

**United Nations Expert Group Meeting on  
Contemporary Practices in Census Mapping and  
Use of Geographical Information Systems  
29 May-1 June 2007  
United Nations, New York**

**Capacity Building for Census Mapping Development: highlighting issues and  
development factors: the australian experience\***

Prepared by

Paul Williams  
Branch Head, Census and Geography  
and  
Alister Nairn  
Director, Geography  
Australian Bureau of Statistics

---

\* This document is being reproduced without formal editing.

# CAPACITY BUILDING FOR CENSUS MAPPING DEVELOPMENT: HIGHLIGHTING ISSUES AND DEVELOPMENT FACTORS: THE AUSTRALIAN EXPERIENCE

## **1. Introduction**

This paper explores some of the institutional and organisational aspects associated with developing census mapping development in Australia. Many of these issues need to be considered as longer term strategic rather than short term operational issues. Indeed in the development of the strategic objectives may also require shorter term operational plans to conduct activities in the interim period. Rome wasn't built in a day!

## **2. Development of a National Digital Spatial Data Infrastructure**

Australia is a federal system with mapping the prime responsibility of the states rather than the national government. Despite the problems inherent in these constitutional arrangements, the Australian Bureau of Statistics and the requirements of the census has played a major role in developing an agreed national digital spatial dataset that is accepted by both the public as well as the private sector.

ABS involvement with digital geographic data preceded this infrastructure with the development of CDATA86 a CD ROM product that brought together the results of the 1986 Census with digital boundaries, digitised from paper census maps. Mapping for 1986 and 1991 Censuses still relied on traditional cartographic techniques and was undertaken by a government body, National Mapping, on behalf of the ABS.

As a result of changed arrangements and reduced national government role in client focussed mapping, the ABS tendered for the provision of mapping services for the 1996 Census. In recognition of this change in supply arrangements for mapping, ABS obtained additional funding from government for this purpose.

This directly led to the formation of the Public Sector Mapping Agency (PSMA) which submitted the successful tender to provide these services. The PSMA was at that stage a consortium of the state and national mapping agencies, with the NSW state government taking the lead role. As a result of this arrangement the PSMA created the first national digital mapping database covering the whole of Australia for the 1996 Census using data obtained from the state and federal national mapping agencies.

While the ABS and the needs of the Census were a catalyst for the formation of PSMA, it has a broader client base than the ABS and has evolved into a company fully owned by the State, Territory and Federal government. Its activities, which were originally funded through the census mapping contract and the budgets of the member agencies, is now funded through revenue from the sale of digital mapping products to both public and private sector agencies. The PSMA digital map database is seen as authoritative and has no real competitors in the Australian marketplace.

ABS is still seen as a key partner with PSMA in the development of national digital spatial data infrastructure. While ABS obtains the digital mapping data from PSMA at market prices, ABS continue to work closely with PSMA in a non commercial way to improve both the quality digital map database as well as the spatial infrastructure. Current projects on which ABS is collaborating with PSMA include improving the quality of the Geocoded National Address File, and on methods to automatically adjust the alignment of the statistical boundaries (provided by the ABS) to any changes in the underlying map database.

### **3. Public / Private Partnerships**

ABS has long used partnership with the private sector for supply of technical services. This has also been the case with mapping and has contributed to the overall success of the ABS geographic work. Before seeking to outsource work to the private sector, the following points are considered:

- is the work part of, or does it contribute to ABS core statistical business;
- does the ABS have the capacity to undertake the work; and
- does the private sector provide a cost effective solution.

If the work is seen as non-core and there is another external logical provider that can undertake the work efficiently, then a contractual arrangement will be considered, along with the normal risk analysis.

The ABS is not a mapping agency and therefore has determined that its contribution to the national geographic infrastructure is in the form of geographic classifications and the associated digital boundaries. However there are major benefits in developing an in-house GIS capacity beyond the preparation of digital boundaries. These include the requirement to maintain and improve the efficiency of collection operations - both for the population census as well as the household surveys and the ability to use GIS for the analysis and dissemination of statistics.

There remains much work that is or could be done by the private sector and this has varied over time depending on particular circumstances. The most important of these is the provision of the digital map database by PSMA which is discussed in some detail above. Other services that have been provided by external contractors in the past include: alignment of boundaries to digital base map, preparation of final electronic print version of maps prior to printing; and printing of maps. Currently all these services are undertaken by ABS staff as being the most cost effective means of doing this work. The ABS is currently in discussions with PSMA to undertake the digital boundary alignment (where changes are due to the underlying digital map base). A private company is working closely with the ABS to develop the web based replacement for the CDATA product for dissemination of census and other small area data.

### **4. Developing and Retaining Skilled Staff**

Australian universities have supplied a regular stream of graduates with appropriate skills in both the technical GIS as well as the wider geography disciplines. This has been supplemented with other ABS staff who have learnt on-the-job.

However, there is a growing challenge to both recruit and retain staff with the increased demands for GIS experts in both government and the private sector and with the aging population causing increased competition for new staff.. One of the

key national initiatives of government is "spatially enabled government" where agencies such as social security, health, emergency services and environment are all expanding their GIS capability.

At an agency level, the ABS is looking at a number of options to deal with this issue, these include structuring jobs within the Geography program and wider ABS to provide a career path and variety of interesting work, possibility of short term interchanges with other government agencies, and use of flexible working and remuneration arrangements to attract the right staff.

At the national level, A Spatial Education Advisory Committee has been established with the support of the Australia New Zealand Land Information Council and professional and industry partners to deal with the looming skills shortage. The Committee will undertake a skills audit and skills needs analysis of the spatial industry and is also working with Government to develop and promote the spatial industry to students contemplating their career options.

## **5. The Need for Organisational Technical Support and Infrastructure**

The Geography Section within the ABS relies heavily on the overall technical infrastructure, capability and support of the Technical Services Division of the ABS. ABS has a well developed and sophisticated technical infrastructure with central management of infrastructure and applications.

Functions such as data base administration, desktop computing, technology architecture, software licensing, applications development, internet services and security are undertaken by this division.

While any centralised management implies some compromise, overall this works very well for the Geography Program. The Technical Services Division both recognises the importance of GIS as well as acknowledging that the nature of GIS applications have different requirements from other mainstream statistical work. As a result the Geography Section (unlike ABS statistical sections) has its own technical GIS experts working to Section management who liaise closely with Technical Services Division to ensure that the particular needs of the Geography Section can be accommodated within the overall ABS technical infrastructure.

Having a significant Technical Services Division provides staff the opportunity for a career structure, meaning that a smaller more specialised section can obtain technical staff that are outposted to Geography for a period of time, before moving on to other parts of the organisation.

## **6. Engagement with the Spatial Community**

ABS is actively involved with the wider spatial community, both with the government and private sectors. This allows the ABS influence the overall directions of spatial activities within Australia, keep in touch with new ideas and inform this wider community of ABS initiatives.

ABS is represented on the Australian Government Spatial Policy Executive and is also involved in the management and working groups that report to this executive. ABS liaise closely with the Australian and New Zealand Land Information Council (membership includes Australian and New Zealand Governments as well as the

Australian states) and as formal Memorandum of Understanding for joint work to promote the greater production and use of spatially referenced data.

ABS staff are encouraged to maintain membership of relevant professional associations and ABS funds staff to attend as well as provide papers for professional conferences. ABS has also acted as sponsor for some of these conferences. Conferences also provide a place where ABS is able to interact with private industry.

ABS is also a member and is on the managing committee of the Australian Research Council Network for Spatially Integrated Social Statistics. This network ties together the leading Australian universities and academics working in spatial research.

## **7. Engagement with Current and Potential Users and Producers of Spatially Referenced Data**

The mission of the ABS is to "encourage informed decision making...by leading a high quality, objective and responsive national statistical service". A key objective in fulfilling this mission is expanding the range of coherent spatially referenced data available both from its own collections or from data gathered by other agencies, in particular from administrative data sources.

"Spatially enabled government" to enable planning and research at the local level is now a nationally recognised objective. ABS is developing some of the infrastructure to ensure that the national statistical service is able to continue to respond to this challenge.

ABS is in the process of implementing mesh blocks (a small spatial unit of around forty households) and assisting in the development (through PSMA) of the Geocoded National Address File. The aim is to encourage a wide range of data holders to code their data holdings to mesh block and make the statistics available to the community. This work is being supported by a redevelopment of the Australian Standard Geographic Classification that will provide a contemporary framework for the common classification of geographic units for statistical output purposes.

A key challenge for the ABS is in getting administrative data holders to geocode their data holdings and make these data more widely available (while preserving the confidentiality of the individuals). Custodians of the administrative data may also have interest in deriving statistics from the data (eg. health agencies) are likely to be more easily persuaded to undertake Geocoded than other agencies that hold data but are not directly interested in any statistics that might be derived from them.

ABS has a range of programs to engage with these organisations: from direct contact by ABS senior staff with key users and producers to consultation processes and meetings.