
National GI Strategies - International Lessons Learned for the UK

Robin McLaren, Know Edge Ltd
Sheila Drew Smith, Independent Economic Consultant
Gavin Keith, Compass Geographics Ltd
Dr David Coleman, University of New Brunswick

ABSTRACT

The UK is not unique in considering the feasibility / applicability of a new national 'Location Strategy' and searching for a revised business model to cope with the web based world. Many countries are also in a state of flux and are making some radical changes to how they manage and disseminate Geographic Information (GI).

This paper reviews the progress made in four countries (Canada, The Netherlands, Norway and New Zealand) and identifies innovation and potential lessons learned that could be applied in shaping a future UK Location Strategy.

INTRODUCTION

This paper reports on national GI Strategies for the formulation, implementation and exploitation of National Spatial Data Infrastructures (NSDIs) in four countries; Canada, the Netherlands, Norway and New Zealand. What quickly becomes apparent is that the UK is not unique in terms of addressing issues with the establishment and operation of a cost-effective NSDI and a supporting business model. All four countries reviewed are in a state of transition and are making some radical changes. None have yet arrived at a stable strategic framework and business model. Yet, in all cases there are experiences and lessons learned that can help influence the future direction of a national Location Strategy (and implementation of a NSDI) within the UK.

The four countries were chosen for the following reasons:

Canada

- A federated solution;
- Maturity of experience in NSDI;
- Partnership arrangements in establishing the Canadian Geospatial Data Infrastructure;
- Approach to constituency-building; and
- New GI policy and governance arrangements.

The Netherlands

- New consolidated institutional arrangements;
- Proposed concept of 'Basic Register' that will be mandated;
- Review of business model; and
- Strong political support has been brokered.

Norway

- Strong partnership approach to building a NSDI, especially between central and local government;
- New consolidated institutional arrangements, including maritime activities;

- Government owned company to distribute GI on behalf of all partners;
- Public sector have clear responsibilities and opportunities to participate in the value chain;
- Strong political leadership; and
- Cost sharing and licensing model.

New Zealand

- Recent publication of a Geospatial Strategy
- Emphasis on governance to oversee delivery of strategy
- Just embarking on delivering on the Strategy
- Strategic goals (governance, data, access, interoperability) broadly similar to any future UK approach

For each of the four countries under examination, a selection of public sector organisations were identified and their respective spatial data products and services summarised using the following criteria; institutional arrangements, GI products and services, description and pricing policy. This paper provides a summary of these findings on a country-by-country basis and provides specific lessons learned that are potentially relevant to the UK.

When comparing these countries' experiences with the UK's, it should be remembered that there are significant differences in institutional structures, cultures and geographies amongst the countries. For example, in the UK there is commercial / strategic interest in GI for approximately 27% of the land mass, whereas in Canada this is likely to be 1%; this significantly influences the business models relevant for these countries. In Norway and Canada, the regional and local governments complement the National Mapping Agencies in their mapping activities, whereas in the UK the Ordnance Survey provides all levels of mapping. These fundamental differences influence the associated strategies and make it difficult to adopt some strategic aspects directly in the UK.

CANADA

At over 9.2 million square kilometres, Canada is the world's second largest country. More than 80 percent of its over 32 million citizens live in towns and cities within 250 kilometres of the United States border. Canada is a federation with a parliamentary system of government. Powers and responsibilities are divided between the federal government, ten provincial governments, and three territorial jurisdictions. In turn, municipal and regional governments operate within each province.

An early entrant into the national spatial data infrastructure field, the institutional situation and market arrangements in Canada are markedly different than in the UK. Geomatics Canada, an organisation within the Earth Sciences Sector of Natural Resources Canada (NRCan), has the national mandate for provision of *nation-wide* geodetic control, topographic mapping frameworks and the land survey system and cadastral mapping on Canada Lands. The Canadian Hydrographic Service (CHS) possesses the mandate for charting of Canada's coastal regions and navigable waters.

Geomatics Canada has been traditionally responsible for map production at scales of 1:50,000 and smaller, while provincial government organizations have handled scales from 1:20,000 up to 1:2,000. Where needed, municipal governments have been responsible for creation of mapping at scales of 1:1,000 or even 1:500 in some instances.

Overlapping activities do exist at each level – as well as *between levels* -- of government in Canada. Such federal organisations as Statistics Canada, Canada Post also collect medium- to small-scale road network information, for example, while Public Works and

Government Services Canada, Transport Canada and others have the occasional need for larger scale mapping. Environment Canada, Agriculture & Agri-Food, and National Defence also have project- and program-driven mapping requirements that cannot always be satisfied with existing information.

As well, there has been the perception of considerable overlap in geodetic control and topographic data collection at the federal and provincial levels. In an effort to coordinate efforts — or at least streamline cooperation towards the common goal of full and up-to-date coverage — a variety of different strategic arrangements were developed and implemented over the past 15 years.

Canadian Federal Government organisations alone spend approximately C\$240 Million [2005-2006] a year on geomatics-related activities. The federal Geomatics Community is “organised” under the auspices of the Inter-Agency Committee of Geomatics (IACG), co-led by the Department of National Defence (DND) as the major user of geomatics products, and NRCan as the major producer of Geomatics products. Other IACG members include the Departments of: Fisheries and Oceans, Agriculture & Agri-Food, Safety & Emergency Preparedness, Environment, Health, Indian & Northern Affairs, Public Works & Government Services, Library & Archives Canada, and Infrastructure, as well as Elections Canada, Statistics Canada, Parks Canada, and the Chief Information Officer Branch of the Treasury Board Secretariat.

Spearheaded by the IACG and CCOG, the Canadian Geospatial Data Infrastructure initiative was launched with the intention of “... *enabling timely access to geospatial data holdings and services in support of policy, decision making and economic development through a co-operative interconnected infrastructure of government, private sector and academia participants*”. The five key thrusts of CGDI are illustrated in the Figure below.

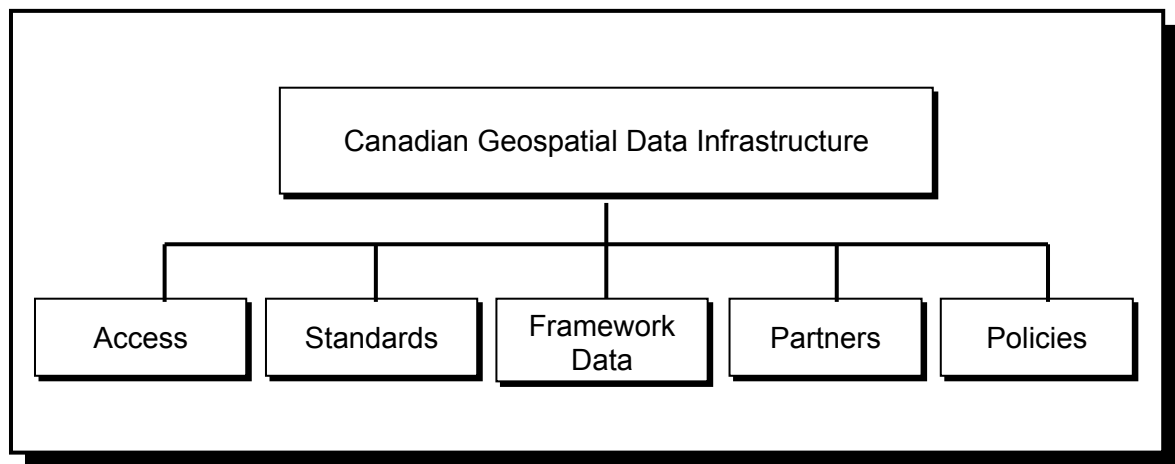


Figure 1: The Five Thrusts of CGDI

In 1999, Canada's CGDI (termed the GeoConnections Programme) was allocated C\$60 million in federal funding over six years to implement the CGDI through seven major projects. Staff support for GeoConnections was provided by Natural Resources Canada. To guide its work, a Management Board was established -- chaired by the Assistant Deputy Minister of the Earth Sciences Sector of Natural Resources Canada and consisting of representatives from the IACG, the CCOG, academia, and industry.

The first phase of GeoConnections did not focus on data collection, although framework data was an integral part of the program. With shared leadership, most of the GeoConnections programs involved network design, ideas for institutional change, development of common policies, capacity building, creation of partnerships, and promotion

of data access and sharing through encouraging the development and use of standards-based products & services.

On June 15, 2005, the Government of Canada announced funding of a further C\$60 million for a five-year renewal of the GeoConnections programme. From 2005 to 2010, the renewed GeoConnections program will work with its existing partners to ensure that CGDI technologies remain current, but will also pursue partnerships with new end-user communities of practice. Specifically, GeoConnections will seek to better understand the needs of users in four key areas (sustainable development and the environment, Aboriginal issues, public health, and public safety) with the goal of collaborating to further develop the CGDI into an operational asset for end users in these areas to employ in planning and decision making.

Like the first phase of GeoConnections, the new GeoConnections program operates in much the same way: led by Natural Resources Canada, it is governed by a management board with several advisory boards and it will undertake cost-shared partnership projects with the public and private sectors and other organizations in support of the CGDI.

A key deliverable – and success – of Canada’s CGDI is the GeoBase Portal (www.geobase.ca). Still in its early stages, GeoBase nevertheless represents a significant milestone in cooperative collection and distribution of Canadian digital topographic mapping. It ensures the provision of -- and access to -- a common, up-to-date and maintained base of medium-scale framework geospatial data for all of Canada. The GeoBase Portal brings together data from federal, provincial and territorial sources to provide Canadians Web-based access to core geographies for the country such as; national road network information, administrative boundaries, digital elevation models, satellite imagery and, soon, hydrology information across the country.

GeoBase can be regarded as much an *institutional* achievement as it is a technological accomplishment. It was created only through a series of individual negotiations between NRCan and representatives from each province. Each negotiation covered a similar set of technical and institutional concerns, but the details of operational priorities, reprocessing costs, pricing and distribution policies, and incentives differed in every case.

Lessons Learned:

- Core Reference Geographies encourage and enable joined up geo-spatial information across public and private sector constituencies.
- Strong political support with governance at the Ministerial level.
- Excellent public / public and public / private partnerships with common goals and clear responsibilities.
- Focus on supporting politically and socially relevant application areas, e.g. sustainable development & the environment and health.
- Significant effort to build capacity in traditional and new sectors.

THE NETHERLANDS

The Netherlands covers 41,000 square kilometres, with a population of about 16.3 million. The country consists of 12 provinces and about 450 municipalities and has a population density of ~420 people per square kilometre.

The Netherlands has recently undergone a review of its institutional arrangements and business model to support their NSDI initiatives. This provides an opportunity to learn from this new transition and to understand why they have decided to obtain political backing for their ‘Basic Registers’ approach.

Originally described as a series of various bottom-up initiatives, *de facto* coordination of the Dutch National Geographic Information Infrastructure (NGII for short) was long the responsibility of the Dutch Council for Real Estate Information (RAVI). However, the Ministry of Public Health, Spatial Planning and Environmental Affairs (MinVROM) has recently assumed the formal position of geo-coordinator again, with GeoNovum, (the new generation of stakeholder based organisation) replacing RAVI and acting as an umbrella organisation partly funded by MinVROM and serving the Dutch GI-community at large.

The NGII covers seven nation-wide large scale key-datasets, which are produced and managed in a coordinated and harmonised way by some 40 (semi-) public institutes. The "authentic registration" of some of these fundamental datasets can be considered as a unique and important success for the NSDI. The Ministry of Interior is now adding a top-down approach and a legal component to the NSDI. It is expected that nine registers, e.g. buildings and basic cadastre, will eventually be recognised as "authentic" or, as they are now called, "Basic Registers", which would make compulsory their maintenance, their quality assurance, and ultimately their use by government.

Cadastral Mapping, Topographic Mapping, Large Scale Mapping and maintenance of the Dutch National Control Network all fall under the jurisdiction of the Kadaster organisation. Kadaster is a "*...self-administering state body that furthers socio-economic traffic relating to immovable property as well as movable property such as ships and aircrafts*". Kadaster processes data on real estate in the Netherlands and records this data in public registers, cadastral registers and cadastral maps. It provides related information almost 16 million times per year to notaries, municipalities, businesses, private citizens and other interested parties. Kadaster also maintains the National Triangulation Network and Topographic Mapping Service used in the Netherlands. Since 1994 Kadaster has been a "Non-departmental Public Body" (NDPB) – a legal entity under public law that carries out its tasks independently and reports to the Minister of Housing, Spatial Planning and the Environment.

A very well-developed reseller policy is in place to assist the Kadaster in distributing data to its customers. A number of companies – like Geodan, for example – have been engaged to provide a commercial outlet for the data, develop new on-line means of distributing it, and creating new value-added information products based on the original datasets.

The Topografische Dienst Nederland (Topographical Service of the Netherlands) is the Dutch national mapping agency. It was part of the Ministry of Defence but has now been merged with the Kadaster. It is mandated to produce the medium-scale vector dataset on a nation-wide basis and update this once every four years. The vector mapping was officially designated a "Basic register" on January 1st, 2007 and becomes available for free to all government users.

The GBKN (Grootschalige Basiskaart van Nederland) is the Large Scale Base Map of the Netherlands. It is produced and maintained by the LSV-GBKN, a public-private partnership of the municipalities, utility companies, water boards, the Dutch Cadastre and the Dutch administration. The GBKN is used for planning, building activities, road management, managing of rural estate and assets. It is updated continuously through negotiated agreements between the partners, i.e. the Dutch Cadastre, the municipalities and the utility companies and is very expensive to keep up-to-date. It is important that the GBKN department was placed under the Topographic Mapping Division of Kadaster at the beginning of 2005.

Since the mid 1980's, cost recovery has been the leading principle influencing data supply by Dutch government bodies to third parties. Kadaster is fully self-supporting: it is required by law to recover its operational costs through registration fees, but is forbidden from making

profits from its core activities. All operating costs are covered by revenues from fees or charges associated with the parcel registration process.

Government users form a relatively small component of the overall cadastral market -- fully 90% of revenues for this product line come from the private sector. Looking at this another way, approximately 70% of the revenues are from registration fees. The remaining 30% comes from information services or products which support the property transfer process.

On the other hand, approximately 90% of the Dutch market for topographic mapping was comprised of government users as of October 2006. Only 10% of revenues originate in the private sector. With such a large component of the market inside government, there has been growing lobby to: (1) have the cost of large-scale mapping production and updating supported totally by government budgets; and (2) distribute the large-scale mapping data available at minimal or no cost.

In 2000 the Dutch government embarked on a three year programme (2000-2003) called *Streamlining Key Data*, a programme designed to support restructuring and advancement of the government's overall information infrastructure. Established as a cooperative venture involving eight federal ministries, the Association of Netherlands Municipalities, and the Dutch Data Protection Authority, the program is now well into its second phase.

The rationale behind the Programme is to create a better government by radically reorganising the information infrastructure of the government. It concentrates on two goals, namely:

- The communal use of data: in principle data would be collected on one occasion, and repeatedly used for the implementation of series of laws; and
- The joint use of data: data from different records required for the performance of a specific government duty would be combined in one database.

A *Basic Register* is defined in the Programme as "a high quality database accompanied by explicit guarantees ensuring for its quality assurance that, in view of the entirety of statutory duties, contains essential and/or frequently-used data pertaining to persons, institutions, issues, activities or occurrences and which is designated by law as the sole officially recognised register of the relevant data to be used by all government agencies and, if possible, by private organisations throughout the entire country, unless important reasons such as the protection of privacy explicitly preclude the use of the register".

In the Dutch government's plans, data which is part of a basic register will be collected only once from individuals or businesses. The most appropriate public agency for the type of data in question will be responsible for its administration. Furthermore, use of this data will be mandatory throughout the entire government sector.

Reports vary as to the number of basic registers ultimately planned. Recent papers highlight 6-9 planned basic registers, including:

1. Natural Persons;
2. Legal Persons;
3. Buildings (Basisgebouwen register);
4. Standardised Addresses (Basisregistratie adressen);
5. Basic Cadastre (Kadastrale registratie);
6. Medium- and Large-Scale Mapping;
7. Registration Numbers (for vehicles);
8. Wage, Employment and Benefit Relationships; and
9. Income and Assets.

Some of these registers are in existence, while others are either under development or in the planning stages. Clearly, a number of building registers, business registers and address registers already exist within different government departments. The challenge is to create a respective single authentic dataset out of each these existing registers. Some are explicitly geographic in nature while others will be geo-referenced.

Proposed mandatory criteria for basic registers include the following:

1. Registration is regulated by law
2. Clients have a report obligation
3. All public institutions are obliged to use the basic register
4. Clear accountability
5. The realisation and operating costs must be within reason and clearly allocated
6. Transparency about the content and scope of the registers
7. Firm agreements and procedures between the registrar and the clients
8. Clear procedures for accessing the basic registers
9. A stringent regime of quality control
10. Procedures are needed so that clients can fulfil their obligation to participate in the decision-making
11. The basic register needs to have a clear position in the overall system of basic registration and the interconnections need to be defined
12. Authority over the authentic registration should rest with a government agency, with one minister responsible for realisation and operation

Part of the context for this goes back to the early 1990's, when the Dutch Government requested every sector within government to prepare a "structure plan" for the management and flow of its information, from initial collection through application and updating. In the case of the Geographic Information Sector, RAVI took a major role in the coordination of this plan through a series of cooperative agreements and standards-based developments. When the Dutch Ministry of the Interior (the department responsible for implementing the Netherlands' e-Government policy) saw the early results of this cooperation, the GI sector was used as one of the models in developing the terms and conditions which would define Basic Registers within government. GeoNovum have recently agreed and published the NEN3610 standard to implement the Basic Registers through the definition of standard objects across Government.

Lessons Learned

- Significant institutional reforms and consolidation in the geo-spatial public sector.
- Basic Registers mandated across Government.
- Pragmatic approach to the business model for cost recovery.
- Strong political support.
- Robust public / public and public / private partnerships.

NORWAY

Norway covers 306,830 square kilometres, with a population of about 4.6 million. Statens Kartverk, the Norwegian Mapping and Cadastre Authority (NMCA), is Norway's national institution for geodesy, hydrography, land registration, cadastre and geographic information. Statens Kartverk is a Public Enterprise reporting to the Ministry of the Environment.

Statens Kartverk's activities are organised in four divisions: Geodesy, Land Mapping, Hydrographic Service, and Cadastre and Land Registry. Medium- and small-scale topographic mapping is produced in both hardcopy and digital form at scales ranging from

1:50,000 to 1:5 million with the data updated regularly. Cadastral information has been available from the municipalities and information on rights from the courts, with responsibility being transferred to the NMCA. The NMCA also maintains a database on property information for the whole country, with co-ordinates for buildings, addresses and properties, and some attribute information (property owners).

The NMCA's responsibilities include the following:

- maintenance of the national geodetic network;
- national GPS service for positioning;
- production and management of national digital map series;
- printed map series (Land and sea) and publications (sea);
- national register for public property information;
- land registry for properties;
- national standards for mapping and spatial information;
- data management
- management of the international electronic navigational chart centre; and
- service delivery, management and distribution of spatial data by internet and WMS services.

NMCA staff was reduced in 2004 due to a changed framework and privatisation of the value adding services. In 2005 this was increased due to the transfer of the land courts to NMCA which will continue on to 2007. Statens Kartverk had a staff of approximately 670 in 2005 and will increase up to approximately 800.

The task of establishing and managing a national infrastructure of spatial information and property information is conducted in close cooperation with municipalities and other public spatial data producers and users through a cooperative venture called "Norge Digitalt" (or Norway Digital). This initiative builds primarily upon three key national level programmes including *eNorge* (which is the eGovernment programme), *Geovekst* (a cooperation programme for establishing digital geographic data) and *AREALIS* (the environmental programme that aims to make environmental data and land use information available). *Geovekst* and *AREALIS* are now integrated in "Norway Digital".

The NMCA described above is the major executive and coordinating body within the NSDI. The NSDI has also received political backing from the Norwegian Parliament, which has stated that "*....Geographic data must be easily accessed and be used efficiently across sectors and management level.*" The eNorge e-Government action plan explicitly addressed geographic information in a limited number of action points, all of which were tasked to the Ministry of Environment:

- Increase of access to local information through binding co-operation agreements between local authorities, the state and other users of geodata on a common map database;
- Establishment of a first version of Net portal for national geographic data;
- Development of Net-based learning in the field of Geographic Information Technology (GIT); and
- Implementation of pilot project for co-ordinated administration of geographic information.

Importantly, the Norwegian NSDI is based on shared core standards and specifications, co-operation on co-financing, and jointly executed projects for establishing, improving and maintaining large scale digital geographic data. A general agreement on this program

includes the State Road Department, the Board of Electricity Companies, the Norwegian Association of Local Authorities, Norwegian Mapping and Cadastre Authority, the Norwegian Telecommunication Company, Department and the Ministry of Agriculture. Other services may participate in the program in specific regions. The Norwegian Mapping and Cadastre Authority undertakes the co-ordination role both on national and regional level (see Figure 2 below which illustrates the Organisational Structure that underpins *Norway Digital* services)

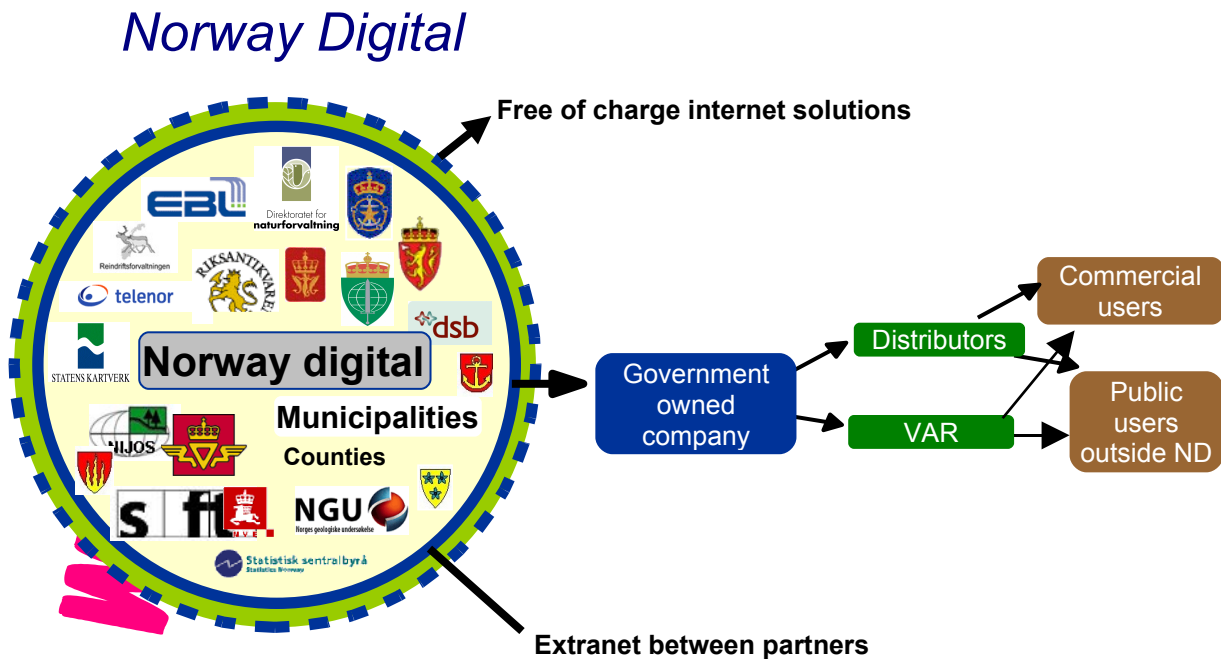


Figure 2: Norway Digital Organisation

The main objective of Norway Digital’s geoportal architecture is to offer a modern, efficient technology for storing, managing and distributing geospatial information based upon existing and upcoming standards, and establish this technology as a national infrastructure in co-operation with public and private sector. The three main components of the infrastructure are:

- A national portal: (see www.geonorge.no)
- A metadata service: The Geospatial Catalogue for Norway; and
- Standardised access services.

The GeoNorge portal is now Norway’s nationwide gateway for geographic information intended to become a central component of the Norwegian’s overall national spatial data infrastructure. The gateway itself has been established and run by Statens Kartverk. And individual and institutional users can apply to receive *and provide* updated geographic information. The gateway is a shortcut to information about official institutions and private companies and their products and services. The content of Norway digital and its relation to thematic data is depicted in Figure 3 below.

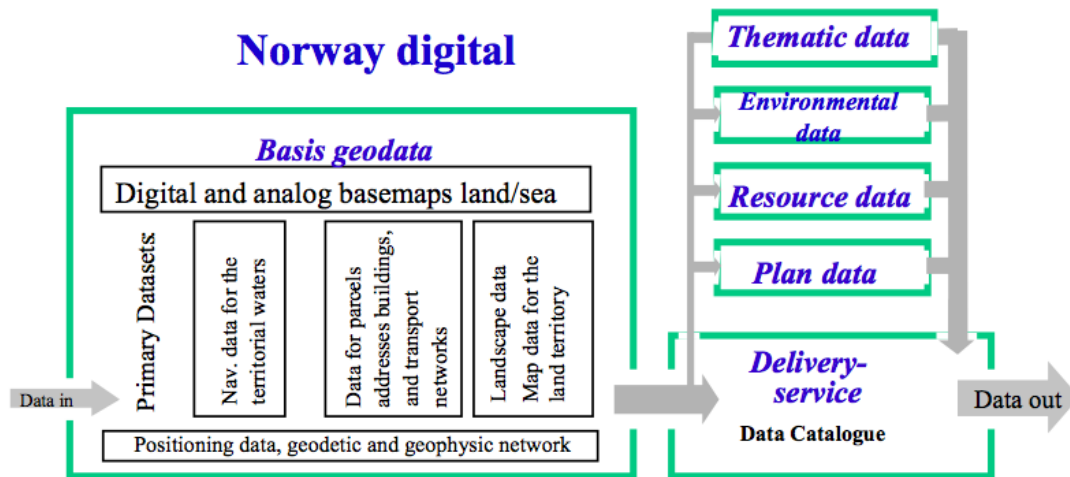


Figure 3: Norway Digital – Data Content and Delivery Mechanisms

Financing comes from government funds, user payment, and joint ventures with public authorities and public owned organisations. Each partner contributes to the projects with funding, personnel and expertise. The resulting databases are accessible to all participants for joint use.

Some 30 governmental authorities and most of the municipalities are now partners in the new framework agreement which makes up the Norway Digital programme. The practical execution is organised as individual projects through which digital data is established and administrated in specific, limited geographic areas. The projects are based on an agreed set of standard rules and manuals, which facilitate the exchange and sharing of data across administrative boundaries.

Within 'Norway Digital' and based on the Parliamentary White Paper in June 2003, a pricing mechanism has been put in place based on following principles:

- a distributed infrastructure
- unifying reference and thematic data
- partnership and joint venture funding
- inclusion of local, regional and national authorities
- establishment of a public limited company to provide delivery services to non-partners (commercial and non-commercial)

Recommendations from this White Paper set the stage for the outsourcing of most geo-information production activities previously completed within government. It gave distribution rights to a state-owned company, and transferred responsibility for creation and distribution of value-added products to private companies.

A government owned company called Norsk Eiendomsinformasjon has been assigned responsibility to provide all information about mapping and land registration to outside customers and private citizens on behalf of the government. The company charges for all its products, but pricing may vary depending on such factors as the number of users, number of computers, and nature of usage (e.g., academic users may get discounts).

Also developed was a system of partnership fees -- called the "Norway Digital Calculator" -- which is a flexible pricing mechanism based on type of datasets needed (and related interest factor), base value and other parameters. This mechanism has been agreed upon between

the partners of the Norway Digital. Some users claim data prices are still too high, and discussions around "fee versus free" issues are still ongoing.

The revenue mix is changing as more and more digital data becomes available online through the geoNorge portal and as more municipalities and institutional users become part of the Digital Norway initiative. In the longer term, one of the significant planks in the eNorway 2009 platform relevant to Norway's GI community is that re-use of public data for value added services shall be free of charge by 2008. Further, all agreements for reuse of public data shall be assessed for adaptation to a common government directive by 2007.

Lessons Learned

- Achievements carried on the back of very strong political support built over the past decade.
- Significant institutional consolidation in the geo-spatial sector.
- Strong partnerships across local and central government and utilities.
- A sustainable and equitable business model for the public sector.
- A single channel for marketing and selling geo-spatial information from the public sector.
- This is the greatest example of a country successfully embracing geo-spatial interoperability standards.

NEW ZEALAND

New Zealand is a country of two main islands along with numerous smaller islands with a total land is covering 268,680 square miles. The current population is approximately 4.1 million.

In terms of government structures, the country is organised into various central government agencies, Crown entities and a two-tiered local government arrangement with twelve regional councils for the administration of environmental and transport matters and seventy-four territorial authorities that administer roads, sewerage, planning, and other local matters.

New Zealand was one of the early adopters of innovative Land Information policies in the 1980' and 90's and at the forefront of public sector reforms. After a series of experiments with public private partnerships, New Zealand has rethought its geo-spatial strategy and the 'New Zealand Geospatial Strategy' was published in January 2007 and approved by Cabinet in April. Subtitled "*A co-ordinated approach to location information*", the Strategy has four strategic goals to:

1. establish the government structure required to optimise the benefits from government's geospatial resources;
2. ensure the capture, preservation and maintenance of fundamental (i.e. priority) geospatial datasets, and set guidelines for non-fundamental geospatial data;
3. ensure that government geospatial information and services can be readily discovered, appraised and accessed; and
4. ensure that geospatial datasets, services and systems owned by different government agencies and local government can be combined and reused for multiple purposes.

While the scope of the Strategy include the citizen, industry and government (see Figure 4 below), the initial emphasis is focused on the public sector in order that public agencies can

develop and maintain national geospatial information as well as share this information across all levels of government. It is hoped that this will become a solid foundation on which the private sector can then develop value-added products and services.

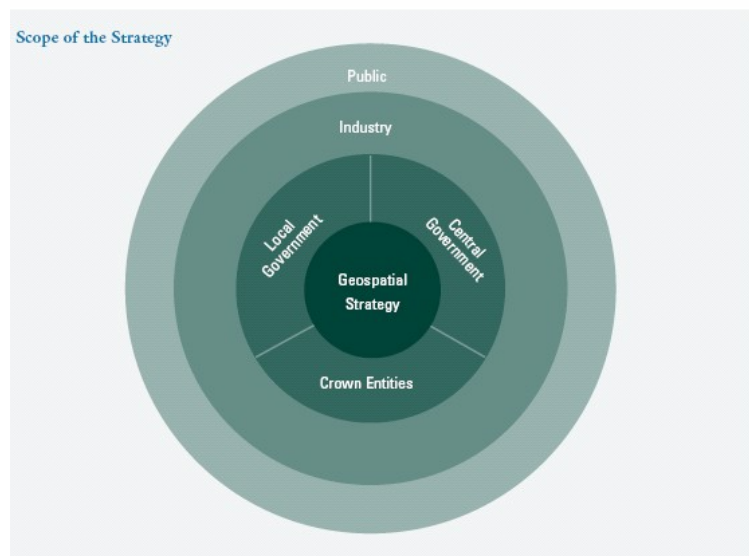


Figure 4: Scope of the New Zealand Geospatial Strategy

The strategic itself was created to respond to a numerous issues that existed within the New Zealand GI community – issues that are broadly similar to experiences elsewhere around the world including the UK. These included:

- poor governance arrangement across the public sector
- duplication of GI created by various organisations with inconsistencies among data, systems, standards and processes;
- the inability to use GI effectively and efficiently to resolve day-to-day government services and respond to current events
- a lack of standards for facilitating data sharing and interoperability
- little attention to information management procedures with no means of assessing 'value for money' in supporting government business activities;
- a lack of capacity within some public agencies and little awareness about GI in general

Importantly, there is already ministerial support to deliver on the strategy and a governance structure that will attempt to ensure effective participation in decision-making by the key geospatial stakeholders - local government, relevant public sector agencies, Crown entities and industry. A Geospatial Office hosted by Land Information New Zealand is being established later this year. The office will co-ordinate the strategy, evaluate its implementation, and provide administrative and programme support to the Geospatial Executives Group (made up of Chief Executives of key public agencies responsible for driving implementation).

It is clearly too soon to assess the progress and benefits accrued from the New Zealand strategy. There is no existing GeoPortal providing access to GI, the business model is unclear, pricing policies have yet to be articulated, indeed, the partnerships that have been established could break down. However, a framework is now being built that could mirror the successes in Canada, Netherlands and Norway.

Lessons Learned

- Ministerial support for strategy.

- Strong governance with Chief Executive level involvement.
- Dedicated resources to support the implementation of the strategy.

CONCLUSIONS - LESSONS LEARNED APPLICABLE TO THE UNITED KINGDOM

Although the lessons learned from the four countries cannot always be applied directly in the UK, due to different constitutional, government and cultural contexts, many should be adapted and successfully applied within a future UK Location Strategy:

Institutional Change

- All countries are changing their governance arrangements to accommodate the wider range of stakeholders now involved in creating and exploiting their NSDIs.
- In Holland, the use of '*Basic Registers*,' such as buildings, is being mandated across government. A new governance structure is being created to ensure these new regulations are adhered to.
- There is a trend to introduce institutional reforms in the GI sector that typically consolidates the National Mapping Agency, Hydrographic Agency, Cadastral Agency and Land Registration Agency. This creates an organisation that can manage information on land and maritime assets more effectively and holistically and delivers efficiency savings.

Partnerships

- NSDIs cannot be created by a single organisation. All four countries have introduced a partnership approach to this work and have demonstrated significant innovation in constituency-building in federated situations.
- In Canada's example, a co-operative initiative in which federal, provincial and territorial government partners each contribute to form a common, up-to-date and maintained base of medium-scale geospatial data for all of Canada is a significant success.
- In Norway's case, a constituency of central government, over 400 local authorities and public utility companies have joined forces to co-finance and create their NSDI. The Norwegian parliament has published a policy statement on the future co-operation between the state authorities and the municipalities to establish and maintain *Norge Digitalt* (or "Norway Digital"), the Norwegian NSDI. This broad cooperation -- with participation from more than 90 % of the municipalities, 19 national partners, 13 ministries, the county governors and the counties -- is unique in an international context.

Core Reference Geographies

- As part of the Dutch Government's *Streamlining Key Data* Programme, up to nine (9) databases or registers will eventually be recognised as "*Basic Registers*". It is intended that: (a) data deemed to be part of a basic register be collected just once from individuals or businesses; (b) a custodian agency will be responsible for its administration; and (c) use of this data will be mandatory throughout the entire government sector. These *Basic Registers* will become available for free to all government users. This supports the INSPIRE initiative and delivers significant benefits through efficiency gains. However, there is concern over how the *Basic Registers* will be sustainably funded and maintained. New standard. Keith check.

Ministerial Support

- All four countries have been very successful in engaging senior politicians and securing parliamentary time to support their NSDI initiatives. This includes serious financial support; Canada has provided C\$60 million over the next five years to support the second stage of its GeoConnections programme. This has been achieved through pursuing partnerships with new end-user communities of practice in four key areas: sustainable development and the environment, Aboriginal issues, public health, and

public safety. These are hot topics for Canadian politicians.

Business Model

- The Norwegians have clearly identified the role of the public sector in the GI supply chain. The public sector provides data and access to information services, but leaves the creation of value added services to the private sector.
- Partners in creating and maintaining the Norwegian NSDI have developed and agreed an equitable system of partnership fees -- called the "Digital Norway-calculator" -- which is a flexible pricing mechanism based on type of datasets needed (and related interest factor), base value and other parameters. Public sector and private sector users of the Norwegian NSDI, outside of the partners, must pay for access to the NSDI. That said, one of the significant planks in the eNorway 2009 platform is that re-use of public data for value added services shall be free of charge by 2008. Further, all agreements for reuse of public data shall be assessed for adaptation to a common government directive by 2007.
- The introduction and mandating of '*basic registers*' in the public sector in the Netherlands will allow all of the public sector to access these registers free of charge.
- Approximately 90% of the Dutch market for topographic mapping was comprised of *government* users as of October 2006. With such a large component of the market inside government, there has been growing lobby to: (1) have the cost of Top10 mapping production and updating supported totally by government budgets; and (2) distribute the Top10 data available at minimal or no cost.

Services not Data

- Both Norway and Canada are world leaders in embracing Open Geo-spatial Consortium standards and delivering compliant Web Mapping Services across their GeoPortals.

Implementation

- Canada has grabbed the attention of the politicians through astutely supporting current political initiatives, such as climate change, health and public safety. This agenda based approach has the added benefit of encouraging capacity building in communities outside the traditional geo-spatial groups.
- Implementation of the strategies requires dedicated resources that are empowered and have a clear remit.

Sustainability

- It is essential that countries formulate and adopt a business model that can sustain the quality of GI required by customers. The business model in countries where the population / land mass ratio is low, e.g. Canada and New Zealand, will be quite different to countries, such as the UK and The Netherlands, where there is considerable urbanisation and this ratio is high.

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