

International Cartographic Association



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A Strategic Plan

for the

International Cartographic Association

2003-2011

As adopted by the ICA General Assembly
2003-08-16

Note

Although this document appears on the ICA website it is **directed primarily at ICA people** – officers and others working within the Association. Some of the following account may seem self-evident, but it is included for new members and as a benchmark against which misunderstandings may be compared.



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Foreword

Since its foundation the ICA has been led and managed by dedicated and enthusiastic teams, but there has never been a full official review of the organisation. A significant and largely independent analysis was presented at the 15th Conference/9th General Assembly in Bournemouth, UK, in 1991, and published in the Proceedings (Rhind, 1991). Its author was about to retire from the Executive Committee but his ideas and earlier contributions to EC discussions led to various changes, notably a new set of aims, which is still in place today. In recognition of the problems identified in the early 1990s and of the great changes now being faced by the ICA, the Executive Committee offers the General Assembly a series of planning proposals for its consideration.

This strategic plan has been prepared by the ICA Executive Committee and edited by Michael Wood. A preliminary version was reviewed by Joel Morrison, Judy Olson and David Rhind. Valuable input has also been received from the commission chairs.

The Strategic Plan has been adopted by the Delegates of the ICA General Assembly on the 16th of August, 2003 as a set of guidelines for the management of ICA.

Durban, South Africa, August 16, 2003

Bengt Rystedt
President

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1 The ICA Strategic Plan 2003-2011 (*in outline*)

As explained within this document, changes have taken place over recent decades, which have had a significant impact on the ICA, its environment and community. If it is to preserve its authoritative international role in cartography (and in the associated fields of Geographic Information Science ¹) important changes are required within the organisation. The proposed changes, which must both confront the challenges being faced and continue to stimulate a wide range of research and professional activities, are presented in the form of a Strategic Plan. The basic concepts and objectives of this plan, for the consideration of members of the ICA, are laid out below.

Values (Our basic priorities):

- Members of ICA respect the freedom and universality of science, the equality of individuals and cultures ², and appreciate creativity and critical thinking.
- ICA seeks the highest quality in technology, standards and production processes.

Vision (The grand ideas):

To see....

- Cartography and GIScience applied to their full potential in science and society.
- ICA recognised as the world authoritative body for Cartography and GIScience.
- ICA recognised for outstanding service to its members.
- ICA attracting membership from national Cartographic and GIScience societies, universities, government and business and commercial organisations, as well as individuals from every country of the world.

Mission (A leadership statement for action):

- 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.

Aims (Subsidiary targets for accomplishment of the vision/mission):

- To contribute to the understanding and solution of world problems through the use of Cartography and GIScience in decision-making processes.
- To foster the national and international use of geospatially referenced environmental, economic and social information; and to encourage introduction of a focused geospatial basis for national and international statistical information.
- To provide a global forum for discussion of Cartography and GIScience.
- To facilitate the transfer of new Cartographic and Geographic Information (GI) knowledge between and within nations, especially to the developing nations.
- To perform or to promote multi-national Cartographic and GI research in order to solve scientific and applied problems.
- To enhance education in Cartography and GIScience in the broadest sense through publications, seminars and conferences.
- To promote the use of professional and technical standards in Cartography and GIScience.
- To support map-related research in specific topics such as those concerning children, history, theory and the visually-impaired.

¹ Referred to as "GIScience" in the remainder of this document.

² Evidence: ICA is a non-governmental organisation acknowledged by the United Nations, and follows the rules of the International Council of Science (ICSU).

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2 The Background and Context of the Plan

ICA is a great family of scientists and professionals who have worked together and made a difference in the world. This section reviews its foundation and maturing years and then highlights the challenges being faced today.

2.1 An Honourable Past – Four Decades of Growth and Achievement

Beginnings. The ICA was formed in 1959 to help overcome internal, national and international barriers in the cartographic profession: it aimed at a free exchange of theoretical and technical information, which had previously been kept secret, to a large degree for defence or commercial reasons. With the support of both national mapping agencies and major atlas publishers, the early years saw the establishment of a sound economic base and a firm belief in the role of cartography in the development of international understanding and co-operation (Ormeling, 1987).

The early aims and achievements of the ICA were both scholarly and scientific, but with the increasing influence of new technology (especially computing and electronic communication) on map production and use, commission themes and activities expanded to include more technical and management-support topics. The organisation grew in size and international stature with national membership increasing by almost 500% by 1991.

New directions. Since 1991, and the adoption of new and more global aims, significant changes followed. The earlier focus on maps and map-making did not diminish but was extended to embrace what was referred to as the implicit ‘use of cartography’ (Rhind, 1991) as a facility to help analyse and solve world problems. This change also reflected the international vision of the earlier foundation years and led to a more expansive policy of interaction with sister societies and with international organisations such as the UN. The ICA now sees itself as part of a wider international initiative addressing the problems of our planet and is increasingly involved in technical matters such as the incremental updating of databases, spatial data standards, multi-scale issues, the Internet and satellite mapping and visualisation and virtual environments. The last theme is an outstanding example of ICA’s recent participation in, and contribution to, major international research. However ICA’s other special themes, cultural and societal matters are also covered with commissions on marine, mountain and planetary cartography, the theory and history of cartography, education and training, national and regional atlases, gender, children, and maps and graphics for blind and visually-impaired people. Details of achievements and current progress are available on the ICA website.

2.2 The Challenges of Today – Changing Activities, Contexts and Environments

New technology has been the greatest force for change and has led to changes in the nature of cartography and in the whole environment and context of related mapping activities.

The nature of cartography. Finding a simple and comprehensive definition of cartography may have proved impossible but our ever-present spatial awareness and knowledge of the environment (the mapping instinct) cannot be denied. Humans have relied on it for millennia and it remains as significant today as it was in prehistoric time. The mental constructs have been referred to as cognitive (virtual) maps and these can be expressed externally (e.g. as sand drawings or pencil sketches) when the situation demands. Such external graphics (maps) offer useful extensions to our thinking ‘space’ and can provide the basis for graphic ‘discussions’ between people about spatial issues. Maps, therefore, act as external aids for spatial communication, but equally (even simultaneously) they make it easier to investigate, analyse and discuss spatial problems. Drawn in more permanent form (e.g. on a

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piece of tree bark, or even paper!) they are also a means of storing spatial information. When such images are formalised through precise survey and graphic symbolism, the result is a conventional map, and the process of its construction is a core aspect of cartography. Cartography, in this basic sense, has not really changed, but its nature, scope, and investigative and communicative power have been advanced throughout history by technological change.

Changes in technologies and environments. Professional cartographers have been producing 'traditional paper maps' for centuries. But recent decades have brought unprecedented changes to the technology and operating environments of cartography and the ICA, mainly through the explosive growth of computing and its increasing effect on every aspect of life. In 1960 the cartographic profession within the national agencies and commercial companies was distinctive and unchallenged. During the past decade technology has helped democratise the cartographic process (by means of user-friendly graphics packages for presentation, and with Geographic Information Systems (GIS) for spatial data exploration, manipulation and analysis) so that some people have even questioned the continued need for cartographers. Although perhaps smaller in active membership today than in the past, the profession continues to flourish with products still ranging from paper maps to maps and atlases on the Internet. Democratisation of mapping may carry its dangers, such as the lack of appropriate basic knowledge in the users of cartographic and GISystems. But, more importantly, increasingly interactive Internet mapping sites (such as Multimap and Mapquest) are quietly and unobtrusively helping people rediscover the scope of their mapping instinct. By participating, interactively, in the simple adjustment of symbols and selection of content, they are learning to **use** cartography as an everyday activity rather than just having to depend on the search for and interpretation of pre-printed maps which can be out-of-date and unsuited to purpose. Not only are more maps being created and used today but there is also a rapidly growing pool of rudimentary 'cartographers'.

Changes in the wider ICA community. The roots of the organisation are in the national committees (where such groups exist) and their associated cartographic/scientific societies, often the primary source of ICA officers, commission members and funds. So intimate is this nourishing relationship that it does not take long for ICA to be affected by changes in the economic health and well-being of such organisations.

Changes in specific organisations. The traditional charitable support offered by *state mapping establishments* is getting weaker due to the restrictions of new management policies of accountability in time and money. *Cartographic publishing firms* and *commercial cartographic practitioners* which were at the cradle of the ICA must also be encouraged back and re-involved by broadening the potential for active participation in conferences and commissions. In some countries or regions there may be a time-lag in *university curricula* of the adoption of courses in GIScience and in the Cartographic required today. With the emergence of GISystems and the popular awareness that – among other things - they can be used to create maps, the word 'cartography', and associated courses (with the essential and fundamental knowledge they offer) are being dropped. This is unfortunate as the map-using constituency of the future will, implicitly, include everyone who accesses the Web and utilises spatial data with the help, but not full understanding, of contemporary map-related technologies.

The Operating Environments

Although they are not distinct, the Environments, mentioned above, within which ICA operates are: Science and Technology, Education, Professional Practice and Society.

1. **Science (and technology):** the development of the scientific and technological basis of Cartography and GIScience.
2. **Education:** the development and promotion, through education at all levels, of the truths of what we know and have discovered about our subject.



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- Professional Practice:** the provision of support for two groups of professionals:
- a) Those who describe themselves as professionally active – as their main occupation - in a specific area of Cartography or GIScience.
 3. **Society (social and organisational):** by seeking to promote applications of Cartography and GIScience in any area that can be beneficial to Society in general.

Changes within specific operational environments.

Science (and technology):

New scientific networks:

- More interdisciplinary.
- Operational on the Web.
- More effective literature search.

Possible technological changes:

- Data-collection to be sensor-facilitated.
- Storage improvements.
- Data communication.
- User-friendly mapping packages and mobile devices.

Society (Social and Organisational):

Changing needs, services and infrastructures will, in turn, affect mapping needs:

- Informal educational facilities for different age ranges.
- Different business environments.
- Different holiday and recreational patterns.
- Daily needs of society (accessing information about home purchases, anticipating and responding to emergencies).
- Growing awareness of spatial relationships and of the spatial context of location-based services.
- New technical possibilities such as texting (SMS) and mobile picture phones.
- Smart machines (e.g. with Blue Tooth wireless facilities).
- Changing school curricula.

Reduction in the availability of volunteers will extend the need for more professionalism within ICA:

- Remuneration of ICA officers.
- Use of a commercial organisation for administration.

Increased integration and interoperability will result from improvements in standards. Some effects:

- The continued need for copyright and pricing.
- Creation/extension of National Geographic Data Infrastructures (NGDIs).
- Organisations will be more specialised – leading to need for more co-operation.
- New databases will be required and created.
- New fields will emerge where geographical information will be used.
- Related aspects will be the building of cartographic interfaces for management purposes and robot-based maintenance.

Effects within ICA:

- While ICA tasks tend to grow, company support will be reduced.

Education and Professional practice:

- Amateur and professional practice within the Geospatial sciences will change in nature, increasing the necessity for Continuing Professional Development.

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3 Responding to the Challenges

3.1 ICA – a Fitness Checkup!

As an essential preliminary exercise, a SWOT analysis³ was performed. However the elements were re-arranged so that the analysis concludes on a more positive note, i.e. not with ‘threats’ but with ‘opportunities’. The analysis is the same but the acronym now reads SWTO!! We also prefer to replace ‘Threats’ with the concept of ‘Risks’.

The status of the organisation was considered as follows:

- Examination and acknowledgement of the **Strengths** of the ICA - to be maintained and developed.
- Location of **Weaknesses** and associated **Threats (Risks)**.
- Identification of **Opportunities** that lie ahead – to be exploited.

Strengths

- Knowledge within ICA is special and unique, accumulated during over 40 years of growth.
- ICA leadership is recognised internationally.
- Pioneering activities by leading scientists and professionals working within the framework of the ICA are recognised for their quality

The subject field:

- Has an instinctive (map-related) attraction for many people.
- Is based on the well-established tradition of cartography – which has moved into a new phase of evolution.
- Retains its instinctive and traditional nature and strengths but is expanding from its presentational functions to provide more effective visual-thinking/decision-support facilities.
- Has evolved with the technology.
- Through maps, is increasing in level of usage in science and society.
- Offers effective solutions for the problems of science and society.

ICA:

- Has a successful, organisational structure, driven by enthusiasm from the ‘bottom-up’ and guided by the Executive Committee from the top down.
- Has an effective membership structure.
- Receives strong support from many member nations.
- Maintains good relations with sister societies in the field of Geographic Information (GI).
- Continues to attract a core of dedicated and talented workers.
- Receives both direct and indirect support from the institutions of some ICA officers.
- Contains Commissions with noted achievements and research output -some achievements have received wide international acclaim.
- Is currently financially sound.

Weaknesses

Subject field:

With the introduction of computing and the growth of GISystems, the **perception of Cartography** is less clear to everyone than it was in the past, for example:

- Definitions may be out-of-date and open to different interpretations.
- Some believe the field to be old-fashioned – maps are primarily regarded as traditional static paper images only.
- The subject is believed by some people to have become wholly or partially redundant with the growth of GISystems.
- Cartography is assumed by some to be only the output phase of a GISystem.
- There is low awareness, outside our field, of how the modern subject has developed.

³ A marketing tool: Strengths, Weaknesses, Opportunities, Threats (SWOT)



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- Previous scientific studies related to mapping, such as research into map reading, are being 'claimed' by some people in GIScience.
- Many previous scientific studies related to mapping should, by their nature and purpose, be included within the wider interpretation of GIScience
- There is inadequate explanation of our new field (i.e. beyond static paper maps).
- The rationale of cartography is doubted by some rival groups.

The organisation (and its members):

- Have a vision and mission that grew from the 1960s, and require updating.
- May be losing awareness of the changing 'cartographic' community.
- Have been showing poor response to the changing operational environments.
- Are depending, too greatly, on voluntary workers from supportive institutions.
- Depend on voluntary executive officers.
- Should be aware that some officers are less active than others.
- Provide too few incentives to motivate officers.
- Receives an irregular and unpredictable money supply – from fee payment.
- Relies too much on national funding.
- Should strengthen its financial resources (to provide sufficient reserve funds for one whole year).
- Should be aware that (for financial reasons) senior officers may have to restrict their travels at a time when the necessity for increased travel is becoming part of new international community activity.
- Has too many aims – and still tries to do too much.
- Poor finances, requiring sections of the ICA to find additional funds elsewhere.
- Must realise that only candidates with financial support can afford to stand for office.
- Needs to improve real communication between members and officers
- Has a poor recent publishing record.
- Has been declared open to new technology but closed to new concepts.
- Do we know who we are?
- Should realise that not all commissions work equally well.
- Should acknowledge that Commissions' terms of reference can be weak and ill-defined.
- Has major conferences which still suffer from financial uncertainties.
- Is showing recent signs of loss of active member nations.

Threats (Risks)

- Possible loss of recognition of world leadership through changing outside views of the nature and relevance of Cartography.
- That a real reduction in the numbers of 'traditional' professional practising map-makers (cartographers) is assumed to imply the demise of cartography itself.
- Democratisation of 'cartography' through new map-making software is believed to reduce the necessity for experts.
- Losing some status and identity by being seen as only a subset of GISystems/GIScience.
- Declining membership (loss of existing members with few new recruits).
- Increasing dependence on a voluntary work force.
- Declining funding.
- More pressure on dedicated individuals.
- Insufficient nominations for key posts.
- Technological, social and political changes.
- With reduced costs of hardware and software, more people can 'make' maps.
- Breakdown of inter-disciplinary boundaries.
- Growth of commercialism and reduction of national mapping.
- Loss of interest from professional cartographers and cartographic firms.

Opportunities

- To fully re-establish our leadership position within cartography and within the wider field of GIScience.

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- To become an equal partner within the GIScience community, and enrich that field – especially from the viewpoint of ‘visualization’ etc..
- For growth.
- For new membership categories.
- To publicise our achievements more widely.
- To take more advantage of new technologies including Internet communication.
- To develop the education potential of ICA.
- To widen our impact on science and society.
- To expand contacts with international NGOs.
- To develop better decision-making and management with improved information flow.
- By clearer definition, to improve the lot of the cartographer.
- Increase affiliate members.

3.2 Priorities for the Future

This realistic and honest review of ICA as an organisation can now be used to highlight priorities for the future. The sections that follow contain key concerns that must be addressed in the strategic plan.

The use and ownership of cartography. Due to the increasingly seamless nature of science there is now some overlap of membership and interests between sister societies. Some, in traditionally more narrowly-focused subjects, may have exhausted the research potential of their core fields and are now expanding their specialised knowledge towards the development of data provision and applications. Inevitably, this involves cartographic presentation and analysis (through geographical visualisation tools or GISystems) to support such activities. Like language, cartography cannot be ‘owned’, and it can only be used to effect with appropriate learning and skill. Despite such preferred knowledge, cartography has many users and applications. For this reason and many others ICA must continue to offer authoritative world leadership for the whole of cartography. Its on-going interests and strengths will always be reflected in the operational fields of its current commissions.

Acknowledging that the field of Cartography already includes Geographic Information Science. Although the concepts underlying cartography have always been much wider, the ICA was founded during the heyday of printed paper maps, and naturally, its first concerns were with their conception, production and study. The creation of maps and mapping systems (real and virtual) remains a priority, but recent years have seen more technical commission themes within the ICA (e.g. incremental updating of databases, spatial data standards, multi-scale issues) which reflect overlapping interests with, and the disappearance of boundaries between. other mapping sciences.

For centuries the production of external representations of our human instinct – maps - has been primarily the responsibility of ‘cartographers’, and these maps, of course, have fulfilled many purposes, including expression of human ideas (real or imagined), spatial data storage and support for research and decision-making. But new technologies have enhanced the power and potential of cartography (exploratory, analytical and communicative) for a much wider community of both professionals and the general public, not all of whom are trained or competent in its use. Some, notably the researchers in analytical cartography (mathematical and analytical theory⁴ and the developers of GISystem technologies, have exploited what have been referred to as the ‘deep structure’⁵ (as opposed to ‘surface structure’⁶) of cartography, to the enormous benefit of science and society. Many new cartographic products (such as maps and atlases on the Internet) are considerably enhanced by (and even depend on) the functionality of such systems.

⁴ See Tobler, W.R., 2000 and Moellering, 1980.

⁵ Spatial data and relationships stored in a non-graphic (normally digital) form. See Nyerges, T., 1981.

⁶ The cartographically displayed data (see footnote above).

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Geographic information science has been defined as ‘the set of fundamental issues arising from the use of... GISystems’ such as ‘scale, accuracy and the relationships between humans and computers’ (Longley et al, 2001). But many of the problems associated with GISystem applications are not new⁷. Questions on mathematical cartography, human-map interaction and generalisation, for example, have been around for decades, even centuries, and still apply. It is obvious that, like GISystem developers, those people involved in creating new dynamic and interactive maps and mapping systems are equally dependent on subjects within Geographic Information Science. *It is appropriate, therefore, that the International Cartographic Association should be qualified with the sub-title ‘The International Society for Cartography and Geographic Information Science’.*

Increasing the visibility of the organisation. This may initially require more general education of the public as to what cartography is (for the exploration, analysis and representation of spatial information) and what it **is not** (drawing maps for paper production).

Remaining relevant to its constituency. Although the exact nature of the ICA membership constituency requires review, ICA must satisfy the needs and expectations of user groups both now and in the future. It must be respected as a reliable and informed intermediary, a role is now facilitated by the ICA Website.

Making better use of increasingly limited human resources. Although the organisation’s wider constituency may remain large and even increase, the number of active members are likely to decrease in the short term. Members who have, traditionally, taken on responsibilities within the organisation now have less time (and money). This reduces the pool of potential membership of commissions where some are currently active in more than one such group. The ICA must take a more professional approach and consider the establishment of some paid posts.

Responding effectively to global geospatial initiatives. Pressures from various sources (especially government and industry) have led to global initiatives which demand the application of Cartographic/GIScience expertise. It is increasingly important for ICA to organise priorities of response to, and procedures for, action with groups such as Digital Earth, The Global Map, Global Spatial Data Infrastructure (GSDI), ISO, UNGIS.

In summary the main challenge is to prepare for a world that will depend, increasingly, on the effective use of Geographic Information and on the application, in particular, of Cartography and GIScience. Developments such as handheld or even wearable cellphone/communicators (and instant compact printed-on-demand images) will bring all forms of spatial data to the eyes, ears and fingertips of the population. Cartography and GIScience will remain essential to support the effective provision of this information at both the virtual digital level (for query and analysis) and graphically, to make the information readable, understandable and fit-for-purpose.

4 Converting Ideas Into Actions - Implementing the Strategic Plan

4.1 Membership Categories

National (full) membership with voting rights. The **normal situation** will remain as one representative/full member per member nation. The representative can either be a national society or committee or an organisation, which is committed to represent the community of cartography and GIScience of the nation.

⁷ Op.cit p 438.



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Individual membership. ICA plans to introduce individual membership within the framework of national membership, through payment of a small fee (e.g.\$10 per year), in addition to the national membership dues. Members of the national cartographic societies of member nations can then become individual members of the ICA giving them direct access to ICA information (by user name and password). In countries without national membership, direct individual membership would also be permitted, but for a higher fee (e.g. \$25 per year). The administration of individual membership would not be the responsibility of the national representative.

Affiliate membership. ICA will re-establish the traditional links with cartographic producers and publishers by giving them greater recognition, as these groups, to a large degree, still determine the 'face' of Cartography as presented to the general public. The following categories are identified (the 'units' refer to membership fees):

1 unit:

- Educational and professional establishments.

2 units:

- Educational and professional establishments.
- National cartographic enterprises.

2-4 units:

- National, public cartographic institutions.

Between 6 and 10 units (by agreement):

- Internationally operating private cartographic or GISystems/Science companies and public bodies.

The space allotted for advertising/logos in the ICA Newsletter and on the ICA Homepage will be commensurate with the degree of membership (fees paid).

4.2 Benefits of Membership

For Cartographic societies:

- The ICA publications with early membership access, especially to new cutting-edge scientific contributions (which will be deliberately short to allow further input from cartographic societies)
- Conference registration fees for pensioners – should be reduced by 50%.

For Map publishers:

- The results of ICA research into map-use.
- The development of new cartographic techniques by commissions.
- The development and maintenance of standards.
- Quality control studies.
- Scientific status within the field of Cartography/GIScience.
- The results of all commission work.
- Competition for an ICA prize for the best school atlas.
- Participation in exhibitions in liaison with organisations such as IMTA(13).

For Affiliate members:

- Visibility in the Cartographic/GIScience community.
- Acknowledgement of contributions to the field.
- Preferential treatment at conference exhibitions.
- The same benefits as individual practicing cartographers/GISscientists.

For Individual members:

- Access to ICA publications (possibly through user-name and password – to be negotiated).
- Access to discounts from providers of web-based continuing education.
- Early access to new and practical knowledge, e.g. (Comparisons of packages and hardware for



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Cartographic/GIScience purposes).

- Through an updated compendium, access to the results of recent relevant academic studies in design, perception, etc.
- Possibility to have access to 3 ICA journals could boost individual membership.
- Discounts for software, possibly for regional conferences.
- Production of a Who's Who in Cartography and GIScience.

4.2 Ideas and Actions for the Organisation and in the Wider Operational Environments

The following are more refined **objectives** being proposed to support the achievement of the ICA's Mission and Aims, and would guide both Executive Committee and Commissions in the composition of programmes for action. The 'Actions' listed would naturally have to be timetabled within Commission programmes, and then monitored by the Executive Committee when complete.

In the ICA as an organisation

ICA will become more professional in nature. More attention will be given to the support of capable officers through the following proposals:

- *Introducing motivational schemes (financial and career-path) for future ICA officers.*
- *Encouraging members of minority groups, young people and people from developing countries to become involved in ICA.*
- *Investigating new forms of identifying senior officers and potential commission members.*
- *Improving communication between ICA officers and membership and provide for a continuous forum for discussion rather than a bi-annual one.*
- *Option to have fully paid officers, e.g. webmaster, executive director, (although this would create an imbalance with volunteers).*

Actions:

- Set up career paths for ICA officers, and encourage new blood.
- Investigate the possibility of joint-presidents and a female presidency (is such affirmative action legal within ICSU?).
- Improve communication within ICA through the website with a full-time webmaster.
- Introduce the possibility of real-time interactivity between membership and ICA officers.
- Develop the ICA Newsletter and a programme for International Journals of Cartography and GIScience.
- A marketing task group to make provisions for pensioners, young scientists.
- Perhaps we should have a group of programme managers instead of VPs. They should be in charge of four fields, e.g. science, society, professional practice and education.
- Introduce a public relations officer.
- Introduce a First Vice President.
- Conferences to be more interesting for practical cartographers.

In the wider operational environments

in Science

Promoting Cartography and GIScience as individual subjects and clarifying the relationship between them as well as with other geospatial sciences by:

- *Strengthening the profile of scientific commissions in ICA.*
- *Promoting international co-operation in scientific research on Cartography and GIScience, including fora for scientific discussions, dissemination of information and scientific publishing in Cartography and GIScience.*

Actions:

- Create clear guidelines to improve the co-operation between EC (Executive Committee), LOC (Local Organising Committee) and the commissions.



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- Implement a global research agenda on key themes within Cartography and GIScience.
- Maintain research into spatial representation and visualisation facilities for spatial exploration and analysis.
- Establish new commissions on mobile services small format cartography and spatial data analysis.
- Review past studies and develop new research in map use, cognition, and aids to map-reading and decision-making.
- Investigate new ways to improve the quality of the scientific papers at ICA Congresses, possibly introducing an award for the best paper presented at the conference.
- Organise commission and cross-commission meetings.
- Establish an international journal programme on Cartography and GIScience.
- Update information on ICA publications, definitions and other related material in the web, on ICA home page.
- Activate interactions between ICA and other scientific geospatial societies as well as those in computer science and statistics.
- Encourage interaction between universities and scientific research groups.
- Organise a scientific bookshop during ICA congresses.

in Education

- Investigate ways to Strengthen and monitor education programmes in Cartography, GIScience and related subjects at all levels (university, high school, elementary, life-long learning).
- Providing fora for discussions of education programs and curricula in Cartography and GIScience.
- Developing information networks and virtual universities on Cartography and GIScience.
- Organizing educational courses on Cartography and GIScience for example in developing countries and for regional purposes.
- Offering 'master classes' in GISystems/mapping to guide managers in spatial decision-making
- Investigate methods (and funding sources) to encourage the participation of students and other young members in ICA work.

Actions:

- Analyse existing university curricula in Cartography and GI Science, and encourage promotion of the goals contained in the ICA mission.
- Help widen the n Cartographic/GIScience knowledge base and skills into new segments of Society
- Increase efforts directed to capacity-building, especially in developing countries, especially with reference to human resource development
- In co-operation with commercial suppliers, develop virtual academy courses on Cartography and GIScience to support and complement what is on offer.
- Provide geospatial data for educational use.
- Establish a network of university/school teachers to provide a forum for discussion and the possibility for support.
- Extend travel awards for young scientists; lower conference participation fees for students.

in Professional Practice

- Encouraging wider application of cartographic principles within information technology.
- Promoting the transfer of GI technology and standards for practical use.
- Strengthening the profile of professional practice commissions in ICA.
- Promoting the presentation of 'best practice' in the field of Cartography and GIScience.
- Providing possibilities for interaction between practitioners during the ICA congresses.
- Attention for digital devices, for copyright and for system funding should be on ICA's agenda, to accommodate cartographic practitioners

Actions:

- Analyse commission structure and establish new commissions in order to maintain a balance between theory and practice.
- Organization of workshops on specific topics.
- Organize high quality technical exhibitions and expert panels during the congresses to attract practitioners to participate.
- Encourage national associations and universities to translate outcomes of congresses and symposia



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into local languages, publish the translations on the web and link them to the ICA page.

- Facilitate the exchange of experts between and within developed and developing countries.

in Society

- *Promoting sustainable development by disseminating information and knowledge on Cartography and GIScience globally.*

- *Investigating ways in which more people can be introduced to the use spatial data, geographic software and map products.*

- *Contributing to the understanding and solution of local and worldwide problems through the use of cartography and geospatial data.*

- *Encouraging under-represented groups, especially women, young people and people from developing countries to be involved in ICA.*

- *Making the participation in ICA worthwhile for individuals, associations and companies.*

- *Integrating research, teaching and practice.*

Actions:

- Atlas production on specific global themes – for example the water atlas – aiming to strengthen decision support based on relevant and reliable geospatial information.

- Provide guidelines on the use and presentation of geospatial data on the Internet

- Develop navigation tools for visually impaired people.

- Participate in research and development projects aimed at personal security, public services and well-being.

- Collect funds from donors in order to organise expert support for developing countries and for developing regions within nation states.

- Where requested, support United Nations by providing geospatial expertise.

- Support United Nations by providing geospatial expertise.

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Appendix – Some Terms and Definitions

The objectives and actions outlined in the plan call for a listing of some terms and definitions to ensure that they are clear and fully descriptive of what is happening in the subjects today.

Cartography

Short definition:

(a) The art, science and technology of making and using maps.

Long definition:

(b) A unique facility for the creation and manipulation of visual or virtual representations of geospace – maps – to permit the exploration, analysis, understanding and communication of information about that space.

Map

A symbolised representation of a geographical reality, representing selected features and characteristics, resulting from the creative effort of its author's execution of choices, that is designed for use when spatial relationships are of primary relevance.

Maps can be described as –

- Permanent/hardcopy (e.g. on paper) or 'virtual' (existing in digital or cognitive form).
- Visible (can be seen) or 'invisible' (stored in a database).
- Tangible (can be handled and/or touched) or not tangible (only existing in digital or cognitive form).

Maps can exist in **various forms**, e.g.:

- On paper (permanent: visible and tangible).
- On a computer screen (virtual: visible but not tangible).
- Stored on a disk (virtual: invisible but tangible).
- Accessible over a network from a database (virtual: invisible and intangible).

Maps have additional **functionalities**, e.g.: can be:

- Dynamic – animated in real time.
- Interactive, containing hyperlinks to connect with additional information within the related database, thus offering sources well beyond their visible content.
- Acting as hyperlinked interfaces to help users navigate through geospace, via associated network-linked databases of geospatially-related information.
- Designed with new variables such as sound.

Maps can **be used** as:

- Single virtual images or collections of such images accessible on CDs or over a network.
- Part of an interactive system in which the user/decision-maker is able: To select and interact with previously assembled maps.
- To access databases (via an interface map) in order to search and customise what is needed.
- Maps may be interactive interface, also with functionality to allow the visualisation process to be used for:
 - Data mining and exploration from databases.
 - Data analysis.

Visualisation

The creation of a visual image of something, mentally, or physically, using graphic, photographic or other means. The subject data of the visualisation may or may not be generalised.

Cartographic Visualisation

This is a subset of 'visualisation' as the term embodies the unique characteristics of a cartographic product (map), i.e. it is generalised, symbolised and measurable to meet its intended purpose.



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However, the term ‘visualisation’ has also now been adopted by computer scientists – as in Scientific Visualisation - to refer to the exploration and analysis of data and information graphically. Cartographic Visualisation can therefore be more specifically defined as a map-related graphical procedure for the investigation of geospatial data and information. Thus an animated interactive digital terrain model is a form of cartographic visualisation.

GIScience (Geographic Information Science)

The scientific context of spatial information processing and management, including associated technology as well as commercial, social and environmental implications. Information processing and management include data analysis and transformations, data management and information visualisation. Associated methodology includes both hardware and software. Commercial, social and environmental implications refer to the wide scope of applications of GI and GISystems as well as the analysis of their implications locally and globally.

GISystem (Geographic Information System)

This is an information system that processes geographic/geospatial information. An information system is a combination of software, hardware, data, data transfer systems, procedures and human beings that support the information processing in a specific application.

Geographic/Geospatial Information

This is information about objects or phenomena that can be related to a location on the Earth. Objects and phenomena can be modelled as discrete objects or fields. Discrete objects are typically presented as point, line or polygon type presentations, while phenomena are often modelled as fields, either showing continuous or classified values of a function. The location is defined primarily by coordinates. Other spatial information can be given by defining the geometry (point, line, polygon) and the topology (graphs, adjacency, inclusion). The location can also be given using some other georeferencing methods such as addresses or codes for administrative areas.