



Project Report

EXECUTIVE SUMMARY

GEOSPATIAL DATA POLICY STUDY

Prepared for

GeoConnections
Policy Advisory Node

Submitted by

Garry Sears
KPMG Consulting Inc.
45 O'Connor Street, Suite 1000
Ottawa, Ontario K1P 1A4
Tel: 613-598-3661
Fax: 613-238-3698

Members of the Policy Advisory Node of GeoConnections:

Canadian Forest Service, Natural Resources Canada
Earth Sciences Sector, Natural Resources Canada
GeoConnections Secretariat, Natural Resources Canada
GeoData BC
Geomatics Canada, Natural Resources Canada
Geomatics Canada-Mapping Services Branch, Natural Resources Canada
Geomatics Industry Association of Canada (GIAC)
Information Services Corporation of Saskatchewan
Linnet Geomatics International Inc
Ministère des Ressources naturelles, Québec
Navitrak International Corporation
Photocartotheque québécoise, Ministère des Ressources naturelles, Québec
Secrétariat du Conseil du Trésor du Québec
Service Nova Scotia and Municipal Relations
Statistics Canada
Telus Geomatics Inc
Town of Richmond Hill
University of New Brunswick
University of Ottawa

Executive Summary

The *Canadian Geospatial Data Policy Study* was commissioned in order to provide empirical information on the impact of current geospatial data policies on all three levels of government (federal, provincial, municipal) and the users and distributors of the data in the business sector and in the community at large. Based on the findings, the project was to make recommendations on how Canadian government geospatial data dissemination policies and practices could be modified to facilitate business development and the improved competitiveness of the Canadian geomatics industry while still ensuring adequate funding for infrastructure.

The study was an in-depth and extensive project lead by the Policy Advisory Node of GeoConnections Canada, with the field work conducted by the Ottawa office of KPMG Consulting Inc. and a group of expert associates.

GeoConnections is a national collaborative program to develop the Canadian Geospatial Data Infrastructure (CGDI). Its goal is to make Canada's geographic information accessible on the Internet. As a national collaboration, GeoConnections has involved broad participation of federal, provincial and territorial agencies, and the private and academic sectors. GeoConnections is being implemented through a number of advisory committees or "nodes", of which the *GeoConnections Policy Node*, is responsible for: developing and promoting policies that facilitate access to, and use of, geospatial data from any level of government and other sectors; identifying and resolving licensing and data distribution issues and other issues that might hinder the effective distribution and use of digital geospatial data; promoting and facilitating data sharing; expanding partnerships; and simplifying access to, and lowering the cost of, geospatial data.

KPMG Consulting, Inc. is one of the world's largest consulting companies with more than \$2 billion in annual revenues. Our more than 9,100 professionals provide business and technology strategy, systems design and architecture, applications implementation, network and systems integration, and related services that enable clients to leverage technology for stronger return on investment, and real, sustainable competitive advantage. We serve more than 2,500 clients, including global companies, Fortune 1000 companies, small and medium-sized businesses, government agencies and other organizations, through six industry-focused lines of business, including: financial services, consumer and industrial markets, high tech, communications and content, public services and health care.

A. Methodology

The *Canadian Geospatial Data Policy Study* was completed using concurrent, multiple lines of evidence involving primary and secondary data collection through a variety of methods. These included:

- Review of central agency policies and guidelines.
- Interviews with key Canadian data agencies.
- Survey of Canadian data users and clients.
- International comparisons through interviews with sample of Australian and US data agencies, and survey of international (Australian and US) data users.
- Review of other relevant documents, literature and international trends.

The study examined the Canadian geospatial policy context by focusing on a review of various guiding policy frameworks, including the federal Treasury Board Secretariat, as well as a number of provincial central agency policies. This component involved a document review, Internet search and interviews with various central agency officials at the provincial and federal levels.

The study also carried out a major review of Canada's geospatial data producing government agencies at the federal, provincial and municipal levels. Information was collected on mandate, major policies and practices, budget and revenue figures, and other relevant issues. It is believed that the sample of 33 responding agencies provides a representative picture of the current geospatial data environment in Canada. Exhibit 1 provides a summary of the participating agencies. Either an in-person or telephone interview was conducted with each of the respondents, in conjunction with an interview guide which was sent prior to the interview. The agencies were also asked to provide a client names for further contact.

The KPMG team sent a survey to over 60 Canadian clients and users of geospatial data in Canada, with the 31 respondents representative of various industries; the private, public and academic/non-profit sectors; and diverse sizes. The survey aimed to collect information on the use and purpose of geospatial data, the client's perception of current policies and practices, their sensitivity to the price of data, and proposed changes. Follow-up telephone and e-mail contacts were attempted to improve the response rate, but a number of the sample firms cited survey-fatigue as an issue for not participating.

An in-depth international comparative analysis component utilized similar interview guides and surveys to collect information from Australian and US data agencies and clients. The 18 responding US agencies provided their information using a web-based format, while the nine Australian data agencies were contacted by phone or in-person interviews. Information similar to the Canadian agencies was collected to provide a comparative benchmark regarding data policies and practices. As well, key policy

documents were examined. In addition to the agency interviews, a small sample of about nine clients from the two countries agreed to complete a survey to provide information on their use and purpose of geospatial data, perception of current policies and practices, sensitivity to the price of data, and experiences with Canadian geospatial data sources. While small, these clients provided qualitative corroboration of the various data policy approaches in play within their countries.

In addition, numerous articles, studies, reports, and other literature were collected and studied as part of the *Canadian Geospatial Data Policy Study*.

The following sections of this Executive Summary represent an overview of the study's more relevant findings and recommendations. For further detailed analysis, please refer to the complete *Canadian Geospatial Data Policy Study* final report.

B. Cost recovery issue

Of key concern to the issue of digital geospatial data policies and practices is the pricing of data based on the notion of cost recovery, as in most cases, data collected by government agencies in the conduct of their mandate is now being charged out to Canadian data users. The study found that central agencies (i.e., Treasury Boards or like organizations), specifically at the federal and provincial levels, influence the pricing and therefore accessibility of digital geospatial data in Canada.

1. Federal cost recovery policy

The federal Treasury Board Secretariat's (TBS) *Cost Recovery and Charging Policy* is far ranging, covering such issues as: when fees are appropriate; the types of fees allowed; and general guidance on the relationship of fees to costs. The policy, however, does not go into detail on the actual approach to proper implementation an agency is to take in applying cost recovery once the agency has determined its products/services are applicable.

The federal cost recovery policy can be summarized as a means of transferring some or all of the costs of a government activity from the general taxpayer to those who more directly receive personal benefit from a product or service. While the cost recovery policy resulted from the 1993 Program Review exercise, the policy is not meant to be "used simply as a means of generating revenue to meet the funding requirements of a department or agency", in the wake of budget cutbacks.¹ In fact, it is intended to result in improvements to the provision of government services and more equitably utilized public resources. Cost recovery attempts to achieve these objectives by:

¹ *Cost Recovery and Charging Policy, Treasury Board Secretariat*

- Promoting an equitable approach to financing government services by fairly charging clients who benefit from services.
- Promoting more efficient use of government services by reducing frivolous demand often associated with free services.
- Facilitating possible improvements in the delivery of services by introducing more business-like and client-oriented practices.

There is a requirement in the policy for departments to...“conduct periodic reviews to ensure user charge policy requirements are being met”. Such reviews should also address “whether fees should be increased or decreased where... the mix of public and private benefits has changed...”.

2. Challenges arising from the policies

A principal challenge facing many geospatial data agencies and their departments is a lack of clarity in implementing key cost recovery practices. Inconsistencies in cost recovery practices is not unique to geospatial data. Recently, the federal Office of the Auditor General (OAG) noted that some programs did not have a structured framework or clear criteria for defining public and private benefits or other cost recovery terms.² Even as early as 1997, the OAG “found that government accounting systems are typically not designed to provide costing information needed to justify the levels of user fees charged.”³

In addition, deciding upon which activities to charge for and how to set the fees is partly dependent upon the thorny concept of defining public versus private goods and benefits. For example, “disease control” is cited as an example of a government activity close to the “public” end of the range. A passport could likewise be placed nearer the private goods pole of this spectrum.

According to a report commissioned by the federal TBS and prepared by Bird and Tsiopoulos, there are six distinct characteristics that are relevant in placing products along this public-private goods spectrum: rivalness; excludability; economies of scale; lumpiness and sunkness of costs; externalities; and social and political objectives.⁴ Data agencies face the difficult challenge of applying these sometimes objective macro-principles to their data products to determine the price.

² Auditor General of Canada, 1999 Report of the Auditor General, Chapter 11

³ Auditor General of Canada, 1997 Report of the Auditor General, “Matters of Special Importance”

⁴ Treasury Board Secretariat, “User Charging in the Federal Government: A Background Document,” by Richard M. Bird and Thomas Tsiopoulos, June 1996

3. Responses to the federal cost recovery policies

In response to the ambiguity in implementing cost recovery, the Canadian Manufacturers and Exporters (CME) organization commissioned the *Blair Report*, which contends that cost recovery is having the opposite effect to its stated goals.⁵ It found the consequences for businesses are higher costs, lower research and development investments and threatened marginal products. The results for consumers are negative: higher prices and reduced products and services. The overall economic consequences, according to this report, are fewer jobs (23,000), reduced economic output by almost \$2.6 billion and a lower gross domestic product (GDP) by nearly \$1.4 billion.

In support, the federal Inter-Agency Committee on Geomatics reports that cost recovery "...is in conflict with encouraging the broad use of spatially referenced data..." and proposes that to ensure data capture continues, "users should pay a fee that recovers the cost of distribution for data collected by government for government use".⁶ The Committee suggests that data clients should "pay a fee for service for any specialized data collection or manipulation".

In addition, a recent report from the federal Standing Committee on Finance regarding cost recovery noted "growing concerns surrounding the government's cost-recovery program and the manner in which it is being followed".⁷ Among other proposals, the report recommends more centralized guidance, stricter guidelines and uniform standards in user fee implementation, as well as information regarding user charge formulas, revenues and performance measures be made readily available.

4. Summary of federal cost recovery policy

What is clear regarding the federal Treasury Board Policy? The existence of private benefits is the basis for user charges. Where there are both public and private benefits from a service, fees should be less than the full cost of delivering the services. For example, some geospatial data producing agencies provide their data products at a nominal charge (primarily to reduce nuisance use), at a COFUR (cost of fulfilling user request—usually cost of media and reproduction) fee, or at some level of recovering the costs for distribution, reproduction, marketing and support.

⁵ *The Blair Consulting Group & Canadian Manufacturers and Exporters, Where Does the Buck Stop?, (Quebec), January 1999.*

⁶ *Inter-Agency Committee on Geomatics (IACG), Working Group on Coordination and Cooperation Report, January 1996.*

⁷ *Parliamentary Standing Committee on Finance, Challenge for Change—A Study of Cost Recovery, June 2000.*

What is not so clear? Within a complex policy environment, there is considerable variation in the setting of prices and other conditions at the department level. Applying cost recovery is driven by the mandate of the agency and the purpose of its data collection—whether it is a central data agency distributing data for others, or a line agency which consumes the data it produces. In fact, it is possible within federal geospatial data producing departments, that individual agencies can interpret and apply the cost recovery policy in such a way that one agency may recover 20% of its budget while another may give its geospatial data away for free and not recover any costs at all. This general and varied application of the policies are a cause of many of the frustrations of Canadian geospatial data clients.

5. Provincial cost recovery policies

The situation on the provincial level is similar to the federal level. Each province has implemented its own policies and approaches, ranging from free data sharing amongst provincial departments in BC and Manitoba, to nearly a full distribution cost recovery approach in Saskatchewan.

C. Canadian geospatial data agencies

The 33 data agencies in the study sample have been classified according to their level of government and main type of data activity, as shown in Exhibit 1.

Exhibit 1

Summary of Canadian data agencies

	Type	Activities				Clients					Pricing Policy				
		Framework	Statistical	Transactional	Thematic	Own Dept	Other Gov't Dept	Commercial	Individuals	Other Levels of Gov't	Free	Data Exchange Group	Cost of Provision	Self Financing	Value Added Fees
Agriculture Canada	F			*	*	*	*	⊙	*	*					
Canada Post-GIS	F			*	*		⊙					*			⊙
Elections Canada-Electoral Geography	F			*	*			⊙							
NRCan CCRS Geo Access, National Atlas of Canada	F	*		⊙	*	*	⊙	*							
NRCan Centre for Topographic Information	F	*			*	*	⊙	⊙	*	⊙	⊙	*			⊙
NRCan Earth Observation Satellite	F	*			⊙	*	⊙	⊙	*	⊙		*			⊙
NRCan Geodetic Survey	F	*			⊙	*	*	⊙	*	⊙	⊙	*			
NRCan Geophysical Information Branch	F			*	*	*	⊙	⊙	⊙	*		⊙			
NRCan Legal Survey	F			*	*	*	⊙	⊙	⊙	⊙	*	⊙			
Statistics Canada-Geography Division	F			*	*	*	⊙	⊙	⊙		*	*		⊙	
Alberta Environment-Land Administration Div	P	*		*		*				*	⊙				
Altalis	P	*	*	*		*	*				⊙		*		*
BC-Crown Lands	P		*	*	*	*				*	⊙				
BC-Geographic Data	P	*		*	*	*	⊙	*	⊙	*	⊙	*		⊙	⊙
Manitoba-Dept of Conservation, LID (Info Utility)	P	*	*	*	*	*	⊙	⊙		*	⊙				⊙
Newfoundland-Surveys and Mapping Division,	P	*	*	*		*	⊙	⊙	⊙	*	⊙	⊙			
Service Nova Scotia and Municipal Affairs-LIS	P	*	*	*	*	*	⊙	⊙	⊙	*	⊙	⊙			
Nunavut, Department of Sustainable Development	P	*		*	*	*	⊙	⊙	⊙	*					
Ontario Ministry of Natural Resources	P	*		*	⊙	⊙	*	⊙	*		*			⊙	*
Ontario Ministry of Northern Development and Mines	P			*	*		*	*			⊙	*			
PEI, Provincial Taxation and Property Records	P	*	*	*	*	*	⊙	⊙	⊙	*	⊙				
Quebec Natural Resources-Photocartotheque québécoise	P	*	*	*	*	*	⊙	⊙	⊙				⊙		⊙
Saskatchewan LIS Corp	P	*	*	*	*	*			⊙	⊙	⊙	*			*
Service New Brunswick-Topographical Mapping (IU)	P	*	*	*		*	⊙	⊙	⊙		*	⊙			
Teranet	P	*	*	*		*	*						*	⊙	*
Yukon Geology	P			*	*	*	⊙	⊙	⊙	⊙					
Cape Breton Regional Municipality	M	*				*	⊙	⊙	⊙		⊙	⊙			
City of London	M	*		*		*	⊙	⊙	⊙	⊙	⊙				
City of Montreal	M	*		*		*	⊙	⊙	⊙	⊙	⊙				
City of Toronto	M	*	*	*		*			⊙	⊙	⊙			⊙	
Halifax Regional Municipality	M	*		*		*	⊙	⊙	⊙		*	⊙			
Regional Municipality of Ottawa-Carleton	M	*		*		*	⊙	⊙	⊙		⊙	⊙			⊙
Simcoe County	M	*		*		*	⊙	⊙	⊙	*	⊙	⊙		⊙	

*=Primary or main focus/activity

⊙=Secondary focus/activity

The sampled agencies tended to have a strong focus on either framework-type data sets or thematic data. In addition, numerous provinces have developed transactional-based data organizations to distribute and manage various data sets. Academics are included under the individual client group, but do not represent a main target group for any agency.

1. Data agency budgets and expenses

The data agencies varied greatly in terms of size and scope of their budgets. Exhibit 2 provides a distribution of expenses for typical agencies at the three levels of government. On the federal level, a typical federal framework data agency has

an annual operating budget of just over \$8M. A typical federal thematic data agency has a budget ranging from just \$500K and \$2M up to some agencies with \$7M in expenses (with an average budget of \$4M). Disregarding the purpose and type of data collected, the overall average budget for federal data agencies is about \$6M, based on the sample.

On the provincial level, data agencies have a wide range of annual budgets. A few of the smaller provincial data agencies had budgets of a couple hundred thousand, while the larger provincial agencies ranged from around \$2-3M up to well over \$10M in annual expenses. Overall, the average agency, based on the sample, had an annual budget of \$5.6M. As would be expected due to their purpose and scope, transactional agencies had annual budgets ranging from around \$2.5M up to \$18M (with an average of \$8M—the same size as a typical federal framework data agency).

In general, municipal agencies are the smallest geospatial data agencies with about \$1.7M in expenses (the expenditures for the municipal organizations that supplied data vary significantly from \$120K to \$3 million). Overall, the sampled municipal agencies had an average budget of \$1.8M.

Exhibit 2 Distribution of operating budgets of data agencies

	Federal Framework	Federal Thematic	Provincial	Provincial Transactional ⁸	Municipal
<i>Average budget size</i>	<i>\$8M</i>	<i>\$4M</i>	<i>\$5.6M</i>	<i>\$8M</i>	<i>\$1.8M</i>
Budget allocation (%):					
Data collection & research	44	35	23	17	9
Data production & processing	7	27	24	33	25
Data maintenance	6	14	11	15	28
Data storage	14	10	4	4	8
Marketing/promotion	4	3	2	4	3
Data distribution	7	5	17*	5	8
Fee collection & sales support	2	2	2	5	4
General overhead	12	7	13	17	10
Other	5	0	3	0	7

* The large overall distribution percentage is due to a few provincial agencies which primarily function as distributors of data to various industries, and so have un-proportionately high data distribution costs compared to other budget allocations.

⁸ Provincial transactional data agencies are a sub-set of the provincial agency survey population. They have been shown separately due to their activities and unique characteristics.

2. Data agency revenues from digital data

Revenues for data producing agencies occur primarily when an agency sells the data it has collected or manipulated to a re-seller/application provider or end-users, which could include government agencies or private sector entities. The approach to data pricing that was encountered within the data agencies ranged from free data provided over the web to recovery of the costs of production and dissemination.

On the federal level, the responding agencies' annual average sales revenue amounted to \$800K, with individual agencies revenues ranging from under \$100K to over \$2M. Government departments are the largest client group. Federal framework data agencies received approximately 75% of their data revenues from the sale of topographic data. Appropriately, federal thematic agencies received 93% of their revenues from the sale of non-framework data.

Provincially, agencies had average data revenues of \$500K per agency. Data sales ranged from about \$20-40K for half the respondents, up to well over a million dollars for a quarter of the agencies. The largest client base of the data sales is the private sector. Approximately 43% of the revenues came from topographic data sales followed by nearly 30% from cadastral digital data products.

On the municipal level, the agencies contacted reported an average of only \$36K per city. Revenues ranged from a few hundred dollars to one agency with \$100K in sales. Government organizations are the largest client group for municipal data. The largest source of data revenues for municipalities is road network data.

It should be noted that much of the current cost recovery practices are adversely affecting other government departments. Based on our sample, over \$4.3M (40%) of the \$11M generated in revenues from the sale of digital geospatial data is between government departments. Exhibit 3 provides a summary of the major client groups, by level of agency supplying the data.

Exhibit 3
Summary of percent of data supplied to client groups

	Federal agency suppliers	Provincial agency suppliers	Municipal suppliers
<i>Average annual revenues:</i>	\$800K	\$500K	\$36K
Percent of data supplied to each client group (%):			
Government	45	31	43
Private sector	41.5	55	41
General Public	6	9	5
Academic	4	4	5
Non-Profit	1.5	2	3
Other	1	0	2

Exhibit 4 provides a comparison of the cost of disseminating geospatial data (including media reproduction, marketing, sales support, fee collection and a relevant portion of overhead) versus the actual fees generated from the different types of typical federal data agencies, as well as provincial and municipal agencies.

Exhibit 4
Cost of data dissemination versus fees collected for data agencies

Percent of budget (%)	Cost of data dissemination ⁹	Fees generated ¹⁰	Net Fee impact on budget
Federal Framework	14.5	13	-1.5
Federal Thematic	10	7.5	-2.5
Overall Federal (average)	10.5	10.5	0
Provincial Transactional*	12	7	-5
Provincial (average)	23.5	14	-9.5
Municipal	16	5	-11

* One provincial agency with 95% cost recovery acted as an outlier and was removed to present a more representative figure.

As shown in Exhibit 4, in general the cost of distributing the data and fulfilling user requests for the typical data agency exceeds the value assigned to geospatial data sales. Applying the broader dissemination cost level (rather than just the smaller percentage of the agency's budget for distribution/reproduction costs), this would imply that the sale of geospatial data covers some of the selling and distribution

⁹ Cost of data dissemination includes costs related to data distribution (media and reproduction), marketing, fee collection, sales support, and a portion of overhead expenses.

¹⁰ While the survey asked for the fees generated from digital geospatial data sales, a small amount of the revenue reported may be from geospatial data derived from value-added services.

function, but does not have a large impact on other mandated requirements such as data collection or maintenance. In fact, most provincial and municipal agencies are not generating sales levels that come close to the current expenses of providing the data.

3. Current pricing practices

The assortment of pricing principles from the various central agencies have led different geospatial data agencies to employ a variety of pricing approaches for their digital data:

- **Free**—Some agencies distribute their data freely, generally using the Internet. Based on the study sample of data clients and users, 21% of their geospatial data is obtained for free.
- **Cost of Duplication**—Some agencies charge only the cost of duplicating/reproduction and providing the data, which tend to be minimal, similar to the “nuisance fee” approach.
- **Nuisance Fees**—Some agencies charge modest fees, intended only to limit demand to users with an actual need or use for the data. According to the data clients surveyed, 20% of their data is obtained with some nominal cost of duplication or nuisance charge.
- **Recovery of Full Distribution/Dissemination Costs**—This approach is generally applied to recover the entire cost of creating the capacity to distribute data (including file preparation, marketing, infrastructure and actual duplication and distribution costs). This approach is generally applied to most of the framework map data prepared by federal agencies.
- **Full Cost Recovery**—Full cost recovery (including the costs of data collection and maintenance) is generally limited to circumstances where data are collected for the express purpose of satisfying a client request.
- **Value-Added Pricing**—A number of agencies will conduct data manipulation or extraction activities to provide data more suited to a particular client’s needs, and they charge the client the perceived value of the “value-added” activities.
- **Market Price**—Relatively little data is distributed based on a “market” price, but some agencies have adjusted their prices in response to market influences, generally by lowering the price.

According to the data users surveyed, approximately 59% of their data was acquired with some form of cost recovery charge.

While these are guiding principles to pricing practices, some agencies or levels of government utilize hybrid models—for example in BC and Manitoba, all data distributed to other intra-provincial public agencies are provided free of cost, while data provided to any other clients, including other levels of government, are supplied with partial cost recovery prices.

4. Current licensing and royalty strategies

Licensing requirements, including the requirement for royalty payments by subsequent users as appropriate are being used with increasing frequency to achieve a range of goals:

- **Revenue Protection**—Is a frequent goal, prohibiting the redistribution of priced products or requiring royalty collection as part of the redistribution in order to require all users to contribute to the cost recovery objectives.
- **Quality Preservation**—Is achieved by licensing restrictions on the alteration of the data.
- **Promotion**—Some agencies have engaged private sector organizations to market their data, encouraging broader use of the data, using the licensing restrictions to protect the revenue of the private sector partner.
- **Recognition**—Although licensing is a way of ensuring adequate recognition of an agency contribution to data, this does not appear to be a prime motivator of licensing initiatives.

D. Economic and social impacts of geospatial data dissemination

It is quite difficult to concretely attribute and quantify the impact of broader geospatial data use in an economic or social context. Leading economists in new growth theory suggest that the ability of firms to identify and secure low-cost information resources is vital to stimulating economic growth in an information-based economy.¹¹

The world market for geomatics products and services is estimated to be \$10 billion. The market appears to be growing at a rate of 20 percent per year.¹² With restrictive data policies in Canada, US and other countries seem more competitively positioned to

¹¹ Xavier Lopez, “Dissemination of Spatial Data—A North American-European Comparative Study on the Impact of Government Information Policy”, 1998.

¹² Industry Canada, *Geomatics Sector Competitiveness Framework*, prepared by Smith , Gunther Assoc. Ltd., 1998.

capture most of this growth. Numerous survey respondents believe that the lead that Canadian firms were once considered to enjoy in the provision of geomatics services is disappearing and, in some areas, the US has already surpassed the Canadian industry.

A number of economic indicators of the impact and importance of geospatial data have been provided to the project team. Interestingly, most refer to a similar 1:4 ratio of benefits to investments—for example, for every dollar invested in producing and distributing spatial information for use by users, four dollars of economic growth is generated in the economy (through increased resource allocation, profits, taxes, etc). What the models do indicate is that extra value is added to the economy in the effective use of data, over and above the initial input costs. This demonstrates some of the social and political objectives, as well as large economic and environmental externalities that are characteristics of public goods. In addition, geospatial data generally have low marginal costs to supply additional data sets due to their digital nature, and high lumpiness or sunk costs associated with gathering the data and its analysis.

The study gathered numerous examples of instances where Canadian geospatial data were not able to be used in an economic, environmental, educational or social context due to some restriction (i.e., price, accessibility) that was in place. In some cases, Canadian users have been forced to use either American data in place of the Canadian data, or to find Canadian data being provided by the federal US agencies for free.

Although quantifying the positive economic and social spillover benefits from wide government geospatial data dissemination is difficult, many arguments can be made for supporting full and open exchange of geomatics information to support Canada's economic development goals. Some arguments include:¹³

- The free flow of information between government and the public is essential to a democratic society. The main goal of Canada's data policies and approaches should be the growth in use of the data.
- The government collects and develops large databases in the conduct of its mission and mandate. This valuable natural resource is of interest to other stakeholders, and should be a commodity in the marketplace.
- Efficient sharing and exchange of government supplied data fosters excellence in academic and scientific research and the effective use of national research and development funds. Innovation in the GIS industry is driven, to a large part, by access to low-cost public domain datasets.
- Cost recovery and revenue recognition has resulted in price increases coupled with growing intellectual property restrictions which decrease access. Setting

¹³ The following arguments are based on inputs from the clients and agencies participating in the Canadian Geospatial Data Policy Study, and are validated by key assumptions and findings Xavier Lopez has developed in the research for the publication "The dissemination of Spatial Data", 1998.

prices above media or reproduction costs puts a large part of the Canadian geospatial information infrastructure out of reach from ordinary citizens, students, non-profits organizations, environmental groups and researchers.

- Cost recovery and revenue generation are short-term interests—long-term effects may outweigh the fees charged. The revenue-generation approach may not recognize the hidden costs associated with forgone economic opportunities.
- Should cost recovery be removed from Canadian geospatial data, many of the major governmental data providers would show a decrease in revenue, but the costs spent managing fee collection and trying to control and monitor use would be eliminated, and increased tax revenues (business taxes and GST from the increased supply and sale of data products and services from the geomatics industry) could effectively pay for the government's geospatial activity.

Quite certainly, the high cost of some geospatial data files in Canada is limiting academic research and effective public sector planning, as well as potentially curtailing commercial development. Success in these areas is not solely contingent upon free or freer data, however access to quality data at a reasonable price (for the consumer) is a key factor. However, some incentives, (such as feedback regarding data accuracy and updating, or the inclusion of government data supply agencies in industry collaboration and data sharing), that resulted when prices were assigned to the data files, may be lost should data be free. Alternative incentives need to be built into a free data model through innovative data sharing and contractual agreements and other tools (such as branding data).

E. Clients comments

The data users that responded to the study's survey were nearly evenly split between private sector end-users, government end-users and geospatial industry (i.e., value-added resellers, application providers). As well, there was also a nearly even split between small (under \$20K annual data purchases), medium and large volume (over \$50K) users. A summary of the comments provided from the Canadian clients of various federal, provincial and municipal data agencies include:

- Half of all clients are dissatisfied with their geospatial data use, primarily due to the price of the data. Of the clients that are satisfied, they have realized improved internal efficiencies, increased productivity and better decision making. In general, data clients' most important reason for using geospatial data is for better decision making followed by integrated planning and better resource management
- Clients are most concerned about the cost, accessibility and quality of geospatial data in Canada. Some clients have witnessed decreasing data

prices (i.e., through Statistics Canada's Data Liberation Initiative), while others believe that some data prices are increasing. Regardless, most clients still feel the prices for some government agency supplied data are high.

- Almost all clients are expecting their digital geospatial data acquisition costs to stay the same or increase over the next three years. The majority of data are being acquired at some price point above nuisance fees. Just over 8% of the digital geospatial data available to users in Canada is for free.
- Accessibility and perceived prices have led some data clients to either develop (and therefore duplicate) their own data or use data (Canadian or foreign) acquired from other countries. While more than two-thirds of Canadian data is acquired through government agencies at all levels, just over one-third is accessible through the Internet. Nearly half of all clients access data from the US, although it amounts to under 5% of the total data used.
- While the Internet is helping deliver data and value-added services to end-users, only 29% of data are delivered to clients through the Internet. Most data users believe that the amount of data accessed through the Internet will increase as bandwidth increases.
- The most commonly purchased data by the users who responded are census information, roads/street networks, and postal code files. The most common source of geospatial data is federal government departments (supplying 31% of data), with the various levels of government supplying 68% of the geospatial data used by the survey respondents. Governmental data clients get over half (54%) of their data from federal departments.
- Clients indicated that restrictive Canadian licensing requirements and royalties limit their use of Canadian geospatial data. They believe that the US federal government freely distributes national geospatial data to the public and therefore has a more comprehensive geospatial database which all sectors of the economy can use for decision making.
- Academic and educational clients believe that more agencies will be seeking long term licensing and/or subscription fees from their clients, which will limit the resources being used. Of great concern to many of these clients are the increasingly complex licensing agreements and the burden of copyright monitoring they impose on the resource-strapped libraries and archives.

F. International comparisons of data policies and practices

This section covers the findings of our interviews and study of the geomatics data programs in the United States and Australia. As has been noted in the previous

discussion on Canadian agencies, they cover the full range of possibilities, from free data to nearly full cost recovery. In the other two countries, the range of approaches seems rather more limited (consistent).

Some data policy and practice commonalities between the countries are:

- Data providers in all three countries recognize the importance of geospatial data and seem to recognize that that importance is growing as more of the public and more of their clients become “spatially aware”.
- Surprisingly, if the wording of the overarching national cost recovery policies in the United States and Australia are compared side by side without reference to the application of these policies, the policies seem very much alike.
- Mechanisms are being sought in Canada and Australia, and to a lesser extent in the United States, to get more geospatial information into clients’ hands and either reduce or recoup the costs of doing so.
- The Internet has had, and continues to have, a profound impact on these policies and practices.

Some differences appear to be:

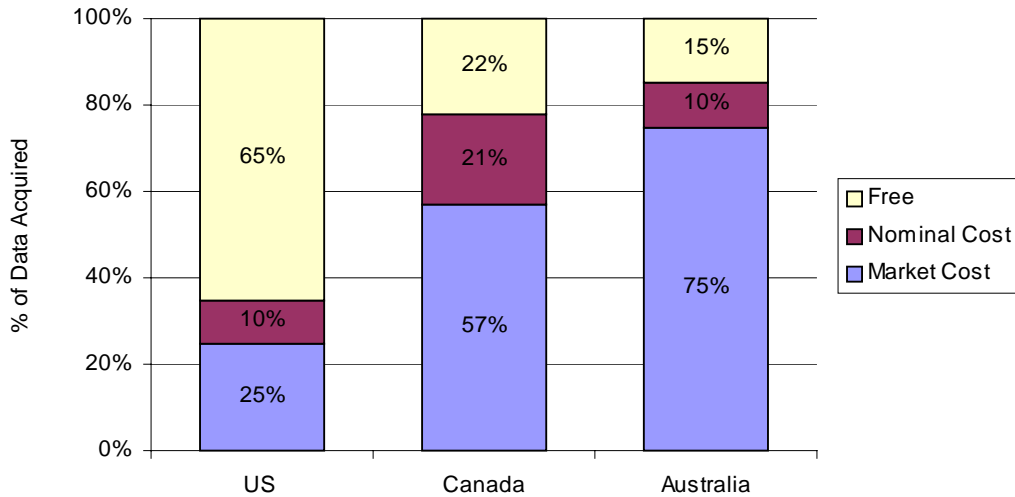
- While certain general guiding principles appear to consistently exist with respect to geo-spatial data distribution in Australia and the United States at the federal and state level, no consistent policy appears to exist in Canada.
- While the national data pricing policies in the USA and Australia are very similar in terms of the words used in the overarching policies, they are clearly different in both application, apparent intent, and result. The US agencies reporting data income had revenues equal to 2% of their expenses. The Australian agencies had revenues equal to over 30% of expenses. (The average Canadian agency is near the middle with about 13% of costs recovered.)
- At the national level, the USA and New Zealand do not copyright their base map data, but Crown copyright exists in Australia and Canada. In fact, some believe the fundamental difference in data distribution policies and practices between Canada and the US is derived from the issue of copyright.
- In the USA it is clear that it has been decided that data are seen as a public good and should be maintained by the Federal (or in some cases State) governments under what Canadians would call “A-Base funding”, or funding provided directly to the agencies for fulfilling their operational mandates.

1. International client comments

A small sample of US and Australian data user clients were contacted to provide their input and opinions on the data policies and practices that impact them. While not an extensive international benchmark comparison due to the limited sample size, the findings do provide some insight from the client perspective to support the conclusions reached regarding the US and Australian geospatial environments. A summary of the comments provided from the international clients include:

- Most of the data the US clients acquire is free (65% of the data), while most of the data acquired by Australian clients are at some form of market or cost recovery (75%). Differences in the two countries' federal cost recovery implementation and copyright legislation drives the disparity. Exhibit 5 shows the distribution of data used by US and Australian clients along the "fee or free" price spectrum, and includes Canadian client results for comparison.
- The international clients primarily use data for better decision making and planning, similar to Canadian clients.
- Canadian clients access the most data over the Internet (29%), followed closely by US clients (27%) and then Australian clients (8.5%).
- The most common source of geospatial data is national government departments (41%), with the various levels of government supplying 66% of the geospatial data used by the international clients. International clients access more data from their federal governments (41%) than Canadian clients (32%).
- With generally free and open access to federal public domain data, US users are satisfied and feel major business opportunities result. Australian clients are less satisfied with the current geospatial data environment. Lack of a national geospatial data strategy in Australia and competition by government agencies in geomatic services that are available in the private sector are believed to be detrimental to the industry and economy as a whole.

Exhibit 5 Comparison of the volume of data used, by cost



G. Unintended outcomes of current Canadian approaches

The current pricing and licensing approaches have a number of unintended and generally negative outcomes, which led to the requirement for the conduct of the present study. These outcomes include:

- Many pricing policies are inconsistent in their implementation across agencies in the same level of government, or even within the same departments. Many policies have competing priorities.
- Decisions are taken without using the best available data because the cost of the data exceeds available budgets and/or perceived value. In some instances, effective, timely and economic decision-making is hindered by licensing conditions such as site licensing or machine-specific licenses. The outcome is inferior decision-making in both the public and private sectors.
- The cost of framework data has resulted in many agencies ignoring available data and creating their own, or manipulating or degrading the data to avoid licensing/royalty restrictions. This in turn has increased internal expenses for the agencies. There are longer term issues with integrating degraded data into other data sets. The problem is most apparent with federal agency framework data, and the agencies affected are at all levels of government.
- Some agencies are unable to distribute their own data to the public, or are required to attach prices to the distribution of their data which they would otherwise make available at no cost in order to respect the licensing and royalty practices of agencies that have provided some part of their data.

- Access to data for education purposes is limited and some Canadian educators are now using irrelevant US data in their educational programs because of the high cost of Canadian data.
- The efforts to avoid paying for federal framework data has resulted in other agencies (at all levels of government) developing their own data on a basis inconsistent with each other and inconsistent with the federal framework maps, making data exchange and integration more difficult.
- Once cost-recovery has been implemented, departments and agencies find it nearly impossible to change things. This is despite the fact that the federal TB cost recovery policy instructs departments and agencies to evaluate, assess and review application of policies on a regular basis.
- Cost recovery has helped make government departments and agencies more-business like, but this may have come at the expense of public good interests. It can be argued that it has 'narrowed' interests and service delivery, with many departments putting more emphasis on cost recovery operations rather than general or public good services. For example, it is not uncommon for managers/programs to have the choice between placing more resources into services to the general public, say free on the Internet, versus putting more resources into advertising and promotion of products that generate revenues that can be retained.
- There are unclear definitions regarding the government's role in providing "value-added" services. Many in the geospatial industry believe the private sector firms have been negatively impacted in their growth by competition from government agencies providing "value-added" services. It should be noted however, in an earlier study done by the Geomatics Industry Association of Canada (GIAC), private sector opinion was mixed on whether the government should withdraw from the production of geospatial data. As well, within government, there are existing geospatial products that cost more than comparable private-sector products, but there are some that cost less.
- The geospatial industry in Canada is believed to have not developed as quickly as in the United States with regards to the development of data manipulation tools and programs, partially as a result of initial costs of data, royalty payments, and the restrictions on distributing data.

H. Optimal policy directions within a changing environment

When first introduced, cost recovery approaches addressed the socio-economic and political environments at the time. However, it is clear that the environment in which cost recovery was first applied has changed in many ways. Numerous drivers of change in the public and private geospatial sectors include:

- The emergence of the Internet and subsequent growth of adequate bandwidth. This has enabled larger and more detailed digital geospatial data files to be transmitted across any distance instantaneously within a secure channel. As well, sharing of data can become more distributed, cost-effective and ubiquitous.
- Interdependent with the Internet, there has been an increase in availability of digital data sets. Digital data files allow a reduction in the reproduction costs on a per file basis, and enable improved distribution over hardcopy forms of geospatial data sets.
- There has been an increased recognition of geospatially referenced data in decision making and planning. More and more industries and client segments are recognizing the importance of integrating accurate geospatial data into strategic and tactic decisions—whether they be policy or commercial related.
- More educational institutions, from elementary school to colleges and universities, are searching for more accessible and cheaper geospatial data to use in teaching and research. These students will become the nation’s workforce in the future and their skills, local knowledge and awareness of geospatial activities need attention.
- Speed of business seems to be increasing at a faster and faster pace. Firms no longer have the luxury of waiting for complex, expensive and bureaucratic licensing and contract negotiations.
- An overriding driver is the globalization of trade and the reduction of trade barriers, and with it, the increased international competition within the geomatics industry. Canadian geomatics and GIS firms are now forced to compete with American, Australian, European and Asian companies in the supply, analysis and value-added goods and services production. While this creates more international opportunities, it also has increased local competition. Many Canadian firms believe they are uncompetitive due to the relative lack of data available, primarily due to cost recovery pricing of government data suppliers.

As part of the federal TBS policy, requirements specify that the role of policy needs to be reviewed as a relevant part of the process of managing the role of government across time, and within the context of advances in technology and business processes. Due to the changes and drivers listed above, it seems only natural that the cost recovery policy be re-visited.

This study has found that most active players within the geospatial industry, in the academic, private and public sectors, have expressed an openness and desire for change. Within the context of this changing environment, prevailing governmental geospatial data policies and practices, especially at the federal level, should strive to address a number of goals:

- First, the overall purpose should be to promote the development of economic, social and environmental wealth in Canada. This is achieved through increased effective use of geospatial data in analysis and decision making processes in all areas of the economy, and in all levels of government.
- The second purpose of any policy changes should be to increase access to and use of geospatial data and improve sharing amongst holders of data, at each of the three levels of government. Data sets need to be based on collective standards. Access and use are improved by reducing barriers—conflicting standards, high data prices, restrictive licensing policies, detailed negotiation processes and limited data access points.
- Third, policies should attempt to develop the global competitiveness of the Canadian Geomatics industry, to any extent possible. A strong and competitive local industry will increase development of value-added geospatial data products, as well as related software and hardware technology, and thereby create economic value for the country. Policy directions addressing industry competitiveness must be done so in a manner that represents “fairness” to taxpayers—that is, policies should not favour the industry over others or provide the industry with undo benefits at the expense of taxpayers. Nonetheless, the general price-point for geospatial data could be reduced by minimizing distribution costs and reducing licensing and royalty restrictions.
- Fourth, policies and practices should continue to embrace client-focused and responsiveness principles. Policies should continue to encourage a “business-like” mind-set within departments in terms of efficiencies, recognition of government’s role in geospatial data supply, internal resource utilization and planning for product/service offerings. These positive outcomes and incentives of the current data access and distribution policies should be maintained in any new policy directions. While cost recovery was one driver to assist in the effective allocation of resources within government agencies, other incentives and concepts should be explored to mitigate some of the policy’s negative outcomes.

Based on the recent changes in the local and international environment, as well as the optimal policy directions, the following recommendations have been proposed.

I. Proposed recommendations

The main goal of Canada’s data policies and approaches should be the growth in use of the data. Success will be determined by how fast Canada, and its federal agencies, can supply the market with the data and tools (products and services) that will satisfy the demand. The end market does not want complicated data. It wants solutions (consumer products and services, or value-added products produced from geospatial data). The role

of the government agencies in the development of a strong value-added industry is crucial.

The following recommendations are based on the integration of the study findings and numerous interviews and discussions with geospatial experts. They are being proposed to address the various issues and unintended outcomes of Canada's very complex geospatial policy environment. Many of the current government-driven pricing principles and strategies remain valid, but must be implemented in a manner that minimizes unintended outcomes and contributes to the economic, social and environmental wealth of Canada, including but not limited to the country's geospatial industry. These recommendations are generally meant to address geospatial data originating from agencies in all three levels of government.

Recommendation 1: Data Accessibility

A large component of geospatial data sets supplied by government can be considered a public good with many positive externalities and benefits. In general, it is believed that the more data that are available to the public, the more they will be used for decision making and policy planning. This intrinsically leads to improved resource utilization, increased efficiencies, and larger socio-economic returns. For example, delivery of more effective and efficient public services in health, education, and criminal justice can be achieved partially through the integration of demographic and geospatial analysis into planning. As another example, Canada can achieve a leading role in environmental management and wetlands conservation through increased access to geospatial data that enables coordination between pollution monitoring, fisheries habitat, soil/vegetation composition, and forestry agencies.

Mandating one or more agencies with the responsibility of facilitating web-based access would reduce duplication of effort and provide a clear indication of the cost and accountability for wide-spread public access to data, likely a defensible and supportable mandate in funding negotiations. This central facilitating body would not control data or its access, but would be established to assist data producing agencies in expanding distribution of their data. Data agencies would maintain their profile and act as the source of the data. There are currently a number of partnership arrangements being orchestrated under GeoConnections regarding this issue.

Recommendation—Digital geospatial data that are collected or created by any level of government should be made as readily available electronically to the public as possible by improving access mechanisms and processes, unless there are privacy, security or competitive reasons not to do so. Specifically, in implementation, the following points should be taken into consideration:

* Expand distribution of thematic data via the Internet, possibly by providing some dedicated marketing and distribution funds to expand web-based focal point(s) for free data distribution (i.e., "GeoGratis" or similar sites).

* Restrictions on redistribution should be eliminated—except where commercial data used within government is redistributed.

Recommendation 2: Core Framework Data

Framework map data, particularly the geo-reference and topographical framework maps, is used as the underlay for thematic data and provides the basis for many geospatial data sets used by public and private industry. Due to the nature of the data itself, most of the framework data sets can be considered as lumpy, non-rival, non-excludable goods—that is, there is a large sunk cost to develop the data, and very low marginal costs to supply one more additional copy once it has been processed.

Cost recovery policies encouraged a client-focused and internal efficiency approach to supplying core framework data—these management paradigms must continue, but the data has become less accessible primarily due to prices charged for these data. Enabling increased access to this core data drives the use of data in decision making. Departments and private sector clients dealing primarily with specific thematic data layers need readily accessible and accurate core framework data to provide the base for their thematic layers to be applied to. Due to their nature as an underlay, framework data are generally easy to place near the “public good” end of the public versus private spectrum, related to say infrastructure.

Recommendation—Core framework data, particularly the geo-reference and topographical framework maps used as the underlay for thematic data, should be provided free as a public good (or more properly, licensed at no cost), to encourage use, standardization, and consistency amongst all client groups. In making this data more accessible, efforts should be made to keep distribution costs to a minimum, however, additional funding will be required for some agencies.

Recommendation 3: Thematic Data

Thematic data represent a key component of many geospatial data products and services. Thematic data are used in a variety of industries and sectors. Frequently, clients request specific types of thematic data to fulfil a decision-making or planning process requirement, which requires in some cases substantial amounts of funding to research, collect and maintain the data sets. This creates an excludable good (i.e., non-public due to its specialization). This situation puts some thematic data closer to the “private benefit” end of the public versus private spectrum, in which case cost recovery can easily be applied. If a client requests that new thematic data be supplied, outside of data already being collected for an agency’s mandate, it seems reasonable for an appropriate cost-sharing agreement to be established.

Recommendation—Where costs are material and exceed the “public good” of encouraging their use, costs should be borne by those seeking the data. Notwithstanding, the cost of making data available should be minimized as much as possible. “Nuisance fees” can be utilized for non-Internet distribution (i.e., CD-ROM, paper), to encourage use of digital distribution and to recoup easily quantifiable hard-copy reproduction and media expenses.

Recommendation 4: Cadastral data/process

Most cadastral and property assessment systems utilize significant fee-based data pricing approaches. Cadastral systems generate most of their revenues from the transaction fees which both record an individual’s (or firm’s) interest in property, and generate the new data required to maintain currency. The assessment systems tend to be co-operative-like, with the municipalities that require the assessment data paying the costs of developing and maintaining data.

Much of the data are covered by privacy restrictions, and its distribution are either prohibited or restricted to “value-added” processed data. Some form of pricing or nuisance fees will continue to be an important element of containing demand on governmental cadastral data resources, especially at the provincial and municipal levels.

Recommendation—Transaction fees should remain an appropriate mechanism for cadastral data systems at the provincial and municipal levels. This includes “registered user” connections and access charges. However, efforts should be made to implement unrestricted integration with municipal / assessment databases.

Recommendation 5: Copyright and Licensing

A marked difference between the digital data policies and practices between Canada and the US at the national level is the Crown copyright requirements. These requirements, coupled with complex licensing agreements, limit the broader use of geospatial data in Canada when compared to federal US data by preventing redistribution, whether within or between organizations. The use of licensing and copyright to prevent redistribution (i.e., to protect pricing policies) inherently contradicts the goals of maximizing data use and the resulting benefits, and therefore should be minimized.

Instead of preventing data use, licensing and copyright should be used to protect data integrity, essentially building a “branding” that can be recognized as a mark of quality data (especially for framework data required to facilitate data integration). This is only effective as long as the data are considered to have integrity and relevance (i.e., currency), which will require additional data collection and maintenance investments in some cases. For example, a data agency supplies an original data product and retains the sole source of the data while providing their branding to the file/product once a data set has been distributed to a user. That user

may be allowed to post the same data file for free on its own website for others to access, but only if the brand remains intact. In this instance, much of the distribution effort and cost is transferred to other users.

To ensure the branding is effective, collaboration with value-added-redistributors (VARs) and distributors should strive to have them recognize the original data source as part of the copyright. This will help in addressing the branding, providing a level playing field and visibility to public sector investments. Major changes to the data sets made by users should be passed back to the agency with the original source data for updating and modification, (this could be established in a similar manner of the style of open-source programming code like Linux).

Recommendation—Digital geospatial data should be licensed at no royalty cost to users with respect to use and redistribution. Use copyright and licensing within Canada to protect quality of geospatial data originating from all government agencies, particularly at the federal level, rather than to prevent use. Most digital geospatial data should be licensed at no cost to users. “Branding” of the original source data would facilitate re-use by retaining the “brand name” as long as the original data is not modified.

Recommendation 6: Inter- and intra-governmental data sharing

Governmental departments make up the single largest user group of geospatial data in Canada. The study found that these governmental clients in some cases cannot use needed data to make a planning or policy decision due to the costs being charged by another government agency through cost recovery. There are the positive externalities (social, economic and environmental) that can arise from effective geospatial data use in government policy planning, as well as important social and political objectives. The potential opportunity cost in public policy planning can range from inadequate fishery habitat management to inefficient social or education program development.

Clearly, due to limited funding, data agencies should be free to enter into cost sharing arrangements with other government agencies to allow the collection of new data / preparation of new products. However once that data exists, the agencies should make them available to all other government departments, at all levels, without charge to maximize the use/benefit from the data/product. This spirit of sharing needs to be encouraged and will require incentives to participate—a clearly defined data collection responsibility framework is one step (i.e., which level or agency will collect what data and to what resolution, etc.), requiring reciprocal participation and national uniform data standards are others. The potential disincentive of waiting for other agencies to spend their resources and create needed data must be mitigated and the feedback loop from users must be maintained. The BC or Manitoba provincial models for data sharing are two current examples that can be analyzed.

Recommendation—Develop an inter- and intra-governmental data sharing policy model which would encourage and allow the free exchange and sharing of geospatial data by data agencies with other government departments and with other levels of government.

Recommendation 7: “Value-added” services

Beyond the provision of data gathered in the conduct of an agency’s mandate, various activities can be applied to the data on a customer’s behalf to create increased value for the client. By its nature, customized data is excludable (non-public due to its specialization and direct private benefits) and therefore more open to user charges. In most cases, the cost of providing these “value-added services”, such as custom data tabulation, manipulation or analysis, can and should be recovered from clients requesting the services.¹⁴ Technology, including hardware and software applications, have allowed the increased opportunity to provide these value-added services with fewer resources. While departments may be providing more data for free (or without a licensing cost), they could develop models/approaches to charge for reasonable additional services, such as after-sales client support.

However, government agencies should limit their involvement in the provision of value-added services to circumstances where it makes sense, generally because of privacy concerns related to the processing of individual data records (i.e., statistical data). Government intervention and supply of value-added products/services, beyond the mandates of the data agencies, should be limited to instances where the private sector cannot provide the value-added products/services due to lumpiness, commercial, public good or privacy concerns.

Recommendation—Reasonable direct costs can and should be recovered from clients (public and private sectors) when a government data agency applies some form of “value-added” service to its data. Government supply of value-added products/services should be limited to instances where the policy rationale is valid (i.e., the private sector cannot provide the value-added products/services due to public good or privacy concerns).

J. Implications and corollary actions

It is suggested that the preceding recommendations are implemented as swiftly as reasonable possible. GeoConnections and other initiatives are already under way and represent feasible avenues for further on-going collaboration to include private industry

¹⁴ Acting as a custodian or steward of digital data (i.e., data maintenance, verifying accuracy, data file cleaning, activities required to prepare a data set for distribution etc.) that is within an agency’s mandate or normal course of activity should not generally be considered as value added services.

in driving changes. This section examines the more specific actions key actors and the federal, provincial and municipal levels would have to take to implement these recommendations, and identifies some of the implications for particular types of agencies.

1. Federal

The implementation of the proposed approach would result in decreased revenues for some federal agencies. However as indicated in Exhibit 4, the fee revenue, after considering the costs of data distribution, comprises a relatively small portion of most agency budgets, and in most cases does not cover the full cost of disseminating data. The key to being able to absorb reduced income is to reduce the costs incurred in marketing and distributing data.

A number of approaches are possible. Distribution through the Internet reduces the cost of the second and subsequent copies distributed, but still leaves agencies with the cost of establishing and maintaining an effective site.

The second approach suggested is simply the removal of restrictions on redistribution. The agency may then retain a fee to make the first copy available, but further distribution can be free (i.e., if an association makes the purchase and distributes to its members) or at a reduced cost (i.e., a value-adder incorporates the data into a product, or a private sector reseller chooses to promote and distribute the product).

However, there would still be a reduced net budget for some agencies which can be a more significant issue for some than for others. This could require reductions in operating costs beyond the data distribution costs, or additional funding. It should be noted, however, that the costs of data collection and maintenance are, by definition, not covered by cost recovery fees in federal agencies. Given that data collection and maintenance funding is inadequate in most agencies, the recommended approach will not resolve this issue either, although the wider and more effective use of agency data may make a more compelling argument for increased funding.

There may be some need to stage implementation of revised approaches in order to:

- Respect existing agreement and arrangements with data distribution and other partners.
- Co-ordinate with growing Internet capability.
- Accommodate the time required to change agency asset utilization and development of capacity within the private sector.

a) Framework data

The federal government could have an important role in providing the framework data, maps, systems and standards required to maximize the usefulness of data collected by all levels of government in Canada, and indeed by the private sector. Properly carried out, this mandate would lead to consistent, compatible and interoperable data sets. The current pricing and licensing practices of the agencies involved have prevented this from occurring with the result that almost all municipal, most provincial and even some federal agencies spend some level of funds to develop duplicate data, often at a higher resolution. These agencies should move quickly to make their data available as widely as possible and move to develop standards, policies and approaches that meet the needs of all three levels of government as quickly as possible. The alternative will be the continued development of a number of independent inconsistent approaches across the country.

b) Licensing principles/approaches

The federal US practice of making data available freely has helped promote a rapidly growing geomatics industry, but the lack of standards has resulted in many users changing the data to suit their own needs, leading back to a series of incompatible data sets. Federal agencies should consider using the copyright and licensing approach to limit this outcome, “branding” its original data and allowing anyone to re-use the original data with whatever overlays may be appropriate and retain the “brand name” as long as the original data is not modified. This approach will only be effective as long as the federal data is considered to have integrity and relevance (i.e., currency), which will require additional data collection and maintenance investments in some cases. It would also be possible to establish a process to review suggested data modifications from users or resellers who wanted to improve the data but retain the brand.

c) Education uses

The recommendations contained in this report should allow adequate data access for educational users. However if they are not implemented broadly, particular initiatives will be required to encourage and assist Canadian educators to nurture "geospatially literate" graduates which will in turn help develop the Canadian GIS industry. Both the prices and the licensing restrictions (multiple users/sites, etc.) reduce the ease of access of educators to Canadian data to develop the necessary spatial awareness to make effective use of the data.

2. Provincial

There are many more provincial agencies where the reduction or elimination of user fees will have substantial impact. However the most significant fee-based systems

are the cadastral and property assessment systems where continued fees are consistent with the recommended approaches. Cadastral systems generate most of their revenues from the transaction fees which both record an individual's (or firm's) interest in property, and generate the new data required to maintain currency. The assessment systems tend to be co-operative-like, with the municipalities that require the assessment data paying the costs of developing and maintaining data. These approaches should continue. The area that could be affected is the subsequent distribution of the data. Much of the data is covered by privacy restrictions, and its distribution is either prohibited or restricted to "value-added" processed data for which fees continue to be appropriate. However the balance of the data, particularly the map elements, should be treated as framework data and made available with as little cost as possible. Restrictions on redistribution of data, particularly by municipalities where the property descriptions are a key element of municipal policy and technical discussions, are counterproductive and should be removed.

Provincial agencies developing other framework map (primarily topographical) and thematic information apply a wide range of pricing regimes and some will have budget implications from adopting the approaches recommended. In addition, provinces often require higher resolution data that is not available from the federal government. However in many cases the provinces and their municipalities have developed data sharing regimes which effectively combine the Geospatial data resources of the two levels of government in order to provide an efficient and quality service to most key users (other than the federal government). The BC experience demonstrates the importance of inter-agency data sales, however, and the fact that elimination of fees will not result in extensive increases in net cost to the taxpayer, just a requirement to shift budgets between the "user" agencies and the central data providers.

3. Municipal

Municipalities provide an interesting case study for fee systems. Many of these municipalities have established carefully justified fee schedules for geospatial data, and in some cases intricate licensing requirements to contain or control data redistribution or use, yet none of them have significant fee revenues. The outcome of the policies is largely to prevent the distribution and use of the data and the subsequent potential improvements in decision-making. This approach will become increasingly non-sustainable as municipalities move towards electronic planning and building permit application processing, where municipal costs can be substantially reduced, and data quality improved by allowing easy access to framework data, and electronic filing of proposals which can subsequently be used to update the database.

Nuisance fees will continue to be an important element of containing demand on municipal resources, but the recommended approach of expanding Internet access to geospatial data and eliminating controls on redistribution of data will contribute

to this coming direction at the municipal level, and help improve both municipal and private sector decision-making.

K. Other issues

While largely outside the scope of the current study, our research has identified a number of other issues that should be addressed by the geospatial industry, and particularly the key government actors in the industry.

- The improvement of data distribution is also a matter of standards
- There is the potential to co-ordinate data collection and maintenance in a manner that reduces or eliminates duplication between levels of government, while improving data compatibility and interoperability.
- While data price is a significant issue in retarding the effective use of geospatial data, the quality of the data may be even more important.
- In moving to a new policy approach, those organizations that invested in old, high-cost models need support and appropriate time to transition.
- Defining the role of government in providing value-added geospatial products and services.
- Further research and analysis may be required to define and understand issues around data distribution exclusivity that were not part of this study's scope.