Delivering Benefits Through Collaboration – Australia and New Zealand's Intergovernmental Committee on Surveying and Mapping (Icsm)

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SUMMARY

The national governments of Australia and New Zealand, and the governments of each of the Australian states and territories, have responsibilities for surveying and mapping. The Intergovernmental Committee on Surveying & Mapping (ICSM), a standing committee of ANZLIC – the Spatial Information Council, is the primary surveying and mapping coordinating body for Australia and New Zealand. ICSM exists to facilitate collaboration between government surveying and mapping agencies, to deliver benefits to all participants.

ICSM's key activities fall into three categories:
1. joint development of standards, to promote consistency of practice;
2. coordination of surveying and mapping activities, to improve efficiency; and
3. communication, to providing information to the surveying and mapping community, and more generally to the community at large.

This paper details some of the work undertaken by ICSM, and the challenges for the future. This work includes:
- the development of a standard for electronic recording and transfer of cadastral survey plan information;
- the development of a national collaborative agreement between government agencies, designed to maximise cooperation in topographic data collection, management and distribution;
- the development of web-based packages to improve the public's understanding of spatial issues, including a Geographic Names teaching package and a Fundamentals of Mapping package;
- maintenance of important reference material including the GDA Technical Manual, Standards and Practices for Control Surveys, and the Australian Tides Manual;
- creation and review of the Australian and New Zealand Rural and Urban Addressing Standard, for consistent and easily understood addressing in Australia and New Zealand;
- development of a Harmonised Data Model and Framework for the fundamental spatial datasets comprising the Australian Spatial Data Infrastructure (ASDI); and
- development of a web-based service whereby information about the latest topographic maps can be sourced in one place – regardless of which organisation produced the map.

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1. INTRODUCTION

The national governments of Australia and New Zealand, and the governments of each of the Australian states and territories have responsibilities for surveying and mapping. There are obvious potential benefits in collaboration between the various surveying and mapping agencies, hence the establishment of ICSM.

As our name indicates, ICSM is an intergovernmental committee which works to address surveying, mapping, charting and other related land information issues. When it was established in 1988, ICSM gave itself the rather daunting vision of developing and maintaining "*Worlds best national land and sea bed spatial data infrastructure which will provide sustainable benefits for Australians and New Zealanders*".

ICSM is the successor to the National Mapping Council (1948-1986) whose primary role had been to focus on national coordination of topographic mapping. ICSM's role continues to include topographic mapping, but has expanded to include other aspects of surveying and mapping. Significantly, this gives Australia and New Zealand 60 years of continuous focus on developing strong national approaches to geospatial issues.

The Australian and New Zealand geospatial industry has now matured into a viable, dynamic industry – with the private, research, professional and government sectors working closely together to ensure continued successes and growth. ICSM is continually monitoring its activities to ensure they remain relevant to the changing needs of the users of spatial information.

ICSM's activities can be broadly divided into three categories:
1. joint development of standards, to promote consistency of practice;
2. coordination of surveying and mapping activities, to improve efficiency; and
3. communication, to providing information to the surveying and mapping community, and more generally to the community at large.

With the ever increasing awareness of geospatial information and the value it makes to well-informed decision making, and the constantly growing expectation that quality geospatial information should be readily available, there is now even greater need for the development of consistent standards.

Although ICSM's work is focused on Australian and New Zealand government surveying, mapping and charting, some of our work is 'World's First' – for example the Australian and New Zealand Street Addressing Standard and the ICSM Harmonised Data Model.

ICSM is a a permanent sub-committee of ANZLIC – the Spatial Information Council, which is the peak intergovernmental body for spatial information in Australia and New Zealand. ICSM's membership is from the surveying and mapping agency in each Australian state and territory, and the national governments of Australia and New Zealand. ICSM members typically are at the surveyor general level or equivalent. The Australian defence forces are also represented, due their interest in, and long involvement with, mapping over the country.

2. HOW WE WORK

2.1 Our Strength is Our People

ICSM meets together twice a year, and uses a sub-committee system to undertake the majority of its work. Members of these committees and working groups are usually technical experts drawn from the same agencies as the ICSM Committee members. Where appropriate, ICSM also engages others, such as specialist consultants, to undertake specific projects. These processes ensure that there is a multi-lateral approach to all ICSM work and that the results of this work flow back to all ICSM agencies.

2.2 Developing National Standards

When it was first established, ICSM's focus was on supporting government surveying and mapping activities. At its very first meeting in 1988, ICSM identified its primary role as:

> *"…to consider matters relating to the development of recommended national standards … and … to assist decision makers in national approaches to major surveying, mapping and land information issues…"*

It was agreed that this could best be achieved by the creation and dissemination of Australia-wide technical reference material – in other words practical national standards.

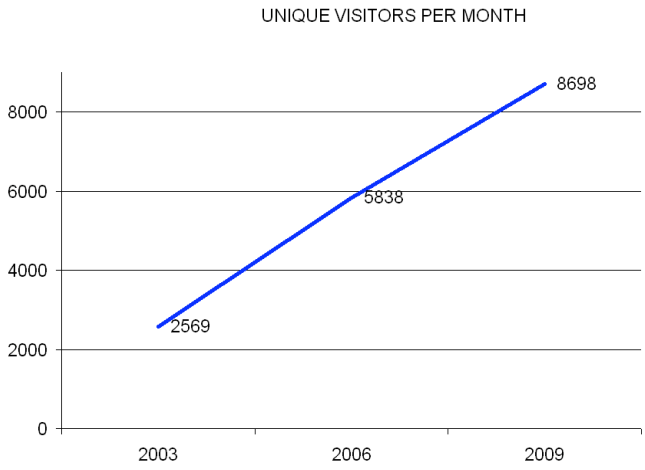
By focusing on standards, ICSM delivers benefits to its member agencies in two ways. Firstly, the agencies can collaborate on activities that each would need to undertake (for example, developing data models) saving the duplication in cost which would otherwise occur. Secondly, it leads to consistency of practice between the member jurisdictions, which makes sense in a country with a relatively small population like Australia's. This reduces costs for organisations such as software providers and data purchasers who deal with more than one jurisdiction.

A number of the standards developed by ICSM are described below under the various individual ICSM projects.

2.3 Communication

As any person who has managed a business knows; communication is the key to success – i.e. "there is no point in creating a wonderful product if no one knows about it".

Increasingly, the mechanism that ICSM uses to inform people about its work is its website – www.icsm.gov.au This site was established in late 2002 and since then it has grown significantly – this is reflected in the rapid increase in its usage rate, as depicted in the graph on the following page. The website allows ICSM to communicate more effectively to an ever-increasing audience.



ICSM recognises that it is not sufficient to place information on the web, and expect people to know about it. Consequently, ICSM complements its web site with communications targeted to specific audiences. These have included: promotional videos, such as those on place names and GDA; CDs containing technical material, such as those on street addressing and GDA; teaching material, such as the place names teaching package; and presentations to conferences such as this.

3. MAJOR ICSM STANDARDS PROJECTS

3.1 Geocentric Datum of Australia 1994 (GDA or GDA94)

The GDA is an older project which is one of ICSM's major successes. At its inaugural meeting in 1988, ICSM resolved to progressively implement a new geodetic datum for all spatial information in Australia. This resolution was based on work which had been undertaken by the National Mapping Council's GPS Working Party.

The new Geocentric Datum of Australia (GDA) was to replace the Australian Geodetic Datum 1984 (AGD84), and a number of older horizontal datums which were still in use. The

move to a geocentric datum was necessary for compatibility with international positioning frameworks and emerging satellite positioning technologies, including GPS.

ICSM chose to facilitate the move to the new datum by establishing a series of specialist working groups which were to focus on the different aspects of this challenging undertaking:
- developing a geocentric datum for Australia;
- GDA promotions; and
- GDA implementation.

A number of strategies were adopted including the development and implementation of:
- an AGD to GDA migration plan
- a GDA technical manual
- promotional & educational awareness strategies
- industry and user support strategies.

A key contribution to the adoption of GDA was a technical manual (in reality a national standard) that provided all of the support information necessary for professional spatial information managers and surveyors to successfully use GDA.

The first version of the *GDA Technical Manual* was released in 1998. There were several refinements to this document over then next few years and, in 2000, the second version was released. The technical manual (Version 2.3, February 2006) still averages around 5,000 downloads per month. It can be found at www.icsm.gov.au/icsm/gda/gdatm/gdav2.3.pdf.

Other vital GDA technical reference information was also supplied from the ICSM website – including software which assisted in transforming existing data from AGD to GDA.

To assist users identify whether data or maps were on the old or the new datum, particularly during the transition phase, ICSM developed a GDA logo. This distinctive symbol enabled users of data and maps to tell at a glance if the product was using the new datum, similar to the way in which the metric symbol was used on maps and plans in the 1970s.

Along with this, an education and outreach program was developed, aimed at two very different audiences:
1. the professional surveyor and GIS user, who needed to know very technical information – in particular the GDA Technical Manual and hyperlinks to providers of professional services; and
2. the general public who may need to understand GDA, including how it would impact on their use of a GPS receiver.

In support of this, ICSM produced a CD which contained a short movie explaining the datum change in lay terms, along with technical information.

The creation of the ICSM website in 2002 provided a more flexible and timely method to disseminate information. This allowed additional information, and 'late-breaking-news' to be released whenever a new issue arose. The FAQ (*Frequently Asked Questions*) web page on GDA proved very popular, answering questions such as:

- How will continental drift affect GDA?
- Will zero degrees longitude still pass through Greenwich?
- Will the equator be in the same place?
- What is GDA?
- Why is Australia adopting the GDA?
- How will GDA affect maps?
- How will GDA affect legal boundaries?

The success of these strategies was demonstrated by the rapid up-take of the new datum. By 2004 the work of establishing GDA was complete and the GDA Working Groups were disbanded. Maintenance of the *GDA Technical Manual* and the GDA ICSM web pages was passed to ICSM's Geodesy Technical Subcommittee (GTSC).

However, the work of establishing and maintaining the datum continues. Looking to the future, the GTSC is developing strategies to improve the geodetic and positioning infrastrucutre, in three key areas:

- height modernisation, to provide a precise model of the difference between the ellipsoid and the Australian Height Datum which is based on a national level network;
- positioning infrastructure, to deliver real-time precise positioning the surveyors and a broad range of other industries including transport, construction, mining and agriculture;
- designing the datum for the future, to account for further refinement of the national geodetic network and for the changing relationship between GDA and the international reference frame.

3.2 Standardising Survey Practice

In the surveying world, standards have always been necessary, but in our modern world they are vital – especially that survey results have a stated and verifiable accuracy; and that reliable methodologies which are appropriate for the particular technology are used to achieve these accuracies.

In Australia, this was first achieved on a national basis by the National Mapping Council's publication in 1966 of Special Publication 1 – *Standard Specifications and Recommended Practices for Horizontal and Vertical Control Surveys*. This document did not prescribe how surveys were to be done, but provided guidelines on techniques that would result in an acceptable survey quality being achieved.

At its inaugural meeting in 1988, ICSM recognised that, in the emerging modern digital era, this publication was in need of a full revision – including adding the new technology of GPS. By 1990, SP1 had been wholly revised and published as *Standards and Practices for Control*

Surveys (SP1). SP1 is reviewed regularly – the latest version being 1.7 dated September 2007. This can be found at http://www.icsm.gov.au/publications/sp1/sp1v1-7.pdf.

SP1 has 4 distinct parts:

- Part A sets clear standards of accuracy for control surveys which are independent of the surveying technique
- Part B provides a selection of guidelines for survey and reduction practices which assist in achieving acceptable survey results
- Part C provides recommended marking practices for survey control
- Part D provides recommended documentation practices.

SP1 was one of the first documents loaded onto the ICSM web site in 2002. In 2009 it is still a very popular document, averaging almost 3000 downloads per month. The web enabled version of SP1 contains hyperlinks to related documents and web sites to enhance its usefulness.

3.3 Australian Tides Manual (SP9)

In 1984, the National Mapping Council published its Special Publication 9 – *Recommended Operating Procedures for Tide Gauges on the National Network* – commonly called SP9 or the Australian Tides Manual. This publication was in constant use, and despite revision in the early 2000s, the manual had become significantly out-of-step with modern technology and techniques – and it needed to be web enabled.

ICSM's Permanent Committee on Tides and Mean Sea Level (PCTMSL) undertook the task to fully update the *Australian Tides Manual*. In late 2005 this was released on the ICSM website. SP9 proved to be very popular and requests for additional functionality resulted in a revised and upgraded version being released in early 2007. This can be found at http://www.icsm.gov.au/icsm/tides/tides_msl.html.

As the manual's former title suggests, the *Australian Tides Manual* provides operating procedures to be followed by operators of tide gauges on the Australian National Network – those stations that provide data for tide predictions at ports. It brings together in a single, user-friendly form, a large number of existing sources of information on the measurement of tides and tidal currents. It is intended to enable the reader to: quickly find the most relevant and up-to-date information; apply consistent and repeatable techniques; and produce verifiable results. This is supplemented by numerous hyperlinks to other websites.

The future work of the PCTMSL will include:

- providing a precise model of the relationship between Tidal Reference Levels such as Lowest Astronomical Tide and the Australian Height Datum; and
- development of a tidal data module within the ICSM Harmonised Data Model

3.4 Harmonised Data Model (HDM)

In both Australia and New Zealand, a number of custodians maintain surveying and mapping information, in a variety of formats, for a wide range of applications and covering different areas of each country. In the 1990s, ICSM recognised the need to be able to transfer such information to other users readily, preferably not in proprietary formats. This prompted the development of data models and data dictionaries for each of four key surveying and mapping datasets – cadastral data, topographic data, street address and place names – so that providers of this information could deliver datasets in a consistent way.

As the finishing touches were being made to these data models, it was recognised that there was some overlap between the models, and in some instances the same term was being used for different purposes (e.g. a road in a cadastral dataset is different to a road in a topographic dataset). This led to the creation of a Harmonised Data Model (HDM) which resolved the inconsistencies and overlaps.

In 2005 ICSM commenced a revision of the HDM to convert it to a conceptual model using Unified Modeling Language (UML) with an encoding mechanism using Extensible Markup Language (XML). This was released in 2008 on the CSIRO SEEGrid website:
https://www.seegrid.csiro.au/subversion/xmml/ANZLIC_ICSM/HarmonisedDataModel/trunk/

With the development of the UML model, the focus has shifted from facilitating the delivery of large datasets to supporting web-based delivery of data, where small amounts of spatial data might be delivered to consumers in response to queries. The model itself continues to expand, with additional modules being added as the need arises. The first of these is a module for the provision of information related to native title.

An ongoing challenge for ICSM's Data Framework Technical Subcommittee, which administers the HDM, is to keep abreast of developments in relation to international standards, in particular the ISO/TC211 geographic information standards and the Infrastructure for Spatial Information in the Europe (INSPIRE) suite of standards. As these standards are likely to be implemented through a range of spatial software tools, they will affect the way spatial information is managed and delivered here is Australia. Consequently, ICSM has endeavoured to monitor these developments, and where the opportunity arises, seek to influence them so that they meet our needs. Recently, as a result of work done here in Australia, we have been able to provide input to the development of a European cadastral data model – the Land Administration Domain Model.

3.5 Data Dictionaries / Feature Catalogues etc

An important aspect of standardisation is ensuring that terminology is used consistently. ICSM has produced a number of 'dictionaries' of technical terms to assist in addressing this. Examples are:

3.5.1 Tidal Interface Compendium of Terms

Legislation in Australia and New Zealand makes reference to a range of different boundaries between the land and the sea. ICSM established a Tidal Interface Working group to research these definitions, with a view to identifying a subset of key terms which could be used consistently in legislation, and implemented progressively as the opportunity arose.

The results of this work have been published on the ICSM web site, in two parts. The first part summarises the research, identifies the recommended key terms and maps the relationship between the key terms and each of the terms used in legislation. The second part is a detailed description of each term which was identified.

As an example, one of the identified key terms is Mean High Water:

Acronym:	MHW
Purpose:	Common law datum for cadastral (land boundary) purposes. Used in Australia unless amended by legislation (as in Queensland for example). Frequently used as the coastal limit on topographic mapping.
Definition:	The average of all high waters observed over a sufficiently long period.

These publications can be found at http://www.icsm.gov.au/icsm/tides/tidal_interface.html.

3.5.2 Mapping terminology and symbology

1. *ICSM Feature Catalogue*
   This contains a description of classes, attributes and relationships presented in the HDM.

2. *ICSM Topographic Feature Catalogue*
   This describes a national standard set of feature codes and feature definitions for topographic data. The document brings together a diverse group of data dictionaries and standards into a single amalgamated set of feature codes and feature definitions.

3. *Topographic Map Symbols*
   This provides a nationally consistent set of topographic map symbols.

These documents assist in achieving nationally consistent mapping based information. They can be found at http://www.icsm.gov.au/icsm/harmonised_data_model/links.html.

3.6 Electronic Lodgement and Transfer of Cadastral Records (ePlan)

In the 1990s, each of the Australian and New Zealand agencies involved in dealing with cadastral survey plans started to consider the possibility of receiving plans from surveyors in electronic form. It was recognised that surveyors were using electronic processes for most of

their work, but had to produce a hard copy plan for lodgement, only to have the government agency capture data from the plan for entry into its databases.

In 2003, ICSM formed the ePlan Working Group to develop a national standard for capturing, recording and transferring survey records. The standard has been designed to cater for the whole land subdivision process, commencing with initial subdivision design, and including capture in the field, submission to approval agencies, recording in databases and land titling systems and ultimately to the generation of digital products for the future use of surveyors.

The new framework will make it possible to lodge cadastral survey plans with government authorities electronically, via the web, without the inefficiencies of paper documents, incompatible unreadable data formats or introducing manual transposition errors.

In order to maximise the uptake of the standard and ensure that an effective system was developed, the ePlan Working Group included representatives from industry as well as government. The working group was able to draw heavily on the experiences in New Zealand, which had already implemented digital lodgement of survey plans.

One of the challenges faced by this project was the lack of UML and LandXML expertise in the Australian geospatial industry; indeed there is a world-wide shortage of these skills.

By mid-2006 the ePlan group has successfully created:
1. a Unified Modelling Language (UML) logical model of a cadastral survey (ePlan Model);
2. a protocol for representing the ePlan Model in LandXML, to enable encoding by software packages; and
3. data capture, visualisation and validation tools to prove the viability of the system.

The model and XML schema have now undergone a successful real-world trial in Queensland and are being progressively adopted in other Australian states and territories. The working group is continuing to monitor the implementation, to assist each of the jurisdictions where necessary, and to resolve any difficulties that may arise with the standard itself.

3.7 Street Addressing

Emergency management agencies such as fire and ambulance rely on consistent, unambiguous street addressing to assist them in responding to requests for assistance. A range of other service providers also benefit from a reliable addressing system.

The ICSM Street Addressing Working Group was established in 1999 to review existing standards and guidelines related to addressing, and to develop an addressing standard in consultation with stakeholder groups and the spatial community. The work involved two very different components. The urban component was aimed at providing consistency amongst the various house numbering systems that were being used in towns and cities across Australia

and New Zealand. The rural component devised a property addressing system based on distance from the start of the road, to greatly simplify the task of locating properties.

In 2003, the current version of the Rural and Urban Addressing Standard (AS/NZS 4819:2003) was released by Standards Australia and Standards New Zealand. This enabled PSMA to launch its Geocoded National Address File (G-NAF) – which provided geographical coordinates for each address in its address dataset – in late 2003.

The standard is currently under review, in part to ensure it is continuing to serve its intended purpose, and in part to extend its application to deal with matters such as complex addressing.

ISO/TC 211 has begun to investigate where there are opportunities to improve the way to define and develop addresses across multi-industry sectors and regions. With this in mind they have submitted a new work item proposal to develop a new international standard for addressing, covering such topics as: reference model for address data; terminology for addresses; dictionary of postal address elements; and country specific templates with precise descriptions of postal address formats and the electronic exchange of name and address data. The standard will not be at odds with any exiting national address standards, but intends to complement with them. (e.g. AS/NZS 4819 – Rural and Urban Addressing).

4. MAJOR COORDINATION PROJECTS

4.1 National Topographic Information Coordination Initiative (NTICI)

The key responsibility of ICSM's predecessor, the National Mapping Council, was the national coordination of the topographic mapping program. Following the formation of ICSM, with a broader range of activities, coordination of topographic mapping in Australia was done largely by bilateral arrangements between the Commonwealth and each state or territory. However, in recent years the need has arisen for a more national approach to mapping, particularly in light of declining budgets for this activity in many jurisdictions. This led to the establishment of the National Topographic Information Coordination Initiative

NTICI is different to the other outputs of ICSM Working Groups. Rather than being a standard or product, NTICI is a national non-binding agreement between the Commonwealth, state and territory mapping agencies and local agencies in areas of topographic data collection, data management and access and mapping. Its governing principle is *'map once, use many'*.

NTICI started life as a collaborative agreement between the members of ICSM's Permanent Committee on Topographic Information (PCTI), under which agencies would coordinate work programs and share data in an unrestricted manner. However once NTICI's success became obvious, other government agencies joined – including local government agencies and Australian government departments such as the Murray-Darling Basin Authority.

One successful feature of the agreement is the development of whole-of-government licenses for data acquisition – such as when purchasing satellite imagery and aerial photography.

A cost-benefit survey on the NTICI process was conducted by Geoscience Australia in 2007-08, on behalf of PCTI. This survey sought empirical evidence of how much collaboration among the jurisdictions is occurring, and the value of this collaboration. The survey clearly demonstrated that the benefits of collaboration far outweighed the costs associated with data integration. There are now large amounts of up-to-date data and products which would not have existed without NTICI.

5. MAJOR COMMUNICATION PROJECTS

5.1 Spatial Information Resources for the General Public

While much of ICSM's work has a strong technical focus, the committee understands its obligation to provide information about surveying and mapping to the broader community. A variety of materials has been produced, with different target audiences depending on the topic. In some cases, material has been prepared to help inform the community of changes which may affect them (e.g. street addressing or GDA). In other instances, material has been prepared specifically for use in the classroom, in a bid to improve school students' understanding of particular topics (e.g. place names or mapping), and to encourage students to consider a career in spatial sciences.

Examples of some of these are given below.

5.1.1 Geographic Names

The Committee for Geographical Names of Australasia (CGNA) is one of ICSM's oldest working groups – indeed it had been established before ICSM was formed. Its members are responsible for providing a coordinated approach in Australasian place naming activities in New Zealand, Australia, Australian Territories (including Antarctica) and the Australian territorial seabed.

There is interest in the general community regarding geographic names. CGNA recognised early on that one of their key roles was to inform the general public about the naming of places and expanding their understanding of the history and derivation of place names – including indigenous names.

This started with the popular 'Quiz Time' page on the ICSM website. In the mid-1990s CGNA produced an informative video about place naming and the role of CGNA, narrated by Ernie Dingo. This is available from the ICSM website.

In the mid-2000s CGNA undertook a much more challenging project – the creation of a geographic names package for schools – with lessons and associated teachers notes. The

package provides lessons and worksheets for each of four levels from year 6 to year 10, with specifically tailored material for each of four curriculum strands: English, science, arts and Studies of Society and Environment (SOSE).

The package was launched in December 2005, in time for the 2006 school year. Initially, it was moderately successful, but after an upgrade and a mail out to teachers associations in late 2006, the package has grown in popularity. By January 2009, there were over 1000 downloads of the package per month (even out of school term).

Because of this wealth of information in the CGNA section of the ICSM website, the CGNA pages are the fourth most popular (after Mapping, GDA and Tides).

5.1.2 Mapping

ICSM's most recent information package is the *Fundamentals of Mapping* web package. This was released in August 2008 and launched at the Australian Geography Teachers national conference in September 2008. In the ensuing year the popularity of the package grew dramatically, from less than 1000 pages per month, to over 10,000 pages per month.

Development of this package began in mid-2007 when ICSM's Permanent Committee on Topographic Information (PCTI) recognised that there is a vast amount of information on the web about topographic maps and mapping in general, but the information was fragmented, very complex or very simple and often required existing knowledge to discover it.

A general design concept was developed, including the following:
- the package was to provide a comprehensive, but uncomplicated, overview of maps and mapping processes;
- there would be numerous hyperlinks to access more advanced or complex information;
- it was to be written using plain English, avoiding the use of jargon wherever possible, and assuming that the reader had little or no existing knowledge of the subject;
- technical terms were to be explained clearly;
- the layout was to be uncluttered and inviting, with numerous maps and diagrams to explain the topic being discussed;
- the construction was to be modular to allow for new topics to be added over time.

The package is continually under review, with usage of pages being monitored to assess the level of interest. In April 2009, two new chapters related to Datums were added – and these have been very popular. ICSM is also currently finalising chapters related to surveying and survey control for mapping – these should be released in early 2010.

The popularity of the Fundamentals of Mapping web package has confirmed that there is a significant, and largely unmet, need for quality information about geospatial issues, and that ICSM is well placed to provide such information.

5.2 Topographic Mapping Index

Finally, the first product of ICSM's newest permanent committee, the Permanent Committee on Topographic Information, was a topographic map index for the whole of Australia. This was released in 2003 and then fully up-dated in 2007. It is now averaging 6000 page views per month.

The index provides up-to-date information about Commonwealth, state and territory topographic mapping – regardless of which agency produced the map. The site also acts as a portal to other Australian mapping agencies, as well as Land Information New Zealand and the Australian Hydrographic Office.

Its 2007 upgrade included adding Landsat imagery to assist in identifying topographic information within a map sheet. The index is now part of the MapConnect package on the Geoscience Australia website and it can be accessed from the ICSM homepage: http://www.icsm.gov.au/

6. FUTURE CHALLENGES

There are some exciting and interesting challenges ahead for ICSM, in addition to those already identified in this paper, including:

- developing a 3D model for cadastral data;
- providing an effective governance framework for ICSM's standards to ensure they are maintained;
- remaining responsive to changes is technology, user requirements and potential uses of surveying and mapping information; and
- continuing our work in times of limited funds.

7. CONCLUSION

The government agencies represented on ICSM are responsible for the capture, management and distribution of surveying, mapping and charting products and services. ICSM exists to enhance these activities – not by becoming involved in them directly, but by providing a mechanism through which collaboration can occur, and standards can be developed for adoption by all of the participants, and by the broader spatial information community. ICSM's achievements since its inception, some of which have been outlined above, demonstrate the value of having a national committee on surveying and mapping.

BIOGRAPHICAL NOTES

Russell Priebbenow is the Director of Surveys in the Spatial Information Group of the Queensland Department of Environment and Resource Management. The position has responsibility for policy issues related to surveying and mapping, including responsibility for

surveying legislation and cadastral surveying standards. Russell has over 30 years of public sector experience in surveying and mapping. He is Queensland's representative and current chair of the Intergovernmental Committee for Surveying and Mapping – ICSM. Russell is a registered cadastral surveyor, and a member of the Surveyors Board of Queensland. He holds a PhD in surveying from the University of Queensland. Russell is a Fellow of the Australian Surveying and Spatial Sciences Institute (SSSI).

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ACRONYMS

AGD	Australian Geodetic Datum (now superseded)
CGNA	Committee for Geographical Names of Australasia (an ICSM committee)
GDA	Geocentric Datum of Australia
GTSC	Geodesy Technical Subcommittee (an ICSM committee)
HDM	Harmonised Data Model (produced by ICSM)
ICSM	Intergovernmental Committee on Surveying and Mapping
ISO/TC 211	ISO/TC 211 Geographic information/Geomatics is responsible for the ISO geographic information series of standards
NTICI	National Topographic Information Coordination Initiative
PCTI	Permanent Committee on Topographic Information (an ICSM committee)
PCTMSL	Permanent Committee on Tides and Mean Sea Level (an ICSM committee)
SP1	Standards and Practices for Control Surveys (an ICSM publication)
SP9	Australian Tides Manual (an ICSM publication)