADMS) (2021), 'Landmark Social Data Research Infrastructure: Australian Social Data Observatory Concept Brief', https://www.admscentre.org.au/wp-content/uploads/2021/12/Ausdo-Concept-Brief-ADMS-Dec-2021.pdf.
[36] ARC Centre of Excellence for Automated Decision-Making and Society, https://www.admscentre.org.au.
[37] ADMS Concept Brief, https://www.admscentre.org.au/wp-content/uploads/2022/04/ASDO-Concept-Brief.pdf.

Data Commissioner, National Data Availability and Transparency Bill, Digital Economy Strategy, Australian Data Strategy, AI Roadmap.[38]

The following issues, challenges and opportunities were identified in our consultations:

- **Developing new methods and tools for studying the digital media environment**, so researchers can use social media data and move into the new epoch of automation in platforms. Exemplar work has been pioneered with a national Twitter collection, unique in the world.[39] The step-change challenge is how to move from collecting tweets or hyperlinks and using them to map society to actively interrogate the role of platforms and their AI in curating a culture and shaping our social relations. This means a different relation to the platforms – and is complicated for institutions to deal with in terms of ethics – but it is an opportunity for a whole new wave of methodology.[40] (See Spotlight on Digital Methods).

Spotlight on Digital Methods for media and communication research

> What does the future look like?
>
> "API-compliant methods (esp. Twitter, YouTube), more attention to subcultural platforms (Reddit, Tumblr)
>
> Return to 'grey area' practices like scraping and automated testing (bots) – do our institutions have the risk appetite for this?
>
> Qualitative/hybrid digital methods e.g. app walkthrough, platform biography
>
> Forensic and experimental methods e.g. algorithm audits, data donation projects (akin to AlgorithmWatch)"

Source: Jean Burgess (2019) 'Digital Methods and the Future of Communication and Media Research', Humanities, Arts and Culture Data Summit presentation https://www.humanities.org.au/wp-content/uploads/2019/04/AAH-DARIAH-Burgess-1.pdf

- **Access and licensing arrangements for 'big social data' generated by proprietary social media platforms** are needed. This is the 'elephant in the room', the increasingly difficult access to data for public research purposes, which is ultimately vital to build trust in the platforms themselves. The problem of intellectual property rights when dealing with commercial data has also not been tackled in any meaningful way. That is another dimension of ethics and governance issues (see below).
- **The potential of novel crowdsourcing and citizen science** data initiatives is untapped, including data donation, to expand the range of data and overcome licensing hurdles.
- **Legal and ethical aspects of social media data collection and analysis** are priorities. Capability in collecting data from social media platforms and analysing is really building but there are major legal and ethical obstacles to sharing data sets. This can sometimes be as simple as getting formal legal advice. A researcher we consulted referenced such a piece of

[38] Following a change of federal government in May 2022, these priorities may be subject to change.
[39] Led by QUT researchers through the TrisMA project, https://research.qut.edu.au/dmrc/projects/trisma-tracking-infrastructure-for-social-media-analysis/ and now hosted by the Digital Media Observatory, https://www.qut.edu.au/research/why-qut/infrastructure/digital-observatory. Datasets also available such as '100 Days of Covid-19 in the Australian Twittersphere', https://researchdatafinder.qut.edu.au/display/n10613.
[40] Jean Burgess (2019) 'Digital Methods and the Future of Communication and Media Research', Humanities, Arts and Culture Data Summit presentation, https://www.humanities.org.au/wp-content/uploads/2019/04/AAH-DARIAH-Burgess-1.pdf.

work funded by ARDC that allowed sharing of data on strong legal footing. The ethics side of things is even more complex. One participant commented that "ethics barely covers it" in working with community or personal data, and data connected to Indigenous people. The value of social and cultural research and data in emergency responsiveness scenarios, for example, has come to the fore in the context of disinformation challenges during Australia's 2019-20 bushfire season. (Spotlight on Social Media Research for Countering Disinformation).

- **AI for infrastructure:** At its most basic there is potential for AI to help make sense of large amounts of text (in the broad sense, i.e., including audio/video) from simple applications like geolocation of historical placenames to 'distant reading' of large datasets. AI can be used to perform automated Named Entity Recognition enabling better discovery across different collections. Optical Character Recognition (based on machine learning models) can increasingly be used to convert older handwritten or printed sources into text for analysis.
- **Integration and standardisation are major challenges** for social media data and research. This is one of the reasons why it is not in scope for the first phase of projects underway through the HASS Research Data Commons. As one participant in our consultation observed "this isn't one tool, this isn't one facility, most of us are producing boxes and the infrastructure is going to be in the pipes". Standardisation around APIs needs to occur – "if you can't get it out and send it to the next place it is useless" – and the major challenge of working on a model that allows integration to occur will be to connect up the services.
- **Multidisciplinary research initiatives** are needed to "explore new ways to close the analytical gap between technical and social approaches to AI." ADMS is one embodiment of this. If research on AI tends to "analytically separate technical and social issues" then research and data infrastructure needs to be cognisant of these risks and seek to overcome them by designing for social and cultural dimensions from the outset.[41]

Spotlight on social media research for countering disinformation in emergency situations

> "During the 2019-20 bushfire season, Australian researchers used sophisticated software tools including tweetbotornot, Botometer, and Bot Sentinel to study inauthentic behaviour. About 300 Twitter accounts were identified as driving the #ArsonEmergency hashtag which was being used to counter evidence that climate change is linked to the severity of the bushfire crisis.
>
> The most effective disinformation campaigns use bot and troll accounts to infiltrate genuine political discussion and shift it towards a different 'master narrative'. A much larger portion of bot and troll-like accounts pushed #ArsonEmergency, than they did #AustraliaFire and #BushfireAustralia. The narrative was then adopted by genuine accounts who furthered its spread.
>
> Close-to-real-time research on flows of information and disinformation allowed researchers to provide an ongoing health check to guide people through the sea of useful, not useful, and deliberately harmful information in emergency situations."

Source: Timothy Graham and Tobias Keller (2020), 'Bushfires, Bots and Arson Claims: Australia Flung in the Global Disinformation Spotlight', *The Conversation*, 10 January, https://theconversation.com/bushfires-bots-and-arson-claims-australia-flung-in-the-global-disinformation-spotlight-129556.

[41] Emma Dahlin (2021), 'Mind the Gap! On the future of AI research', *Humanities Social Science Communication,* 8(71), https://doi.org/10.1057/s41599-021-00750-9.

Challenge scenario: Australia's cultural resilience

Cultural resilience and identity are tested in uncertain times or in times of crisis. In charting a COVID-19 recovery or in transitioning to a clean energy economy people need to be engaged "in the context of their lives, jobs, and communities".[42] The humanities stand to make a unique contribution to understanding and building Australia's cultural resilience.

For Australia's research sector, social and cultural expertise in the humanities and arts (together with the social sciences) are key to understanding human experience and behaviour at times of disaster and crisis, both historical and contemporary. This includes learning lessons from the past; developing practical actions to make Australians safer; understanding the conditions that make for effective responses and resilient communities; framing the questions to both guide research approaches and inform policy action; and identifying opportunities to build resilience and assist recovery by developing trusted solutions with lasting social traction.

Australia now hosts world-leading digital research systems, including the National Library of Australia's Trove, the Pacific and Regional Archive for Digital Sources in Endangered Cultures (PARADISEC), and the Atlas of Living Australia. Recent technological transformations have enabled new methods and modes of engagement with these systems. Researchers undertake data mining, curation, re-use, analysis, and interpretation to discover once inaccessible patterns, to challenge accepted truths, to reveal previously hidden voices, and to introduce a diversity of perspectives to inform understanding of Australia's history, culture and environment. Increasingly, outcomes of this research are reintegrated into systems in ways that enhance connections between cultural institutions and academic and broader communities. It is even possible to think about the potential of continental-scale observations – deep time observations not just geological but historical, Indigenous, and cultural.[43]

This area of research supports: Australia's Digital Economy Strategy, Digital Culture Strategy, Preserving Australia's at-risk collections.[44]

The following issues, challenges and opportunities were identified in our consultations:

- Working with data held in museums, galleries, archives, and libraries (GLAM) collections, researchers constitute and reconstitute understandings of Australia's history, culture, and identity. The collections, platforms and infrastructure generated by humanities research may be nationally significant but are often subject to **ad hoc or fragile institutional investment**.
- There is a strong cohort of researchers engaging with collections for data-enabled research but evidence of **uneven capability development** and a need for tools, services, and platforms interfaces to expedite broader uptake and innovation. (See Spotlight on GLAM Workbench).

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[42] Australian Council of Learned Academies (2020), *Australian Energy Transition Plan*, https://acola.org/wp-content/uploads/2021/06/acola-2021-australian-energy-transition-plan.pdf.
[43] Bert Roberts (2018), 'A Time Machine for Australia?', Humanities, Arts and Culture Data Summit, https://www.humanities.org.au/wp-content/uploads/2018/04/HACDS18-Roberts-PPT-V0.1.pdf and interdisciplinary agenda of the ARC Centre of Excellence for Australian Biodiversity and Heritage, https://epicaustralia.org.au/.
[44] Following a change of federal government in May 2022, these priorities may be subject to change.

Spotlight on GLAM Workbench

> "The GLAM Workbench is a collection of Jupyter notebooks to help researchers explore and use data from galleries, libraries, archives, and museums. It includes tools, tutorials, and some pre-harvested datasets.
>
> Designed for humanities researchers to encourage uptake of data and digital methods. Developed and maintained by historian Tim Sherratt, there is no underlying platform that needs to be maintained. The Jupyter notebooks are JSON files, structured according to an agreed standard, and can be deployed in a wide variety of environments. The GLAM Workbench uses existing services to run its notebooks, integrating with tools and platforms like Binder, Reclaim Cloud, Nectar, and Docker. But it is not dependent on any of them. If a particular service disappears, something else can be swapped in.
>
> It also is increasingly making use of scripts and GitHub actions to do routine maintenance tasks like building Docker images, managing versions, and updating documentation."

Source: Tim Sherratt (2021), GLAM Workbench (version v1.0.0), Zenodo, https://doi.org/10.5281/zenodo.5603060.

- There are Interdependencies between humanities research and GLAM collections. Yet Australia has not really explored the **opportunities for overlap and efficiencies in bringing together cultural and research infrastructures**. For the most part, this is happening at a project-based level, with individual researchers and projects duplicating effort time and again in accessing, curating, and analysing data in cultural collections. Limited effort is deployed to enabling data 'life cycles' which could serve research, cultural, and community agendas. (See Spotlight on Australia's Literary Trove).
- Historical records contain extensive structured data, in the form of tables, which are not computer readable. **Methods exist for digitising this data, but support is required to implement them**.
- There are challenges with the heterogeneity and scale of data collections. These include text corpora, entire web archives, structured tabular data, unstructured data, material, artefacts, images, and born digital. A stand-out example is the National Library of Australia's web archive. In March 2019, the library published the entire Australian web domain of the last 20 years.[45] Unprecedented internationally, this unique Australian 'dataset', offers unparalleled insights into areas such as policy history, or civic engagement. Currently **users can only perform limited keyword searches; its potential for advanced research and data curation has not yet been capitalised**.
- In many cases, **projects contain data that could be usefully linked together to enable field-changing historical and cultural insights**. Founders and Survivors, a project now effectively 'frozen', offers a foundation for a step-change on digitising Australia and its peoples.[46] It includes demographic and other data on early migrants to Australia that could be linked to other records including: population datasets created from vital registrations, parish records, social welfare records, wealth transfer and land holding records, military records, criminal records, inquests — and the potential for this to be linked to clinical records nationally such as Medicare and bio banks. One jurisdiction in Australia (Western Australia) does this, and its records only go back to 1944. It is possible to go back a hundred years more

[45] National Library of Australia, The Australian Web Archive, https://www.nla.gov.au/collections/what-we-collect/archived-websites.
[46] Founders and Survivors, https://foundersandsurvivors.com/, led by Professor Janet McCalman FAHA FASSA.

and include records of colonisation. Such records can also be with GIS and map the life ways of the Australian people against climate changes, climate events and environmental challenges.

Spotlight on Australia's Literary Trove: Approaching collections as data

Working with the National Library of Australia's Trove database of digitised newspapers, Professor Katherine Bode has unearthed a literary history of Australia which challenges some of the most powerful stereotypes of Australian identity in the nineteenth century and has repercussions for how we see ourselves today.

The original collection, identified through text-mining, contained 21,000 publications of novels, novellas, and short stories in Australian historical newspapers, including double the number of Australian novels that had previously been recorded. Yet the fiction in the database contained multiple OCR errors and was quickly outdated due to Trove's ongoing digitisation of historical newspapers. When Professor Bode completed a final harvest of fiction in mid-2015, Trove had around 17 million pages; today it has over 25 million. In approaching collections as data and thinking about the infrastructural conditions of this shift, she followed Trove's lead in approaching the community as co-builders of the collection.

By making the database a crowdsourcing one, Professor Bode collaborated with citizen researchers to improve the database, and with it, both Trove Newspapers and Trove. Members of the research community can find a story they're interested in and correct it as they read it in Trove's text-correction interface; they can also add missing instalments and new titles. Since the database was launched, over 10,000 new titles have been added and many thousands more have been corrected. Because Trove harvests data from the 'To be continued' database on a weekly basis, to add records to its collection, all these community additions are also represented in Trove, where they are sustainable into the future and available for anyone to discover and enjoy.

Source: Katherine Bode and Carol Hetherington, eds. "*To be continued . . .": The Australian Newspaper Fiction Database*, http://cdhrdatasys.anu.edu.au/tobecontinued.

Opportunities exist for a more coordinated and strategic approach. Australia has a strong and vibrant creative sector and long-term partnerships between cultural institutions and researchers, most operating at the project-based level (funded through ARC Linkage projects for example). Investments in 'lab' infrastructure are an example of the ways in which researchers and cultural institutions can collaborate on a more formal basis. (See Spotlight on GLAM Labs).

Spotlight on GLAM Labs

"Cultural heritage organisations have historically provided access to and preserved cultural heritage. The shift towards the digital has presented new opportunities for experimentation and innovation. The fast pace of technological developments impacts society and culture worldwide. Some institutions may not be ready for this. This is the world of GLAM Labs. Labs and Lab-style work challenge the traditional approach and use new, existing and emerging technologies to make their collections available in innovative, engaging and unexpected ways. Labs experiment, collaborate, take risks, sometimes fail, and always push boundaries."

Example: KB Lab, Netherlands: The KB National Library of the Netherlands set up the KB Lab in 2014. "The Lab hosts tools, datasets and a researcher-in-residence program where the Lab team collaborates with early career researchers."

Example: North Terrace Cultural Precinct Innovation Lab: North Terrace Cultural Precinct Innovation Lab (SA GLAM Lab) "is a new cultural heritage Lab that brings together four state government-funded South Australian institutions; the History Trust of South Australia, the South Australian Museum, the State Library of South Australia and the Art Gallery of South Australia, establishing a South Australian centre for excellence in digital cultural heritage and effecting digital and cultural transformation across the city's cultural precinct. The Lab is an interdisciplinary collaborative space where all four institutions share knowledge, resources, skills and expertise to advance new cultural, audience and research practices, as well as access to and experimentation with digital collections."

Source: Open a GLAM Lab, https://glamlabs.pubpub.org/.

In the humanities and arts fields, GLAM organisations have featured as strong partners over time in ARC-funded projects. Our preliminary search across ARC projects over the 2001-18 period involving a GLAM organisation showed 248 projects with a museum as a participating institution over the period with total funding of $122,972,610. There were 40 projects involving the NLA, for example, over that period, with total project funding of $10,508,618. The NLA has collaborated on projects involving 16 Australian universities, in each state and territory.

The ARC itself conducted detailed analysis on the networking of GLAM organisations through its funded projects over the 2008-14 period, which showed most GLAM organisations were involved through Linkage projects (71 per cent of total funded projects).[47] From 2008-14, the financial contribution by the GLAM sector each year in Linkage projects was approximately $1-2 million in cash, with an in-kind contribution ranging from $3 million in 2008 to a high point of over $6 million in 2011.The full spectrum of disciplines is involved with biological sciences, and history and archaeology the top two fields (based on numbers of projects). Several messages from that work are worth drawing out: the involvement of GLAM organisations on bids increased the success rate; the GLAM sector contributed financially and through its technical and curatorial expertise to pure and applied research development in Australia; and there was (and continues to be) an under-realised potential for partnering with GLAM in strategic and capacity-building programs.

[47] This work was undertaken by Denise Meredyth when she was Executive Director of Humanities and Creative Arts at the ARC and presented at the Australasian Consortium of Humanities Researchers and Centres (ACHRC) annual conference. 'Humanities and Creative Arts HCA, Partnerships and the Public Interest Research Platforms', 12 October 2014, University of Melbourne.

Priority areas identified during this Environmental Scan where research, policy and cultural organisations align to foster cultural resilience include:

- Indigenous engagement, data sovereignty, cultural repatriation.
- Media and digital literacy.
- Communications, outreach, social inclusion.
- Bridging the digital divide – especially in the context of COVID-19, and the shift to both online education and working from home.
- Building linguistic expertise and intercultural exchange between Australia and the Asia and Indo-Pacific region.

Gaps and opportunities

A preliminary summary of gaps and opportunities for data enabled humanities research was identified during this Environmental Scan, informed by key reports and consultations:

BUILDING KNOWLEDGE PARTNERSHIPS FOR HUMANITIES DATA-ENABLED RESEARCH

- There are opportunities to build national, strategic approaches with data custodians of relevance to humanities (institutional infrastructures, collecting institutions, GLAM). Research advice on platform development approaches is important to ensure security and perennity of nationally significant data.
- CSIRO's National Collections and Marine Infrastructure is structured to support Australia's marine sciences research.[48] The humanities do not have an equivalent – a formal, coordinated, efficient set of platforms and collections brought together for cultural and social research at scale.
- State-based models of collaboration between universities and cultural and collecting institutions are instructive. (See Spotlight on Digitisation Collaboration).

Spotlight on Digitisation Collaboration

> "The Digitisation Centre of Western Australia is an important piece of research infrastructure that aims to digitise, to global archival standards, the major Humanities, Arts and Social Sciences collections held in Western Australia. This Centre emerges from an innovative collaboration between the Western Australian universities, the State Library of Western Australia and the Western Australian Museum. The collections that will be digitised are of national and international significance.
>
> It was funded through a $1,100,000 Linkage Infrastructure, Equipment and Facilities Grant from the Australian Research Council and $425,000 in cash contributions by the five Western Australian Universities, the State Library of Western Australia and the Western Australian Museum. Plus 'in-kind' contribution of time and expertise by staff at all participating institutions."

Source: The Digitisation Centre of Western Australia, https://www.uwa.edu.au/schools/research/the-digitisation-centre-of-western-australia.

DEVELOPING COLLECTIONS OF UNIQUE NATIONAL SIGNIFICANCE

- Real-time data and social media platforms hold huge potential for research but there are obstacles with proprietary platforms like Facebook. These are critical data sources on contemporary public debate current events. They enable the observation of societal dynamics at an unprecedented level of detail and in close to real time, and provide insights

[48] CSIRO, National Collections and Marine Infrastructure, https://www.csiro.au/en/about/people/business-units/ncmi.

both on acute, short-term, current events and on the longitudinal, gradual change in views, attitudes, and communicative practices over months, years, and decades.

- The Australian Twitter collection developed by QUT researchers and the TriSMA infrastructure is one exemplar providing a potential blueprint for other social media platforms. [49]

LEVERING EXISTING INVESTMENTS

- There are opportunities to leverage existing NCRIS and ARDC investments, and to learn lessons from the data and infrastructure planning undertaken for ARC Centres of Excellence, including plans for dealing with legacy data and platforms.
- Humanities researchers can learn from other communities, and also test feasibility through pilot initiatives. Within research domains, it is important to understand the tools and data services people are currently working with, and how these fit into the broader set of services available. What new things need to be built and what can we leverage from existing platforms and models? Where you get success is by using things that already exist in new ways. As one researcher put it during consultations: "What's at the bottom of the vertical that we can build upon and leverage? Some of it is already around but it just hasn't been applied in the spaces that we've been working in yet."

MANAGED FRAMEWORK FOR HUMANITIES DIGITAL PLATFORMS

- There is a need for coordinated approaches for data management, platform sustainability, research translation, and protocols for dealing with legacy datasets. A large part of the data and infrastructure ecosystem in the humanities is funded via short-term projects. There are major challenges for archiving, re-use, and sustainability beyond the life of individual projects – and real need and potential to solve these challenges in aggregate.
- The start-up costs of humanities infrastructure can be significant, but the maintenance of platforms becomes the real burden. There is no sustainability option for many of these projects, even for data, platforms and resources that are in the national interest.
- A model is King's Digital Lab (KDL) in the UK, which was established in late 2015.[50] KDL services an institutional remit; Australia's federated system, relatively small number of universities, and the size of the humanities workforce makes some of these challenges achievable at national scale.

'START-UP' EXPERIMENTATION AND TRANSFORMATION

- Related to the point above, a coordinating entity akin to a 'start up' hub to provide opportunities for experimentation and innovation, and to minimise duplication of effort. This would not be a funding program but a site of advice, bringing projects together with business and research analysts with a line of sight across the humanities landscape. The purpose would be to provide a testing ground for ideas and development of business cases.

DATA LINKING OF SOCIAL, CULTURAL AND OTHER POPULATION DATA (INCL. HEALTH)

- There is real potential for project data – generated by researchers – to be linked together to enable field-changing historical and cultural insights.

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[49] This is the work of Axel Bruns and Jean Burgess, etc. See https://www.qut.edu.au/about/our-people/academic-profiles/a.bruns.

[50] James Smithies (2019), 'Integrating DH into the longue durée: Research Laboratories, History, Methods', Humanities, Arts and Culture Data Summit, https://www.humanities.org.au/wp-content/uploads/2019/03/AAH-DARIAH-Smithies.pdf.

- Further possibilities for linking data come from under-realised partnership opportunities across sectors to capitalise on 'bottom-up' efforts.

TRANSFORMING SKILLS AND CAPABILITIES

- One of the skills and capabilities challenges for humanities researchers is to 'mainstream' data management practices in accordance with discipline or domain-specific analytic approaches. Like other research domains, the humanities need policies focusing on career development, as well as specific training in digital methods and data handling. The *Building Expertise Strategy* of Europe's Social Sciences and Humanities Open Cloud (SSHOC) is instructive.[51]
- Depending on the research life-cycle, the most beneficial forms of training may be face-to face-masterclasses in which people bring their own data; pop-up labs; community events; or summer schools (models include the Oxford, Leipzig, or QUT's DMRC Summer Schools).[52] Online platforms that list available courses and programs, or tools and training modules for researchers to use, were also highlighted as critical elements of skill-building infrastructure (an example is DARIAH's Digital Humanities Course Registry, and Parthenos portal – which provides pooling activities, resources and tools for heritage e-research).[53]
- Consultations undertaken for the Academy's Future Humanities Workforce project identified the need to focus at undergraduate level for base-level skills and literacy, advanced training in methods at HDR level, and sustained focus on early career researchers. An initial list of data handling and capability skills needed over the next 5-10 years is at Appendix B.
- The newly established SHAPE Futures Network, which brings together early and mid-career researchers (EMCRs) in the humanities, arts and social sciences in Australia offers a forum to engage next-generation leadership on these issues. The network is aimed at "fostering an inclusive and diverse community that supports, empowers and promotes EMCRs in Australia, within and beyond academia".[54]

[51] See https://sshopencloud.eu/d62-building-expertise-strategy.
[52] See https://research.qut.edu.au/dmrc/research-training/2022-dmrc-summer-school/.
[53] See https://www.dariah.eu/tools-services/tools-and-services/tools/digital-humanities-course-registry/ and https://www.parthenos-project.eu/portal.
[54] SHAPE Futures EMCR Network (2021), https://humanities.org.au/news/shape-futures-emcr-network/.

Appendix A

Humanities, Arts and Social Sciences (HASS) Fields of Research

Humanities & Creative Arts (HCA)
33 BUILT ENVIRONMENT & DESIGN
3301 Architecture
3302 Building
3303 Design
1204 Engineering Design
3305 Urban and Regional Planning
3399 Other Built Environment and Design
36 CREATIVE ARTS AND WRITING
3601 Art history, theory and criticism
3602 Creative and professional writing
3603 Music
3604 Performing arts
3605 Screen and digital media
3606 Visual arts
3699 Other studies in creative arts and writing
43 HISTORY, HERITAGE AND ARCHAEOLOGY
4301 Archaeology
4302 Heritage, archive and museum studies
4303 Historical studies
4399 Other history, heritage and archaeology
47 LANGUAGE, COMMUNICATION AND CULTURE
4701 Communication and media studies
4702 Cultural studies
4703 Language studies
4704 Linguistics
4705 Literary studies
4799 Other language, communication and culture
48 LAW AND LEGAL STUDIES
4801 Commercial law
4802 Environmental and resources law
4803 International and comparative law
4804 Law in context
4805 Legal systems
4806 Private law and civil obligations
4807 Public law
4899 Other law and legal studies
50 PHILOSOPHY AND RELIGIOUS STUDIES
5001 Applied ethics
5002 History and philosophy of specific fields

5003 Philosophy
5004 Religious studies
5005 Theology
5099 Other philosophy and religious studies
Social, Behavioural & Economic Sciences (SBE)
35 COMMERCE, MANAGEMENT, TOURISM AND SERVICES
3501 Accounting, Auditing and Accountability
3502 Banking, Finance and Investment
3503 Business Systems in Context
3504 Commercial Services
3505 Human Resources and Industrial Relations
3506 Marketing
3507 Strategy, Management and Organisational Behaviour
3508 Tourism
3509 Transportation, Logistics and Supply Chains
3599 Other Commerce, Management, Tourism and Services
38 ECONOMICS
3801 Applied economics
3802 Econometrics
3803 Economic theory
3899 Other economics
39 EDUCATION
3901 Curriculum and pedagogy
3902 Education policy, sociology and philosophy
3903 Education systems
3904 Specialist studies in education
3999 Other education
44 HUMAN SOCIETY
4401 Anthropology
4402 Criminology
4403 Demography
4404 Development studies
4405 Gender studies
4406 Human geography
4407 Policy and administration
4408 Political science
4409 Social work
4410 Sociology
4499 Other human society
52 PSYCHOLOGY
5201 Applied and developmental psychology
5202 Biological psychology
5203 Clinical and health psychology
5204 Cognitive and computational psychology
5205 Social and personality psychology
5299 Other psychology

Source: Australian and New Zealand Standard Research Classification (ANZSRC) (2008), https://www.abs.gov.au/statistics/classifications/australian-and-new-zealand-standard-research-classification-anzsrc/2020.

Aboriginal and Torres Strait Islander (ATSI) Fields of Research

45 INDIGENOUS STUDIES
4501 Aboriginal and Torres Strait Islander culture, language and history
4502 Aboriginal and Torres Strait Islander education
4503 Aboriginal and Torres Strait Islander environmental knowledges and management
4504 Aboriginal and Torres Strait Islander health and wellbeing
4506 Aboriginal and Torres Strait Islander peoples, society and community
4507 Aboriginal and Torres Strait Islander sciences
4508 Te ahurea, reo me te hītori o te Māori (Māori culture, language and history)
4509 Mātauranga Māori (Māori education)
4510 Ngā mātauranga taiao o te Māori (Māori environmental knowledges)
4511 Te hauora me te oranga o te Māori (Māori health and wellbeing)
4512 Ngā tāngata, te porihanga me ngā hapori o te Māori (Māori peoples, society and community)
4513 Ngā pūtaiao Māori (Māori sciences)
4514 Pacific Peoples culture, language and history
4515 Pacific Peoples education
4516 Pacific Peoples environmental knowledges
4517 Pacific Peoples health and wellbeing
4518 Pacific Peoples sciences
4519 Pacific Peoples society and community
4520 Other Indigenous data, methodologies and global Indigenous studies
4599 Other Indigenous studies

Source: Australian and New Zealand Standard Research Classification (ANZSRC) (2008), https://www.abs.gov.au/statistics/classifications/australian-and-new-zealand-standard-research-classification-anzsrc/2020.

Appendix B

Skills and capabilities

What data handling skills will researchers need in 5-10 years?

Critical assessment

- Critically evaluate data analysis tools, willingness to learn and take critical perspective without needing to be beholden to a particular tool/method
- Capacity to access, understand and critically assess data relevant to field
- Algorithm bias awareness
- Critical understanding of data privacy and data sovereignty

Data handling skills

- Working with multimedia data
- How to manipulate heterogenous data sources, recognition of open and closed datasets
- Make data ready for machine learning procedures
- Transferring text materials into different datasets quickly, transfer datasets into visual tools
- Persistent identification of tailored, filtered, tagged, personalised datasets as research objects

Data management

- Data life-cycle management
- Connecting up datasets from heterogeneous sources

Data and digital methods

- Creative, immersive and exploratory data handling approaches, especially working with live data streams rather than 'analysing' static 'datasets'
- Curation of large datasets; navigation of multimedia environments, critical distance from social media, circulation, historical and comparative analysis
- Provenance assessment, understanding how the data was generated (could be harder in 5-10 years as more data is curated and complied automatically e. g. with machine learning)
- Better understanding of quantitative methods
- Geo-mapping

Research environments

- Experience working inter-disciplinary teams, e. g. familiarity with the skills/experience brought in by a GIS specialist, a data scientist, a UX developer[55]
- Generation of Virtual Reality and Augmented Reality research environments.

Source: Future Humanities Workforce consultation at Humanities, Arts and Culture Data Summit in 2019.

[55] A UX developer (or designer) is someone working on 'User Experience Design,' which is the process of developing and improving the of quality interaction between a user and a product (in this case, a software product).

What data capability skills in general are critical for ALL humanities researchers to learn over the next 5 years?

Critical thinking

- Critical data literacy, thinking critically about data and tools, familiarity with key terms like machine learning
- Critical thinking about tools
- What constitutes a 'good' dataset
- Dealing with hybridity

Data management

- Finding datasets
- Handling of large datasets
- Data management – full cycle
- Understanding how to structure, curate, analyse and represent data
- Documentation
- Packing data in a way that is shareable and preservable
- Transform data into scholarly output in a way that is verifiable and can be validated
- Produce datasets that can be reused and re-purposed by others

Operating context

- Familiarity with infrastructure landscape (including GLAM)
- A national and international perspective

Communications, engagement and translation

- Talking about data in ways that other people understand
- To clearly explain HOW data skills relate to REAL world problems
- The mechanics of systems for data analysis and text-mining

Professional development

- Acquire the skills for up-skilling, not specific tools or tasks
- Understanding of digital and data opportunities, necessary training tailored for that field of research

Transforming methods

- Available datasets, data standards, recognition of data analytics as a research method
- Transferring the management techniques for uncertainty to digital paradigms (regardless of the method)
- Digital research project design
- Relationship between research question, data and method
- Developing collaborative pipelines

Source: Future Humanities Workforce consultation at Humanities, Arts and Culture Data Summit in 2019.

See: Australian Academy of the Humanities, Future Humanities Workforce project, https://humanities.org.au/our-work/projects/future-humanities-workforce/.

Appendix C

Key infrastructures and assets

NATIONAL COLLABORATIVE RESEARCH INFRASTRUCTURE STRATEGY (NCRIS) FUNDED

- Australian Research Data Commons (ARDC): Humanities, Arts and Social Sciences Research Data Commons and Indigenous Research Capability program
- Australian Urban Research Infrastructure Network (AURIN)
- Population Health Research Network (PHRN) (for HASS health-related research)

AUSTRALIAN RESEARCH DATA COMMONS (ARDC) COMPETITIVE FUNDED (SELECT)

- Projects funded through ARDC's open call in 2020:
    - Australian Digital Observatory: Infrastructure for Dynamic Digital Data (QUT)
    - Time-Layered Cultural Map of Australia 2.0 (University of Newcastle)
    - Australian Text Analytics Platform (University of Queensland)
- Investments made pre-ARDC include NeCTAR Virtual Laboratories (VL), Alveo (the Human Communication Science VL) and HuNI (Humanities Networked Infrastructure); and FAIMS (Field Acquired Information Management Systems)

NATIONAL AGGREGATOR

- Trove is an aggregator of cultural heritage, research and community collections. Hosted, developed and maintained by the National Library of Australia it is also a repository of collaboratively digitised and born digital full text content including Australian newspapers, Commonwealth and State Government Gazettes, digitised Australian journals, and AGWA/PANDORA/Whole of Domain Archived Australian Websites.

EXEMPLAR PLATFORMS AND PROJECTS (SELECT)

- PARADISEC
- AustLit
- AustLII
- Design and Art Australian Online
- AusStage
- Time Layered Cultural Map
- The Prosecution Project
- Founders and Survivors
- Australian National Corpus
- TRisMA
- The Digitisation Centre of Western Australia
- GLAM Workbench

GLAM DATASETS AND COLLECTIONS

The following list is sourced and reproduced from GLAM Workbench, developed and maintained by Tim Sherratt.

“Harvested GLAM-related datasets from the various national and state data portals:

- Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS)
- History Trust of South Australia
- Libraries Tasmania
- Mount Gambier Library
- Museum of Applied Arts and Sciences
- Museums Victoria
- NSW State Archives
- National Archives of Australia
- National Library of Australia
- National Portrait Gallery
- Public Records Office Victoria
- Queensland Museum
- Queensland State Archives
- South Australian Museum
- State Library of NSW
- State Library of Queensland
- State Library of South Australia
- State Library of Victoria
- State Library of Western Australia
- State Records Office of Western Australia
- State Records South Australia
- Western Australian Museum

A full list of datasets at October 2021”

Available at https://glam-workbench.net/glam-datasets-from-gov-portals/.

Australian Research Council (ARC) funded digital humanities and arts projects

ARC-funded digital humanities and arts research, by scheme 2011-18

Scheme	Number	Funding
Australian Laureate Fellowship	1	$3,194989
Discovery Indigenous	3	$1,500,000
Future Fellowships	11	$9,424,128
Linkage Infrastructure, Equipment and Facilities	13	$5,917,890
Discovery Early Career Researcher Award	14	$5,053,789
Linkage Projects	22	$5,337,065
Discovery Projects	44	$12,465,751
Total	108	$42,893,612

Source: Joanne Tompkins, presentation to Humanities, Arts and Culture Data Summit 2019.

ARC-funded digital humanities and arts research, top fields of research by funding, 2011-18

Primary Field of Research (two-digit level)	Number of projects
20 Language, Communication and Culture	47
19 Studies in Creative Arts and Writing	19
18 Law and Legal Studies	14
21 History and Archaeology	11
16 Studies in Human Society	8
12 Built Environment and Design	5
08 Information and Computing Sciences	2
14 Economics	1
13 Education	1
Total	108

Source: Joanne Tompkins, presentation to Humanities, Arts and Culture Data Summit 2019.

ARC-funded digital humanities and arts research, top fields of research by funding, 2011-18

Primary Field of Research (four digit level)	Number of projects
2001 Communication and Media Studies	21
1902 Film, Television and Digital Media	10
2002 Cultural Studies	13
1801 Law	12
2103 Historical Studies	5
1601 Anthropology	4
2005 Literary Studies	8
1904 Performing Arts and Creative Writing	6
2102 Curatorial and Related Studies	3
1205 Urban and Regional Planning	1
2101 Archaeology	3
1201 Architecture	4
2004 Linguistics	2
1905 Visual Arts and Crafts	2
1899 Other Law and Legal Studies	2
Total	108

Source: Joanne Tompkins, presentation to Humanities, Arts and Culture Data Summit 2019.

ARC-funded digital humanities and arts research, top 15 administering organisations, 2011-18

Administering Organisation	Number of projects
The University of Melbourne	14
University of New South Wales	13
The Australian National University	11
Queensland University of Technology	10
The University of Sydney	9
University of Technology Sydney	7
Monash University	5
Curtin University	4
Flinders University	4
The University of Western Australia	4
Deakin University	3
Edith Cowan University	3
La Trobe University	3

Source: Joanne Tompkins, presentation to Humanities, Arts and Culture Data Summit 2019.

Current ARC Centres of Excellence in the Humanities

Centre	Investigators	Partners
ARC Centre of Excellence for Automated Decision-Making and Society Commenced 2020 Anticipated end date August 2027 RMIT University (Administering Organisation) Primary Field of Research: 2001 - Communication and Media Studies Announced funding: $31,783,576 The Centre aims to create the knowledge and strategies necessary for responsible, ethical, and inclusive automated decision-making (ADM). ADM applies new technologies from machine learning to blockchains across a wide range of social sectors; it carries great potential and risks serious failures. The Centre combines social and technological disciplines in an international industry, research, and civil society network. It will formulate world-leading policy and practice; inform public debate; and train a new generation of researchers and practitioners. Expected benefits include reduced risks and improved outcomes in the priority domains of news and media, transport, social services, and health.	Prof Julian Thomas (Lead Investigator) Prof Kimberlee Weatherall A/Prof Anthony McCosker Mr Nicholas Walsh Prof Jackie Scully Prof Jean Burgess Prof Heather Horst Prof Sarah Pink Prof Mark Andrejevic Prof Christine Parker Prof Christopher Leckie Prof Megan Richardson Prof Deborah Lupton Prof Axel Bruns Prof Nicolas Suzor Prof Paul Henman Prof Gerard Goggin Prof Mark Sanderson Prof Dan Hunter Prof Jason Potts Prof Dr Wolfgang Schulz A/Prof Vaike Fors Prof Karen Yeung Dr Cornelius Puschmann Prof Dr Maarten de Rijke Asst Prof Julia Stoyanovich Prof Frank Pasquale Ms Ivana Jurko	RMIT University Queensland University of Technology The University of Melbourne Monash University Swinburne University of Technology The University of New South Wales The University of Sydney The University of Queensland Data & Society Research Institute Digital Asia Hub Hans-Bredow-Institut AUSTRALIAN BROADCASTING CORPORATION Australian Communications Consumer Action Network Limited Australian Red Cross Society Consumer Policy Research Centre LTD Google Australia PTY LTD The Bendigo Hospital Cornell University, NY Halmstad University, Sweden University of Amsterdam, Netherlands University of Birmingham, UK University of Oxford, UK New York University Consumers Health Forum of Australia Ltd Australian Council of Social Service Max Kelsen PTY. LTD. Office of The Victorian Information Commissioner Volvo Car Corporation AW AlgorithmWatch gGmbH Western Sydney University Brooklyn Law School
ARC Centre of Excellence for Australian Biodiversity and Heritage Commenced 2017 Anticipated end date June 2024 University of Wollongong (Administering Organisation) Primary Field of Research: 2101 – Archaeology Announced funding: $33,750,000. This centre will create a world-class interdisciplinary research program to understand Australia's unique biodiversity and heritage. The Centre will track the changes to Australia's environment to examine the processes responsible for the changes and the lessons that can be used to continue to	Prof Richard Roberts (Lead) Dr Kieren Mitchell Dr Amy Way Dr Vera Weisbecker A/Prof Janelle Stevenson Prof Rebecca Bird Dr Geraldine Mate Prof Kristofer Helgen Prof Ian McNiven Ms Julie Matarczyk Prof Susan O'Connor Prof Zenobia Jacobs A/Prof Timothy Cohen Prof Simon Haberle Prof Michael Bird	University of Wollongong The Australian National University James Cook University The University of New South Wales The University of Adelaide Monash University University of Tasmania Queensland Museum Australian Museum Scarp Archaeology PTY LTD South Australian Museum State Library of New South Wales Bioplatforms Australia Ltd University of Savoy University of Papua New Guinea

adapt to Australia's changing environment. The Centre will support connections between the sciences and humanities and train future generations of researchers to deal with future global challenges and inform policy in an interdisciplinary context	Prof Sean Ulm Prof Christian Turney Prof Nicholas Nakata A/Prof Darren Curnoe Prof Corey Bradshaw Dr Laura Weyrich Prof Bruno David Prof Lynette Russell Prof Barry Brook Prof Christopher Johnson Dr Brit Asmussen Dr Michael Slack Prof Jean-Jacques Delannoy Dr Matthew Leavesley Prof Michael Storey	Natural History Museum of Denmark Indonesian National Centre for Archaeology Flinders University Papua New Guinea National Museum and Art Gallery The Pennsylvania State University, USA
ARC Centre of Excellence for the Dynamics of Language Commenced 2014 Anticipated end date September 2022 The Australian National University (Administering Organisation) Primary Field of Research: 2004 – Linguistics Announced funding: $28,000,000. Language is central to human existence and to the flow of information. The Centre will address the most critical questions about language: How do languages evolve? How different can languages be? How do our brains acquire and process them? How can technologies deal with the complexity and enormous variability of language in its central role in human information processing? What can Australia do to increase its linguistic abilities at a time of increasingly multilingual demands in trade and information? The Centre will also secure language heritage, develop new language technologies, connect policy with indigenous and migrant communities, and build strategies to help 1st and 2nd language learning and those isolated by language difficulties.	Prof Nicholas Evans (Lead) A/Prof Anthony Angwin Ms Romina Paskotic Prof Felicity Meakins Prof Rachel Nordlinger Prof Anne Cutler A/Prof Nicholas Thieberger Prof Janet Wiles Prof Kim Sterelny Prof Greville Corbett Prof Dr Stephen Levinson Prof Janet Fletcher Dr Judith Bishop Prof Catherine Travis Prof Gillian Wigglesworth A/Prof Caroline Jones Prof Jane Simpson Em/Prof Alan Rumsey Dr Bethwyn Evans Prof Stephen Matthews Prof Paola Escudero Prof Morten Christiansen Prof Rena TorresCacoullos Prof Miriam Meyerhoff Prof Caroline Rowland Prof Elena Lieven Prof Russell Gray A/Prof Bee Ng Prof Virginia Yip	The Australian National University Western Sydney University The University of Melbourne The University of Queensland Appen Pty Ltd Cornell University, NY University of Surrey Max Planck Institute for Psycholinguistics The University of Manchester The Pennsylvania State University, USA Australian Institute of Aboriginal and Torres Strait Islander Studies Chinese University of Hong Kong The University of Hong Kong Nanyang Technological University, Singapore Victoria University of Wellington Max Planck Institute for the Science of Human History

Source: Australian Research Council, 'Grant Search' portal, https://dataportal.arc.gov.au/NCGP/Web/Grant/Grants.

Linkage Equipment Infrastructure and Facilities projects 2017-22

Humanities and Creative Arts projects	Details
Modularised cultural heritage archives future-proofing PARADISEC The University of Melbourne This project will build an innovative modularised infrastructure to implement standards of data governance for cultural heritage records. This new infrastructure aims to build on the award-winning Pacific and Regional Archive for Digital Sources in Endangered Cultures collection and to capitalise on new technologies for metadata harvesting, temporal mapping, crowdsourced metadata, and automated transcription. The project expects to promote national and international research collaboration with Australian archiving communities and to build capacity in Pacific cultural institutions. The project will benefit research data communities across the sector as well as community custodians of cultural heritage collections.	Lead investigators: A/Prof Nicholas Thieberger Funding: $620,000 Year: 2022 Field of Research: 2099 - Other Language, Communication and Culture Investigators: A/Prof Myfany Turpin; Prof Nicholas Evans; A/Prof Sally Treloyn; Dr Amanda Harris; Dr Danielle Barth; A/Prof Bill Palmer; A/Prof Stephen Morey; Prof Jane Simpson; Prof Nicholas Enfield; Prof Linda Barwick; Prof Steven Bird; A/Prof Nicholas Thieberger; Prof John Hajek. Partner institutions: – The University of Melbourne – The University of Sydney – The Australian National University – La Trobe University – The University of Newcastle – Charles Darwin University
The Australian Emulation Network: Born Digital Cultural Collections Access Swinburne University of Technology This project aims to conserve and render born digital artefacts widely accessible by establishing an Australian Emulation Network. High value cultural collections from university archives and the GLAM sector requiring legacy computer environments will be targeted. The project expects to generate new knowledge across media arts, design, and architecture. Expected outcomes include stabilising and providing researchers with emulated access to born digital cultural artefacts, sharing legacy computer environments across the network, and establishing an Australian software preservation community of practice, building skills in preserving and emulating digital cultural artefacts with substantial future applications also in scientific preservation.	Lead investigators: Prof Melanie Swalwell Funding: $751,723 Year: 2022 Field of Research: 1902 - Film, Television and Digital Media Investigators: Prof Roger Dean; Prof Kim Vincs; Prof Anna Munster; A/Prof Peter Raisbeck; Prof Sean Cubitt; Prof Norie Neumark; Prof Sarah Teasley; Mr Adam Bell; Dr Barbara Lemon; Dr Kirsten Day; Prof Simon Biggs; Asst Prof Ionat Zurr; Prof Melanie Swalwell; Dr Helen Stuckey; Prof Harriet Edquist. Partner institutions: – Swinburne University of Technology – RMIT University – The University of Melbourne – University of South Australia – The University of New South Wales – Western Sydney University – The University of Western Australia – Australian Institute of Aboriginal and Torres Strait Islander Studies – Aarnet PTY LTD – Library Board of Victoria – Australian Centre for the Moving Image – Art Gallery of NSW – Museum of Applied Arts and Sciences – Australian Computer Museum Society INC – National Archives of Australia – OpenSLX GmbH – Yale University, USA – Cornell University, NY – Australian Institute of Architects – National Library of New Zealand Te Puna Matauranga o Aotearoa – Te Rua Mahara o te Kawanatanga - Archives New Zealand

AusStage LIEF 7: The international breakthrough

Flinders University

The aim of AusStage LIEF 7 is to enhance the world's oldest and most extensive national dataset on live performance. The project expects to maximise research arising from the global flow of data now accessible following the adoption of the AusStage schema by Norway, the UK, and potentially, China. Expected outcomes include improvements to the AusStage user interface; adaptation of the AusStage schema to support longitudinal studies of the impact of government policies; and development of AusStage immersive virtual reality theatres to popularise delivery of performing arts research. These innovations should benefit Australia by reinforcing AusStage's position as an international leader in the provision of digital research infrastructure.

Lead investigators: Em/Prof Julie Holledge

Funding: $566,523

Year: 2021

Field of Research: 1904 – Performing Arts and Creative Writing

Investigators: Em/Prof Julie Holledge; Prof Maryrose Casey; Dr Mary Cochrane; Prof Rachel Fensham; A/Prof Rea Dennis; Prof Stacy Holman Jones; Prof Bree Hadley; A/Prof Gillian Arrighi; A/Prof Jonathan Bollen; A/Prof Laura Ginters; A/Prof Jonathan W. Marshall; Prof Peta Tait; Dr Jane Woollard; Prof Julian Meyrick; Dr Margaret Hamilton.

Partner institutions:

- Flinders University
- The University of Queensland
- The University of Melbourne
- Deakin University
- Monash University
- Queensland University of Technology
- The University of Newcastle
- The University of New South Wales
- The University of Sydney
- Edith Cowan University
- La Trobe University
- University of Tasmania
- Griffith University
- University of Wollongong
- Australian Dance Theatre
- Performing Arts Heritage Network of Museums Australia
- Australia Council
- Victoria and Albert Museum
- University of Oslo, Norway
- The Hang Seng University of Hong Kong

Nyingarn: a platform for primary sources in Australian Indigenous languages

The University of Melbourne

This project aims to build Nyingarn, an online platform of digital text versions of early Australian Indigenous language manuscripts with images of the original documents. There are over a thousand such documents that are foundational to understanding Australia's languages, and Nyingarn makes textual versions, accessions, and navigates such documents, with a means for adding more in future. Expected outcomes of this project are accessible sources useful for educational materials, and for understanding the local language, its history, and its relationship to other languages. Nyingarn will provide cutting-edge methods for ingesting, analysing, and presenting these historical materials, both for research and for the general public.

Lead investigators: A/Prof Nicholas Thieberger

Funding: $600,000

Year: 2021

Field of Research: 2003 – Language Studies

Investigators: A/Prof Nicholas Thieberger; Prof Trevor Cohn; Prof Jane Simpson; Dr Terhi Nurmikko-Fuller; A/Prof Stephen Morey; Prof Linda Barwick; Prof Jakelin Troy; Prof Nicholas Enfield; A/Prof Myfany Turpin; Dr Roman Marchant; A/Prof Robert Amery; Prof Clint Bracknell; Mrs Amanda Lissarrague.

Partner institutions:

- The University of Melbourne
- The University of Sydney
- Edith Cowan University
- The Australian National University
- The University of Adelaide
- Australian Institute of Aboriginal and Torres Strait Islander Studies
- La Trobe University
- National Library of Australia
- First Languages Australia Limited
- State Library of New South Wales
- State Library of Western Australia

Australian Cultural Data Engine for research, industry and government The University of Melbourne The project aims to develop an Australian Cultural Data Engine (ACD-Engine), which will be an open software engineering facility that interacts with leading existing cultural databases in architecture, visual and performing arts, humanities, and heritage to build a bridge to information and social sciences. The ACD-Engine will unify and expand these disparate and previously unconnected systems to allow advanced analysis techniques to be performed. It will deliver innovative and searchable formats that ensure interoperability, improved search, interactive design and interpretation aids that will benefit the policy and planning for national and international alignments between researchers, industry and government.	Lead investigators: Prof Rachel Fensham Funding: $440,000 Year: 2021 Field of Research: 1904 - Performing Arts and Creative Writing Investigators: Prof Rachel Fensham; A/Prof George Buchanan; Prof John Macarthur; Dr Scott East; A/Prof Amir Aryani; Prof David Carlin; Em/Prof Hugh Craig; A/Prof Joanna Mendelssohn; Em/Prof Julie Holledge; Dr James Smithies; Dr David McMeekin; Prof Lisa Given. Partner institutions: — The University of Melbourne — Swinburne University of Technology — Curtin University — The University of Newcastle — Flinders University — The University of Queensland — The University of New South Wales — King's College London — RMIT University
A National Facility for the 3D Imaging of the Near Surface Flinders University This proposal aims to fund the establishment of a National Facility for the 3D Imaging of the Near Surface. It aims to provide Australian researchers with access to next-generation geophysical instruments for high-resolution landscape scale mapping of the shallow subsurface. The expansive size and impressive density of these data can fundamentally change the research questions that can be asked in the fields of archaeology, earth, environmental and forensic science. This integrated suite of equipment is currently not available in the Southern Hemisphere and will, if funded, position Australia at the forefront of the exciting field of near surface geophysics and facilitate collaboration with partner institutions in Asia, Africa and Oceania.	Lead investigators: Dr Ian Moffat Funding: $279,591.00 Year: 2021 Field of Research: 2101 - Archaeology Investigators: Dr Ian Moffat; Prof Patrick Hesp; A/Prof Amy Roberts; Dr Martin Polkinghorne; Dr Eddie Banks; Prof Graham Heinson; Prof Robert Fitzpatrick; Dr Xanthe Mallett; A/Prof Philippe De Smedt; Dr Petra Schneidhofer; Dr Nikos Papadopoulos; Prof Dr Apostolos Sarris. Partner institutions: — Flinders University — The University of Adelaide — The University of Newcastle — University of Cyprus — Ghent University, Belgium — Institute for Mediterranean Studies, Foundation for Research and Technology-Hellas — Vestfold and Telemark County Council
The Digitisation Centre of Western Australia (Phase 1) The University of Western Australia All five Western Australian Universities, the WA State Library and the WA Museum will collaborate to establish a world-class archival quality Digitisation Centre. There is no existing facility of this kind in WA. During this 12 month project all digitisation equipment will be acquired, installed and used to digitise a diverse range of cultural objects so as to ensure its ability to address the full spectrum of research needs. The Digitisation Centre will form a major piece of national research infrastructure with a prominent international profile and significance. The Centre will have the capacity to digitise all significant Humanities, Arts and Social Sciences (HASS) research collections held by participating institutions within a decade.	Lead investigators: Prof Benjamin Smith Funding: $1,100,000 Year: 2020 Field of Research: 2102 - Curatorial and Related Studies Investigators: Prof Benjamin Smith; Prof Helena Grehan; Prof Jo McDonald; Em/Prof Erik Champion; Dr Toby Burrows; Adj/Prof Michael Broderick; Prof Paul Arthur; A/Prof Jonathan McIntosh. Partner institutions: — The University of Western Australia — Murdoch University — Curtin University — Edith Cowan University — The University of Notre Dame Australia — Western Australian Museum — State Library of Western Australia

Time-layered cultural map of Australia. The University of Newcastle The Time-layered cultural map (TLCMap) of Australia is an online research platform that will deliver researcher driven national-scale infrastructure for the humanities, focused on mapping, time series, and data integration. The TLCMap will expand the use of Australian cultural and historical data for research through sharply defined and powerful discovery mechanisms, enabling researchers to visualise hidden geographic and historical patterns and trends, and to build online resources which present to a wider public the rich layers of cultural data in Australian locations. TLCMap is not a singular project or software application with a defined research outcome, but infrastructure linking geo-spatial maps of Australian cultural and historical information, adapted to time series and will be a significant contribution to humanities research in Australia. For researchers, it will transform access to data and to visualisation tools and open new perspectives on Australian culture and history. For the public, it will enable increased accessibility to historical and cultural data through visualisations made available online and in print.	Lead investigators: Em/Prof Hugh Craig Funding: $420,000 Year: 2019 Field of Research: 2103 - Historical Studies Investigators: Em/Prof Hugh Craig; Prof Deb Verhoeven; Prof Paul Arthur; Prof Andrew May; Prof Rosalind Smith; Prof Ning Gu; Em/Prof Erik Champion; A/Prof Mark Harvey; Prof Victoria Haskins; Em/Prof Lyndall Ryan. Partner institutions: — The University of Newcastle — University of Technology Sydney — Edith Cowan University — The University of Melbourne — University of South Australia — Curtin University — University of Alberta, Canada — The Australian National University
The Australian environmental and planning law library University of Technology Sydney This project aims to provide comprehensive and free access to relevant Australian Environmental and Planning legal research resources, in all Australian jurisdictions not currently available online. A subject-specific ˜Australian Environmental and Planning Law Library" will improve the ability of all researchers in the field to conduct the highest quality research. The project will build a comprehensive resource of materials including case law, legislation, Impact Statements, Planning Approvals, Plans and similar resources. Expected outcomes include support of the highest quality research relating to the array of issues arising from the protection of natural resources, the prevention of pollution, and the planning of urban development and infrastructure. This database will support the development of improved public policy and better outcomes for the natural and built environments.	Lead investigators: Prof Andrew Mowbray Funding: $515,000 Year: 2019 Field of Research: 1801 – Law Investigators: Prof Donald Anton; Prof Rosemary Rayfuse; Prof Andrew Mowbray; Prof Rosemary Lyster; Prof Jacqueline Peel; Prof Nicole Gurran; Prof Paul Martin; Prof Benjamin Richardson; Prof Lee Godden; A/Prof Philip Chung; Dr Justine Bell-James; Prof Jan McDonald; Prof Alexander Gardner; Dr Julia Dehm; Mr Brendan Grigg. Partner institutions: — University of Technology Sydney — The University of New South Wales — The University of Sydney — The University of Melbourne — University of Tasmania — The University of Western Australia — The University of New England — Griffith University — The University of Queensland — La Trobe University — Flinders University
iHUB: a smart urban research-synthesis-engagement platform for decision making Swinburne University of Technology This project aims to establish the first phase of a nationally networked research collaboration to support smarter urban planning, design and management. The iHUB facility will provide an integrated digital infrastructure platform for built environment research, synthesis and engagement targeting a wide range of city stakeholders and end-users previously constrained by bespoke data analytics and visualisation facilities. The project will also create novel processes for government agencies, practitioners and citizens to engage in more effective	Lead investigators: Prof Dr Peter Newton Funding: $725,405 Year: 2019 Field of Research: 1205 - Urban and Regional Planning Investigators: Prof Shane Murray; Prof Andrew Rohl; A/Prof Badin Gibbes; Prof Mark Burry; Prof Hussein Dia; Prof Christopher Pettit; Prof Jurg Keller; Prof Dr Peter Newton; Prof Gregory Morrison; Dr Christian Urich; Prof Carl Grodach; Dr Xin Liu; A/Prof Matthias Haeusler; A/Prof Steven Kenway; Prof Marcus White. Partner institutions: — Swinburne University of Technology — The University of New South Wales — Monash University

decision-making in the planning, design, construction and monitoring of Australia's rapidly growing metropolitan regions, at scales ranging from cities, towns, and precincts to buildings.	— Curtin University — The University of Queensland
Creating a unique open access database on Antarctic law and governance University of Tasmania This project aims to collate, digitise and make the Bush Collection available as an online open access database and special collection at the University of Tasmania. The Bush Collection is a private, historic collection of documents from Antarctic treaty negotiations, gathered over a thirty-year period by Australian Department of Foreign Affairs lawyer, Mr William Bush. This project will make the collection publicly available for researchers by creating an online open access database that will provide a resource of primary data for Antarctic scholars. The database will facilitate a new era of research on historical and current issues in Antarctic governance within both Australian and oversees universities.	Lead investigators: Prof Marcus Haward Funding: $191,340 Year: 2018 Field of Research: 1801 - Law Investigators: Prof Shirley Scott; Prof Timothy Stephens; Prof Marcus Haward; Prof Stuart Kaye; A/Prof Jeffrey McGee. Partner institutions: — University of Tasmania — The University of Sydney — University of Wollongong — The University of New South Wales
Foundations of the common law library The University of New South Wales This project aims to build a comprehensive, historical, legal resource for the whole common law world, 1215-1914. The free access Foundations of Common Law Library will include reported cases from superior courts, and selected others, in all common law jurisdictions. Databases of other key materials such as treatises, legislation, and treaties, will also be added wherever possible. Databases of case law extracted from newspaper reports, prior to formal law reporting will be included. Citations for all documents added will expand greatly an automated international historical citator to the whole of the common law world, linking past and present.	Lead investigators: A/Prof Philip Chung Funding: $499,899 Year: 2018 Field of Research: 1801 - Law Investigators: Prof Stefan Petrow; Prof Arlie Loughnan; Prof Kit Barker; Prof Natalie Skead; Prof Bruce Kercher; A/Prof Ann Genovese; Prof Andrew Mowbray; Prof Shaunnagh Dorsett; Prof Mark Finnane; Prof Anita Stuhmcke; Prof Matthew Groves; Prof Gregory Taylor; Prof Lisa Ford; A/Prof Philip Chung; Prof Mark Lunney. Partner institutions: — The University of New South Wales — University of Technology Sydney — The University of Melbourne — The University of Sydney — The University of Queensland — The University of Adelaide — University of Tasmania — The University of Western Australia — Griffith University — The University of New England — La Trobe University
Linked semantic platforms for social and physical infrastructure and wellbeing Swinburne University of Technology This project aims to develop the next generation of decision-support tools for interdisciplinary research on critical public policy issues. This project will use linked open data, knowledge graphs and collaborations across existing research infrastructure projects. Expected outcomes include inter-operability across major social science databases and new analytical tools that will transform the research capabilities for evidence-based policy making. Outcomes are expected on sustainable built environments and transport in urban and regional communities, social care and health in the community, work and wellbeing, digital inclusion and digital health.	Lead investigators: Prof Jane Farmer Funding: $1,361,651 Year: 2018 Field of Research: 1205 - Urban and Regional Planning Investigators: Adj/Prof Timoleon Sellis; Prof Richard Sinnott; Prof Jane Farmer; Prof Penelope Schofield; Dr Steven McEachern; Prof Kerry London; Prof Catherine Bridge; Prof Susan Luckman; Prof Dr Peter Newton; Prof Maureen Dollard; Prof Julian Thomas; Prof Jago Dodson; Prof Mark Sanderson; A/Prof Peter Graham. Partner institutions: — Swinburne University of Technology — University of South Australia — RMIT University — The Australian National University — The University of Melbourne — The University of New South Wales

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Visualising venues in Australian live performance research Flinders University This project aims to construct a two- and three-dimensional visual interface and digital curatorial space, improving the existing AusStage open-access live performance database. This new interface, 'Phase 6', will create visualisation infrastructure, map relationships between Australian artists, audiences and venues, and collaborate with leading performing arts collections to foster compatible models and projects. Expected benefits are better understanding of the physical parameters of live performance and improved decision-making for metropolitan and regional communities about managing theatre sites and venues.	Lead investigators: Prof Julian Meyrick Funding: $465,000 Year: 2017 Field of Research: 1904 - Performing Arts and Creative Writing Investigators: Prof Peta Tait; Prof Maryrose Casey; A/Prof Ian Maxwell; Em/Prof Joanne Tompkins; Prof John O'Toole; Prof Rachel Fensham; Dr Jonathan W. Marshall; A/Prof Bree Hadley; Dr Glenn D'Cruz; A/Prof Gillian Arrighi; Dr Caroline Wake; Dr Margaret Hamilton; Ms Janine Barrand; Prof Julian Meyrick. Partner institutions: — Flinders University — The University of Queensland — The University of Melbourne — Monash University — Deakin University — The University of Newcastle — Edith Cowan University — Griffith University — Queensland University of Technology — The University of Sydney — The University of New South Wales — La Trobe University — University of Wollongong — Victorian Arts Centre Trust — State Theatre Company of South Australia — Performing Arts Heritage Network of Museums Australia — Association of Performing Arts Collections
Networked knowledge for repatriation communities The Australian National University This project aims to build a digital facility that supports the repatriation of Indigenous human remains. Repatriation contributes to reconciliation and Indigenous healing and wellbeing, and has been the most important agent of change in the relationship between Indigenous peoples, museums and the academy over the past 40 years. Successful repatriation requires and produces research materials diverse in type, geography and accessibility. Within an Indigenous data-governance framework, this project will gather, preserve and make accessible a critical and extensive record of repatriation information worldwide. The project is expected to support repatriation practice and scholarship and improve the opportunities of repatriation for social good.	Lead investigators: A/Prof Cressida Fforde Funding: $1,231,000 Year: 2017 Field of Research: 2102 - Curatorial and Related Studies Investigators: A/Prof Cressida Fforde; Mr Luke Trevorrow; Mr Wesley Morris; Mr Lui David; Prof Paul Tapsell; Ms Honor Keeler; Dr Michael Pickering; Prof Dr Robin Boast; Dr Charles McKeown; Prof Andreas Winkelmann; Dr Kelly Wiltshire; A/Prof Gavan McCarthy; Prof Daryle Rigney; Prof Paul Turnbull; A/Prof Steve Hemming. Partner institutions: — The Australian National University — Flinders University — The University of Melbourne — University of Tasmania — National Museum of Australia — University of Otago, NZ — Association on American Indian Affairs — University of Amsterdam, Netherlands — University of Cologne — Australian Institute of Aboriginal and Torres Strait Islander Studies — Kimberley Aboriginal Law and Culture Centre Aboriginal Corporation — Ngarrindjeri Regional Authority Inc — Gur A Baradharaw Kod Torres Strait Sea and Land Council Torres Strait Islander Corporation — Department of Communications and the Arts

Collaborative embodied movement design network Deakin University This project aims to create a national collaborative network of arts/technology researchers to study the creative potential of movement-based human computer interaction systems. Movement-based technologies such as augmented and virtual reality, haptic and robotic interfaces form the cutting edge of human computer interaction development. This project will develop new infrastructure to enable researchers to work together to improve these systems from an embodied perspective. This is expected to benefit industry, commerce, education, health care and the arts.	Lead investigators: Prof Kim Vincs Funding: $350,000 Year: 2017 Field of Research: 1904 - Performing Arts and Creative Writing Investigators: Dr Scott deLahunta; Prof Bruce Thomas; Dr John McCormick; A/Prof Adam Nash; Prof Simon Biggs; Dr Jordan Vincent; A/Prof Robert Vincs; Dr Troy Innocent; Prof Kim Vincs; Dr Keith Armstrong; Dr Petra Gemeinboeck; Prof Saeid Nahavandi; Prof Frank Vetere; Dr Tom Chandler; Prof Doug Creighton. Partner institutions: — Deakin University — The University of Melbourne — Monash University — The University of New South Wales — RMIT University — Swinburne University of Technology — University of South Australia — Queensland University of Technology
Comprehensive free access to Australian industrial and workplace law University of Technology Sydney This project aims to develop an 'Australian Industrial and Workplace Relations Law Library' on AustLII. The project will make relevant current law searchable in one location; digitise decisions contained in the major industrial law report series published since Federation; scan other key resources; add dynamic virtual databases; develop data mining tools to better recognise citation information in printed industrial law materials; and develop citation analysis, visualisation and other analytical tools for industrial and workplace law research. The project hopes to improve research in the field of Australian industrial and workforce relations system and the history and development of work in Australia, and inform policy and debate.	Lead investigators: Prof Andrew Mowbray Funding: $450,000 Year: 2017 Field of Research: 1801 - Law Investigators: Dr Michael Rawling; Prof Peter Sheldon; Dr Jillian Murray; Mr Anthony O'Donnell; Prof Andrew Mowbray; Prof Andrew Stewart; Prof Michael O'Donnell; Prof Graeme Orr; Prof Mark Bray; A/Prof Anna-Louise Chapman; Prof Shae McCrystal; A/Prof Philip Chung. Partner institutions: — University of Technology Sydney — The University of New South Wales — The University of Melbourne — The University of Sydney — The University of Adelaide — The University of Queensland — The University of Newcastle — La Trobe University
The Aboriginal History Archive Victoria University This project aims to create an online archive of records about Aboriginal self-determination, the land rights movement and Aboriginal community survival programs. The project will provide access to unavailable materials that record the perspectives and voices of Aboriginal participants in contemporary political history, including primary source material collected and donated by individuals and community-controlled organisations. The project expects to address the data gaps in Australia's historical record and improve public understanding and awareness. It will also inform educational curricula and public policy responses for the political, legal, health and social position of Australia's Indigenous communities.	Lead investigators: Prof Gary Foley Funding: $475,000 Year: 2017 Field of Research: 2103 - Historical Studies Investigators: Prof Jon Altman; Prof Nikos Papastergiadis; A/Prof Gavan McCarthy; Dr Andrew Schaap; Prof Victoria Haskins; Prof Larissa Behrendt; A/Prof Melinda Hinkson; Prof Linda Smith; Ms Margo Neale; Prof Gary Foley; Ms Libby Stewart; Prof John Maynard; Prof Anthony Birch; Prof Graham Smith; Dr Edwina Howell. Partner institutions: — Victoria University — Deakin University — The University of Newcastle — University of Technology Sydney — The University of Melbourne — Te Whare Wananga o Awanuiarangi — University of Exeter, UK — The University of Waikato — National Museum of Australia — Old Parliament House

Source: Australian Research Council, 'Grant Search' portal, https://dataportal.arc.gov.au/NCGP/Web/Grant/Grants.