

National Elevation Data Framework

*The Shared Digital Representation of
Australia's Landform and Seabed*

Background Paper

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Background

There is strong support for development of a National Elevation Data Framework (NEDF) for Australia. The purpose of the proposal is to develop a collaborative framework that can be used to increase the quality of elevation data and derived products such as digital elevation models describing Australia's landform and seabed. The aim is to optimise investment in existing and future data collections and provide access to a wide range of digital elevation data and derived products to those who need them.

The strategic imperative is how to optimise Australia's investment in elevation data and ensure this investment is directed at policy and operational needs at both national and local levels. It is about putting the "third dimension" on the national agenda.

Impetus for a national approach to digital elevation data is coming from a range of sources. This support is driven by:

- Calls for a national framework approach from the Council of Australian Governments (COAG) for the National Climate Change Framework and multi-jurisdictional bodies such as the National Spatial Information Management (NSIM) Committee in its Spatial Strategic Plan 2007-2010 for counter-terrorism and emergency management needs;
- The urgent data needs of the National Water Security Plan;
- The very wide range of applications using elevation data and products;
- A universal need for increased accuracy of elevation data to meet this wide range of applications (and exploit growing availability of high-resolution sources);
- Need for better access to both existing and future elevation data sets by a wide range of users;
- Ability to use data derived from various sources to create new products, such as 3D visualisation for urban and infrastructure design and for communication with the general community.
- Current needs in key areas such as climate change, water management, wetland and coastal management, disaster mitigation, infrastructure planning and management, local planning and city management and industries such as insurance and mining.

ANZLIC – the Spatial Information Council, with the support of the Australian Greenhouse Office (AGO), Geoscience Australia (GA) and the Cooperative Research Centre for Spatial Information (CRCSI) is sponsoring the NEDF proposal.

Deliverables to date are:

1. User Needs Analysis through direct contact with key stakeholders in a series of workshops around Australia and an initial audit of existing elevation data.
2. Business Plan, setting out the intent and potential form of the NEDF, identifying key stakeholders and a preliminary review of existing usage of elevation data sets and products in Australia.
3. Science Case to support the implementation of the project and its review by the Academies.
4. Agreement on use of applicable data standards and access arrangements such as licensing.

Needs

A series of workshops held in 2007 around Australia identified key needs to be addressed.

National agencies identified the need for a consistent continental specification for elevation data sets to meet a variety of national needs. Many State government agencies expressed the need for a seamless multi-resolution, extensible DEMs and program to infill gaps. This should be done within a national framework and where possible meet the needs of national programs.

Several industry sectors expressed a strong need for better access to existing elevation data and emerging high-resolution products. The insurance industry needs focussed on risk mitigation in areas such as coastal communities and floodplains. Utility services and infrastructure providers stated a requirement for high-resolution data for infrastructure development and management especially in urban areas. Mining was also a major user of elevation data. Their operations were often at national scale and a national framework would help to meet their requirements.

Particular mention was made by providers of elevation data in the private sector of their willingness to participate in a national framework approach, if there was an appropriate level of return on investment. Private sector concerns focused on the need for intellectual property (IP) issues to be addressed up front and carefully, as this will affect private sector investment. The private sector has shown it is willing to invest if both needs and risks (funding, IP) are known.

Local government was identified as a major user of elevation data. Local government often has very location-specific very high-resolution needs. Purchases made by local government were not always discoverable and available to other potential users. Often, these purchases were made using public funds from other levels of government and there was an opportunity to optimise this investment by wider use of the data.

There was general consensus about users having a better ability to find and access elevation datasets using a coordinated approach, virtual data repository and a one-stop portal. The concept of a virtual data repository and single online portal was supported as a way of identifying existing data and providing better data access through registration of data sets and documentation of data sources. There is a need to address how the portal will operate, including functions of data publishing, access, metadata and linking of data sets from diverse sources.

Identifying upcoming projects was seen as a way of facilitating partnerships and joint investment in elevation data acquisition, providing the opportunity to increase the coverage and accuracy of data in individual projects. A number of agencies showed a willingness to be part of a consortium approach to purchase of elevation data sets.

Although there were different elevation data requirements based on a wide range of different applications requiring various accuracies and coverage, there was still a use (as a default) for a nationally consistent “freely available” elevation data product of higher accuracy than the current 9 second data set. The product should be developed within the national elevation data framework and where possible meet the needs of

national programs. The coverage of such a product should be the entire area of Australia's sovereignty, out to the edge of the continental shelf and preferably covering the Australian Antarctic Territory (AAT), Heard Island, Macquarie Island, Southern Ocean between Australia and the AAT. Within the product there will need to be a nesting of elevation data of variable resolutions and accuracies collected from various sources and platforms, which reflected the fit-for-purpose needs at any particular time.

A summary of user data requirements is contained in Attachment 1.

Business Plan

Key implementation initiatives are:

1. Leadership and engagement of stakeholders through a business model and governance structures.
2. Stakeholder engagement through facilitated communication networks and forums.
3. National standards and common vertical datum
4. Virtual data repository and online portal including functions of registration of data sets, metadata, data publishing, digital rights management, linking of data from various sources, distribution and access.
5. Shared investment model including identification of forthcoming data capture programs, national elevation data acquisition program and gap filling priorities.
6. Nationally consistent elevation data set(s) including the concept of a "default" national data product using a "nested DEM" concept using data of varying accuracies depending on availability that may meet a number of known user needs.
7. Research and development program focused on national priorities.

Leadership for major implementation matters is proposed for:

- Governance issues – ANZLIC
- Standards and practice issues – ICSM with private sector and research input
- Science issues – CRCSI and Academies
- Framework elements and national product – Geoscience Australia

The business plan proposes the following priorities for action.

Deliverable	Tasks	Key Participants	Indicative Timeframe
NEDF governance structures and implementation	Set up NEDF Steering Group	ANZLIC, industry peak bodies, GA, national programs	Early 2008

plan	Develop business rules for intellectual property, digital rights management, procurement and access issues	NEDF Steering Group, jurisdictional coordinators, local government, commercial data providers	By July 2008
	Approve and circulate NEDF implementation plan	NEDF Steering Group	By July 2008
Develop technical standards	Set up Technical Working Group	Formalise existing ICSM working group	Early 2008
	Develop data standards and interoperability specifications	Technical Working Group	By July 2008 (building on initial specifications)
	Develop access, distribution and use arrangements	NEDF Steering Group, Geoscience Australia, public and commercial data providers	By July 2008
Identify national funding and investment sources	Fund coordination and framework development, investment clearinghouse and procurement guidelines	Geoscience Australia Relevant Ministerial Councils Other peak bodies	By July 2008
	Implement data collation and collection priorities	Program sponsors	During 2008
Set up operational roles to implement NEDF components	Develop virtual repository and online portal	Geoscience Australia National programs requiring elevation data Data providers	Basic functionality by July 2008
	Develop seamless national data product based on known user needs and current data availability	Geoscience Australia National programs Jurisdictional agencies	During 2008

Further Reading

See www.anzlic.org.au.

Attachment 1: Summary of user requirements

It is useful to group elevation data requirements in order to discern broad patterns in future needs of the wide variety of uses reported in the NEDF User Needs Analysis. The following table shows a broad interpretation of these “rolled up” needs. The information is only for indicative purposes and meant to elicit more detailed user requirements. The figures shown are for horizontal and vertical resolution and not accuracy.

Resolution Range	Key Applications
5-10m x,y 0.15-1m z	<u>Specific areas</u> for coastal zone risks and management; landscape modelling and predicting water movement through landscapes, including hydro-geological modelling, surface and groundwater modelling; whole of catchment management and sub-catchment delineation for water quality modelling, hydrological analysis and ground water analysis for catchment management and water quality monitoring, surface analysis and 3D analysis for catchment risk analysis including climate change and drought; floodplain management for insurance risk and local government; stream modelling; gully/stream bank erosion monitoring; land use and urban planning; vegetation modelling and mapping; forestry operations; infrastructure development and management; corridor mapping; aviation safety; airport and flight path management around airports; line of sight, radio and telecommunication coverage; fire modelling; landslide mapping; storm water modelling; 3D modelling in cities; precision agriculture, farm management; marine including fisheries, oil spill response, estuaries, habitat mapping and maritime environmental protection services
10-40m x,y 1-5m z	<u>National and jurisdiction wide</u> identification of areas of risk as above; drainage analysis; hydro-dynamic modelling out to 80m depth; international/national coastal navigation; management and planning of maritime navigation network; search and rescue; land use planning in rural areas; land suitability studies; investigations for infrastructure development; aviation safety; airport and flight path management; defence operations and flight simulation; reconnaissance and surveillance; cross-country mobility; bushfire management in prone areas, slope and fuel loads; ortho rectification of photography, production of ortho photos; geological, landform, regolith mapping and soil mapping
>40m x,y >5m z	Safeguarding communities and infrastructure; situational awareness for defence, CIP, CT and EM operations; deep water bathymetric mapping; oil and gas offshore, including pipeline design, anchoring, infrastructure planning, surface models for geological and geomorphologic interpretations; broad scale climate studies, climate change impacts, ozone modelling