



Submission to the Productivity Commission Inquiry into *Data Availability and Use* Final Report, September 2016

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1. Executive summary

Geoscience Australia (GA) is pleased to make this submission to the Productivity Commission's Inquiry into Data Availability and Use. This submission is structured in alignment with the topics of the Productivity Commission's issues paper released on 18 April 2016.

This submission provides information about key GA activities that illustrate both the challenges and opportunities in making data not only available but also discoverable and open. GA aims to make sure the data it is custodian for is available but also ensure that there is longevity of the utility of this data, through the way we store, manage and deliver data. This requires investment in both our data management and services. GA has challenges when it is using data that it isn't custodian of. This submission will highlight those challenges; in particular I draw your attention to Appendix 1, a case study on the National Flood Risk Information Project which highlights the challenges in making public funded studies available to the public.

Key Points

- GA recommends that a National Framework (or Accord) for the Procurement of Hazard Information should be developed to ensure that publicly funded data and information is procured openly to ensure communication to, and re-use by, the whole Australian community.
- A National approach to data availability and use is needed. The Productivity Commission's findings should extend to the state and territory tiers of government.
- Legislative change is needed for open file data. "Private Sector Data" about company minerals and commodities for the Australian Stock Exchange (ASX) should be open and availability using open data standards.
- There is a cost in maintaining data over time. The role of GA in maintaining Geoscience Knowledge and Capability for Australia cannot be understated.

2. Introduction

Geoscience Australia (GA) is the Australian Government's national geoscience organisation, applying geoscience to Australia's most important challenges. It is the government's technical adviser on all aspects of geoscience, and custodian of the geographical and geological data and knowledge of the nation.

The organisation is a trusted source of advice to all areas of government, industry, the academic sector, and the community based on our high quality, innovative approach to geoscience. The value of GA's products and services is determined by the benefit our stakeholders receive. This value defines the scope of our work and highlights the benefits we provide in delivering against government priorities.

We deliver a wide range of products that address important and significant national issues to assist government and the community to make informed decisions about the use of natural resources, the management of the environment, and community safety.

Through six key [strategic priority areas](#), GA provides applied research and information for the Australian community to obtain sustainable economic, social and environmental benefits.

- [Building Australia's Resource Wealth](#)
- [Ensuring Australia's Community Safety](#)
- [Securing Australia's Water Resources](#)
- [Managing Australia's Marine Jurisdictions](#)
- [Providing Fundamental Geographic Information](#)
- [Maintaining Geoscience Knowledge and Capability](#)

We apply our geoscience knowledge and capability to acquire, store and manage Australia's national fundamental geological and geographic information.

This enables Australia to make critical decisions regarding our natural resource potential and marine environment, and helps to build our resilience to natural hazards. It also ensures sustainable Australian communities by managing our precious water resources.

GA continues to actively promote Australia's mineral and energy resources to international trade partners, increasing awareness of the opportunities Australia's vast resource sector provides. Working with our government partner organisations, we have broadened our scope of work in support of Australia's efforts to reduce the impact of natural disasters in our region.

Geoscience Australia's Data Stewardship Strategy Vision

GA is custodian of the geographic and geological data and knowledge of the nation. The information garnered by GA's through its applied science programs informs Government, industry and the community decisions on the economic, social, and environmental management of the nation's natural resources. A primary goal of GA's is, therefore, to ensure data is enduring, authoritative and the useability of our datasets has longevity. This places the management of data assets at the core of GA's business. In order to maintain its reputation as the custodian of geographic and geological data and knowledge, it is imperative that GA's data stewardship practices maximise online discovery, access, sharing, interoperability, transparency and use of GA's science data.

The value of good data stewardship to the GA is high. There is also value to internal stakeholders by providing efficiency and ease of use of systems and processes. Methods of implementation have advanced significantly and moving GA towards more up to date systems, processes and tools enable analysis of data that is evolving rapidly and increasing in complexity. The *Data Stewardship Strategy* will define a path forward for GA to provide efficiency, transparency, trusted products and to make it easier to perform reputable science.

Geoscience Australia's Science principles

In 2013, GA adopted six *Science Principles* upon which it bases its science activities. Each of these *Science Principles* have major implications on the way we do data stewardship. In order to enable these Science Principles traditional data stewardship principles of data being authoritative, trusted, compliant and governed must now consider as a major part of them discoverability and usability. This will ensure that we can maximise the impact and value from our data by supporting existing human readable interfaces but also enabling machine to machine interactions. This will support all datasets used and produced from our science to be discoverable and usable in alignment with our Science Principles.

The GA *Science Principles* are:

1. Relevance to Government;
2. Collaborative science;
3. Quality science;
4. Transparent science;
5. Communicated science; and
6. Sustained science capability.

Geoscience Australia's Data stewardship principles

GA's data stewardship practices are a central element of its business and explicitly support its science activities. This includes practices that help to embed the *Science Principles* underpinning GA's science activities into the agency's business as usual operations.

Further, GA's data stewardship practices directly contribute to the meaningful use of GA data in delivering government defined outcomes and policies. This includes meeting *Australian Government Principles on Open Public Sector Information*, and *Declaration of Open Government*. In this context, data stewardship in GA is based on the following principles:

1. **Strategic alignment:** ensuring that all of GA's information, data products, services, data collection and management activities are aligned with government and agency priorities.
2. **Authoritative and trusted:** ensuring that GA's data stewardship practices are designed to give confidence in the quality of our data, products and services.
3. **Deliver value:** the goal of the Agency's data stewardship practices is to enhance the long term value of its data assets ensuring that it is reusable and have the ability to be repurposed long after it was created.
4. **Discoverable and useable:** In line with the Australian Government Principles on Open Public Sector Information is that the GA's data and information products are openly and freely available. Data stewardship practices at the Agency are designed to enhance discoverability and accessibility of our data.
5. **Robust management and governance:** ensuring appropriate data management practices are used across the agency as well as implementing systems and tools to support this function.
6. **Leadership and compliance:** effective data stewardship requires support from management and executive staff. In addition, collaboration on data stewardship practices internally as well as across other government agencies builds a body of knowledge of effective data stewardship practices.

3. Responses to Questions on high-value public sector data

Examples of High-value public sector datasets

GA is custodian of the geographic and geological data and knowledge of the nation. Many of the data sets that it is custodian for are examples of high value datasets.

Positioning data from the national positioning infrastructure underpins all spatially referenced data in Australia and consequently should be considered a high-value dataset. GA has worked closely with ANZLIC through the Foundation Spatial Data Framework (FSDF) to define a common view across governments in Australia and New Zealand on what foundation spatial data is and how it should be made available to users. Please see ANZLIC's separate submission to this Inquiry for more information on FSDF.

High value public sector environmental, geophysical and geological datasets include:

- Earth observation satellites
- Lidar (*for elevation*)
- Geophysics e.g. seismics, gravity, magnetics, radiometrics, magnetotellurics, electromagnetics, resistivity (*physical properties of the solid Earth*)
- Geological observations e.g. photos, field note books (*lithology and structure*)
- Rock samples, drill cores, sea bed cores, sediment samples and analytical data (*grain size, mineralogy, geochemistry*)
- Groundwater samples (water salinity, water chemistry)
- Seabed bathymetry and acoustic backscatter (*seafloor topography and hardness*)
- Sub-bottom profiles (*shallow sub-surface geology*)
- Side-scan sonar (*seafloor topography*)
- Underwater video and photography (*seafloor characteristics, sedimentology and biology*)
- Oceanographic observations (*currents, tides, water chemistry*)
- Biological information (*species, presence / absence, communities*)

Additional examples of high value data include derived datasets from earth observation and geoscience studies and scientific modelling, including mapping and modelling how natural hazards have impact on the safety and livelihood of our cities and communities; mapping and modelling mineral, energy and water resource prospectively across the nation; mapping and modelling environmental impacts and climate change.

Characteristics of high-value data - High-value dataset framework.

Broadly speaking, key factors in determining high-value datasets include:

1. **The economic, social and environmental value that accrues from the exploitation of the data.** This should factor in current exploitation, but also take into account potential future exploitation once relevant technical barriers are overcome. Such studies can also help inform prioritisation of data stewardship activities, and identify opportunities for commercial providers to enter the market.
2. **Replaceability of data.** If a data loss occurred, would it be possible to capture new data that would offer the same value? For example, environmental processes must be monitored over time, so a loss of time series data (or a failure to capture it) is critical.
3. **Substitutability of data.** Specifically, is it possible to use another source of data to be able to answer the same question to the required level of certainty?

Benefits from increasing the availability and use of public sector data

The following benefits are realised by the work that GA does including making our data available for use by the public sector:

- Building Australia's Resource Wealth by maximising the benefits for Australia's minerals and energy resources, now and into the future.
- Ensuring Australia's Community Safety by making Australian communities more resilient to natural hazards.
- Securing Australia's Water Resources by optimising and sustaining the use of Australia's water resources.
- Providing Fundamental Geographic Information to understand the location and timing of processes, activities and changes across Australia to inform decision-making for both natural and built environments.
- Maintaining an enduring and accessible knowledge base and capability to ensure evidence-based policy and decision making by government, industry and the community. Maximise the value of public sector information by creating opportunities for innovative use and reuse of data.

4. Responses to Questions on the collection and release of public sector data

GA is committed to making its data *available*. The agency has made great progress in recent years, with many datasets not just *discoverable* but now available for direct download. However, further investment is required to ensure that:

- All critical observational data is being **sustainably captured**; and
- That data is then **discoverable and usable**.

In relation to the first point, efforts to date have focussed on ensuring *existing* data is accessible. However, in some cases there are critical challenges in:

1. Appropriate **planning** regimes not being established to ensure there is a clear picture of what data *should* be available to ensure the nation has access to the type of integrate picture of Earth, and how it is changing, that it requires. This is critical in terms of observational data where investments in observatories, or in partnerships with international satellite operators, are costly and have long lead times.
2. There are **gaps** in the observing system with no clear plan on how to address them. Although in the realm of satellite data this has improved in recent years for certain key data sets, there are still critical datasets for both operational and research purposes of national significance where there are no arrangements in place for data collection.
3. A lack of a clear plan for **sustaining** the observing system, and curating the acquired datasets. This may be a result of a lack of ongoing operational funding for facilities constructed using 'one off funding', the fact that the facilities are maintained by 'research' rather than operational agencies, or a result of equipment lifecycles that necessitate capital investment in replacement facilities. Subject matter expertise is also critical, and best maintained centrally, as it is not possible for a user seeking to apply multiple datasets to be subject matter experts in each of them.

The Australian Government Earth Observations from Space Working Group has made significant progress in terms of (1), establishing a process to undertaken regular reviews of observational requirements for satellite data. However, a more holistic approach inclusive of non-satellite observational data is required.

In relation to (2) and (3), further investment is required to establish the necessary facilities, assure security of funding, and establish the necessary international partnerships, as appropriate.

It is important to note, also, that where users are 'unsure' that a particular type of observational data will not be available to them on a sustained basis they are much less likely to invest in the development of products and services that could exploit that data stream. This nasty 'chicken and egg' issue is a significant factor in the lack of commercial uptake of Earth observation data worldwide, although recent steps to establish long-term operational programmes, like Europe's *Copernicus*, show much promise.

In relation to the point on ensuring data is *actionable*, efforts to ensure satellite Earth observations play their role in supporting implementation of the big global agendas, and in supporting a high-growth

global satellite applications market, are currently held back by ground systems that are not up to the job. These limitations also hold back data uptake within governments.

Traditional approaches, with a focus only on enabling users to better discover and download discrete datasets, leave technical barriers too high and leave too much satellite Earth observation data unused. These burdens are particularly high for small-medium enterprises, non-government organisations, and for less developed countries. Moreover, these approaches tend to promote 'mission lock in' where a highly stove-piped processing pipeline is established, making a user more vulnerable to the failure of a particular satellite, and preventing them from taking full advantage of all available data sources.

An example of the type of solution that should be adopted to 'unlock' these datasets is the Australian Geoscience Data Cube (the Data Cube) initiative delivered by GA.

The Data Cube unlocks vast amounts of satellite data to produce new information for decision makers. This is possible through careful pre-processing of the satellite images so that each image pixel is a measurement. The images are also re-organised to allow efficient analysis, especially to detect changes through time. The Data Cube operates on the super-computer at the National Computational Infrastructure (NCI) facility at the Australian National University. This means the issue of 'how much data can I process' is effectively eliminated.

The Data Cube allows scientists from GA, the CSIRO, the NCI and other collaborators to analyse satellite image data vastly more quickly and efficiently than previously possible. Tasks that would otherwise take years of effort can be completed in hours or minutes, producing new information products for use in government, industry and the community.

GA is now working to secure the required funding to take the Data Cube, which is at present a prototype capability, and turn it into an *operational data infrastructure*.

This operational system will be a shared big-data analysis capability that will enable the Australia Government to measure and detect changes in every 10x10 metre square of our landscape, with new data available for every part of our country every week. It will be built and operated by GA and its partners, but used across the Australian Government to transform how it does business. This will have spin-off benefits also for states/territories, industry, the research sector and our regional partners who may otherwise struggle to deal with these volumes of data.

This model, which leverages investments in national research infrastructure to solve problems for governments and researchers that would otherwise be out of the reach of individual actors, while also providing opportunities for commercial cloud infrastructures to support private sector exploitation, has great potential to be extended to other non-satellite datasets.

In taking this next step, it is critical to recognise that most real world problems require integration of multiple datasets, and require collaboration between stakeholders from different sectors, and involvement of experts from different domains. Infrastructures need to recognise the need for solutions that bring users from different domains together to collaborate, vs current approaches which tend to isolate users who go off into their own systems. The Data Cube, for example, makes multiple different types of data available within a common analytical framework, on a platform to which many different user groups have access.

Moreover, the underpinning Data Cube software has been released and made available as open source. It is now being used in the United Kingdom, United States and France. International fora of space agencies are now discussing how to create an international network of compatible systems that will enable collaboration not just at a national scale on national problems, but at regional and global

scale to tackle the big challenges. This approach also enables players from different countries to contribute and share code, ultimately lowering the cost for the Australian taxpayer in developing and maintaining the platform for local needs.

Other topics that require specific attention if Australia is to take the next-step forward include:

- **Re-invigorating efforts to streamline data licensing.** A significant overhead for projects is the need to reconcile different licenses, even where all licenses are 'open'. This can consume significant resources, makes projects less viable and therefore less likely to proceed and/or result in fewer relevant datasets being applied to a particular challenge. Further effort is required to:
 - Increase convergence on a (subset) of available licenses
 - Establish formal machine-readable mappings between licenses
- **Ensuring that data quality is systematically and rigorously assessed by custodians, not just documented and communicated.** This means that appropriate resources and processes must be in place, and they must happen in a quality assurance framework that ensures quality assessments of discrete products can be compared, e.g. through traceability to fiducial reference standards. Although *some* datasets are actively maintained, with ongoing quantitative assessment of the data quality produced and published, this is the exception. In many cases, quality statements are in effect time capsules that advise '*caveat emptor*'. This pushes work downstream where:
 - It is then undertaken multiple times, which is inefficient;
 - Someone other than the custodian, who is best positioned to quantify quality issues and uncertainties, is required to undertake the assessment.

More generally, in terms of criteria that should be applied when determining what data to make publicly available and how much processing to undertake before it is released:

- The default position should be to publish all data, unless there is a compelling privacy, commercial sensitivity or national security reason not.
- In terms of processing, the notes above about methodologies for evaluating current and projected future downstream value can provide a critical input for such decision-making.

What are the main factors currently stopping government agencies from making their data available?

There are a number of barriers making it difficult to make public data available. These are outlined below. Innovation and common platforms across both the government and research sectors are needed to improve this situation, for example leveraging the growing cloud infrastructures and/or public data platforms such as NERDIP described in the National Computational Infrastructure's submission to this inquiry.

Licensing and cost recovery

Current procurement practises across all levels of government are resulting in publicly funded data and information products being "locked up" under erroneous copyright and restrictive licensing arrangements. In addition, these valuable information resources are then being stored in repositories with either no access or restricted access for the public.

Aggregation of Commonwealth and State/Territory data is often inhibited by State/Territory licensing and cost recovery policies.

Resourcing

Often datasets and their metadata are in poor condition and no provision for data management is included in data collection programs. Curation and compilation are additional activities. For example GA does general lab geochemistry very well, but for isotopic geochemistry there is an extra layer of interpretation, and hence additional resources are needed before the broader community can make use of the data.

There is often an assumption that data stewardship will just happen in both research and government. Often new data platforms need to be built and hardware needs to be bought to store and deliver new types of data. Careful consideration of the costs of ongoing data stewardship should be included when government funds research and data collection through mechanisms such as the National Collaborative Research Infrastructure Strategy (NCRIS).

How could governments use their own data collections more efficiently and effectively?

At GA through our data stewardship principles we use our own data efficiently and effectively. However there needs to be better alignment of these data stewardship principles across government.

Should the collection, sharing and release of public sector data be standardised? What would the benefits and costs of standardising be? What would standards that are 'fit for purpose' look like?

The collection, sharing and release of public sector data should be standardised. All data provided by GA meets international metadata standards and enables the rapid flow of information. However GA has a number of recommendations in this area:

1. GA recommends the establishment of a National Framework (or Accord) for the Procurement of Hazard Information involving all levels of government, to ensure publicly funded data and information is procured openly to ensure its availability to the public.
2. Standards on spatial data should be clear with respect to reference coordinate frameworks (metadata) to ensure compatibility with current and emerging satellite positioning technology.
3. GA recommends the continuation and expansion of the role of the Australian Governments' Open Access and Licencing (AusGOAL) Program in assisting jurisdictions procure publicly funded data and information openly, and further assist these jurisdictions open up existing data for re-use by the community.

What specific government initiatives (whether Australian Government, state, territory or local government, or overseas jurisdictions) have been particularly effective in improving data access and use?

For more than 50 years mineral and energy data and information collected in Australia have been readily available for any company or individual to use. This philosophy of freely available data is a deliberate strategy to assist in attracting exploration investment to enable the discovery of additional resources. It is one of Australia's competitive advantages in a highly competitive global resources market. Moreover, this strategy sets Australia apart from some of its competitors for highly mobile capital and investment, and is commensurate with Australia's position as a global energy exporter.

Freely available data ensures efficiencies in the acquisition of new data as explorers are able to build on the cumulative benefit of previously acquired data. Pre-competitive data is acquired for the purpose of reducing risk to industry so is made publically available as soon as practicable.

More recently the following government initiatives are just 2 examples that GA has been involved in or taken advantage of have been effective in improving data access and use in areas beyond precompetitive data:

1. The Australian Governments' Open Access and Licencing (AusGOAL) Program is assisting jurisdictions procure publicly funded data and information openly.
2. The NCRIS AuScope program was an important initiative which improved the sharing of Global Navigation Satellite System (GNSS) data between the Commonwealth, State and Territory governments and the research sector.

5. Responses to Questions on data linkage

Which datasets, if linked or coordinated across public sector agencies, would be of high value to the community, and how would they be used?

As noted above, in the previous section, all fundamental environmental observation datasets are of inherently high value to the community. Fortunately, a framework (through the Australian Government's Environmental Information Advisory Group) is in place to help coordinate and link efforts to increase access to this data. The ongoing work of this group should be supported, and implementation of its recommendations made a priority for agencies.

Being able to quantitatively understand the environment, and how it is changing over time, is only becoming more important; quantitative science is a key tool in resolving contentious debates about what we should do and how we should do it across all sectors of the economy.

Which rules, regulations or policies create unnecessary or excessive barriers to linking datasets?

Duplication of data between Federal and the State and Territory authorities is a significant issue in terms of authoritativeness (i.e., single source of truth) and data storage inefficiencies. This causes uncertainty for all stakeholders in terms of making informed decisions that affect their business, including management and regulation of the resources sector by Government. For example for mineral and energy resource information both GA and the state and territory geological surveys have holdings of the same datasets.

How can Australia's government agencies improve their sharing and linking of public sector data? What lessons or examples from overseas should be considered?

GA is working closely with their international counterparts through organisations such as the Research Data Alliance (RDA), Open Geospatial Consortium (OGC), the European Geophysical Union (EGU) and the American Geophysical Union (AGU) to ensure we are using international standards for data sharing. GA has active participation in National and International standards working groups on data standards, Linked Data and Provenance.

6. Responses to Questions on High value, private sector data

What private sector datasets should be considered high-value data to: public policy; researchers and academics; other private sector entities; or the broader community?

In each case cited, what characteristics define such datasets?

Insurance Data

The Insurance Industry holds vast archives of claims data for natural hazard events. Access to these data would enable researchers in both government and industry to develop more robust mitigation options, increasing community resilience to these hazards.

This dataset would hold information on damage sustained by a property during a natural hazard event resulting in an insurance claim. The information obtained and held the Insurance Industry varies between hazards but would include inter alia; location information, property type, details of damage to property and contents, insured value of property and contents and an assessment of damage cost to property.

Earth Observation Data

A range of commercial Earth observation datasets are available for purchase, with significant and ongoing investments in improvements in terms of data quality and availability. This is driven both by technological advances (e.g. in sensor design) but also as a result of new players entering the market as a result of new business models such as that of PlanetLabs and SkyBox.

However, the business models of many providers have made it more challenging for government agencies to actually integrate this data into their business processes. This is the case even where it may add significant value. Historic approaches, based on buying individual satellite images, which are then delivered on disk and require time-consuming one-off processing, do not fit well into the majority of government applications where the focus is on consistent and routine national monitoring and mapping, and where operational processing chains need to be established.

Government agencies require access to a marketplace of commercial datasets that can be easily used to augment the core public good datasets that underpin their products. For example, Geoscience Australia makes extensive use of public-good data from Landsat satellites to monitor the environment. This dataset typically provides fit-for-purpose data quality. However, in some cases it would be ideal to be able to integrate higher-resolution commercial data for specific purposes (e.g. to better characterise a specific change in the landscape). At the moment integrating one-off datasets into supply chains is difficult, as the data is not available through any sort of standards-based services-based interface.

Geoscience Australia is, however, pleased to note that key commercial providers are now changing business models and systems to make it easier to integrate commercial datasets into existing supply chains, for example by 'renting pixels' through a services interface.

Offshore Marine Data

The offshore petroleum industry acquires marine data to fulfil legislative requirements under the Environment Protection and Biodiversity Conservation (EPBC) and Offshore Petroleum and Greenhouse Gas Storage Acts (OPGGSA). Many of the datasets are of very high value, not only because they are expensive to acquire, but also, because there is sparse data available particularly in the offshore marine jurisdiction. Every small piece of data from every source helps to fill a gap in our knowledge – providing better understanding of our marine environments for safety of life at sea, and for environmental management of Australia's Exclusive Economic Zone (EEZ).

The key datasets acquired by the industry that are of high value for public good include environmental and geotechnical datasets such as:

- Seabed bathymetry (and acoustic backscatter)
- Sub-bottom profiles
- Side-scan sonar
- Underwater video and photography
- Seabed cores, sediment samples and analytical data (grain size, mineralogy, geochemistry)
- Oceanographic observations (currents, tides, water chemistry)
- Biological information (analysed / catalogued samples)

Mineral and Energy Company Exploration and Production Data

The mining and exploration industry collects a wealth of high-value datasets during both their exploration and production (mining). These have high-value due to the costs and in the case of production and mining data it is impossible to collect them again after the resource has been depleted. These datasets have high value for earth observation but also to understand the resource wealth of Australia, what has already been depleted and what are the estimates of what remains. Whilst some of this data has to be made available due to ASX reporting requirements and some state and territory mining legislations, there needs to be consistency across the jurisdictions. In addition if a company is a private or foreign company then they have no obligation to report under ASX requirements. Government intervention is needed to be able to collect production and mining information about these companies.

Research Data

There is a wealth of data collected about the Earth through research programs around Australia, for example geological observations and geophysical datasets. These datasets are of high-value due to the acquisition costs and difficulties in acquiring these datasets due to location eg. Antarctica.

What would be the public policy rationale for any associated government intervention?

One very clear public policy rationale for government intervention would be simply community safety through increasing community resilience to the impacts of natural disasters in a changing climate.

In the case of private and research earth observation data including geological and geophysical datasets, these datasets would add to public data to lower the barriers including cost of exploration for minerals and resources which ultimately will increase investment in Australia.

What benefits would the community derive from increasing the availability and use of private sector data?

The benefits of making private sector Geoscientific and Geospatial data available are the same as for those for making public sector data more available and were outlined above in the public data section of this submission.

If private sector geoscientific and geospatial data is made available then it will add to fill the gaps and resolution in the earth observation data to improve our understanding of earth processes. This will lead to (as examples):

- increased community resilience to the impacts of natural disasters in a changing climate.
- Improved satellite positioning and weather forecasting.
- Building Australia's resource worth.

Summarised in the table below are a list of government and non-government functions where these datasets can contribute to improved outcomes.

Area Benefited	Description	Outcome
Pre-competitive assessments	Improved data for pre-competitive industry assessments	- Identification of potential risks and hazards and environmental issues prior to lodging a bid
Emergency Response	Additional data for emergency response modelling (such as spill models)	- Baseline data for emergency response planning and review - Baseline data to assess impacts
Hazard Reduction / Risk Assessment	Additional data for hazard reduction / risk assessment → improved risk assessment	- Reduced risk - Improved options to minimise risks - Better plans to respond to potential risks
Knowledge Gaps	Single location of data provides review potential to Identify knowledge gaps	- Identify and prioritise marine science programs
Cumulative Impact Assessment	Recording environmental condition on a regional scale	- Identify and better model potential impacts of cumulative projects
Monitoring	Long-term collection of data with baseline data for independent post-activity change detection and environmental monitoring	- Improved ability to identify changes and assess impact on local and regional area - Improved management decisions based on better data and predictions
State of Environment Reporting	Improved baseline and trend data for state of environment reporting	- More detailed reporting for offshore areas and better informed environmental management
MPA Management and Review	Improved scientific data to contribute to MPA's baselines and for future reviews of zoning.	- Pre and post MPA implementation comparisons - Better knowledge of the regional significance of biota/habitats
New science	Improved data accessibility	- Access new datasets for biodiversity and ecosystems characterisations and modelling - Re-use of data in new types of applications

7. Responses to Questions on access to private sector data

Are there any legislative or other impediments that may be unnecessarily restricting the availability and use of private sector data? Should these impediments be reduced or removed?

What principles, protocols or legislative requirements could manage the concerns of private sector data owners about increasing the availability of their data?

Should the collection, sharing and release of private sector data be standardised in some way? How could this be done and what would be the benefits and costs? What would standards that are 'fit for purpose' look like?

What role can governments usefully play in promoting the wider availability of private datasets that have the potential to deliver substantial spillover benefits?

How can the sharing and linking of private sector data be improved in Australia? What lessons or examples from overseas should be considered?

The primary legislative restriction on access to private sector Earth observation data is the national security restrictions that are placed on the satellite operators by the governments in the countries in which they operate. These restrictions are reasonable and have not been shown to have any material impact on availability of data for civilian use. Beyond this, a set of principles adopted through the United Nations state that all Earth observation data collected over a nation should be available to that nation at 'reasonable cost'.

Where governments do purchase private datasets, every effort should be made to secure 'whole of government' or, preferably, 'open access' licenses on behalf of the community. This may require additional investment beyond what an individual agency may pay for access to data only for their own purpose. GA, through a cooperative procurement panel called OGRE, showed the potential value of this approach but was unable to sustain it due to a lack of co-investment from other relevant agencies due to competing priorities.

Marine data collected by the offshore petroleum industry is varied and important. Of the data acquired, only exploration seismic data, well logs and biological samples are required to be submitted to GA and museums respectively. The majority of other marine data types are retained by individual companies

or their contractors. As a consequence, the data are not available to contribute to the national marine environmental knowledge base.

In 2009 the Productivity Commission recommended that all environmental data collected by industry relating to Commonwealth, coastal and inland waters reside with a central agency, GA (GA). (Review of Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector, Recommendations 6.1 and 6.3, 2009).

Centralised management and accessibility of marine environmental data would provide benefits to the offshore oil and gas industry and the Australian Government through access to consistent, robust environmental data at the regional and national-scale to:

- support evidence-based decision making;
- streamline management, delivery and analysis of environmental data;
- improve consistency and transparency between government, industry and the public;
- enhance the national marine information base; and
- reduce the regulatory burden on industry and government through open access to a common set of marine environmental data.

GA strongly supports the 2009 Productivity Commissions recommendation (6.1), and additionally notes that facilitating public access to this data, will support industries social licence to operate.

The availability of, and access to, geophysical and geological data acquired under the range of Australia's onshore and offshore petroleum exploration legislation is defined in regulations. Statistical data such as reserves and resources is dealt with by a blanket confidentiality provision.

The main barrier is the inability of regulators to see past the confidentiality provisions of their regulations and to see how their data could be used to assist Government and others, but still protect the data from individual sources. Regulators are not trained to be data managers, but in essence, we expect them to undertake the role and to understand how the data could be used by others.

Additional distortions to the data management framework occur as a result of loop-holes in the legislation that allow deliberate commercial decisions by the private sector to be made in response to adverse market conditions, which result in inequitable data access outcomes for all stakeholders. For example, petroleum companies undertaking non-exclusive data acquisition to meet regulatory requirements and minimise exploration expenditure instead of more expensive exclusive data acquisition that attract significantly shorter confidentiality periods.

8. Responses to Questions on resource costs of access

There are costs associated with not only making data available but also for maintaining data over time. This is one of GA's strategic priorities: ***Maintaining Geoscience Knowledge and Capability***. To maintain an enduring and accessible knowledge base and capability to enable evidence-based policy and decision-making by government, industry and the community. Maximise the value of public sector information by creating opportunities for innovative use and reuse of data.

It should be noted that this strategic priority is for not only maintaining knowledge but also capability. GA is working on a Digital Science Strategy to ensure that the agency can embrace Digital Science with the right mix of skills in Science, Technology, Engineering and Mathematics (STEM), a new agile way of working and with the right quantitative science platforms.

Cost recovery for GA data and products has been debated for some time. The Department of Finance undertook a strategic review of GA in 2011¹. A key issue explored in the review was 'whether the agency should be seeking to recover more of its cost, particularly from commercial users of GA information.' The review notes that this issue has been debated many times over past decades. Its findings were specific to GA, but are relevant to the more general issue.

The review noted, in particular, that "Pricing may also cause an efficiency loss where it causes underutilisation of a product or service" and that "An increasingly relevant consideration for public sector information is the difficulty in anticipating all possible applications of that information and therefore the value being sacrificed by restricting its usage."

Extract from the Strategic Review of GA, May 2011.

Chapter 5: Financial sustainability, page 94.

46. Limiting access through pricing can create dynamic efficiency losses by choking off innovation and discouraging the discovery of new ways of applying and combining public sector information. This appears to be a particularly relevant consideration for spatial data due to its pervasiveness across many social and economic policy applications. For example:

- aero-electromagnetic survey information originally compiled by GA over many years to assist onshore resource development planning is finding increasing application in groundwater and salinity definition and management;
- archives of satellite imagery originally aimed at identifying surface mineral deposits are now useful for time-series analysis of land clearing and land degradation; and
- information from offshore seismic surveys aimed at identifying geological features favourable to petroleum reserves are now being used to identify potential carbon dioxide stores and to assist protection of marine biodiversity.

¹ <https://www.finance.gov.au/publications/strategic-reviews/geoscience.html>

Example for Environmental Data

An excellent example of this relates to the Landsat programme. When the US government charged for Landsat only a few thousands scenes from each billion-dollar satellite were downloaded per year. As a result in the change of policy, over five million scenes are now downloaded per year. A 2014 study found that ““The economic value of just one year of Landsat data far exceeds the multi-year total cost of building, launching, and managing Landsat satellites and sensors.” This value is only being delivered now because of a change in data policy.

The European Commission has adopted a similar full, free and open data policy for their 8 billion Euro Copernicus programme on the basis that such a policy will create many more jobs (in the tens of thousands), and much more economic activity in downstream sectors, than any sort of charging-based model would have provided.

The review concluded that “Limiting access through pricing can create dynamic efficiency losses by choking off innovation and discouraging the discovery of new ways of applying and combining public sector information. This appears to be a particularly relevant consideration for spatial data due to its pervasiveness across many social and economic policy applications.”

GA’s approach is to provide ‘basic information products’, which are in effect those of a pre-competitive nature (i.e. useful for many different purposes and not of value only or overwhelmingly to a specific person or company due to for example customisation or geographical coverage), should be made available on a full, free and open basis in line with these findings. This approach is consistent with government policies, and would ideally be applied across all pre-competitive datasets produced by governments.

Two specific points should be raised in relation to Earth observation and environmental datasets.

- Firstly, the question of how effectively regulatory approaches balance environmental protection against efficiency of resource exploitation is the subject of much debate. Any approach which resulted in a lack of equity in access to independent, comprehensive, government-produced environmental information (e.g. by restricting access only to those who can pay, which are typically private sector companies), will tend to create a less certain investment environment and more social discord, at the same time. This is not in the national interest. An accessible baseline of pre-competitive ‘basic information products’, which are trusted by all sides of the debate as providing a comprehensive picture of the ‘state of the environment’ and how is it being impacted by policy settings, is critical in addressing this challenge.
- Secondly, much of the environmental and observational data that is redistributed by the Australian Government, or used the primary input to its derived products, is provided for free. For example, much satellite data from foreign governments is provided to Australian users under full, free and open licenses. It is important to support this policy in our treatment of the data, particularly within government programmes, otherwise we create the risk that partners may change their policies. If this were to occur in the case of satellite data, the cost to replace that data through sovereign capability or through commercial purchase, would be many billions of dollars per year.

As a corollary to the above, governments are also a major funders of activities (both in the research and private sector) that create data. Governments should do whatever possible to ensure that such data is available on as full, free and open basis as possible consistent with the above. This does not

always occur, with the issue sometimes being ignorance of officials on what the implications are of the licensing agreements they sign with subcontractors.

Example for Exploration Data

Freely available geophysical and geological data is a cornerstone of Australia's exploration investment attraction strategy, and has been so for more than 50 years.

GA is financially supported to ensure that the data are readily and easily available, and every effort is made to ensure that the data are available over the internet at no cost. However, some of the datasets are very large (multi-terabytes to petabytes) and cannot be easily transferred or manipulated using the internet. In these instances GA needs to deliver the data on a physical medium. For this we charge the client the cost of transfer only. The private sector is moving away from physical media for large data transfer and processing, given the exponential increase in data volumes and security implications. Use of the data holdings would be improved through access to the latest technology, hardware and software. National investment in data transfer infrastructure, linking High Performance Computing nodes, across Australia should be a national priority to gain the maximum benefits from using such vast digital data (e.g., a private sector equivalent of AARNET).

9. Responses to Questions on other Restrictions

By the very nature of legislation regulators, are only required to consider their own “patch”, however, there is no collective oversight that considers the implications of the myriad overlapping pieces of legislation and the impact this has on both the private sector and Government, or the opportunities for Government in being able to use the data for other purposes. Too much legislation is covered by the principle of “data can only be used for the purposes for which it is collected”. Often the private sector is required to report similar data to different regulators under different legislation.

There is an opportunity to thoroughly review of all reporting requirements within the resources sector to introduce efficiencies in reporting where a single report to a single government agency could satisfy multiple regulatory requirements across multiple agencies.

10. Responses to Questions on data security

Clear data security and data sharing principles need to be established to enable the appropriate flow of data within Government and to enable the release of agreed data to the public.

However GA believes that security policies are not prima facie the issue. The key challenge is in implementing systems in such a way that they comply with the policies **and** still make it easy to publish data.

11. Geoscience Australia portfolio example

Case study – the National Flood Risk Information Project

Case study – the National Flood Risk Information Project

OVERVIEW

In the past 5 to 10 years, Australian governments have spent in excess of \$150 million procuring flood studies. Flood studies are critical instruments to support management of flood hazard and risk, generally procured by government and prepared by consulting engineers. The Australian Governments, under COAG, determined that these studies should be publicly available, to enable the community to engage with and manage its flood risk. In 2012, the Australian Government provided funding for the Australian Flood Resource Information Portal (the Portal), which will enable anyone to search for and access flood studies from around Australia. To date, GA has compiled over 1000 such studies, and there are more to be added.

However, there are two problems that face the Australian Governments in this endeavour. Firstly, none of the studies can be reused by the community because they contain an “all rights reserved” copyright restriction. This means that they cannot generally be reproduced or reused by the community without the express permission of the rights holders.

Secondly, the entity expressed to be the holder of the copyright on the studies is generally not the true copyright holder. This arises primarily from inconsistent procurement practices and failure to monitor compliance with flood study procurement agreements.

Together, these problems render the flood studies unusable by the community, defeating the purpose of the Portal, and undermining COAG’s intention.

This case study discusses a solution to enable publication and reuse of the current studies, and it also makes recommendations to avoid this problem recurring for future studies. Unless these issues are addressed proactively and cooperatively by all stakeholders, they will recur. The case study recommends ways to resolve the correct ownership of current flood studies and their licensing under the Creative Commons Attribution 4.0 Licence. It also proposes a national framework for procurement of future studies that will enable them to be reused by the community under the same licence.

The solution also provides added benefits (Attachment A). It will enable greater efficiencies in government procurement of (flood) information, saving taxpayer funds. It will enable the flood and water engineering community to provide services more efficiently to government and to their private clients. It will enable materials purchased and used once, to be reused infinitely, by anyone. Information is valuable because, unlike many commodities, it can be used more than once. Public information and its management are central to innovation. This case study presents a unique perspective on an open-access public/private business model that is supportive of the innovation agenda.

Key Points

- Publicly funded flood studies, costing Australians in excess of \$150 million in the past 5-10 years, are not accessible or reusable by the public. This paper proposes solutions to enable the community to reuse and access these flood studies.
- Implementing a Creative Commons Licence will fix the problem and facilitate more efficient and innovative reuse of these studies, ultimately benefiting government and the wider economy.
- The methods and solutions discussed in this paper could (and should) be applied to all forms of information and data procurement by government, including other hazard information.

CONTEXT

Copyright is a significant inhibitor to reuse. Copyright was intended to ensure that rights holders had the ability to exploit their material, to the exclusion of all others, generally for commercial gain. This incentivised creators to continue to create new works. However, the application of copyright restrictions by government has been misplaced for many years. Governments should, and do publish their material for the community to reuse. The material government produces was funded by the taxpayer. Increasingly Australian governments are adopting open access initiatives to correct this imbalance. Much work has been done, for example, to modify government intellectual property policies so as to remove all rights reserved crown copyright restrictions from government websites and material. Over the past few years 'open data' has also become a feature discourse both politically, and bureaucratically, however, this has not yet lead to changes in procurements practices to ensure data is publicly available.

BACKGROUND

In response to the widespread flooding in 2011, the impact of floods on Australian communities was the subject of the National Disaster Insurance Review. The review highlighted the need for consumers to be more aware of the risk they may face from natural disasters. In response to the recommendations of the review, the COAG Standing Committee on Police and Emergency Management determined that a four year programme to improve the quality, availability and accessibility of flood information across Australia should be undertaken. In July 2012, GA initiated the National Risk Information Project (NFRIP) to meet this objective and is comprised of three core activities;

- Water Observations from Space – analysis of the GA's historic archive of satellite imagery to derive water observations to help understand where flooding may have occurred in the past in areas of Australia not covered by a flood study.
- Australian Rainfall and Runoff – improving the quality of future flood information by completing the revision of the Australian Rainfall and Runoff – a series of national guidelines and datasets fundamental for understanding flood risk.
- Australian Flood Risk Information Portal (the Portal) – working towards making legacy flood information and associated mapping freely available from a central location through an online portal.

GA has been working with representatives from the States and Territories to obtain access to their flood study information for entry into the Australian Flood Studies Database, and for public access and re-use via the Portal (www.ga.gov.au/afrip). During this engagement, the jurisdictions have reported two major impediments to the provision of flood information to NFRIP. The first was the perceived political and legal risks associated with making flood risk information (reports and maps) publicly available. For example, the potential negative impact on property prices and an increase in their tortious liability by releasing the information. The second issue relates to the Intellectual Property (IP) and Copyright assignments on the legacy flood study outputs; the reports, maps and spatial data.

A subsequent audit of over 1000 flood study documents in the Portal identified that the copyright resides with the consultant in over 80% of these documents, in most case as "All Rights Reserved". This is the most restrictive type of licence that prohibits any re-use without consent. Whilst the copyright on the remaining flood study documents, mostly maps, resides with the commissioning organisation, they too are subject to the "All Rights Reserved" licence.

By implication the Commonwealth, State and Territory Governments and other commissioning organisations (i.e. local councils and Catchment Management Authorities) are all potentially infringing the copyright in this material by having these documents on their website(s). So, too is anyone (private individual or business) who downloads a copy of the flood study documents without the consent of the copyright holder. This has created a significant copyright infringement liability for all parties.

THE PROBLEM

Since July 2015, GA and the Australia Governments' Open Access and Licensing program (AusGOAL) have been working with various stakeholders from all levels of Government and Industry to address the copyright ownership and licensing that is preventing the release of publicly funded flood studies through the Portal.

1. None of the flood studies we have identified to date provide copyright permissions to the study outputs consistent with open access principles which are now enshrined in policy in a number of jurisdictions.
2. Our investigations have identified inconsistencies between the copyright permissions required under contract and the permission expressed in the resulting study. For example, some contracts specify that all of the flood study outputs are to be licensed to the commissioning organisation (under a range of conditions), however, in these examples the flood study copyright notice indicates that copyright remains with the consultant, and in many circumstances all rights are reserved. Either by a specific notice or in the absence of such a notice, where the law presumes that the copyright is all rights reserved.
3. The contracts for procurement of these studies do not extend copyright permissions to electronic communication of the study, nor reuse by the public.

GA are concerned to ensure that future flood study copyright is procured and managed such that the studies can be published electronically for the community (be they private citizens or business) to use. This includes the third party materials reproduced in the flood studies themselves. In that regard, we are keen to ensure that as many openly licensed government materials (e.g. maps and elevation data) as possible can be made available to the contracting consultants in undertaking their work.

THE SOLUTION

This solution is the use and application of the Creative Commons Attribution 4.0 Licence (CC BY 4.0) for both the existing studies and future studies. Most Australian Governments have endorsed implementation of the Australian Governments' Open Access and Licensing (AusGOAL) programme as it recommends and supports the use of the CC BY 4.0 licence.

EXISTING STUDIES

Our investigations have identified that the majority of existing flood studies are owned by the commissioning local governments (even though the flood study materials themselves may suggest otherwise). We are seeking support of each State Government to invite their Councils to consent to the application of the CC BY 4.0 Licence to their flood studies. Once consent is obtained, the task of

applying the CC licence to the flood studies could be completed easily with software and other support provided by GA.

We enclose a draft letter in respect of the existing flood studies as Attachment B. Our resolution strategy is to identify the actual copyright holder and request application the CC-BY 4.0 licence to all flood study materials (reports, maps and some spatial outputs) generated with public funds. Where the copyright holder cannot be readily determined from the procurement documentation, the copyright ownership will be assigned to the consultant and we will request that they apply the CC-BY 4.0 licence.

FUTURE STUDIES

To prevent this issue recurring for flood studies procured in future, we have developed specific Intellectual Property and Licencing clauses for insertion into procurement contracts to ensure that flood studies are 'procured open'. We implemented these clauses in an example contract modified from Local Buy, included in Attachment C.

Local Buy Pty Ltd is a company owned by the Local Government Association of Queensland. It operates to provide tender / procurement panel services for local governments around Queensland. Consequently, it employs standard form contracts for councils and consultants to use when Councils procure consultancy services. We received a copy of the Local Buy consultancy contracts and modified them to the extent that we are reasonably comfortable they will achieve open procurement of flood studies. We understand that Local Buy has these modified and agree to use these clauses in their contracts for consultancy services offered through their panel.

Similar entities to Local Buy exist in other jurisdictions and GA is now working with these organisations to encourage the adoption of these changes at the local government level, nationally.

MOVING FORWARD

GA also recognises that providing prescriptive clauses for insertion into contracts simply does not work. This is because we can never draft a standard set of clauses for all contracts. There is simply too much variation across the many different state and local government contracts in use. While a clause may work well in one contract, different defined terms or contractual structure will often prevent the same clause(s) from being incorporated into another contract.

Therefore, rather than a "set of standard clauses" that articulate the requirements of open licensing of flood, hazard and other publicly funded information products, it would be more effective for the Commonwealth to develop and prosecute a "National Framework (or Accord) for the Procurement of Hazard Information". We envisage that this Framework would;

- establish principles that enable legal sharing and reuse of material under copyright law, where, at the moment, most reuse is unlawful,
- establish metadata requirements that will be uniform across the hazard information sector addressing copyright, metadata requirements, , and finally
- make minor enhancements to the current reporting for Commonwealth funding for hazard research to ensure that the Commonwealth gets what it pays for, and the outputs of the funding are discoverable for a range of government programmes and related projects.

However, as the Commonwealth is only negotiating with the States and Territories for funding, the Framework will need mechanism to ensure that local governments are also held to the standards that the Framework proposes.

We have developed some draft principles for a national agreement based on the discussions with numerous stakeholders.

Principles for Copyright:

Hazard information products shall be procured as follows:

1. The purchaser receives the information product (and collateral material) with a Creative Commons Attribution 4.0 (CC-BY 4.0) licence pre-inserted by the supplier. In some jurisdictions the copyright in the product is assigned to the purchaser upon payment, while in others it is licensed to the purchaser. In either case, as long as it is the CC-BY 4.0, the Commonwealth does not mind if the copyright in the (original material in the) product is licensed to or owned by the purchaser.
2. Purchasers and suppliers are contractually deemed to have supplied their 'existing material' for inclusion into the product under the CC-BY 4.0. Existing material is a term commonly used to define material that was in existence and owned by the purchaser and or supplier prior to the execution of the contract, and which is incorporated (or a derivative of which is incorporated) into the product. For example, the purchaser might supply a map that will be incorporated into a flood study report. This would ensure that existing material owned by either the purchaser or the supplier can be excised from the product and reused without the need for complicated bespoke licensing arrangements to enable later reuse, which are difficult to negotiate.
3. The contractor is obliged to use their best endeavours to prefer third-party materials that are openly licensed. If a contractor has a choice of inserting something that is all rights reserved (which they would likely not have the permission to reproduce in the product anyway), or identical content that is CC Licensed from another source, they are required to use the CC Licensed material (the least restrictive CC licence (or similar) if more than one is offered), and attribute the material appropriately.
4. The supplier shall particularise the nested copyright materials within the product, generally through a Table of References which must include particulars of the licences (or lack thereof) applicable to each piece of nested material. Our discussions with the flood engineers revealed that it was standard practice to include a table of references in reports and that these additional requirements were of little consequence to their workload.
5. All contracts include a template copyright notice and instructions that refer to the template maintained online via AusGOAL. An example of the licence template can be found in Attachment C. This will enable suppliers to copy and paste the correct copyright notice into their template corporate stationary.

Principles for Metadata:

In our discussions with the various stakeholders in the hazard and risk information community, we have identified a concern relating to reuse of the information products. For example, the purchasers were concerned some members of the community may reuse a flood study beyond its own

limitations, potentially causing harm to themselves or others. This is not-dissimilar to the concerns raised in government about the publication of information and open data, despite liberal use of disclaimers (and the Creative Commons licence has a particularly strong disclaimer that can be further augmented).

During these discussions on the use of disclaimers, while important for the purchaser/publisher of the hazard information, the role and provision of metadata was explored in some depth, and ultimately considered to be an elegant solution to this and a number of other issues. Consequently, we would require a set of standard metadata to be completed by suppliers before delivery of the hazard information to the purchaser.

The Metadata should be supplied in the form provided in a template, similar to the licence information referred to above in the Local Buy example, and be developed, consistent with international standards and best practise. It will particularise:

1. Title and date
2. Geographic area (e.g. river catchment and/or drainage basin)
3. Commissioning organisation
4. Purpose of study
5. Key assumptions
6. Statement of limitations
7. Specific issues
8. Summary of findings
9. Licence information
10. Spatial metadata – this will follow recognised industry standards either ANZLIC or ISO 19115
11. Model metadata – to ensure the modelling outputs can be replicated and will include the modelling software version, setup parameter values, a summary of inputs datasets (date, version, URL/DIO), and output datasets (scenarios modelled).

GA would seek to work with a range of stakeholders, including the National Flood Risk Advisory Group, the Australian Tsunami Advisory Group that report to the Australian New Zealand Emergency Management Committee and the consulting community, to develop this template.

Principles for Reporting:

Reporting to the Commonwealth on the outcomes of spending on hazard information products should extend to the reporting of copyright licence applied, the URL of the published material online. In addition, and only initially, it should include a stocktake of hazard information products currently in the possession of an organisation. For example, this would include flood or other studies in the possession of a local government, perhaps procured independently of Commonwealth funding.

GA has valued the knowledge and role of AusGOAL through this process and note that AusGOAL can play an important role in these arrangements. It is a cross-jurisdictional programme with linkages to important information management areas in government and research organisations across Australia. It could support implementation of these arrangements on the ground by providing a

single template that is updated to take into account future changes in law and licensing. AusGOAL can also supply advice and guidance for anyone required to comply with the principles advocated above.

CONCLUSION

GA believes the development and implementation of a principles based “National Framework for the Procurement of Hazard Information” would be more effective and encompassing than providing a bespoke set of clauses for insertion into contracts that intend to deal with copyright alone. Adoption of the Framework will provide better outcomes for both the community and government. It will enable more effective and efficient reuse of the material that the Commonwealth funds (by the community), as well as the hazard engineering community. It would (more efficiently) enable research across a range of domains for which the Commonwealth, States and Territories would be beneficiaries. We believe this approach would ensure that while funds that are expended on a hazard information output are spent once, the output itself could be discovered, and legally and efficiently used many times, by the many and diverse members of the community and hazard management sector.

Attachment A: Benefits of Open Access to Hazard Information

WHY IS OPEN ACCESS TO FLOOD STUDIES IMPORTANT

Flood studies funded by local, state or federal government are commissioned in the interest of communities to ensure risk to people and property is protected, minimised or mitigated against effectively. There are numerous benefits for both the consultant and the commissioning organisation to licensing flood studies openly, while still retaining the copyright. These benefits are outlined below.

Benefits to the community:

1. Flood hazard information will be freely available for the community to use to better understand the risk flood poses that at the household level.
2. The community will have access the same information the insurance companies are using to assess and price flood risk insurance premium, facilitating transparency for the consumer.
3. Re-use of this information will lower the cost to the taxpayer

Benefits to the consultant:

1. Openly licensed flood studies demonstrate the engineering community's desire to contribute to broader community flood resilience.
2. Simplifies the process of undertaking a flood study. It makes it easier (and cheaper) for the flood engineering community to legally reuse the significant body of flood studies already produced.
3. AFRIP will display a portfolio of work by consulting engineers that will receive greater interest from the community, including other engineering firms and government and private clients alike.

Benefits to the commissioning organisation with IP owned by the consultant:

1. Reduction in the costs to maintain and undertake compliance of IP custodianship. costs associated with copyright management, protection and compliance
2. Openly licensed data allows the LGA to share the data or not.
3. Establishes a reuse platform (via the Portal) which lowers transaction costs to other contractors/developers who want to use the flood study outputs for LGA business.

Open access will facilitate use or incorporation of this flood study material into other services and products that will benefit the economy and the community.

Attachment B: Letter to Local Council to openly licence flood study information.

To: General Manager,
Local Council

Dear Sir/Madam,

RE: REQUEST TO OPENLY LICENCE FLOOD STUDIES

We write on behalf of the Australian and State Governments, and your Local Government Association, and we refer to flood studies in your Council's possession. GA and the "relevant State Agency" possess certain flood studies in which we understand your organisation holds the copyright. We write to request that your organisation consent to the application of the Creative Commons Attribution 4.0 Licence (the CC Licence) to these studies, to enable the Australian community to better understand and mitigate their flood risk.

Background

In 2012, under the authority of the Council of Australian Governments (COAG), the Australian Government funded GA to develop the Australian Flood Risk Information Portal (the Portal) which provides a single point of access for flood information. It is COAG's intention that all publicly funded studies be incorporated into the Portal. GA has been working with representatives from the relevant State Agency to obtain access to their legacy flood study information to complete this work. However, copyright has been identified as an issue following a review of the flood studies we have received to date.

The review has identified that the copyright in over 80% of flood study documents in our possession is purportedly held by the author of the study (that is, the consultant engineering firm). This is the case where either an 'all rights reserved' copyright notice in the name of the consultant has been applied to a study, or, where such a notice is absent, the law presumes that the copyright is held by the author. In the remainder of cases, we note that Councils are correctly identified as the copyright holders, however these flood studies are also 'all rights reserved'. This form of copyright restriction prevents these studies from being reused by the Australian community, because if they did so, they would likely infringe the copyright in these studies.

With the support of the Australian Governments' Open Access and Licensing Program (AusGOAL) we intend to resolve this situation by coordinating and implementing the use of the CC Licence to all publicly funded flood studies. The Australian Government is currently drafting grant conditions to ensure that future studies undertaken with public funding will be procured under these open terms.

Request

To facilitate wider reuse of these studies, we request that your organisation:

1. provide us with details of the flood studies currently in your organisation's possession;
2. Consent to the application of the CC Licence to these studies, which will be applied to the documents by GA. Should your organisation choose to apply the CC Licence itself, we have included a guide and FAQ that we recommend you refer to; and
3. Forward your organisation's flood studies and any associated data files to GA in the manner proposed in the attached form.

Should you have any questions about copyright ownership of the studies, or any other aspect of this request, we would be happy to discuss these matters with you. Please contact Martyn Hazelwood, National Flood Risk Information Project, GA, e-mail: martyn.hazelwood@ga.gov.au. Phone: +61 2 6249 9521. Also enclosed is additional explanatory information and FAQs which may be of some assistance.

We would appreciate if you would respond to us by **[DATE 21 DAYS]**.

If your organisation does not consent to licensing the publicly funded studies in which it purports to hold the copyright, we ask that you provide your reasons to us in writing for further consideration by close of business **[DATE 14 DAYS]**.

Thank you for your consideration of this important matter.

Yours sincerely,

Dr Chris Pigram
Chief Executive Officer GA

[Delegate Name]
Position
Relevant State Agency

[Delegate Name]
Position
Local Government Association

Attachment C: Sample Intellectual Property Clauses for Information Product Procurement

Explanatory Notes

IP clauses in many contracts do not satisfactorily attend to the reality of reuse and incorporation of copyrighted material in an information product. They contain sweeping unrealistic requirements, such as requirements that the contractor obtain all necessary permissions from third-parties for the reproduction of their material in a product / document. That is unrealistic. Then they resort to warranties and indemnification as against the contractor to protect the purchaser from future claims of infringement. It is arguable, in some contracts, whether that will protect the purchaser. It places an unnecessary burden onto the contractor, and it does nothing to legally support or enable public reuse of the content. Indeed, the conditions of some contracts are such that a contractor would breach the procurement contract itself as soon as they incorporated third-party material into a product without a licence.

The objective here was to achieve the desired outcome with minimal disturbance to the features of the pre-existing contract.

In this contract, Existing Contract Material was defined by reference to another document to include material from either party or a third-party, which existed prior to the commencement of the contract. The definitions section could also be amended to define the Creative Commons Attribution 4.0 Licence

The intended effects of these changes are to ensure:

1. That the purchaser received a product / document (and collateral material, such as data) with a Creative Commons Attribution 4.0 licence pre-inserted. It would then be a matter for the purchaser to determine when and or if it was to be publicly released. Access and licensing are separate issues. In the context of this particular contract, it was considered more efficient for the contractor to insert the licence than the purchaser. This was largely a practical decision because in this scenario there were likely to be fewer contractors than purchasers, and it would be easier to provide licensing support to a few contractors if they needed it.
2. That consultant and purchaser are deemed to have supplied their material for inclusion into the product / document under a Creative Commons Attribution 4.0 Licence. For example, the purchaser might supply a map that will be incorporated into a flood study report. Open licensing of nested copyright material is very important because they can be excised and reused separately, and sometimes different conditions apply to different material owned by a single organisation.
3. That the contractor was obliged to use their best endeavours to prefer third-party materials that are openly licensed. If a contractor has a choice of inserting something that is all rights reserved (which they would likely not have the permission to reproduce anyway), or identical content but CC Licensed from another source, they are required to use the CC Licensed material, and attribute them appropriately.
4. That the contractor particularise the nested copyright materials within the product, generally through a Table of References which must include particulars of the licences (or lack thereof) applicable to each piece of nested material. Our discussions with the flood engineers revealed that it was standard practice to include a table of references in reports and that these additional requirements were of little consequence to their workload.

Provided that the instructions are complied with, the resulting product / document would be CC BY Licensed with as much of the nested material as possible also CC licensed, and the details of which fully particularised in a table of references.

Clauses highlighted in yellow having been drafted by AusGOAL, all other material is © Local Buy Pty Ltd.

INTELLECTUAL PROPERTY RIGHTS²

Existing Contract Material

- a. The Purchaser Agreement does not affect ownership of Intellectual Property Rights in any Existing Contract Material.

New Contract Material

- b. Unless otherwise agreed between the Purchaser and Consultant in writing, title to and Intellectual Property Rights in all New Contract Material provided to the Purchaser as part of the Deliverable Services will upon payment vest in the Purchaser.
- c. The Consultant must insert a copyright notice into the Deliverable Services in accordance with the form and instructions in Schedule A. The Consultant must particularise New Contract Material and Existing Contract Material, as specified in the instructions in Schedule A.
- d. The Consultant must work with the relevant Purchaser (including signing all required documents) to ensure that the Intellectual Property Rights in all New Contract Material are legally transferred, assigned and vested in the Purchaser.

Personnel

- e. Prior to an individual commencing work in respect of any New Contract Material on behalf of the Consultant, the Consultant must obtain from that individual, in writing, and provide to the Purchaser, upon request:
 - (a) all consents, permissions and assignments to enable the Purchaser to exercise in full, without cost to the Purchaser and without impediment, the rights granted under this Condition 1; and
 - (b) without limiting paragraph (a), a consent to any act or omission (including the specific acts or omissions set out in the Contract) which would otherwise infringe the Moral Rights of that individual. If requested by the Purchaser, such consent must be in a form specified by the Purchaser.

Third Party Rights

- f. The Consultant warrants that the supply of the Deliverable Services by the Consultant to the Purchaser under the Purchaser Agreement will not infringe the Intellectual Property Rights of any third party.
- g. The Consultant shall, when reproducing third party intellectual property in the Deliverable Services, use its best endeavours to source and prefer Existing Contract Material from a third party that is licensed under a Creative Commons Attribution Licence, or any other type of Creative Commons Licence, in that order, and the Consultant must specify it in the Table of References in accordance with the instructions in Schedule A.
- h. To the extent that the Consultant will reproduce the Consultants and or the Purchaser's Existing Contract Material as part of the Deliverable Services, the Consultant and or the Purchaser shall supply, and each is taken to have supplied that material under a Creative

² This content is subject to copyright; please refer to Copyright notice at the front of this document.

Commons Attribution 4.0 Licence, and the Consultant must specify it in the Table of References in accordance with the instructions in Schedule A.

- i. Where it becomes apparent that a third party's intellectual property rights are infringed by the Deliverable Services supplied by the Consultant, the Consultant shall use its best endeavours to provide a version of the Deliverable Services which excludes the infringing material. It shall be at the sole discretion of the Purchaser whether the Purchaser is willing to accept the modified version of the Deliverable Services.
- j. The Consultant fully indemnifies Local Buy and the Purchaser in respect of any breach by the Consultant of the intellectual property rights of any third party.

SCHEDULE A

This copyright notice is to be incorporated into the Deliverable Services. It can be downloaded MS Word format from: <https://goo.gl/dsuQD5>. You must remove any other copyright notices in the document(s) templates you normally use.

Drafting Instructions:

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2. Replace [Title of document] [Year] with the appropriate content
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4. Obtain the particulars required by the Purchaser for inclusion under the heading: **Further Information**
5. In the Disclaimer section, replace [**Consultant**] and [**Purchaser**] with the appropriate content. Please note that the Purchaser appears twice.
6. You are required to particularise the Existing Contract Material (this includes third party material and material provided by the Purchaser) that is **incorporated** into the Deliverable Services, in a Table of References. Each reference shall particularise the title of the material being reproduced, Author or Copyright Holder, Year of Publication, Page number (if appropriate), Copyright Licence(if any - E.g. CC Attribution Licence), or 'All Rights Reserved'

If you have any questions please contact Baden Appleyard at AusGOAL, 0459 824 061, or e-mail b.appleyard@ausgoal.gov.au

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Further Information

For further information about the copyright in this document, please contact:

[Purchaser]

[Purchaser Address]

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C J Pigram, PhD

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