President Inaugurates ICA Column

It is my privilege to launch this series of papers about the activities and accomplishments of the International Cartographic Association (ICA). This column will be published in GIM International on a regular monthly basis from now on.

The ICA has 79 member states and affiliate organisations (www.icaci.org) and co-operates with sister organisations such as ISPRS, FIG, the International Association of Geodesy (IAG), the International Hydrographic Organization (IHO), the International Geographical Union (IGU), the Committee on Data for Science and Technology (CODATA) and other invited sister organisations. The goal is to initiate new types of co-operation within the so-called Joint Board with the aim of co-operating at global level. ICA supports worldwide spatial data-oriented activities such as Global Mapping, Global Spatial Data Infrastructures and Digital Earth. It also supports and co-operates with UN efforts, especially Early Warning and The European Navigation Conference GNSS, and is active in or creates links with the International Organization for Standardization (ISO), as a category A member, and OGC.

ICA participated in the World Summit on Sustainable Development in Johannesburg in 2002. At regional level, it supports important initiatives such as INfrastructure for SPatial InfoRmation in Europe (INSPIRE) and Global Monitoring for Environment and Security (GMES) in Europe. It maintains discussions with organisations such as the Pan-American Institute of Geography and History (PAIGH) in the Americas, EuroGeographics in Europe and some others. ICA analyses and provides support for development in the fields of cartography and Geographic Information (GI) in both developed and developing countries (for example, by creating a Working Group on Mapping Africa for Africa).

ICA is mainly concerned with cartography and the people working within cartography, providing help to members in their everyday lives by sharing best practices from across the world and encouraging members to be prepared and competitive in all fields which are part of cartography (ubiquitous mapping is an example).
ICA also targets children (The Barbara Petchenik Award, which has engaged thousands of children from all over the world) and people with difficulties (for example, the Commission on Maps and Graphics for the Blind and the Partially Sighted).

Discussions concerning changes in cartography paradigms are going on. Some people believe that such paradigms have already changed and are looking forward to a time when cartography, supported by ICTs and with access to GI, finally realises its long-sought goals, especially in the field of cognitive cartography.

At the last International Cartographic Conference (ICC) in Durban, South Africa in 2003, ICA approved its guiding document, the Strategic Plan (SP). The basic concepts and objectives of the SP are defined under four headings:
Values, Vision: ICA recognised as the world authoritative body for Cartography and GIS science; *Mission*: to ensure that geospatial information is employed to maximum effect for the benefit of science and society through promotion and representation of the discipline and profession of Cartography and GIS science internationally, and *Aims*: to contribute to the understanding and solution of world problems in decision-making processes, to foster the national and international use of geospatially referenced environmental, economic and social information.

I look forward to sharing our knowledge with you in coming issues of GIM International.

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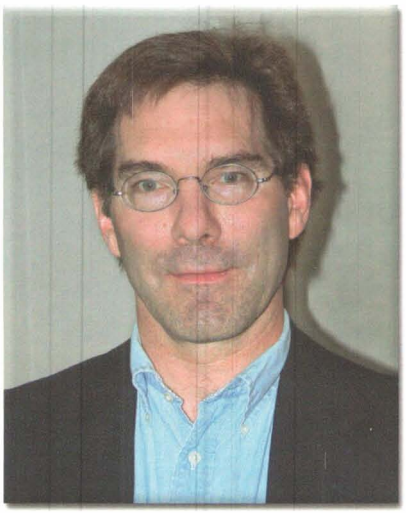
The United States NHGIS



Through the International Cartographic Association column in GIM International we wish to provide periodic updates on the key activities of ICA commissions, members and member nations. In this issue we detail The National Historic Geographic Information System (NHGIS), a five-year National Science Foundation (NSF)-funded project in the United States designed to create a comprehensive US census database, at both census tract and county level, for geographical and attribute data. Technological change presents an unprecedented opportunity to make this data readily available for social science research, thus bringing the complete census within reach of social scientists. Two centuries of data collection will thus be unlocked to stimulate research in economics, history, sociology, geography and other fields.

Researchers are increasingly attempting to use census geographic base files for historical geo-demographic analyses. For instance, after the 1990 census it became possible to document changes in geo-demographics between 1980 and 1990, using the 1990 TIGER files. One common application was mapping the change in minority populations between the two periods. However, the availability of only pre-1970 files generally constrains researchers to two or three decades of temporal analysis. The development of digital geographic base files for the period 1940 to 1990 will allow a detailed analysis of population change at much finer levels of resolution (especially tract level) for most urban areas. Many potential research projects/application areas will benefit from the availability of such boundary files.

The overall goals for the NHGIS project are to create a comprehensive spatio-temporal database at tract and county levels for the entire United States and to enable robust spatio-temporal analysis of census data, comparing census data with different enumeration boundaries through areal interpolation.

The project consists of three major components: data and documentation, mapping, and data access.

- The data and documentation component gathers all extant machine-readable census summary data, fills holes in the surviving machine-readable data through data entry of paper census tabulations, harmonises format and documentation of all files and produces standardised electronic documentation according to the recently developed Data Documentation Initiative (DDI) specification
- The mapping component creates consistent historical electronic boundary files for tracts, counties and larger geographic units
- The data access component creates a powerful but user-friendly web-based browser and extraction system, based on the new DDI metadata standard. The system provides public access free of charge to both documentation and data and presents results in the form of tables or maps

Researchers at the Minnesota Population Center and the Department of Geography at the University of Minnesota are involved in conducting this research. For more information, see: www.nhgis.org/.

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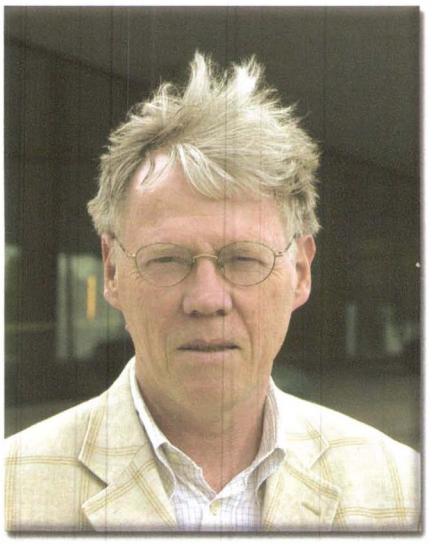
In Praise of Map Use



The mission of the ICA 'To ensure that geospatial information is employed to maximum effect for the benefit of science and society through promotion and representation of the discipline and profession of Cartography and GIScience internationally' calls for the use of geospatial information. One of such uses is in mapping. I highlight this here as it gets too little attention, both in research and in education. Geospatial information is produced and distributed in an engineer-dominated world. Up until now it has been their concern to simply get this information to the user, assuming that once there it will be perceived and understood - as it were, by a sort of osmosis. Their knowledge of the characteristics of user groups allowed cartographers in the past to adjust visualisation of geospatial information in such a way that it could indeed be perceived and understood. This experience, built up during the last century, is now in danger of being lost: cartographers are no longer responsible for producing most maps, but statisticians, geoscientists or planning specialists. Luckily, some map design programmes are now finally incorporating rules elaborated by cartographers.

But these rules are restricted to design aspects; mapping or GIS packages that also contain directives or help functions for reading maps and basing decisions on them are still to come. We do have developed help functions to inform the user about data accuracy, so that some aspects of the spatial decision process are accounted for. But the simple scenario of how to interpret a map in taking a specific decision remains unsupported. ICA is now attempting to address various user groups, such as agricultural specialists who are using maps for planning extensions of agricultural areas. A workshop was held on this subject in Thailand in December 2003. Emergency workers have also been addressed to help them to base decisions on a specific map. An ICA working group has been set up on Risk Management.

But more is needed. Map use receives insufficient attention in the field of research and this is why results of the few related studies are so eagerly awaited. True, some promising techniques tackled in the past have rendered precious little, 'eye fixation registration' is an example, but there have been others more rewarding. Nowadays our hopes lie in the video protocol technique that registers spoken comments or actions while taking map-based decisions. This technique might be used for assessing different types of visualisation (map types, scales or resolutions, animations) to be used for the same decision-making task, or the same type of visualisation for differing decision-making tasks.

It is frequently said that about 80% of all the decisions we make have some geospatial basis. We have to live with the fact that it is not cartographers that take the important decisions in our lives. We can, however, try to help those that do to properly use maps so that their decision-making on the basis of visualised geospatial information indeed reflects relevant aspects of this information. Presenting geospatial information people need, in a form they can understand and which is 'fit for use' might not be enough - though this is certainly how most cartographers would understand their task. We may have to add educating people in making sense of such information.

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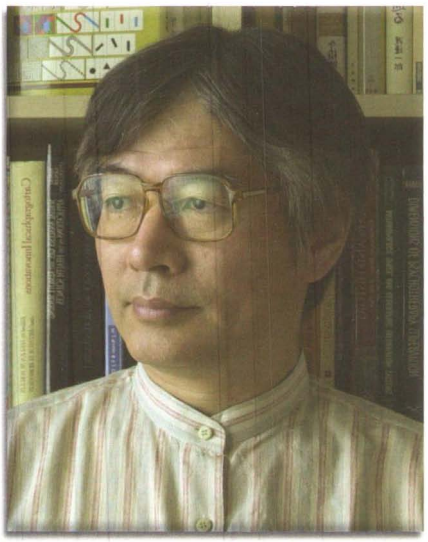
Realising the Well-mapped Society



One of the goals of the International Cartographic Association (ICA) is to help realise the well-mapped society: a society in which anyone anywhere and anytime has access to the maps required for the task in hand, be it navigation, zoning, environmental protection or just recreation. The concept of the well-mapped society was introduced into our midst at the 2003 International Cartographic Conference held in Durban, South Africa, by James Carter (Illinois State University) and was elaborated by him at the January 2004 Prague ICA workshop with commission chairs. Several new issues relating to contemporary mapping are emphasised in this initiative, including the importance of democratisation of map-making, map-user mobility, and the need for further study of map use in the development of contemporary cartography based on information technology.

In most cases, mapping methods required for these new developments bypass traditional topographic and thematic maps, creating and using products in many different forms and differing systems. Such new products give rise to new possibilities for interaction with geo-spatial information: as the individual gains the ability to access relevant spatial information on demand, human behaviour will be influenced in interesting ways. Many of us have come into contact with at least some of the new techniques by using GPS or car navigation systems, but the overall picture that will emerge through the use of these all-pervasive techniques still eludes most of us.

It is only the technically advanced among us that have experience of commercial, multi-modal human navigation services through GPS-equipped cellular phones. Or have been able to compare differing commercial in-car navigation systems with real-time information services such as traffic-jam detection, accident notification and nearest parking, through FM radio, beacon systems and the internet. And only few of us realise how new institutions emerge from new techniques; examples of such are the metropolitan traffic control centre, the vehicle information and communication centre and new cartographic or geospatial companies such as digital map maintenance, or mobile mapping system-development companies.

These considerations led the ICA General Assembly in 2003 to create a new commission: the Commission on Ubiquitous Mapping. The starting point for this new Commission is this concept of a 'well-mapped society' in which maps are available anywhere and anytime. It will concentrate initially more on the theoretical implications of such new behaviour than on practical issues of production. This summer the Commission will hold a 'Joint workshop on Ubiquitous, Pervasive and Internet Mapping (www.ubimap.net/upimap2004/)' in conjunction with the ICA Commission on Maps and the Internet. This will take place from 7th to 9th September in Tokyo; the 3rd SVG Open meeting, which has significant impact on map making using Scaleable Vector Graphics (www.svgopen.org/2004/) will be held simultaneously.

The total number of GPS-equipped cellular phones and in-car navigation systems has now reached 10 million units in Japan alone. These and the data they handle have become very popular and almost indispensable for daily life, especially for young people in urban areas. If one technique provides us with the possibility of making sense of the increasingly complex environment in which we live it is mapping technique coupled with the new potential of global mobile access. That is why we regard this as one of the directions in which ICA can move to fulfil its objective of supporting society at large.

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Cartography in the Wider World

One of the many aims of ICA (each directed towards achieving its mission of "ensuring that geospatial information is employed to maximum effect") is "to perform or to promote multinational cartographic and GI research in order to solve scientific and applied problems." The Commissions listed to the left conduct such research work and this column is intended to report, among other issues, on this.

The broader scope of ICA should not be forgotten, however. Cartography and GIScience affects, and is affected by, a range of continually changing perspectives, activities and operating environments. The 2003-2011 ICA Strategic Plan presents four detailed environments defining the structures within which ICA operates on a broader stage.

The first of these, *Science and Technology*, has clearly had a dramatic and continuing impact on society in general and on cartography in particular. Scientific networks ease data search and dissemination (for example, the Web), data collection techniques offer higher accuracy, frequent updates and finer-resolution data handling (for example, high-resolution satellite imagery). Improved storage and archiving methods help develop digital libraries, dynamic and mobile solutions to spatial data collection; presentation and use yield location-based map services, and dedicated cartographic software improves user-friendly methods for presenting and assimilating map data.

Society, the next operating environment of note, covers a range of social and organisational issues linked to cartographic and GIScience practice. These include daily needs of society (from house purchase to disaster management), developing business practices (including globalisation, more spatially aware commercial enterprise, directed Customer Relations Management (CRM)) and changing governmental priorities (such as cost-recovery for national mapping agencies, copyright legislation and increasing importance of nationally-based spatial database infrastructures). These important issues are supplemented, for ICA, by the changing profile of professional and learned societies: how do we organise increasingly complex organisations using volunteer labour? How can we retain commercial support and financial backing in a culture of 'short-termism'?

Education is a further important operating environment. Changing school curricula, the impact of Continuing Professional Development (as well as informal provision of courses on 'spatial awareness') and the problems of student recruitment to cartography courses in some areas all offer evidence of the intrinsic link between our subject and broader educational provision.

The final heading is *Professional Practice*. We need to offer continuing support to those within our profession. Most are minority specialists within a larger organisation, perhaps isolated from other cartographers; many actively seek some form of accreditation or professional recognition in a discipline not traditionally organised to offer this and some feel that a vibrant society representing their subject will increase their professional worth. Support is needed also for those who use systems or procedures from cartography or GIScience as part of their professional activity, such as environmental managers, utility managers and planners.

These broad issues affect and are affected by the nature of cartography and GIScience and ICA is actively discussing their impact. In addition to researching into the fundamentals of our subject, ICA keeps its eye on the wider picture.

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Commission on Visualisation and Virtual Environments
- Alan M. MacEachren, Penn State University, USA

Working Group on Mapping Africa for Africa
- Haggai Nyapola, Survey of Kenya, Kenya

Working Group on Spatial Data Uncertainty and Map Quality
- Robert B. McMaster, University of Minnesota, USA
- Kirsi Virrantaus, Helsinki University of Technology, Finland

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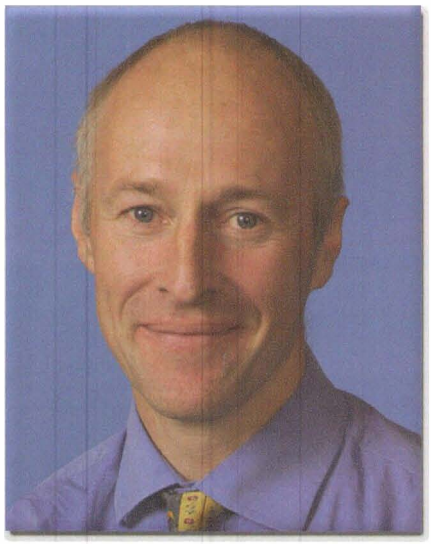
Map Generalisation and Multiple Representation



All science is technology-driven, no more so than the fields of automated cartography and GIS. Technological developments coupled with the internet revolution have resulted in a paradigm shift away from the passive paper map to an interactive one in which the graphical interface acts as a window into large, seamless, distributed, very fine-scale databases. Beyond this hyperbole, issues pertaining to the art and science of cartography remain paramount. Minksy, regarded by some as the father of artificial intelligence, remarked "you cannot tell you are on an island by looking at the pebbles on a beach." This nicely demonstrates the idea that scale, or the level of detail at which something is viewed, is central to ideas of interpreting and giving meaning to the world around us.

An interesting set of questions arises in trying to deliver multi-scaled, multi-themed cartographic products from a single detailed database, namely: what level of automation is achievable? What are the underlying data models and analysis techniques required to synthesise different cartographic solutions and evaluate them? How can a lay person articulate their mapping requirements in such 'system' environment?

One of the many commissions of the International Cartographic Association is the Commission for Map Generalisation and Multiple Representation. This seeks to co-ordinate at international level a range of activities in support of research attempting to answer these sorts of questions. The membership of this commission is excitingly varied, bringing together practitioners such as National Mapping Agencies and Map Publishing Companies, vendors and researchers in fields such as spatial cognition and cartographic modelling, database specialists and interface designers, and spatial modellers. These research elements reflect the core components essential to the development of systems capable of both modelling the cartographic process and interacting with users in an intuitive manner in the design and delivery of a range of cartographic products.

The ability to 'mix' distributed datasets raises issues of interoperability, specifications and standards. Since spatial information is continually being updated, the question arises as to how to manage the update process, recording changes once at the fine scale and subsequently 'rippling' these changes through to smaller-scale products. Research continues to draw on developments in spatial analysis and topological modelling that make explicit the characteristics inherent among map features. There are also exciting developments in the application of generalisation techniques to 3D modelling, categorical mapping and generalisation of temporal events. And as map generalisation systems have become increasingly complex, so the need for intuitive interfaces to such systems has become critical to their commercial success.

The Commission is always keen to broaden its membership and is organising two events immediately prior to the ICA conference, both in A Coruña Spain. Following on from our very successful workshop at Leicester University, the next annual workshop will take place from 7th to 8th July 2005. Open to all, the two days of presentations, brainstorming sessions and discussions will focus on the very latest developments in the field of generalisation and multiple representation. Quite separate from this workshop, the Commission is holding a one-day tutorial on Sunday 10th July 2005 specifically aimed at those wishing to know more about the science, art and application of map generalisation technologies (see http://ica.ign.fr).

William Mackaness and Anne Ruas

Dr Anne Ruas and Dr William Mackaness are co-chairs of the ICA Commission on Map Generalisation and Multiple Representation. William is a senior lecturer at the School of GeoSciences and Anne heads the Cogit Laboratory, one of the research centres at the IGN, the National Mapping Agency of France
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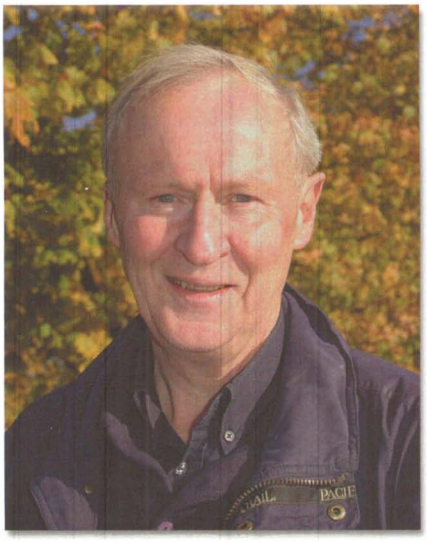
ICA Underpinning of Society



In the ICA Strategic Plan we have defined four fields of operation: Science, Education, Professional Practice and Society. Each of these is the direct responsibility of a member of the Executive Committee, who will report on them in turn. Although research in cartography and GI may have a direct impact on (and be affected by) science, most advances in our discipline also have an indirect impact on society. The ICA overall goal in this field of 'Society' is expressed in the Strategic Plan as the promotion of *applications of Cartography and GI-Science in any area that can be beneficial to Society in general.*

Clearly, there are many such areas where ICA activities have an impact. Examples are:
- assisting in promoting sustainable development by global dissemination of information and knowledge of cartography and GI-science
- investigating ways in which more people can be introduced to the benefits of spatial data, geographic software and map products
- contributing to the understanding and solution of local and worldwide problems through the use of cartography and geo-spatial data
- encouraging under-represented groups, especially women, young people and people from developing countries.

By integrating research, teaching and practice in these areas and promoting our actions, ICA seeks to make participation in its work worthwhile for individuals, associations and companies.

The work of ICA is the work of its commissions and working groups. These now total more than twenty, most having some societal perspective to their work. For example, several commissions could be involved in atlas production, long a concern of cartographers. Data is compiled daily at local, national, regional and global levels in order to supply decision support. The advent of computers and the internet have made both compilation and dissemination more efficient. It might be possible for Turkey to benefit from a National Atlas Information System in their negotiations for membership of the European Union. Such a system is also in line with currently developing concepts of Geo-spatial Data Infrastructures.

A further example of ICA commitment to society is the ICA working group 'Mapping Africa for Africa', established in 2003 at the International Cartographic Conference in Durban, South Africa from an initiative taken by the local organising committee of the conference and supported by NEPAD (New Partnership for Africa's Development). The aim of the group is to support African countries in their efforts to develop Geo-spatial Data Infrastructures. The challenge now is to combine all efforts and organisations involved to achieve sustainable results.

We recently received the sad news that Professor Arthur Robinson (USA) and Professor Torsten Hägerstrand (Sweden), both strong supporters of ICA, had passed away. Through their academic research work, each contributed significantly to cartographic and GIScience education, professional practice and, in the end, to society as a whole.

A further report on what ICA is doing in the field of 'Society' will be given at the next International Cartographic Conference, ICC 2005, in A Coruña, Spain.

Photo: Britt-Louise Malm

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