3

Existing SDIs in Europe

The development of SDIs has been studied extensively in Europe over the last five years. This is partly due to the interest of the European Commission in such activities, expressed initially in the GI 2000 initiative and more recently in the INSPIRE programme (discussed in chapter 4). As a result, the Commission has funded a number of important studies in this field. These include the Methods for Access to Data and Metadata in Europe (MADAME) project (Blakemore et al. 1999) and the Geographic Information Network in Europe (GINIE) project (Craglia et al. 2003). More recently two of the three European Commission Directorates-General responsible for the INSPIRE programme commissioned separate studies of the state of play of SDI activities in all the European countries from the Spatial Applications Division of the Catholic University of Leuven (SADL) in Belgium (http://inspire.jrc.it/state_of_play.cfm). The study began in 2002, and the reports have been revised and updated every year up to 2006. These studies constitute a major resource describing the evolution of SDI development throughout Europe.

The initial findings of the Leuven studies suggest that only a handful of European countries have anything like a full-fledged SDI either planned or in place at the present time. Even countries like the Netherlands and Portugal do not meet all of their criteria for a complete SDI as "in neither case, are all components of a theoretical SDI in place or even planned" (SADL 2003, 9). As a result SADL authors claim that most of these "NSDI initiatives can therefore better be described as SDI-like or SDI-supporting initiatives." Because of considerable progress since 2003, the authors concluded in 2007 that "most of the countries studied are developing a truly national SDI" and "in a lot of cases this is going hand in hand with the development of regional initiatives" (SADL 2007).

SADL authors have developed a useful typology of SDIs that is based on the coordination aspects of these initiatives. Matters of coordination are emphasised because "it is obvious coordination is the major success factor for each SDI since coordination is tackled in different ways according to the political and administrative organisation of the country" (SADL 2003, 13). A basic distinction is made between countries where a national data producer such as a mapping agency has an implicit mandate to set up an SDI and countries where SDI development is being driven by a council of ministries, a GI association, or a partnership of data users. A further distinction is then made between initiatives that do and do not involve users in the case of the former and between those that have a formal mandate and those that do not in the case of the latter (figure 3.1, table 3.1). Each of the European countries can be classified according to these criteria.

More than half of the SDI initiatives are led by national data producers. This is particularly the case in the central and eastern European countries that became members of

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Figure 3.1

State of play in Europe. Based on Table 6 in "Spatial Data Infrastructures in Europe: State of play in spring 2006." ▶

Led by national data producers

- Users involved
- Users not involved

Not led by national data producers

- Formal mandate
- No formal mandate
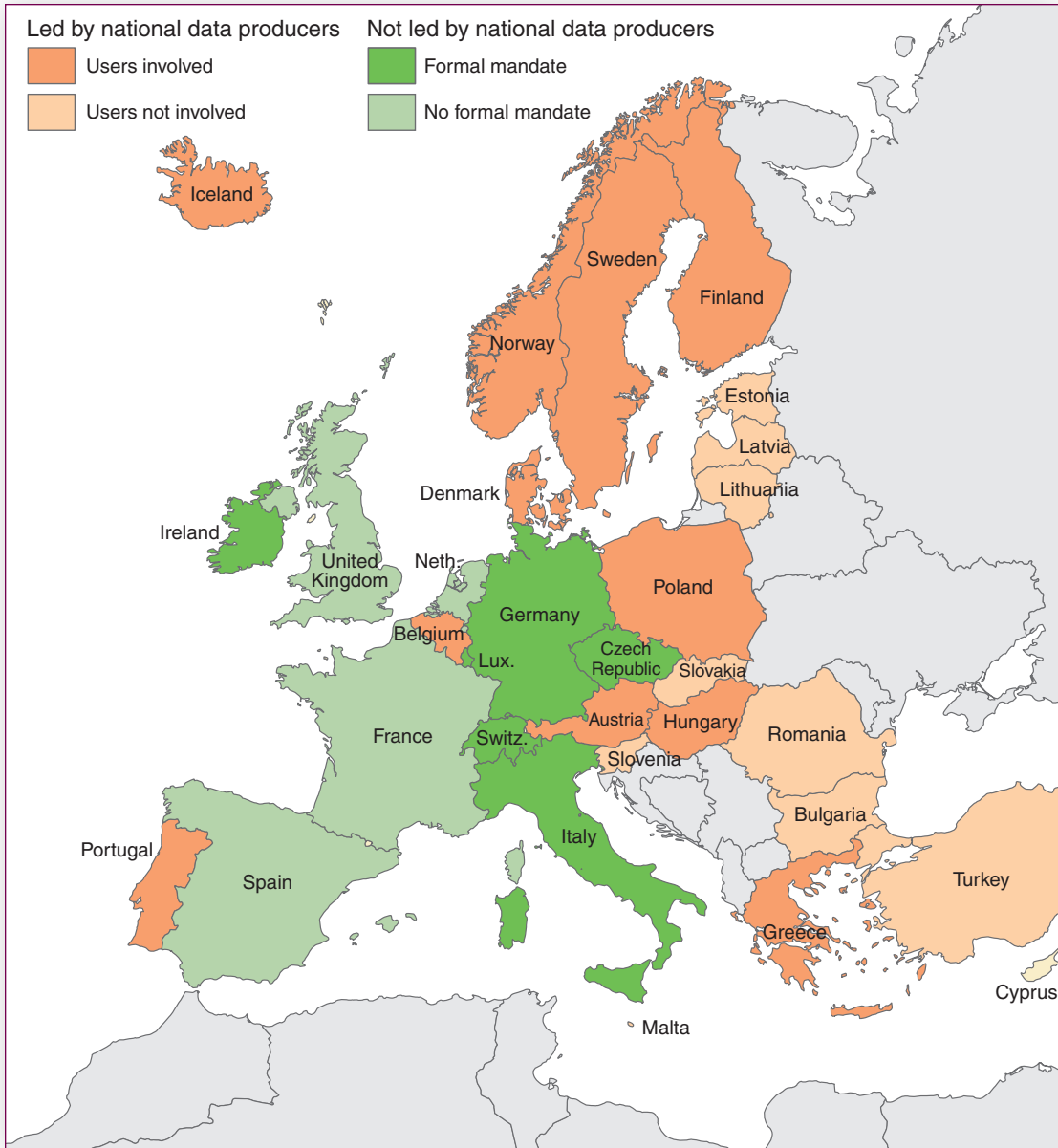
SDI STATUS	LED BY NATIONAL DATA PRODUCERS	NOT LED BY NATIONAL DATA PRODUCERS
	Users involved	**Formal mandate**
Operational	Denmark, Finland, Hungary, Iceland, Norway, Portugal, Sweden	Belgium (Flanders), Czech Republic, Germany, Switzerland
Partially operational	Austria, Greece, Luxembourg, Poland	Ireland, Italy
Not operational	Belgium	
	Users not involved	**No formal mandate**
Operational	Slovakia, Slovenia, Lithuania	Belgium (Wallonia), Netherlands, Spain, United Kingdom
Partially operational	Cyprus, Estonia, Latvia, Liechtenstein	France
Not operational	Bulgaria, Malta, Romania, Turkey	

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Table 3.1

SDIs in Europe. Source: Spatial Applications Division
Leuven (2006, 35). Used by permission.

the European Union in 2004 and 2007 as well as in the Nordic countries. All the Nordic countries explicitly include data users in the coordination process, whereas only a minority of new EU members have involved users. Not all of these SDI initiatives are operational.

The remaining countries have made other arrangements for the coordination of their national SDI activities. In three countries (Germany, Italy, and Ireland), government interdepartmental bodies were formally charged with creating national SDIs. These are now operational in Germany. In the Netherlands, the government successfully encouraged a national GI association to take the lead in developing an operational national SDI. Belgium presents a special case, as two different agencies have come into being to coordinate SDI activities in Flemish-speaking Flanders and French-speaking Wallonia, and a national initiative began to emerge only recently.

Accession to the European Union—a unique historic opportunity to further the integration of

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Box 3.1

National SDI of the Czech Republic (see also Nemoforum 2001).

CZECH REPUBLIC

The development of the Czech national SDI within the country's broader national information infrastructure is an ongoing process. The main players are the Office for Surveying, Mapping and the Cadastre; the Ministry of the Interior; the Czech Association for Geographic Information; and Nemoforum. Nemoforum was set up in 1999 to promote cooperation in the GI field within the framework of an EU-funded PHARE project led by the Dutch Cadastre. It brings together representatives from central and local governments, professional bodies with an interest in GI, the utilities, and the universities. Nemoforum produced a plan for the development of the Czech National Geoinformation Infrastructure from 2001 to 2005, which was accepted by the Czech government at the time as background material for State Information Policy. However, Nemoforum has no legal powers and acts mainly as a platform for cooperation between the various stakeholders, and no single governmental body is responsible for SDI coordination. Recent political developments have led to changes in the structure of the government. As a result, the duties of the former Ministry of Informatics have been mainly reassigned to the Ministry of the Interior. Nevertheless, significant progress has been made by both central and local government agencies as well as the private sector in Web services for GI access and dissemination.

the continent by peaceful means and extend the zone of stability and prosperity to new members (CEC 2000a)—has been a major driving force for SDI development in most of the central and eastern European countries. Ten countries—Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia—joined the EU in 2004, and Bulgaria and Romania joined in 2007. The EU has been assisting these countries in adopting EU laws, and it has also provided financial incentives to improve their infrastructures and economies. The process of EU enlargement can be seen as both a carrot and a stick for SDI development. The carrot is the need to develop an effective means of monitoring the spatial impacts of a

wide range of social, economic, and environmental policies that are associated with EU accession, while the stick is the need to take steps to modernise public administration in these countries to make this possible.

The examples of Finland, the Czech Republic, Germany, France, and Lithuania give some indication of the diversity of experiences in various European countries (boxes 3.1 to 3.5). Finland is classified as a data-producer-led

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Box 3.2

The Finnish National Geographic Information Strategy (see also Finnish National Council for Geographic Information 2004).

FINLAND

The de facto leader of SDI developments at the national level in Finland is the National Land Survey (NLS) (Maanmittauslaitos). It has been active in this field since the 1980s, but the term "SDI" has only recently been used in Finland. Prior to that, it was customary to refer to the "shared or joint use of geographic information." The NLS produced a vision paper on a national geographic infrastructure for Finland in 1996, but it was not until 2001 that the Council of State established the Finnish Council for Geographic Information to oversee SDI activities. This is a high-level body with a formal mandate to develop strategies for SDI implementation. Its 17 members include all the key stakeholders in central and local governments and the private sector. The Council published its National Geographic Information Strategy for 2005–2010 in autumn 2004, setting out the principles, objectives, and measures needed for the development of an SDI in Finland. This strategy is expected to foster more efficient and diverse usage of the available databases and facilitate the emergence of new services as a result of better access to information. The National Strategy also forms part of the Finnish government's Information Society Programme.

GERMANY

Germany is a federal republic with 16 states. Each of these states has its own surveying and mapping service, land and property registers, and statistical data collection services. To improve coordination of geographic information, the Federal Government established an Interministerial Committee for Geoinformation (Inter Ministerieller Auschuss fur Geoinformationswesen [IMAGI]) in 1998. IMAGI recognised that the development of the German national SDI (GDI-DE) required the cooperation of the 16 Lander and the local authorities within these Lander. Its efforts were given a substantial boost in February 2001 when the German Parliament passed a resolution on the "use of geoinformation in Germany." Following this resolution, IMAGI developed an implementation strategy, which included proposals to bring together existing concepts and strategies within Germany as well as harmonising metadata services and moving toward the creation of a national geodatabase. The Federal Agency for Cartography and Geodesy has played an important part in these developments. IMAGI is also working with the German national geographic information association (DDGI) and the private sector to promote the exploitation of geographic information.

Box 3.3

Geodateninfrastruktur Deutschland (GDI-DE) (see also Lenk 2005).

SDI that involves users. The Czech Republic, Germany, and France are classified as nondata-producer-led countries. The Czech Republic became a member of the EU in May 2004 and now has a formal mandate for SDI development. Germany is a federal republic which also has a formal mandate for SDI development, whereas in France, SDI development is only partially operational at the national level, with a number of well-developed examples at the subnational level. Lithuania is one of the former Baltic states of the Soviet Union that became an EU member in May 2004. It differs from the other European states in that it commissioned external consultants to carry out a feasibility study of the prospects for its SDI as part of an EU-funded initiative.

The reports prepared by SADL also contain a comparative evaluation of each country's experience, with respect to a number of key variables. These include organisational issues, legal issues and funding, fundamental reference data, and metadata services. The existence of some form of provision in most countries to cover the organisational aspects of SDI development and the advances made in the creation of fundamental datasets and metadata services contrast sharply with the limited progress achieved in resolving the legal and funding issues associated with SDI development.

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Box 3.4

SDIs in France (see also Salge 2005).

FRANCE

The French national SDI is only partially operational at the moment, even though the government set up a national GI Council (Couseil National de l'Information Geographique [CNIG]) to promote the use of geographic information in France in 1985. CNIG has more than 30 members. Most of these are central-government departments, but there are also representatives from local government, industry, and trade unions. The purview of the French national mapping agency (Institut Geographique National [IGN]) has been enlarged since 1999 as a result of the recommendations of the Lengagne report on "the evolution of geographic information in France and its consequence for IGN." The report proposed that IGN should take the responsibility for the development of a large-scale basemap for the whole country (Referentiel Geographique a grand Echelle [RGE]). Work on this project is scheduled for completion by the end of 2007. In the absence of a national SDI a number of local SDIs have come into being: in Lyon and Nantes at the municipal level, in Haute Savoie and Vendee at the provincial level, and in Provence-Alpes-Cote d'Azur at the regional level.

LITHUANIA

A detailed feasibility study of the prospects for an SDI in Lithuania was carried out in 2004 by external consultants within the context of the EU PHARE programme. Its main objective was to explore the issues involved in creating "an open shared infrastructure for accessing and distributing information, products, and services online." The study showed that the Lithuanian Geographic Information Infrastructure (GII) would not be just about technology but would also require a clear framework of agreements between government agencies and between the government, the private sector, and the citizens. These agreements would require highest-level political support for the GII, and substantial efforts would be required to make the stakeholder community in Lithuania more aware of the benefits of implementing an SDI. The consultants also produced detailed proposals for GII implementation in 2005–2008 and estimated that this will cost nearly €16 million. In light of these recommendations, SDI development is proceeding along three main lines: establishment of an organisational framework, the creation of training materials to assist in capacity building, and development of the necessary framework data. Work on the first of these goals started in 2005 with support from EU structural funds, and applications have been filed for funding the other two activities.

Box 3.5

Lithuanian Geographic Information Infrastructure (see also ASTEC Global Consultancy 2004).

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The following three case studies illustrate the main components of SDIs that were described in the previous chapter. The examples from the United Kingdom, Netherlands, and Spain represent innovative and imaginative approaches to SDI development and implementation. The fact that none of the three SDIs is wholly national in character highlights the multilevel nature of SDI development and the issues that must be resolved at the subnational level during SDI implementation. Much of the data is collected at the subnational level, which is where choices often have the greatest direct impact on day-to-day SDI decision making.

WORKING FROM A SHARED VISION: NORTHERN IRELAND'S MOSAIC

The first component of SDI development consists of the institutional arrangements that need to be made from the outset. These should take account of both the day-to-day coordination of SDI activities and matters of overall SDI governance. The extent to which the various groups of stakeholders are able to participate in the strategic decision making is particularly important. This presents problems in many countries because of the very large numbers of organisations that have a stake of some kind in SDI development and implementation. The challenge is how to ensure that these stakeholders develop a sense of shared ownership that would promote their continuing commitment.

One of the most distinctive features of the strategy that has emerged in Northern Ireland is the innovative nature of the process that was used to build a shared vision of the strategy among key stakeholders from the outset. Ordnance Survey of Northern Ireland and its parent ministry, the Department of Culture, Arts and Leisure, decided that a new approach to the development and implementation of geographic information policy in Northern Ireland was required. They chose the Future Search method, which helps participants in multistakeholder situations find common ground (box 3.6).

More than fifty organisations were invited to participate in a GI policy Future Search on the island of Lusty Beg in County Fermanagh, Northern Ireland, in February 2002. In addition to all the main stakeholders in Northern Ireland, British and European organisations sent representatives. Participants were divided into six more-or-less equal groups: (1) GI industry—technical; (2) GI industry—systems and data; (3) culture, arts, leisure, and tourism; (4) agriculture and environment; (5) emergency services, health, and transport; and (6) land property and networks.

The Future Search process worked well. The participants collectively created a mind map with 32 main trends and an even larger number of subtrends (figure 3.2). They then identified and voted (privately) for their main priorities within this mind map. The already complete digital topographic data coverage of Northern Ireland emerged as the key factor, closely followed by the need to take account of the growing pressures on public funding. Other factors rated highly included the recognition that GI is an economic resource, the need to promote

FUTURE SEARCH

Future Search is a unique planning meeting used worldwide by hundreds of communities and organisations to achieve two goals: (1) to help large diverse groups discover common values, purposes, and projects and (2) to enable people to create a desired future together and start working toward it right away. Typically a Future Search involves a group of 60 to 70 people with many different perspectives. The size of the group allows for dialogue at every stage in the process. The optimal length for a Future Search meeting is two and a half days with a minimum of four half-day sessions. The meeting facilitator has no direct involvement in the issues being discussed.

   The Future Search process consists of five main stages: (1) establishing the common history of the participants; (2) mapping the world trends affecting the whole group; (3) evaluating the progress made so far by each of the stakeholder groups; (4) considering some ideal future scenarios, identifying the common-ground themes that appear in each scenario, and confirming a common future; and (5) signing up to work together on action plans.

   Future Search avoids conflicts and focuses on the evolution of a shared agenda. Participants treat "problems and conflicts as information rather than action items while searching for common ground and desirable futures." At the end of a successful Future Search, participants will have created desirable future scenarios and committed themselves and their organisations to action plans.

Box 3.6

The Future Search method was used in Northern Ireland to help stakeholders find common ground (Weissbrod and Janoff 2000).

Figure 3.2

Part of the mind map produced by Lusty Beg partici-
pants. Photograph by the author.

environmentally sustainable development, and concerns about the lack of standardisation.

Key elements of a common ground for the future emerged during subsequent discussions: the importance of creating an overall GI strategy for Northern Ireland, the need to facilitate access and promote awareness, and the importance of partnerships in realising these objectives. On the basis of these discussions all the participants agreed to work together in various working groups to hammer out the details.

The results of these debates were described in the consultation paper "Geographic Information Strategy for Northern Ireland," published by Ordnance Survey Northern Ireland (OSNI 2002). The paper put forward a framework for SDI development and set up working groups for key sectors with immediate interests in better coordination: public safety/emergency services, land/property, transport, environment, utilities/networks, statistics, education/awareness, and key datasets (the activities of the last group cut across those of all the other groups). All these sectors were represented at Lusty Beg.

Another round of consultations followed the publication of the strategy report, and participants met for a feedback workshop in March 2003. These events culminated in a proposal for the setting up of "a suitably robust and high level strategic framework" to manage and coordinate the successful implementation of the GI strategy. The strategy was subsequently approved by the Minister of Culture, Arts and Leisure with the support of the e-Government Board. A small GI support office with two and a half staff positions was set up to provide a focal point for coordination.

The MOSAIC programme for implementing the Northern Ireland GI strategy was launched in May 2004 by the Parliamentary Under-Secretary of State for Northern Ireland. Its vision is "to provide the strategic leadership required for a practical, coordinated and inclusive approach to improving the collection, funding, dissemination and use of geographic information, in order to maximise the social, economic and educational potential of this crucial component of the national information infrastructure resource" (www.mosaic-ni.gov.uk).

MOSAIC is administered by a steering group consisting of the chairs of each of the working groups, the chair of the Northern Ireland branch of the Association for Geographic Information (AGI), and the Chief Executive of Ordnance Survey Northern Ireland (figure 3.3, box 3.7). This group reports to the head of the Department of Culture, Arts and Leisure in the Northern Ireland government and also to the
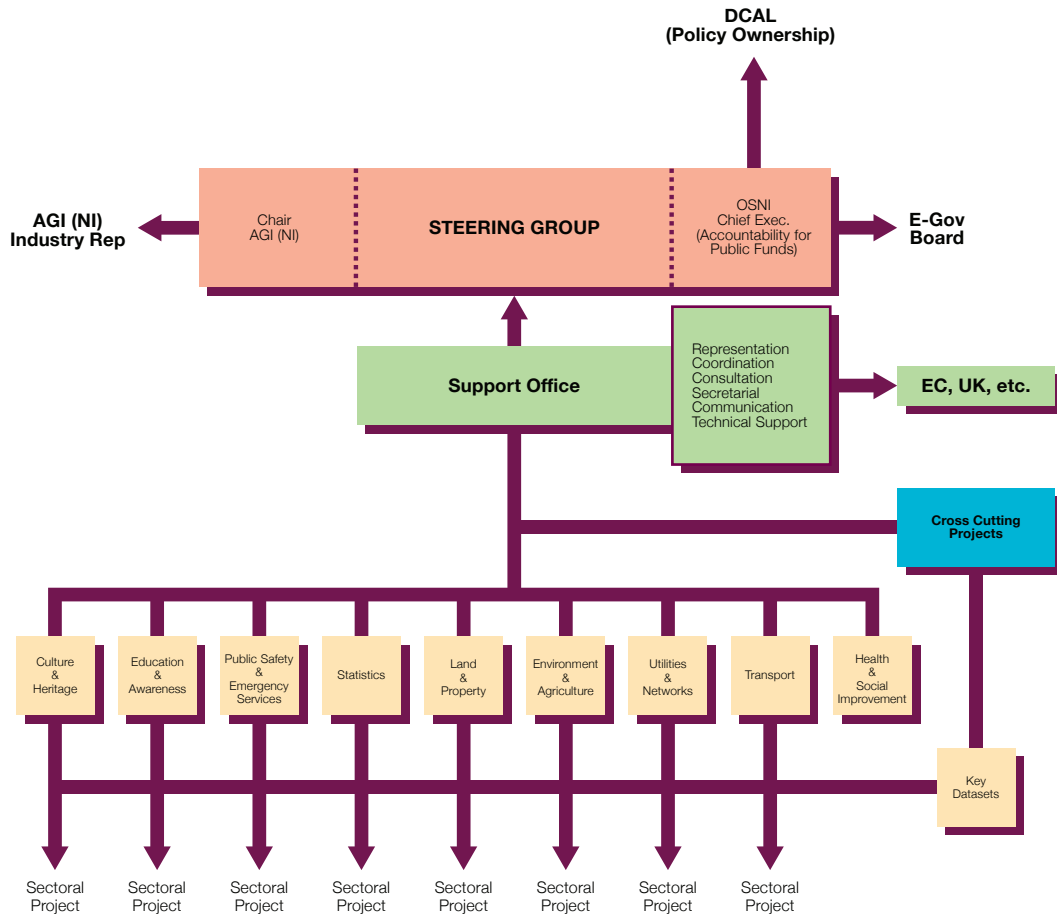
DCAL
(Policy Ownership)

AGI (NI)
Industry Rep

Chair AGI (NI)	**STEERING GROUP**	OSNI Chief Exec. (Accountability for Public Funds)

E-Gov
Board

Support Office

Representation
Coordination
Consultation
Secretarial
Communication
Technical Support

EC, UK, etc.

Cross Cutting Projects

Culture & Heritage	Education & Awareness	Public Safety & Emergency Services	Statistics	Land & Property	Environment & Agriculture	Utilities & Networks	Transport	Health & Social Improvement

Key
Datasets

Sectoral Project | Sectoral Project | Sectoral Project | Sectoral Project | Sectoral Project | Sectoral Project | Sectoral Project | Sectoral Project

Figure 3.3

*Organisational structure of MOSAIC. Courtesy
of Ordnance Survey of Northern Ireland, Crown
Copyright 2006.*

IAIN GREENWAY

Iain Greenway joined Ordnance Survey Northern Ireland (OSNI) as its chief executive in July 2006. Prior to this he was general manager of Ordnance Survey Ireland, responsible for the management of the organisation's operational activity and its mapping technology since 2000.

Iain graduated with an M.A. in Engineering from Cambridge University and an M.Sc. in Land Survey from University College London. He joined the Ordnance Survey of Great Britain in 1986. A variety of technical survey posts followed, including short-term consultancies supporting land reform in eastern Europe. After completing an MBA at Cranfield University, he rejoined Ordnance Survey of Great Britain in 1995, undertaking roles in strategic planning and pricing and in sales and marketing as well as conducting management visits to Swaziland and Lesotho. He subsequently undertook a secondment to Her Majesty's Treasury, working in the Secretariat to the Public Services Productivity Panel (PSPP).

Iain is a Chartered Surveyor, a Fellow of the Irish Institution of Surveying (FIS), and a member of the Chartered Institute of Marketing (MCIM). He is the head of the RICS delegation to the International Federation of Surveyors (FIG) and Chair of the FIG Standards Network. He is also a member of the Management and Editorial Boards of the Survey Review.

Looking to the future, Iain feels that,

> *MOSAIC has already shown many organisations the power of GI and the possibilities that open up when data sources are brought together. The collaborative nature of MOSAIC's development has been a vital element in its success. The next stage is the building of a Northern Ireland GeoHub—a technical platform that will enable users in all sectors to share their spatial data holdings and thereby facilitate improved policy making and more effective service delivery. I see the coordination and oversight of the MOSAIC programme as one of OSNI's key priorities in fulfilling its mission as a national mapping agency.*

Box 3.7

Profile of Iain Greenway, Chief Executive, Ordnance Survey Northern Ireland. Photo courtesy of Ordnance Survey Northern Ireland.

Culture and heritage	Key datasets	Public safety and emergency services	Transport
Dept. of Culture, Arts and Leisure *EHS Built Heritage* *Foras na Gaelige* *Ordnance Survey NI* *Public Records Office NI* *Queens University, Belfast* *Ulster Museum* *University of Ulster, Coleraine*	*British Standards GI Committee* *BKS Surveys* *Dept. of Agriculture and Rural Development* *NTL* *NI Housing Executive* *NI Statistics and Research Agency* *Ordnance Survey NI* *University of Manchester* *Water Service*	*Central Emergency Planning Unit* *Health and Safety Executive NI* *Local Govt. Emergency Management Group* *Maritime and Coastguard Agency* *NI Ambulance Service* *NI Fire Brigade* *Ordnance Survey NI* *Phoenix Natural Gas Ltd* *Translink*	*Dept. of Regional Development* *GDC* *Mosaic* *Ordnance Survey NI* *Roads Service* *Translink* *University of Ulster, Jordanstown*
Environment and agriculture	**Land and property**	**Statistics**	**Utilities and networks**
Dept. of Agriculture and Rural Development (various sections) *Dept. of Culture, Arts and Leisure – (Inland Waterways and Fisheries)* *Dept. of the Environment (various sections)* *Dept. of Regional Development* *Geological Survey NI* *Ordnance Survey NI* *Water Service*	*Geological Survey of Northern Ireland* *Land Registers of Northern Ireland* *Mosaic* *North Down Borough Council* *Northern Ireland Housing Executive* *Ordnance Survey NI* *Planning Service* *Roads Service* *Valuation and Lands Agency*	*CDC* *Dept. of Agriculture and Rural Development (various sections)* *Dept. of Enterprise Trade and Investment* *Dept. of Finance and Personnel* *Dept. of Health, Social Services and Public Safety* *Dept. of Social Development* *NI Statistics and Research Agency* *Ordnance Survey NI* *PSC* *Translink*	*British Telecom* *Northern Ireland Electricity* *NTL* *Phoenix Natural Gas Ltd.* *Rivers Agency* *Roads Service* *Water Service* *Sysdeco*

Table 3.2

Mosaic participants.

e-Government Board. The Steering Group is chaired by Head of Ordnance Survey Northern Ireland (box 3.7).

The working groups include representatives from the Northern Ireland government and universities, the utilities, and private-sector companies (table 3.2). There are also several representatives from UK agencies and universities.

A pilot project was initiated to bring together existing environmental and rural data into a single GI repository which would act as the definitive source for spatial datasets relevant to both the urban and the rural environments. The environment/agriculture, culture/heritage, key datasets, and land/property working groups collaborated closely on this project (Mason 2006).

Given the special political circumstances of Northern Ireland, central-government decision making features prominently in MOSAIC activities. One of the goals of the program is to enable every public servant to access appropriate geographic information to facilitate policy development and evaluation, administration, and service delivery at the desktop in a seamless way. In April 2006 the Northern Ireland Mapping Agreement (NIMA) came into force. Under the terms of this corporate supply agreement, all the Northern Ireland civil service departments, agencies, and nondepartmental public bodies gained the right to use geographic information held by Ordnance Survey Northern Ireland, free at the point of use until April 2009 to support policy making, operational delivery, and communication with the public. NIMA will also support an enlarged MOSAIC Support Centre during this period. With this in mind, a GeoHub for Northern Ireland will be developed

to provide the technical and organisational infrastructure needed to make all government-held geographic information accessible and usable.

MOSAIC also has a strong educational dimension. The strategy document recognised two main barriers to the uptake of geographic information: the lack of awareness of geographic information's potential and the lack of education on how to exploit geographic information and its associated technologies. MOSAIC addresses these problems through its education and awareness working group.

FORMING COALITIONS TO CREATE DATA RESOURCES: THE DUTCH GBKN

The second component of SDI development deals with the creation of fundamental datasets. These datasets differ from the thematic datasets that are needed for particular kinds of applications such as environmental or transportation system modelling. Fundamental data typically includes geodetic reference points, elevation and hydrographic data, street names, addresses, administrative boundaries, and property and transportation information. Large-scale maps and property information must be seen as particularly important components of these fundamental datasets because they provide the basic building blocks for a lot of other fundamental data. In many European countries the creation and maintenance of large-scale datasets of this kind lie outside the traditional purviews of national surveying and mapping agencies, and these challenges often call for innovative solutions.

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The GBKN initiative (Grootschalige Basis Kaart Nederland [large-scale basemap of the Netherlands]) (www.gbkn.nl) is a good example of the kind of coalitions that must be built. The task involved the creation and maintenance of a large-scale map of the Netherlands at a scale of 1:500 to 1:1000 for urban areas and 1:2000 for rural areas. The coalition relies heavily on the continuing commitment of the participants, with the costs shared between central- and local-government agencies and private utility companies. The national joint venture agency (Landelijk Samewerkingsverband [LSV]) that manages the project as a public-private partnership between data producers and data providers has been operating at the local, provincial, and national levels for more than 10 years.

The Dutch government approved the creation of GBKN in 1975 and assigned the practical work of database development to the Dutch Cadastre. The project progressed slowly due largely to the high financial input required from the Cadastre. To deal with these problems, a new partnership framework was launched in November 1992, with utility companies agreeing to pay 60 percent of the costs and the Cadastre and the Association of Dutch Local Authorities (VNG) each agreeing to pay 20 percent (Murre 2002). Provincial public-private partnerships (PPPs) formed by the Cadastre, Dutch Telecom (KPN), and wherever possible, regional utility companies and municipalities took on the responsibility for the implementation of the project.

The outcomes of these efforts were very positive. By 1995, nearly 60 percent of the whole country had been covered, and the last piece of the jigsaw was fitted into place in January 2001. Some people called it "the map that had taken twenty-five years to complete." But it probably would never have been completed without establishing a cost-sharing public-private partnership involving the key beneficiaries. Also, map production was only the first stage of a longer process during which the map is regularly updated by the partners. Some of the discrepancies between the different pieces of the map have been resolved since 2001, and general guidelines have been developed to help the participants. However, some variations remain. These include the use of the "staple map" in the southern Netherlands which shows only the front of buildings (van Loenen 2006). Although some differences remain between the pieces, the GBKN is generally adequate for use as a framework layer in the Dutch national SDI. The map contains three types of information: hard topography (buildings, constructions, paved roads), soft topography (waterway boundaries such as hedges and fences), and identifiers (street names, house numbers, names of waterways).

A hierarchy of not-for-profit organisations with defined missions established under Dutch law (stichtingen) forms the framework of GBKN management. It is built around ten regional organisations more or less corresponding to the Dutch provinces. The organisations have a shared mission "to produce and supply a digital large-scale map in order to support the business processes of the users as effectively as possible" (figure 3.4). The board membership of each of these bodies consists of representatives from regional utility companies, the Cadastre, and the municipalities. The national-level General
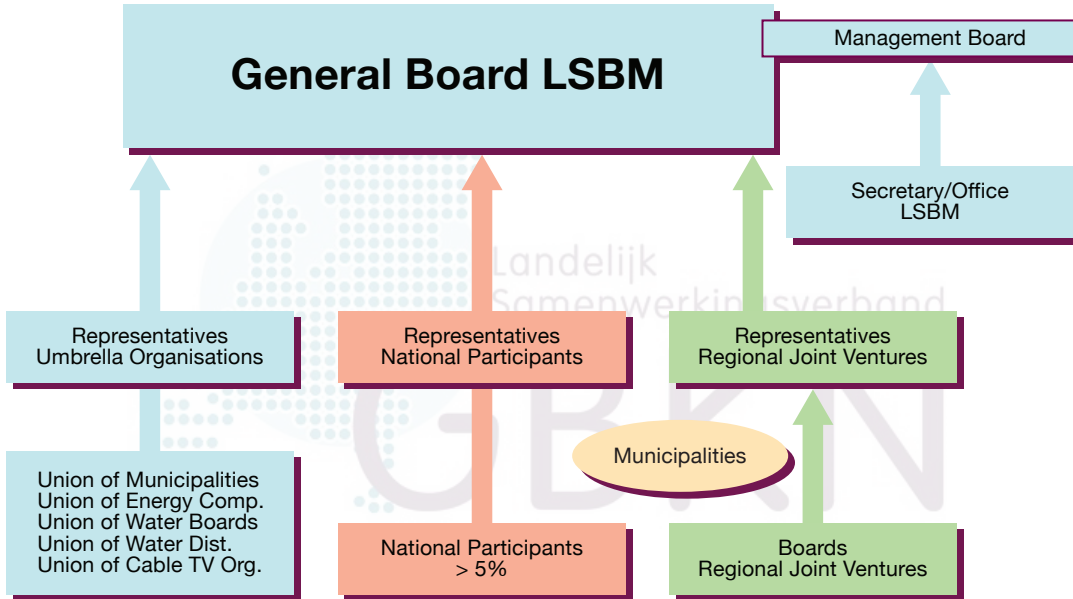
Present Organisational Model

Figure 3.4

Organisational structure of GBKN. LSBM, large-scale basemap. Courtesy of LSV GBKN.

LEEN MURRE

Leen Murre has been involved in the field of geoinformation since 1971. He worked for 19 years at the Survey Department of the Ministry of Traffic and Public Works, where he worked his way up from junior operator/land surveyor to senior advisor of the Management Board. He studied geodesy at the Technical University of Delft, graduating in 1985. He became Head of the Survey Department of the city of Amsterdam in 1990 and managed to complete the Large Scale Base Map of Amsterdam by 1995.

Leen became part-time managing director of the National Large Scale Base Map in 1999 and later combined this function with that of the managing director of the National Geo-information Clearinghouse. He has been working full-time on the National Joint Venture Large Scale Base Map since 2003. His task has been to standardise the basemap and develop it as an official register and a component of the Dutch national SDI. Leen was also president of Geo-information Netherlands (GIN)—the Dutch association for geodesy, cartography, remote sensing, GIS, and geoinformatics—from 2003 to 2006.

On the basis of his experience with the GBKN, Leen offers the following advice:

> *Working together saves money, but it is not easy. Everybody has to give up something, and it takes time and effort to find an acceptable compromise. But this effort pays off eventually when all the users are satisfied with the outcome.*

Box 3.8

Profile of Leen Murre, Managing Director, National Large Scale Base Map of the Netherlands. Photo courtesy of Leen Murre.

Board includes representatives from regional organisations, user groups, the national stakeholders (including the Cadastre), the Association of Water Boards, the national telecom company (KPN), and the Association of Dutch Municipalities (box 3.8). A small support centre based in the Cadastre's offices in Apeldoorn assists the General Board.

The initial production costs of the GBKN amounted to about €250 million, and maintenance costs are currently running at around €20 million a year. All the participants currently own the digital map, and the Board operates a cost recovery policy for nonmembers of the joint venture. The data can be purchased as any combination of tiles, each of which covers a hectare. A single tile costs €2.50 for a rural area or €15.00 for an urban area (figure 3.5). On this basis, the complete dataset for the whole country would cost €15 million. The LSV launched its own Web service in 2001 to provide a central order facility. The overall income from GBKN sales in 2005 was on the order of €1 million.

The future of the GBKN is not clear (Besemer et al. 2006). It may become an official register in the context of the Dutch e-Government programme. The objective of the official-register strategy is to make commonly used datasets such as population registers, business registers,

Figure 3.5

GBKN online. Courtesy of LSV GBKN.
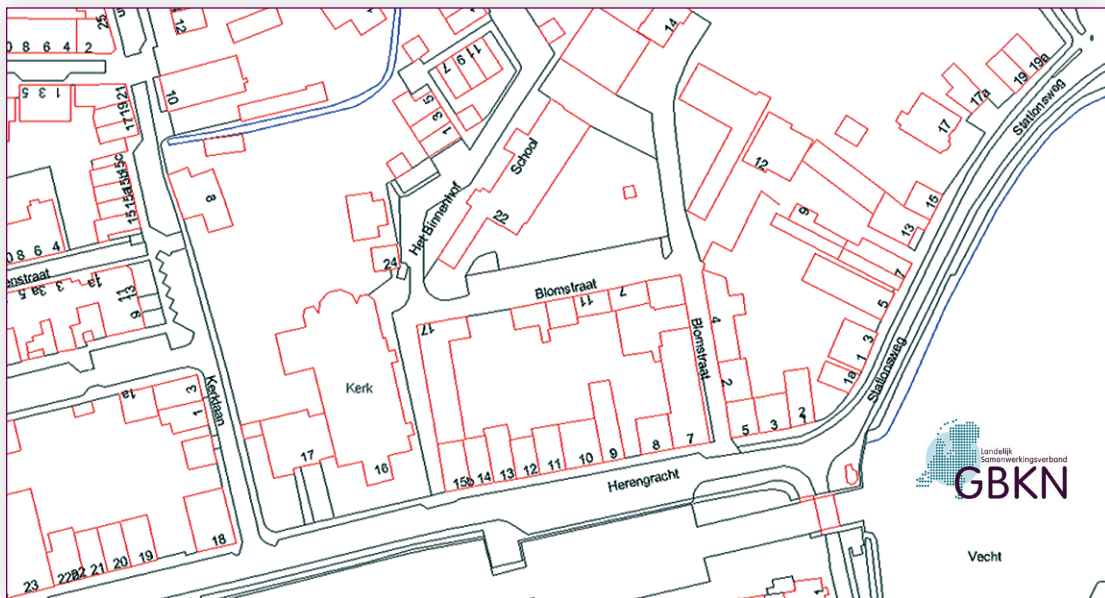
addresses, buildings, and cadastral information available to everyone. Legislation to create some of these registers is already going through the Dutch Parliament. However, the incorporation of the GBKN into this system requires fundamental decisions on the part of the Dutch government regarding the distribution of responsibilities and funding, overall control, and organisational structure.

GBKN is only part of an SDI. Nevertheless, some useful lessons can be learnt from its experience. Firstly, the project would never have been completed without the willingness of very different organisations in both the public and the private sectors to create a coalition and share the costs of database creation and subsequent maintenance. Secondly, those organisations had to commit themselves to agreed standards. Thirdly, some form of top-level management was essential to ensure the smooth running of the project. The costs of this tier of management are minuscule in comparison with overall costs. Finally, the case study shows how the enlightened self-interest of the participants has resulted in a win-win situation. Each participating organization has access to a detailed large-scale database it needs for its operations at a fraction of total cost!

FACILITATING ACCESS TO DATA RESOURCES: CATALONIA'S IDEC

The third component of an SDI revolves around the development of metadata services and products. In order to maximise the use that is made of existing resources, potential users need to know what data exists for a particular area, as the same data may be potentially useful for many different users in the context of many different applications in a wide range of fields. They also need to know whether any limitations have been imposed on this data with respect to access. These can take the form of restrictions on reuse in commercial applications or charges for data provision. One feature of metadata products and services which has made them one of the success stories in the SDI field is that they can deliver results quickly to users with minimal resources.

The SDI for the autonomous region of Catalonia in Spain—Infraestructura Dades Especials de Catalunya (IDEC)—exemplifies the issues involved in the development and implementation of a wide range of metadata services (www.geoportal-idec.net). IDEC started as an initiative of the Catalan government's Secretariat for Telecommunications and the Information Society. Its objective is to promote the use of

JORDI GUIMET

Jordi Guimet was born in Lleida, Catalonia, and studied industrial engineering in Barcelona. He was the deputy general director for Information Technologies in the General Directorate of the Cadastre Organization (Madrid, 1987–1991), where he was in charge of technical modernization, introducing IT and GIS in all the cadastre offices and central services. He was also appointed regional cadastre director in Catalonia (Barcelona, 1992–2001). He was the director of IDEC from 2002 to 2005 and is now director of the Catalan Spatial Data Infrastructure Support Centre within the Cartographic Institute of Catalonia.

Jordi was awarded a Doctorate of Industrial Engineering in 1990 and is an Associate Professor of information systems and business management at the Technological University of Catalonia. He is also director of the Master of Geospatial Technologies and Systems Programme at the Polytechnic of Catalonia. He founded the Spanish GIS Association in 1990 and was its president until 2000. He is the current president of the Catalan chapter of the association.

In Jordi's view,

> *The GIS field has grown a lot over the last few years, as evidenced by the large number of GIS companies operating today. This is a clear sign that broad access to geoinformation via the Internet is bringing significant benefits. The new infrastructure and a growing knowledge of interoperability technologies have made it possible to plan innovative projects.*
>
> *SDI development is always a slow process, but as soon as minimal services are operating, the pace accelerates accordingly. Political perceptions about the usefulness of GIS and SDI have also changed, as can be seen from the recent legislation governing the Catalan SDI. After four years of project evolution, the future looks very bright.*

Box 3.9

Profile of Jordi Guimet, director of the Support Centre of the Catalan Spatial Data Infrastructure. Photo courtesy of Jordi Guimet.
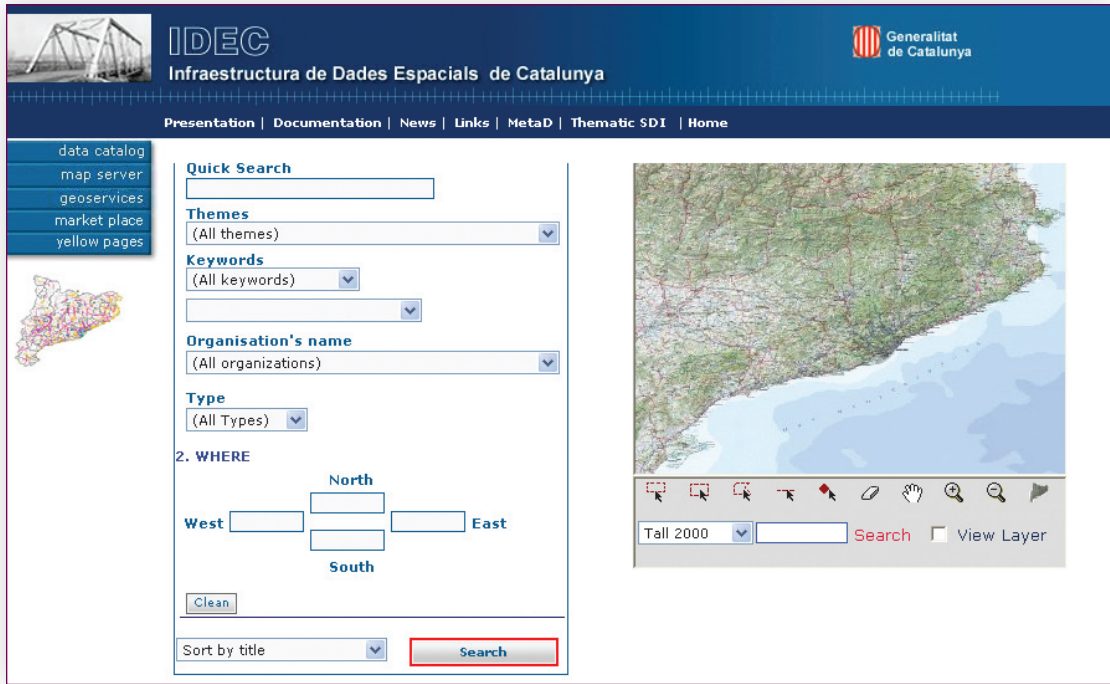
Figure 3.6

IDEC geoportal for Catalonia. Courtesy of IDEC-Institut
Cartografic Catalunya.

geographic information by making this data more available to public- and private-sector users and ordinary citizens. The project came under the direction of the Cartographic Institute of Catalonia and has been actively supported by the Catalan section of the Spanish national GI association (AESIG). Its main function is to develop an enabling platform to promote the dissemination of information and encourage contacts between data providers and data users. The project was also seen as a means of stimulating geographic-information-based projects in universities and research centres in the region.

IDEC began in 2002 with a two-year grant of €900,000 from the Catalan government and the European Regional Development Fund, which made possible the establishment of a small Support Centre with four technical staff to manage the IDEC. The Cartographic Institute of Catalonia provided the required technological infrastructure. The initial objectives were to compile information about existing data resources and products within the region and to create a software platform for making the data available to users throughout the region. IDEC first focused on data sharing between the departments of the regional autonomous government and then, in 2004, within local governments in the region. The status of IDEC was formalised in December 2005 by a law passed by the Catalan Parliament, which established an independent Support Centre to manage IDEC within the Cartographic Institute of Catalonia (Guimet 2006). The Support Centre acts as the basic technical organisation for the promotion, exploitation, and maintenance of the Catalan

SDI and the dissemination of associated data and services (box 3.9).

The Support Centre does not produce any data itself but rather facilitates data sharing between data producers and data users in the region. Its main tasks are to publish a catalogue of the data and services as well as to encourage data producers to make their data freely available over the Internet. It also provides a forum for representatives of organizations involved in geoinformation management to meet and exchange experiences. In this way it plays an important role in raising overall awareness of the potential of digital geographic information throughout the region.

The Support Centre has developed two main services to achieve its objectives: a searchable data catalogue service and a Web map service (WMS). In June 2006 the data catalogue service contained 20,000 records of datasets supplied by 67 different bodies including government departments, municipalities, and private-sector organisations (Guimet 2006). The documentation of records conforms to the metadata standards approved by the International Standards Organisation (ISO) for dataset content, producer, spatial coverage, and currency and the conditions under which data can be obtained. This catalogue can be searched by topic, area, keyword, or coordinates (figure 3.6).

The IDEC Web mapping service links together the servers of 12 main data providers (figure 3.7), enabling users to access more than 150 layers of reference and thematic data. Available geoinformation includes topographic and environmental data, orthophotos, cadastral data, and

urban planning information. Users can also download some of this data using Web Feature Service (WFS) and Web Coverage Service (WCS) software.

IDEC is currently seeking to increase the participation of municipalities. All the larger municipalities are already involved in some way, as are 75 percent of the municipalities with populations of more than 10,000. However, only 15 percent of the small municipalities are involved at the present time (Guimet 2006). The funding of local GIS projects adds a strong capacity-building dimension to this work. Catalan e-Government funds provide more than €1 million per year for creating metadata and publishing data in WMS and particularly for GIS projects meeting IDEC objectives. The Centre offers support for applications based on its SDI resources platform. This includes customised services such as data catalogues, viewers, and feature editors. IDEC goals for the end of 2006 included connecting the Web services of at least 30 municipalities to its Web mapping network and publishing the metadata of 60 municipalities in its data catalogue. IDEC recognises that it will take a long time for all the municipalities in the region to be able to participate.

IDEC has also been involved in several thematic SDI projects which make use of the services described above but focus on a particular applications sector. A good example

is the coastal SDI, which seeks to promote greater user participation in the management of the coast of Catalonia by making relevant data easily accessible. The geoportal developed for this purpose has both a catalogue and a map server. A new thematic SDI is also being developed in the framework of the EU INTERREG programme to facilitate the participation of universities and research centres in the regional SDI. Other thematic projects underway include applications in the cartographic and local-government fields.

Now that IDEC's status has been formalised, its future is ensured. The data holdings accessible through IDEC's portal are likely to steadily increase, as more and more municipalities use IDEC to share their data. The Support Centre's role is primarily that of a facilitator in this process. In essence, its ultimate objective is to foster the sharing of data and services and maximise the use that is made of existing data resources in the broader context of an emerging information society. Initiatives such as IDEC can profoundly change existing administrative cultures and promote more widespread commercialisation of information gathered by public-sector organisations. As noted above, the resources that are required for this kind of work are relatively trivial by comparison with those needed for basic data collection and updating.
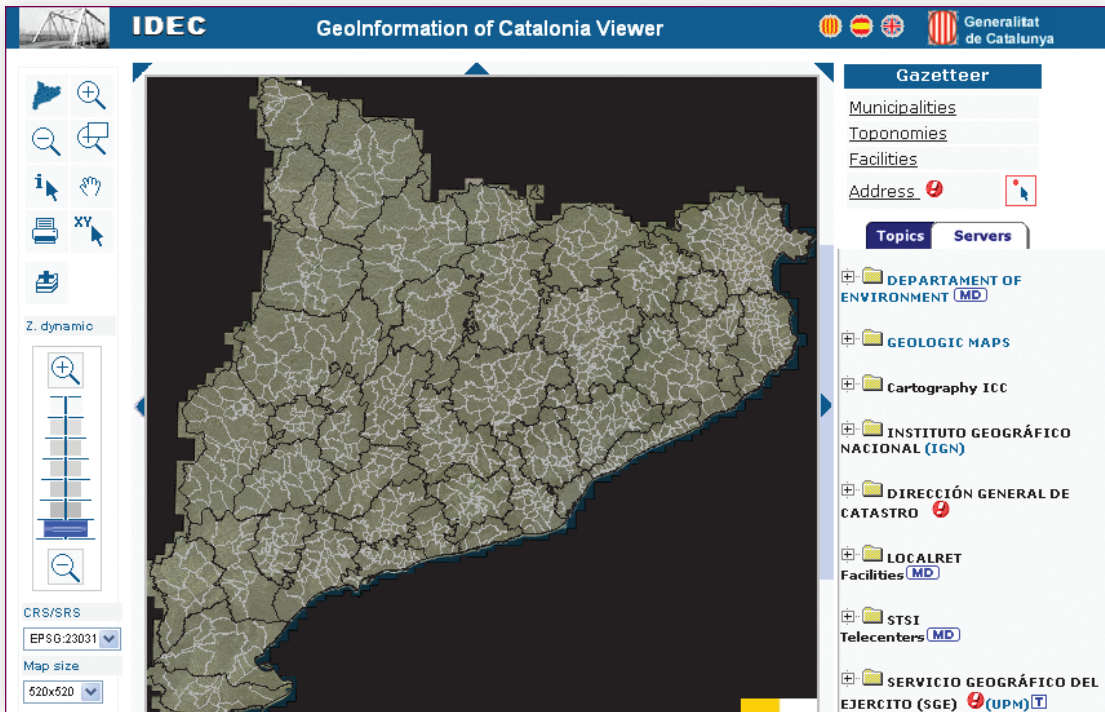
Figure 3.7
IDEC map viewer. Courtesy of IDEC-Institut Cartografic Catalunya.

CONCLUSIONS

The SDI phenomenon has spread throughout almost all of Europe, but countries vary considerably in the degree of progress made in establishing operational SDIs and in the types of approaches toward SDI development. The INSPIRE initiative offers much-needed standards and guidelines, and the governments of all EU member states are actively participating in INSPIRE-related activities.

The case studies from Northern Ireland, the Netherlands, and Catalonia exemplify innovative and imaginative approaches to SDI development and highlight the multilevel nature of SDI implementation in practice. Much of the data is collected at the subnational level, where decisions often have the greatest direct impact on day-to-day decision making. The three case studies also illustrate the importance of involving stakeholders in all aspects of SDI development.

Support centres play a vital role in the development and implementation of SDIs. The MOSAIC support centre acts as the hub for SDI-related activities in Northern Ireland. The GBKN national support centre has both strategic and management functions with respect to the other regional and national participants. And the IDEC Support Centre has been very proactive in mobilising regional data resources. The amount of money involved in backing these activities is surprisingly small: currently only two and a half staff for MOSAIC and four staff each for GBKN and IDEC. However, all three support centres are closely linked to key players in their regions and are able to draw upon the resources of the much larger organisations if necessary. This can be seen in the relationships between the

MOSAIC Support Centre and Ordnance Survey Northern Ireland, between the GBKN Support Centre and the Dutch Cadastre, and between the IDEC Support Centre and the Cartographic Institute of Catalonia.

The developments described in the three case studies must also be viewed from a wider perspective. Ordnance Survey Northern Ireland is a member of the United Kingdom's GI Panel, which is currently considering the development of a UK SDI strategy. GBKN has links with the Dutch national GI association, which has played an important role in the development of the Dutch national geographic information infrastructure. And IDEC is an important player in Spain's national IDE. E-Government agencies are actively involved in the management of the Northern Ireland SDI as well as IDEC. All of them are also actively involved in developments at the European level, particularly with respect to the INSPIRE initiative, which is described in the next chapter.