

# CARTOGRAPHIC EDUCATION – ISSUES WE NOW FACE

**Fraser, David**

School of Mathematical and Geospatial Science, RMIT University, Melbourne, Australia, [david.fraser@rmit.edu.au](mailto:david.fraser@rmit.edu.au)

**Abstract:** *Cartographic education has been influenced in recent years by related disciplines that are, for convenience, often placed under the umbrella term of Geomatics or Geoinformatics. The overlapping spheres of influence between these disciplines has meant that there can be confusion outside the industry as to what the different terms used to describe the industry mean in practice. In turn this requires those within the industry to provide a short account of the historical development of the industry without actually describing the meaning of the terms.*

*The industry is output oriented and spans the education spectrum from training, undergraduate education, continuing professional development and postgraduate applied research. Cartographic theory, once the domain of the cartographic sciences, is now introduced under different titles, to many different disciplines, by those who would not see themselves as cartographers. Those practitioners, not taught by qualified cartographers, lack the depth of cartographic knowledge required to fully appreciate the requirements of contemporary map making. Practitioners are at the interface between the industry and the community and need to champion cartography. Qualified cartographic practitioners should be represented at industry forums as well as on academic boards that determine the content of the programs run by the universities. In turn, cartographers in tertiary institutions must push the bounds of knowledge through their research and scholarship so that the industry has a sound theoretical underpinning.*

*This paper will review where cartographers, cartographic education and the cartographic sciences sit in the current “geomatics” industry. Key issues will be raised so that these can be debated following the presentation.*

## INTRODUCTION

Cartography, cartographers and cartographic education have been influenced in recent years by related disciplines that are, for convenience, often placed under the umbrella term of Geomatics or Geoinformatics. The overlapping spheres of influence between disciplines has meant that there can be confusion outside the industry as to what the different terms used to describe the industry mean in practice. In turn this requires those within the industry to provide a short account of the historical development of the industry without actually describing the meaning of the terms.

This paper will review where cartographers, cartographic education and the cartographic sciences sit in the current “geomatics” industry.

## CARTOGRAPHERS

The constituents that combine to make a Cartographer are related to the intellectual development of cartographic theory in the mind of an individual over time and the associated emotional development, or the passion for cartography that comes from the heart. Both the mind and the heart need to be engaged in the art and science of map making.

The cartographer understands the importance of information products (maps) without which a database is of little use. To treat a database as the end product, is to forget that the purpose of the whole process is to create an information product from which effective decisions can be made. Unfortunately, in a number of quarters, there seems to be an undue emphasis placed on the importance of a database with little consideration being given to the sound cartographic theory needed for a sophisticated map product to be created.

The “geomatics” industry has evolved and as it has evolved it has spawned a number of new areas of theoretical development.

## SPATIAL SCIENCES

The spatial sciences have many specialised areas provide opportunity for the development of focussed research and innovation. Some of these specialty areas are listed below:

Cartographic science  
GIS Analysis  
Geoscience  
Geomatics  
Geoinformatics  
Surveying  
Photogrammetry  
Image analysis  
Graphic design  
Geodesy  
Remote sensing science

The spatial sciences in general are understood by only a small sector of the population and individual academics and practitioners identify with different specialty areas. Even so the products created permeate to every corner of the globe and are used by millions of people every day. This has always guaranteed that cartographic education is available in some shape or form all around the world.

## **CARTOGRAPHIC EDUCATION**

The cartographic industry is output oriented and available academic programs span the education spectrum from training, undergraduate education, continuing professional development and postgraduate applied research. Those who would not see themselves as cartographers now introduce cartographic theory, once the domain of the cartographic sciences, to many different disciplines.

Some of the Australian education programs listed below include cartography, GIS, photogrammetry and remote sensing as key subjects and some even provide majors in these discipline areas.

Cartography	Information Technology (Honours)
Cartography (Honours)	Land Administration
Computer Aided Drafting	Land Data Management
Geographic Information Science	Land Information
Geographic Information Studies	Land Studies
Geographic Information Systems & IT	Mapping
Geographic Information Technology	Multi-Media Cartography
Geographical Visualization	Photogrammetry
Geography	Remote Sensing
Geoinformatics	Spatial Analysis
Geomatic Engineering	Spatial Information Science
Geomatic Studies	Spatial Information Services
Geomatics	Spatial Information Systems
Geomatics Science	Spatial Information Systems (Honours)
GIS	Spatial Sciences
GIS (Honours)	Urban Development
GIS (Postgraduate)	

This, somewhat confusing, diversity of education programs has led to a breaking down of the clear discipline boundaries which once existed in the industry and has changed the employment profile in the industry.

## **CAREER PROSPECTS**

The boundaries between the professionals involved in the capture, manipulation and presentation of spatially related data have become blurred as previously specialist areas become quite routine due to the advances in technology and computer software. This has opened up many opportunities for individuals with the right skills to push into other sectors that now see advantages in digital spatial analysis.

Employment prospects for cartographers cover wide and varied fields. Graduates are involved in developing geographic information systems, designing tourist guide publications, interpreting remotely sensed satellite images, producing topographic and base maps, compiling street directories, operating desktop mapping packages and developing computer mapping systems. Many private organizations; local, regional and national mapping authorities; exploration and mining industries; environmental mapping agencies; and town planning companies employ cartographers.

Listed below are some of the areas Cartographers are now employed:

Administration	Geo-scientific mapping
Advertising	GIS
Animation and dynamic mapping	Graphic arts
Atmospheric mapping	Graphic Interface design
Bioinformatics.	Hydrographic charting
CAD/CAM	Image processing
Cartography	Land management information
Charting	Land planning
Community services mapping	Landscape ecology services.
Computer assisted cartography	LIS
Data capture and integration	Map reprographics
Data standards	Map/Graphic design
Database management	Marketing
Defence mapping	Mobile location services
Desktop publishing	Multi-media cartography
Digital cadastre	Natural resources information systems
Ecological models	Network analysis
Education	Network development
Education/Training	Photogrammetric mapping
Environmental information system	Photogrammetry
Environmental management	Publishing and marketing
Environmental mapping and monitoring	Remote sensing
Generic mapping tool development	Software development
Generic mapping tools software develop.	Spatial data management
Geographic data service	Spatial information and analysis networks
Geographical sciences	Spatial technologies
Geography	Systems analysis/design
Geo-Informatics	Systems implementation
Geological mapping	Tourist mapping

The dynamic nature of the industry and the changing employment profile has led to the industry constantly re-evaluating itself. This is reflected in the changes that are occurring in the professional organisations that represent the members in the industry.

## ORGANISATIONS WHICH SERVE THE CARTOGRAPHIC INDUSTRY

In Australia the cartographic profession was well served for many years by the Australian Institute of Cartographers (AIC). In recent times and after much debate, the name of the Institute was changed to the Mapping Sciences Institute – Australia (MSIA). This shift was in recognition that the industry had changed and that the Institute needed to appeal to the new groups of professional that were dealing with spatial data and its presentation.

Listed below are some of the professional bodies that have represented members of the industry in Australia.

MSIA	Mapping Sciences Institute, Australian
ASMLA	Australian Surveying and Mapping Lecturers Association
AURISA	Australasian Urban Regional Information Systems Association Inc.
IAG	Institute of Australian Geographers
ICA	International Cartographic Association
ISPRS	International Society of Photogrammetry and Remote Sensing
RSPAA	Remote Sensing & Photogrammetry Association of Australia

ASIBA	The Australian Spatial Information Business Association
AMC	Australian Map Circle
IMTA	International Map Traders Association

A number of these professional organisations have decided to combine together and to be represented by the one professional body called the Spatial Sciences Institute (SSI). This change will impact on the cartographic profession in Australia and hopefully will provide new opportunities for the industry. There is strong resistance from many members of the sister organisations who do not want to see such change. Unfortunately, it appears that the industry is not strong enough to move forward unless there is a coalition of the existing professional institutes.

An outline of the Spatial Sciences Institute's purpose is presented next as one possible model for the future.

## CASE STUDY

### The Spatial Sciences Institute

The following text has been extracted and modified from information available at the Spatial Sciences Institute website (<http://www.spatialsciences.org.au/index.asp>).

In April 2003, the members of the Mapping Sciences Institute, Australia (MSIA); the Australasian Urban and Regional Information Systems Association (AURISA); the Institution of Engineering and Mining Surveyors Australia Inc (IEMS); the Institution of Surveyors, Australia (ISA) and the Remote Sensing and Photogrammetry Association of Australasia (RSPAA) voted to become founding members of the Spatial Sciences Institute.

The Spatial Sciences Institute (SSI) is now the national body combining the professional disciplines of mapping, surveying, engineering & mining surveying, remote sensing & photogrammetry and spatial information. The national structure takes advantage of economies of scale and standardised administrative procedures. Service delivery, however, especially Continuing Professional Development, remains at the regional level to ensure the needs of members are best understood and met.

There are no barriers to membership of the Institute, but all members must adhere to SSI's Code of Ethics. Members will not be required to hold an academic qualification. However, training, qualification and experience will be recognised and rewarded through formal certification.

The Spatial Sciences Institute represents the professional interests of people who specialise in the spatial disciplines and Communities of Practice that use spatial information to complement and support their business operations or personal activities. Some of the people represented come from the:

**Spatial disciplines** - surveying, geographic information systems, mapping sciences, remote sensing, global positioning systems, photogrammetry; and

**Communities of Practice** - land administration, natural resource management, emergency management, forestry, agriculture, defence, marine environment, local government, health, education, tourism, transport and many more.

### Education

According to the Spatial Sciences Institute documentation the following aspects of the Institutes activities relate to education.

- SSI will promote and contribute to "spatial literacy" activities across all school-based curriculum
- SSI will have a strong presence at careers days and orientation weeks at relevant universities and tertiary institutions
- The tertiary education sector will recognise the role of spatial sciences in everyday life
- SSI will maintain the lead role in the Spatial Sciences Education and Skills Formation Advisory Committee
- SSI will maintain representation on our industry sector Industry Training Advisory Board (ITAB)
- The term 'spatial literacy' will be understood and used by the education sector
- Continuing Professional Development will be recognised by the spatial sciences community as an inherent attribute of the SSI

## **International Relationships**

According to the Spatial Sciences Institute documentation the following aspects of the Institutes activities relate to international professional groups.

- SSI Commissions will be recognised by international professional groups as representing Australia in their area of interest, and will participate in their activities

### ***By June 2006, SSI members will:***

- Have access to on-going CPD programs across all regions and commissions
- Have access to a certification program that is recognised as a valuable addition to their professional standing
- Receive a suite of publications that are interesting, educational, informative, and which promotes innovation
- Participate in regular forums to network and share ideas and experiences
- Recognise the biennial conference as the premier spatial science event
- Access a diverse range of seminars and other events reflecting their business interests and professional disciplines
- Have access to services that meet the particular needs of under-represented groups, including women, young professionals, senior and retired members, Para-professionals, non core users of spatial information services and those in remote localities

## **CONCLUDING COMMENTS**

Those practitioners, not educated under the guidance of qualified cartographers, lack the depth of cartographic knowledge required to fully appreciate the requirements of contemporary map making. Practitioners are at the interface between the industry and the community and hence need to champion cartography. Qualified cartographic practitioners should be represented at industry forums as well as on academic boards that determine the content of the programs run by the universities. In turn, cartographers in tertiary institutions must push the bounds of knowledge through their research and scholarship so that the industry has a sound theoretical underpinning.

