

The Regional/State View: Case of Catalunya, Spain

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Foreward

The Institut Cartogràfic de Catalunya (Institute of Cartography of Catalonia – ICC) was founded by law 11/1982, of the 8th of October, which was issued by the Parliament of Catalonia. The purpose of this institution was to perform the technical tasks for the development of geomatic information within the sphere of duties of the Generalitat de Catalunya.

In 1997, a law issued by the Parliament of Catalonia transformed the ICC into a public institution of the Generalitat, so as to make it more flexible and to grant it a greater capacity for action.

Since its creation, the ICC has been working so as to provide Catalonia with cartographic bases that are adequate for its territory. This fact has come forth through the performance of technical surveys, the implementation and the generation of cartographic documents and papers. In this sense, the ICC carries out official and general interest surveys for the Generalitat de Catalunya – through an Agreement Programme, which has been established with the Department of Territorial Policy and Public Works (DPTOP). Moreover, it also assumes studies and works that have been commissioned or requested by public institutions or private organisations and individuals. In order to carry out such tasks, the ICC uses and develops state-of-the-art technologies and the necessary working techniques in the field of cartographic production.

The ICC's own goal is to carry out the technical works that are necessary to develop and to create cartographic, geologic and geophysical information, among which we may cite the following:

- Creation, reproduction and divulging of the basic cartographic works that are planned throughout the Catalan territory (32 000 square kilometres in surface, 6 000 000 in habitants).
- Completion of the necessary projects on vial cartography, for the realisation of public infrastructure works in Catalonia (roads and public works in general), and of urban or city cartography (planning, cadastre, and so on).
- Densification and preservation of the inferior or lower order geodetic network, and deployment and implementation of GPS (Global Positioning System) positioning systems throughout Catalonia.
- Execution of programmes focusing on the development and the elaboration of thematic cartography, intended for the assessment of the available resources and environmental problems and issues, through the use of Remote Sensing techniques (fires, uses of the ground, and so on), or else by means of different techniques (geology, assessment and evaluation of natural risks and hazards, and so on and so forth).

- Creation of a geo-cartographic data bank that could be used in automatic systems of cartography tracing and analysis; this would not only allow to obtain cartography but also the immediate exploitation of the same in public service works, cadastre, and so on.
- Technical coordination of the cartographic works carried out by both public and private organisations, and promoting the partnership with other public organisations and private institutions from outside of the Catalan territory, that have an analogous purpose. Deployment and improvement of the seismologic network of Catalonia, interrelated with the Spanish, European and world networks.
- Production of territorial scale geological cartography, in accordance with the needs of the DPTOP, and collaboration with the Spanish geologic cartography programmes.
- Publication and divulging of the works carried out by the ICC, that are considered to be of public and scientific interest
- Creation, structuring and organisation of the “Cartoteca de Catalunya” (Library of Cartography of Catalonia); the purpose of this institution is to gather, catalogue and study existing cartographic and geographic documents.

Furthermore, the ICC considers itself to be the heir of the cartographic tradition in Catalonia. Whenever this country has enjoyed national freedom, this science has thrived, as was the case, for example, during the medieval times, particularly between the 14th and 15th centuries. Catalonia is an ancient European nation, a nation within the Federal State of Spain and therefore, we believe we can naturally extend the ICC's nomenclature to an RMO (Regional Mapping Office).

Data and metadata

Description of cartographic projects

The cartographic undertakings and tasks carried out by the ICC may be divided into two large groups: local projects that are commissioned by general managements and institutions of the Government of the Generalitat de Catalunya, and the series of tasks of territorial coverage. Both groups are included in the agreement programme that the ICC has signed with the Government of the Generalitat de Catalunya. Generally speaking, the first group deals with large scales, from 1:5 000 to 1:500, while the second group embodies medium scales from 1:5 000 to 1:50 000, and small-scale projects from 1:100 000 up.

Once the first cartographic implementations were achieved in Catalonia, the goal of the ICC for the coming years is to increase its wealth and quality level in, order to simplify its maintenance, to reduce the updating cycles, to automate production and facilitate the creation of topographic and cartographic bases intended for SIG applications. These make it possible to integrate and to combine practically all types of information having a space component, and have established requirements that printed cartography fails to consider. Furthermore, computer tools are being used to elaborate the said bases. From the viewpoint of a cartography producer, this implies reviewing and re-designing the model and data dictionary of each type of cartography, and in the production stage, the mentioned producer needs to check thoroughly the logical coherence and the metric, topological and semantic quality of the data. Fortunately, this coherence and this quality allow using increasingly automatic tools in the production process.

The goal of the presentation is to review some of the features¹ of topographic cartography performed by the ICC and the general plans for the coming years. Another goal is to present examples of some of the cartographic products that have been created – topographic maps, topographic or cartographic bases and derived maps.

Further to this introduction, to providing certain definitions and to presenting the general production flow, we shall go on to describing the different sets of digital data by means of the metadata proposed by the CEN (European Committee for Standardisation). In addition, the derived cartographic products have also been included, and finally mention will be made of the territorial coverage general plans of topographic cartography for the coming years.

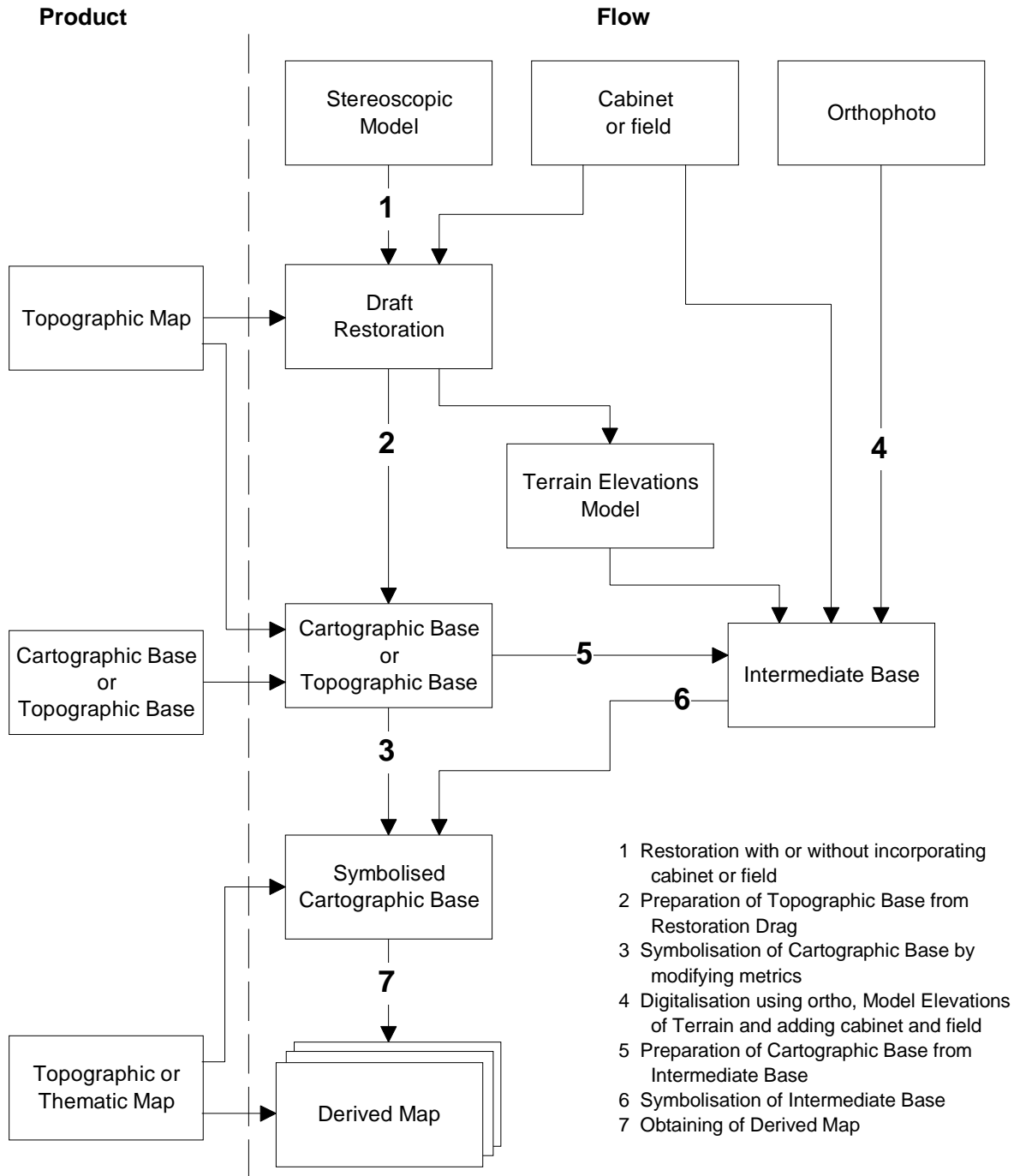
Terminology relative to the ICC's numeric cartography

The cartographic products that have been produced have detailed specifications depending on the phase of the production flow from which they were drawn out. In order to use a specific terminology, we shall define the following types of products:

- **Topographic map** – Set of geographical data including topographic data which, because of their coding and/or the symbols contained, have been designed mainly on grounds of their visualisation. As a rule, and in the event it deals with vectorial information, their specifications do not include sufficient capture requirements to create topology.
- **Cartographic base/topographic base** – Set of geographical data containing coded and structured topographic/cartographic data, in order to automate the production of cartography itself, and also to be used in SIG environments. If a specific topology is missing, their specifications include sufficient capture requirements to allow the creation of topology with very little effort. In a more advanced stage, they include information that makes it possible to identify objects (such as road codes).
- **Intermediate cartographic base** – Set of geographical data, intended for internal use at the ICC, containing cartographic data from which the cartographic base and the relevant symbolised cartographic base will be derived. This intermediate base appears in small-scale cartography projects, in which the information from the cartographic base has a certain degree of generalisation. This intermediate base includes two versions of the objects having different compilation certifications in the two bases, that is, different levels of generalisation.
- **Symbolised cartographic base** – Set of geographical data deriving from intermediate bases or from topographic/cartographic bases, including topographic/cartographic data with symbols in such way that it may be used as grass-roots information for editing derived topographic or thematic maps. The updating pace of these bases is closely linked to the speed at which the maps are published. This rate is always higher than the updating periodicity of the relevant topographic/cartographic base, since the latter requires that the information be compiled by photogrammetry or by orthophoto interpretation, in order to ensure the established accuracy. Every time the topographic/cartographic base is updated, a new derivation of the symbolised cartographic base is performed.

¹ The activity carried out in the field of topographic cartography may also be divided in works that have been externally commissioned and works included in the Agreement-Programme. From a technical viewpoint, both cartographies are very similar and therefore, the definitions, record cards and examples may also be applied to cartography for external projects.

These products have been extracted from a systematic and general flow diagram that we shall now proceed to describe. Due to space reasons, we shall specify a series in production such as the Cartographic Base and the Topographic Map of Catalonia, 1:5 000 v.2.



The ICC's productive spirit and endeavour complies with a short-term (yearly) planning, a medium-term (four-year) planning and a long-term planning (1989-2000 strategic planning). The governing council, which performs the tasks of a surveillance council, and the Technical Commission, which acts as a technical council, validate the decisions made by the ICC's general management and approve its programmes, which are reviewed on a regular basis. The products are extremely varied and many of them are performed in response to a specific demand. In order to synthesise them, we are including the following tables of products that form series and their availability to the public:

TOPOGRAPHIC MAPS

Supports	1:250 000	1:100 000	1:50 000	1:25 000	1:5 000	1:2 000
Digital		–			v.1/v.2	
Electronic printing	–	–	–	–	v.1/v.2	
Form					–	
Comment	Official map of Catalonia	Following the provinces	Following the regional division (41 regions)	Following the IGN's MTN division (unfinished)	National and economic map	Cover, metropolitan area of Barcelona
# Pages	1	8	86	304	4.230	525

Figure 4.1: Available in digital, electronic printing and regular printing

IMAGE MAPS

Supports	1:250 000	1:100 000	1:50 000	1:25 000	1:5 000
Digital			–		v.2
Electronic printing	–	–	–	–	
Form					v.1
Comment	Satellite image map (Landsat)	Image series from the Spot Satellite	Series of satellite images (Spot)	Orthophotomap from high altitude flights 1:60 000	Orthophotomap Produced in co-operation with the cadastre
# of pages	1	8	86	304	4.230 v.2 6.338 v.1

Figure 4.2: Available – orthophoto of image from plane to satellite

All of these products have the description of their metadata, using the European prestandard prEN 12657 'Geographic Information – Data Description – Metadata'. Technical Committee 287 'Geographic Information' from the European Committee for Standardisation (CEN TC 287).

Data: 1998-03, which will soon be transformed into a conclusive standard.

The identification of the ICC MTC 1:5 000 metadata is included next.

METADATA ASSOCIATED TO SETS OF NUMERIC GEOGRAPHIC DATA.

M: Compulsory; C: Conditional; O: Optional

	Metadatum	Compulsory Nature	Description
1	IDENTIFICATION OF THE SET OF DATA	M	
1.1	Name	M	Topographic map of Catalonia 1:5 000
1.2	Alternative name	O	
1.3	Abridged name	O	MTC 1: 000
1.4	Version	O	1.5
2	GENERAL ASPECTS OF THE SET OF DATA	M	
2.1	Summary	M	Topographic cartography covering the territory of Catalonia in three dimensions. As pointed out in the documentation, some elements have been gathered with constant z coordinate.
2.2	Name of the producing institution	M	Institut Cartogràfic de Catalunya
2.3	Type of spatial scheme	M	Spaghetti (Spaghetti)
2.4	Description of the spatial scheme defined by the user.	C	
2.5	Language of the set of data (dataset)	M	Catalan Castilian or Spanish (locally) French (locally) English (locally)
2.6	Set of characters	M	ISO 8859-1
2.7	Production purpose	O	Base map of Catalonia. Necessary to develop technical and management applications and for territorial planning within the DPTOP and other departments of the Generalitat de Catalunya. It is also necessary for other public institutions and private organisations.
2.8	Foreseen scale of application	O	1:5 000 – 1:25 000
2.9	Potential use	O	Technical and management applications and territorial planning. Compilation and updating of cartography at other scales.
2.10	Reference documents	O	Topographic map of Catalonia 1:5 000 v1.5. DGN format. December 1995 Topographic map of Catalonia 1:5 000 v1.5. EXPORT format. December 1995 Topographic map of Catalonia 1:5 000 v1.5. DXF/DWG format December 1995
2.11	Sample	O	
2.12	Sets of related data	O	
2.13	Description of the institution	O	The Institut Cartogràfic de Catalunya (ICC) was created by means of Law 11/1982 of the 8 th of October, issued by the Parliament of Catalonia, with the purpose of carrying out the technical tasks to develop geomatic information within the scope of the issues over which the Generalitat of Catalonia has power.
2.14	Raster data types	O	
2.15	Description of raster data	O	
3	QUALITY ELEMENTS OF THE SET OF DATA	M	
3.1	Lineage	C	Data set compiled by photogrammetric restoration (with analogical and digital restorers) of 1:22 000 flight scale photograms .
3.2	Global positional accuracy	C	in x,y: 1m, in 93% of the points covered by photogrammetry in z: 1/4 of the interval of level curves, 1.25 m, in 94% of the marked out points.
3.3	Global semantic accuracy	C	Non-quantified.
3.4	Global temporal accuracy	C	
3.5	Global logic coherence	C	100%
3.6	Global completeness	C	Non-quantified.
3.7	Use	C	
3.8	Homogeneity	C	
3.9	Update date	C	1983-1992. Second sheets.
3.10	Quality text	O	
4	METADATA REFERRING TO METADATA	M	
4.1	Date of creation	M	1998-10-26

	Metadatum	Compulsory Nature	Description
4.2	Date of last validation	C	1998-10-26
4.3	Date of most recent updating	C	
4.4	Date of next review	O	
4.5	Spatial reference system of metadata	O	
5	SPATIAL REFERENCE SYSTEM OF THE SET OF DATA	O	
5.1	<i>System of Indirect Positioning</i>	C	
5.1.1	Name	C	
5.1.2	Name of the location class	C	
5.1.3	Reference date	O	
5.1.4	Administrator of the Indirect Positioning System	O	
5.2	<i>Direct Positioning System</i>	C	
5.2.1	Identifier of the Positioning System	C	
5.2.2	Name of the Positioning System	O	European Datum 1950 (ED50)
5.2.3	Name of the geodetic datum	O	Potsdam (Torre Helmert)
5.2.4	Name of the geodetic ellipsoid	O	Hayford 1924
5.2.5	Name of the projection	O	UTM
5.2.6	Name of the vertical datum	O	Sea level, with origin in Alacant
6	EXTENSION OF THE DATA SET	M	
6.1	<i>Status of the extent of the data and completeness of data set</i>	M	
6.1.1	Status of the extension	M	100%
6.1.2	Extension date	M	1994
6.1.3	Final extension date	O	
6.2	<i>Planar extension</i>	O	
6.2.1	Limit of the quadrilateral	C	
6.2.1.1	Minimum x,y	C	
6.2.1.2	Maximum x,y	C	
6.2.2	Area limits	C	
6.2.2.1	Limits	C	
6.2.3	Geographical area	C	
6.2.3.1	Name of the geographical area	C	1:5 000 Cut sheet
6.2.3.2	Name of the system of geographical identifiers	O	1:5 000 MTN Cut
6.2.3.3	Code of geographical area	O	Sheet identifier
6.2.3.4	Extent of geographical area	O	4270 sheets covering Catalonia
6.3	<i>Vertical extension</i>	O	
6.3.1	Minimum height	C	
6.3.2	Maximum height	C	
6.4	<i>Time extension</i>	O	
6.4.1	Description of time extension	C	
6.4.2	Particulars on the time period range	C	
6.4.3	Initial date	C	1983
6.4.4	Final date	C	1992
7	DATA DEFINITION	O	
	(Not included)		
8	DATA CLASSIFICATION	O	
	(Not included)		
9	ADMINISTRATIVE METADATA	O	

	Metadatum	Compulsory Nature	Description
9.1	<i>Institution and duty of the Institution</i>	O	
9.1.1	Name of the Institution	C	Institut Cartogràfic de Catalunya – Institute of Cartography of Catalonia
9.1.2	Acronym of the Institution	C	ICC
9.1.3	Address	C	Parc de Montjuïc E-08038-Barcelona Tel 34 934252900 Fax 34 93 4267442
9.1.4	Duty of the Institution	C	Producer, administrator and distributor
9.1.5	Visiting address	O	Parc de Montjuïc E-08038-Barcelona Tel 34 934252900 Fax 34 934267442 C Balmes, 209-211 E-08006 Barcelona Tel 34 932188758 Fax 34 932188959 C Emili Grahit, 10 ^a 17002 Girona Tel 34 972200493 Fax 34 972200493 C Doctor Fleming, 19 E-25006 Lleida Tel 34 973274776 Fax 34 973274776 C Anselm Clavé,1 E-43004 Tarragona Tel 34 977230156 Fax 93 977230156
9.1.6	Alternative name	O	
9.1.8	WWW home page of the Institution	O	http://www.icc.es
9.2	<i>Point of Contact and duty of p. of contact</i>	O	
9.2.1	Name of point of contact	C	Distribution unit
9.2.2	Address of point of contact	C	Parc de Montjuïc E-08038-Barcelona Tel 34 934252900 Fax 34 93 4267442
9.2.3	Duty of point of contact	C	Distribution of cartographic products
9.2.4	Visiting address	O	
9.3	<i>Distribution</i>	O	
9.3.1	Restrictions on use	C	– Use for the purpose stated on the application or on the Agreement – No part of this publication may be reproduced, traded or otherwise included in any type of product or service
9.3.2	Copyright owners	C	ICC
9.3.3	Distribution unit	C	Spatial: – 1:5 000 MTN cut sheet – Rectangle defined by UTM co-ordinates rounded up to the kilometre Theme: – Altimetry – Planimetry – Complete
9.3.4	Information on price	O	
9.3.5	Recording support	O	CD-ROM
9.3.6	Available Formats	O	Microstation Export DXF DWG
9.3.7	On-line access	O	
9.3.8	Obtaining	O	Completing the application form, which may be obtained at any of the addresses of the ICC. May also be obtained by e-mail to point of contact.
9.3.9	Support Services	O	

Relations with other Spanish administrations

From the perspective of an organic relationship, during the past 18 years the ICC has signed over 400 inter-administrative partnership agreements (this means about two every month) with different Catalan, Spanish and European administrations.

Let's describe them briefly:

Departament de Política Territorial i Obres Públiques (DPTOP), that is, the Ministry of Territorial Policy and Public Works: This is the regional Ministry in which the ICC is allocated and for which it carries out all the activities listed on the Agreement-Programme (AP). This is signed every four years and includes all of the production planning of the cartographic series (also known as vocational activity), the specific demands for the management of the DPTOP (town planning, housing, roads, railroads, territorial planning, hydrologic planning, geotechnics, geology, geophysics, and so on) and the public services that depend on the ICC, such as the Library of Cartography of Catalonia, the geodesic network, the network of fiduciary stations GPS, the RASANT system, the system of seismic surveillance, nivometeorology and others.

Other Ministries or other Regional Departments of Catalonia: These have access to the ICC's geo-cartographic information and in the event there is a large demand, it is proposed to sign a collaboration agreement. Currently, there are specific partnership agreements with the Ministry of Environmental Issues, with the Home Office and the Ministry of Agriculture.

The Catalan Local Administration: In Catalonia, the Local Administration is organised in three different levels:

- **Town Council:** From a total number of 941 corporations, direct treaties have been signed with over 100 of them for the execution of cartographic assignments.
- **Regions:** There are 41 regions in total and with cartographic Cupertino agreements have been signed with all of them.
- **County Councils:** Production agreements have been signed in the past and are still being signed with these provincial administration institutions (there are four of them in total in Catalonia). It has often been tried to achieve triangular agreements between the ICC, the County Council and the Town Councils, and this has proved to be a useful method to put together resources for projects covering many sectors.

The Spanish State Administration in Catalonia: In spite of the fact that the Government of the Generalitat of Catalonia enjoys many exclusive powers, the Central State still holds many jurisdictions in the Catalan territory, as well as in the generation/production of basic information. Collaboration agreements exist with the following institutions:

- Instituto Geográfico Nacional (IGN) (National Geographic Institute): During the last 18 years, 14 agreements have been signed for the performance of flights, photogrammetric restoration, toponymy and formation of the topographic Map 1:25 000 of Catalonia.
- Instituto Tecnológico y Geominero de España (ITGE) (Spanish Technologic and Geomining Institute): Partnership agreements have been signed for the execution of the sheets of the geological Map (MAGNA) 1:50 000 in Catalonia.

- Dirección General del Catastro (Ministerio Economía y Hacienda) (State Cadastral Office – Ministry of Economics and Finance): About ten agreements have been established for financing the production of the Orthophotomap of Catalonia 1:5 000.
- Servicio Geográfico del Ejército (SGE) (Geographic Service of the Army): Mutual information exchanges on Catalonia have taken place.

General constants for the future

Endeavouring to define the context of the next decade, running from years 2000 to 2009, is necessary in order to provide the setting for the future options that any Corporation or Institution needs to make, as well as to planning these options.

The first fact that ought to be emphasised is that the history of NMOs and therefore, their experience will only be significant in that it contributes to shape the starting point of each of them. However, it will have a scarce projection in the future, since the latter will bring about new demands and challenges that did not exist in the past and that often could not even be imagined. In any case, we shall endeavour to bring to light the reference settings that might in all likelihood appear.

- The role of an official agency with exclusive powers will be maintained in terms of its efficacy. As for the market, it will be implacable and will occupy either partially or totally the fields that are inherent to the NMOs/RMOs. The market will rule.
- Globalisation will generate a further varied demand, but also an offer that is more specific for needs. Production might be affected by globalisation.
- Global technologies will dominate (SPS, high-resolution satellites, thematic satellites, wide range telecommunications, etc.); furthermore, they will provide the few agencies with quality and updated information. We do hope that the market will try to improve and correct the protectionist attitudes that may be found today.
- The technologic race in the field of microelectronics will channel and direct the efforts of the market and the investment in ownership systems. This will bring about an increase in the demand of high quality, highly complex and low-cost information, which will in turn reduce the generation of real self-financing margins.
- New applications for consumption, such as the electronic book, the map in the car, the complementary thematic image, among others, will produce emerging markets. These will be enormous markets, although it will be difficult for organisations that fail to comply with the conditions of being small, mobile and intelligent to have access to these markets.
- The data servers (clearinghouse) of the National Spatial Data Infrastructure will develop and compete with private servers within the market that has been created by Internet. This means that it will be necessary to have available real copyright laws at European and world level. Otherwise, it might be very difficult to keep up with the market loss. Information is almost impossible to protect and in addition, the programmer's industry and its experience are already disclosing the coming difficulties.
- The reduction of budget deficits, as a general policy adopted by Western and World governments, will imply the reduction of Agreement-Programmes below reasonable levels of efficiency.
This is something that politicians are tempted to do and needs to be successfully argued against; however, it is indeed part of the ruling economic culture.

- Cartography, an accurate model of the territory, involves a cost that the GIS user - who is the major user- is not willing to pay for. What will the decision of NMOs/RMOs be? To generate a complex, timely, and costly product, that is therefore scarcely appealing for the market, or else to lower the specifications and generate substitute products versus high-quality cartography products?
- The pressure of self-financing in NMOs and RMOs clashes with constants such as that the sales to the general public experience an annual 3 to 5 % growth rate (Grelot, 1995), which is much lower than the demands of Agreement-Programmes. The risk they involve is that the attention to the public is neglected in detriment of the remaining activities.
- The coexistence of a plurality of disciplines will dominate. The borders between sciences and technologies are increasingly less delineated and a good use should be made of this fact in a positive and synergetic manner, so as to create new products, new working methods and new market-leading applications.

Basically speaking, the future is open. The ten above-mentioned characteristics may be argued, but they are just a part of an unpredictable world. This is what makes it both so attractive and fearsome. The decisions that are made will be increasingly influenced by facts and events foreign to NMOs/RMOs than by their own programmes, approved by well-meaning Committees, that will often be very distant from the market and its influencing trends.

Future options for NMOs and RMOs

As mentioned previously, the year 2000 is the last year for the strategic planning ruling the long-term action that the ICC develops through its 1989-2000 strategic plan. Therefore, the current year 1999 is a right moment to reflect, to visualise the past and to try to define the setting of a typical RMO such as the ICC, at medium and short term.

This consideration is set in the following sections:

Technological options:

To maintain a certain advantage over the demand, it is necessary for technologies to generate products that join three characteristics: quality, innovation and low cost. This is what the market will request and in order to succeed, we need to invest human efforts and investment in the following:

- To encourage primary data capture: specifically in the field of active and passive digital sensors, thus increasing the productivity that implies the flexibility to create new products, particularly by merging sensors and the speed (and therefore, lower cost) that this involves.
- Reinforcing the standards and achieving quality levels. In this sense, we shall invest as much as the market itself will allow. The balance is in the production cost and timing of the services and products.
- The independence between the currently existing internal productive structures will be increased; they will be made responsible from beginning to end of production, from the conception of the product up to the delivery of the same to the client.

These technological options attempt to generate production circuits that are more efficient and measurable than the current ones.

Productive options:

Demand increasingly requires the possibility of projects with a wider scope (higher production volumes in shorter production times), at increasingly lower costs. This will imply

- To promote the automation of photogrammetric production lines, from the currently existing lines, which are quite automated.
- To grant the designing cartographer the capacity to programme his own data-set and productive system;
- To foster first-level generalisation between two scales and to advance in second-level generalisation, between three scales.

The above-mentioned productive options are closely linked to technology and a huge cultural effort will be necessary, in terms of organisation, in the following ways:

- A permanent reorganisation or organisation change. This type of operation needs to become a part of corporate lifestyle.
- Permanent and systematic training in order to fight personal and technologic ageing.
- Structuring in totally measurable units. The most independent in terms of productive measuring within the organisation, but with their own operating account.

This set of options in the production field should make it possible to evolve so that we may adapt to the market and to the Agreement-Programme; turning away from this would imply obsolescence and lack of realism.

Financial options:

The future approach isn't easy. We may include three comparative tables of external financing of the three NMO's/RMO's :

Catalonia (1998)	%	Sweden (1996)	%	Canada (96-97)	%
		NLS + CFD		Geomatics	
Agreement-Programme	42%	Agreement-Programme	35%	Digital Info	19%
Public	4%	Market	30%	Topographic maps on paper	29%
Catalonia + Spain	14%	Sweden	35%	Aeronautical Charts	47%
World	40%			Aerial Photography	5%
Total	US\$ 22 (100%)	Total	US\$ 200 (100%)	Total	US\$ 9.9 (100%)

(source: ICC, 98)

(source: Rhind, 97)

(source: Rhind, 97)

Two deductions may be concluded:

- The sale of products, both analogical and digital, has extremely low limits owing to its cost price that needs to be subsidised for the general public. Canada is a good example of NMO: a country with an extremely large surface which is in the van of progress when it comes to geomatic issues; its revenue is proportionately very small with regard to its investment and Agreement-Programme.
- Most of the revenues for self-financing must spring from the work carried out by other public administrations and international projects (this is the case of the ICC's NLS + CFD).

This means that the performance line that the ICC begun years ago, of being competitive within Catalonia and Spain, needs to be maintained, preserved and expanded.

New activities:

In the particular case of Spain, it might happen that in the near future, the fields for which the Cadastre is responsible, that the Central State currently controls, might be transferred over and delegated to the regions. This would rationalise the cartographic and cadastral production. Sweden is an example of rationalisation, since it united the cartographic agency, the NLS (National Land Survey) and the cadastral agency, CFD (Control Board for Real Estate Data).

Research:

Knowledge is the fuel of any Corporation and this fact will be increasingly true. The ICC will promote its own development equipments (teams), together with the "Consorti Institut de Geomàtica", that is, the Geomatics Partnership Institute, which it rules, while generating specific agreements with Catalan Universities. This means that to us, it is truly strategic to develop and increase knowledge, because of its tremendous importance for the future.

Conclusion

The "Institut Cartogràfic de Catalunya" (Institute of Cartography of Catalonia) is an NMO - that is, a National Mapping Office-, in the national Catalan sense, and it is an RMO (Regional Mapping Office) in the European sense of region. This institution has a cartographic demand that is similar to that of the different regions in Europe and the world. Going deeply into a policy of serving our Government through an Agreement-Programme, in which the persistent idea of our Government -which is both the customer and the businessperson- is to recoup the cost, will act as a catalyst and will force us to systematically change our organisation, production and financial strategies in order to maintain and justify the recoupment of costs. This will be a highly constant idea in the coming decades and therefore, of the ICC culture.

On the other hand, trade, industrial and development activities will increase outside the scope of the Agreement-Programme, and this is and will be an essential part of our future activity. The presence in Catalonia itself, in Spain, the European Union and the rest of the world will be systematic and increasing.

In any case, our own survival as a public Company of the Government of the Generalitat of Catalonia, in search of geomatic excellence, has a key element. This is the capacity for technological development we may have, both ourselves and/or related organisations, since the future society of knowledge implies the prior existence of the information society, in which we are currently immersed. Knowledge per se is not easily transmissible; furthermore, it is inherent to each organisation. Nowadays, it is important to have good economic parameters, although this is no guarantee for the future. Guarantee is a concept that has fallen into disuse; moreover, a well-balanced change and production, economic and research excellence are the only policy for the future, and this future needs to be planned today in order to ensure successive present times.

For further information, the ICC continuously updates its Internet address <http://www.icc.es>. Please look it up and let us know what your opinion is.

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