Borders in Cyberspace: Conflicting Public Sector Information Policies and their Economic Impacts[1]

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[1] The views expressed in this paper are these of the authors and do not necessarily present those of the National Weather Service or PwC Consulting.

Executive Summary

Introduction

Many nations are embracing the concept of open and unrestricted access to public information -- particularly scientific, environmental, and geographic information of great public benefit. Other nations do not share these views and are treating their information as a commodity to be "commercialized" and assert a monopoly on certain categories of information in an attempt – usually unsuccessful -- to maximize revenues. Such arrangements tend to preclude other entities from developing markets for the information or otherwise disseminating the information in the public interest. The U.S. government and the scientific and environmental research communities are particularly concerned that such practices have decreased the availability of critical data and information[2]. And firms in emerging private sector information industries seeking to utilize public sector information find their business plans frustrated by restrictive government data policies, and other anticompetitive practices. Strategic goal of the U.S. National Oceanic and Atmospheric Administration is to foster the open sharing internationally of weather, climate and other critical environmental information for the protection of life and property and the enhancement of the global economy[3].

In an attempt to convince government policy makers and politicians around the world of the social benefits of open access policies for public sector information and databases, this paper lays out the economic reasoning behind such policies. To date, arguments to support open access policies have primarily focused on the fact that the information is already there (governments gathered it for their own use) and that the information has already been paid for by the taxpayers who should not be charged a second time for it.

Although these arguments are convincing to many (the entire US open access policy is based on them), they are not strong enough to convince all governments to adopt open access policies which maximize economic benefit, particularly jobs and wealth, encourage scientific and technological research and development, and thereby ultimately maximize general tax revenues in the longer term. Accordingly, this paper makes an economic argument to adopt open access policies: maximizing state revenues through taxable business, job and wealth creation. This paper puts aside [abstract] freedom of information concepts in favor of economic reasoning suggesting that open access policies are beneficial in the short term as well as in the longer term for the general public, the private sector and also for government entities. Although freedom of information policies and recent developments are discussed as part of the overall analysis, the focus is on (1) maximizing economic and social benefit from the dissemination of information and data already acknowledged by governments as not confidential, and (2) fair terms for commercialisation of government data and competition

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[2] "For example, requiring scientists to obtain multiple permissions from possibly unknown sources before working with data could become very burdensome, even if the fee is negligible. If the administrative burden is too great, scientists will abandon the research and the societal benefits from the potential new knowledge will not be realized. Consequently, the greatest benefit from use of taxpayer resources comes from full and open access to scientific information." From: National Research Council (2001). Resolving conflicts arising from the privatisation of environmental data. National Academy Press. P. 43.

[3] "Vision 2005: National Weather Service Strategic Plan for Weather, Water and Climate Services" August 1999.

with the private sector. The paper does not engage in the ongoing policy debates regarding active dissemination of new categories of information, e.g. documents disclosing the inner deliberations of governments.

The paper is in three parts. Part one examines the range of existing data policies in light of the economic characteristics of information. It focuses on the benefits of open access policies for public sector information, and explains why attempts at aggressive cost recovery in the public sector are generally doomed to fail. This part ends with government competition with the private sector. Part two examines policy developments at the European Commission level, and in four countries: the Netherlands, the United Kingdom, Germany and Finland. Part three contains the authors' conclusions and recommendations.

In addition, the paper has three appendices. Appendix I reviews general economic concepts as they apply to information. It outlines certain specific characteristics of information such as its dependence on a medium; and explains why information is considered to be "non rival" and "non appropriable", and why information tends to exhibit high elasticity of demand. It then looks specifically at public sector information and examines its value and different funding and pricing options. Appendix II explains why arguments for cost recovery do not hold. Finally, Appendix III hands out suggestions for future research.

But first, some background is in order[4]. United States domestic federal information policy is based on the premise that government information is a valuable national resource and that the economic benefits to society are maximized when government information is available in a timely and equitable manner to all. Other nations do not necessarily share this view and are sometimes treating their information as a commodity to be commercialised. Some governments take advantage of their domestic copyright laws to impose monopoly control over certain categories of information in order to generate extra revenues.

Entities dependent upon international data exchanges, particularly those in the academic, research and environmental communities, face problems resulting from differing government copyright and data use policies. Therefore, there is a tension between the recognition that public information is a societal resource that needs to be openly shared and the perceived need of public managers, often encouraged by national treasuries, to find new sources of revenue.

Public bodies are by far the largest producers of information both in Europe and the United States. Recent research, discussed below, shows that public sector information is a major, but so far under-exploited resource, which could and should be a fundamental building block of the new economy and the information society. It could also contribute more substantially to basic scientific and technical research, as well as to more complete scientific and public understanding of environmental issues.

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[4] The following summarizes the paper "International Information Policy in Conflict: Open and Unrestricted Access versus Government Commercialisation" by Peter N. Weiss and Peter Backlund first published in 1997 as a chapter in the book "Borders in Cyberspace: information policy and the global information infrastructure", edited by Brian Kahin and Charles Nesson, MIT Press.

The US government is a major creator, collector, user and disseminator of information. During the '80's and '90's, a broad consensus developed in the United States that government information is a public asset and a valuable national resource to be managed in accordance with a few simple principles. The government should make information available to the public on timely and equitable terms. It is also necessary to foster diversity of information sources, in which the private sector, along with state and local governments, libraries and other entities, are significant partners. On the one hand this means that the government should not engage in monopolistic practices, and, indeed, should actively encourage the development of a robust private sector. On the other hand, it means that government should actively disseminate its information, particularly the raw content from which value-added products are created, at no more than at cost of dissemination and not attempt to impose copyright or other restrictions.

These US consensus principles are set forth in OMB Circular A-130[5] which contemplates charging for information at no more than the cost of dissemination. The core information dissemination principles of this Circular are codified in the Paperwork Reduction Act of 1995 (44 U.S.C. Part 35). Among other provisions, the Act charges agencies with "encouraging a diversity of public and private sources for information based on public information". Diversity is essential to both a robust economy and a robust democracy. In the US, state and local governments cooperate as major partners with the federal government in the collection, processing and dissemination of information that is required to maintain the operation of government at all levels. National information resources are greatly enhanced through these major cooperating efforts. This diversity has resulted in the growth of a number of vibrant new industries utilizing government information. These industries contribute to the economic health of the nation through job creation and to the government itself through corporate and individual tax payments[6]. Information created, collected, developed and disseminated by the public sector utilizing taxpayer-funded resources is the factual raw material for the products and services that support decision-making in all walks of life in the information society. These products and services create jobs, generate substantial commercial activity and improve the quality of life for all citizens.

Evidence suggests that even where such efforts seem viable, restrictive government information practices aimed at raising immediate revenue ultimately operate against the financial interests of governments. The European Commission ("EC") Green Paper, "Public Sector Information: a Key Resource for Europe," (the "Green Paper"), its follow-on study, "Commercial Exploitation of Europe's Public Sector Information," and the recently issued EC Communication[7], argue that although governments can gain limited income in the short term from information sales and licensing fees, they lose the taxation and employment benefits from the higher volume of commercial activity that would be generated by

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[5] See: http://www.whitehouse.gov/omb/circulars/a130/a130.html

[6] See for instance: PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information.* Final Report for the European Commission, Directorate General for the Information Society.

[7] Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions. *e*EUROPE 2002: Creating a EU Framework for the Exploitation of Public Sector Information. Brussels, 23.10.2001. COM (2001) 607 final.

abandoning data charges and accompanying restrictive practices. The EC-sponsored research also finds that a conservative projection of a doubling of market size resulting from eliminating government information license fees and other restrictive practices would produce additional taxation revenues to much more than offset the very limited lost revenue from public sector information charges.

The raw information from which products and services are created is collected for the public sector's purposes, for government and its agencies. Public sector information is wide ranging – from company results used for business planning; to mapping information essential for travelling and land use planning; from statistics for research and analysis; from data essential to environmental regulation; to weather, water and climate observations necessary for forecasting.

The policy advocating a diversity of sources and channels of information is based on the reality that no one supplier can design all the modern information products required to meet the needs of all users in a modern information-based economy. Instead, market forces and entrepreneurial energy can combine to determine user needs and to stimulate innovation in the marketplace with a wide range of products, services, business models and distribution media in order to satisfy the needs of every market niche.

Such a policy has been evolving in the US for a long time. A 1948 report by the Department of Commerce Advisory Committee on Weather Services on the role of the private sector and the U.S. National Weather Service (then Weather Bureau), says:

> "There is a feeling among many Weather Bureau employees that encouragement of private meteorology is incompatible with growth of the national weather service. This is not in accordance with the American philosophy of private enterprise and competition. We believe the progress of one is indissolubly bound to that of the other. This concept should be stressed at all levels[8]."

As a result of this concept of public/private partnership, the U.S. boasts a robust private meteorology industry with revenues in excess of $500 million annually[9], and a rapidly growing weather risk management industry with risk management instruments approaching a value of $8 billion[10]. The authors believe that the relatively small size of corresponding business sectors in the EU[11] is primarily due to the restrictive data policies of a number of governments and their national meteorological services.

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[8] Department of Commerce Advisory Committee on Weather Services (1948). *Weather is the Nation's Business*. Report to the Weather Bureau on the role of the Private Sector.

[9] See: Kelly, Jack (2000) Opportunities for 21st century meteorology: New markets for weather, water and climate information.

[10] See: PricewaterhouseCoopers (2001) The weather risk management industry: survey findings for November 1997 to March 2001. Prepared for the Weather Risk Management Association, June 2001.

[11] Approximately $500 million in gross receipts annually for the commercial meteorology sector in the US versus 30-50 million in the EU, and a notional value of over $7 billion in weather risk management instruments in the US versus less than $200 million in the EU.

In sum, U.S. domestic federal information policy is relatively straightforward: a strong freedom of information law, no government copyright, fees limited to recouping the cost of dissemination, and no restrictions on reuse. In contrast, European countries vary greatly in their information policies. Some public bodies have attempted to treat public sector information as a commodity to be commercialised and asserted a monopoly on certain categories of information in order to maximize short-term revenue. Such arrangements have tended to preclude other entities from developing markets for the information or otherwise disseminating information in the public interest. The emerging private sector information industry, as well as the rapidly growing environmental risk management sector, seeks to utilize public sector information but too often have their business plans frustrated by restrictive government agency data policies and practices. Such practices also have decreased the availability of critical data and information to the scientific and environmental research communities. In the words of the European Commission's "Green Paper":

> "The ready availability of public information is an absolute prerequisite for the competitiveness of European industry. In this respect, European Union companies are at a serious competitive disadvantage compared to their American counterparts, which benefit from a highly developed, efficient public information system at all levels of the administration."[12]

The National Academy of Sciences makes a similar point:

> "[…] Countries that exercise intellectual property rights over government data, [] limit the extent to which government-collected data can be used, even in international collaborations. By making it more difficult to integrate global data sets and share knowledge, such a commercialisation policy will fail to achieve maximum benefits provided by international collaboration and the scientific endeavour. […] Inefficiencies will also occur if the organizations are not-for-profit, but recover all their costs from user fees (e.g. commercialized government agencies in Europe."[13]

The Ordnance Survey of the United Kingdom is an example of an attempt to take certain government functions off budget by requiring the agencies to recover the costs of operations through commercialising government information. Chartered as a semi-independent Executive Agency in 1990, the OS is required to maximize its reliance on revenue from customer entities. However, of the £100 million annual OS revenues, only 32 million comes from actual sales of its products. The remainder comes from other central, regional and local government departments and agencies, as well as from entrenched usage of large scale maps by the recently privatised utilities[14]. These revenues cannot be called "commercial", but

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[12] For an excellent survey of Freedom of Information and database protection policies in Europe see: Perritt, Henry H. Jr. and Zachary Rustad, "Freedom of information spreads to Europe". 17:4 Government Information Quarterly (2000).

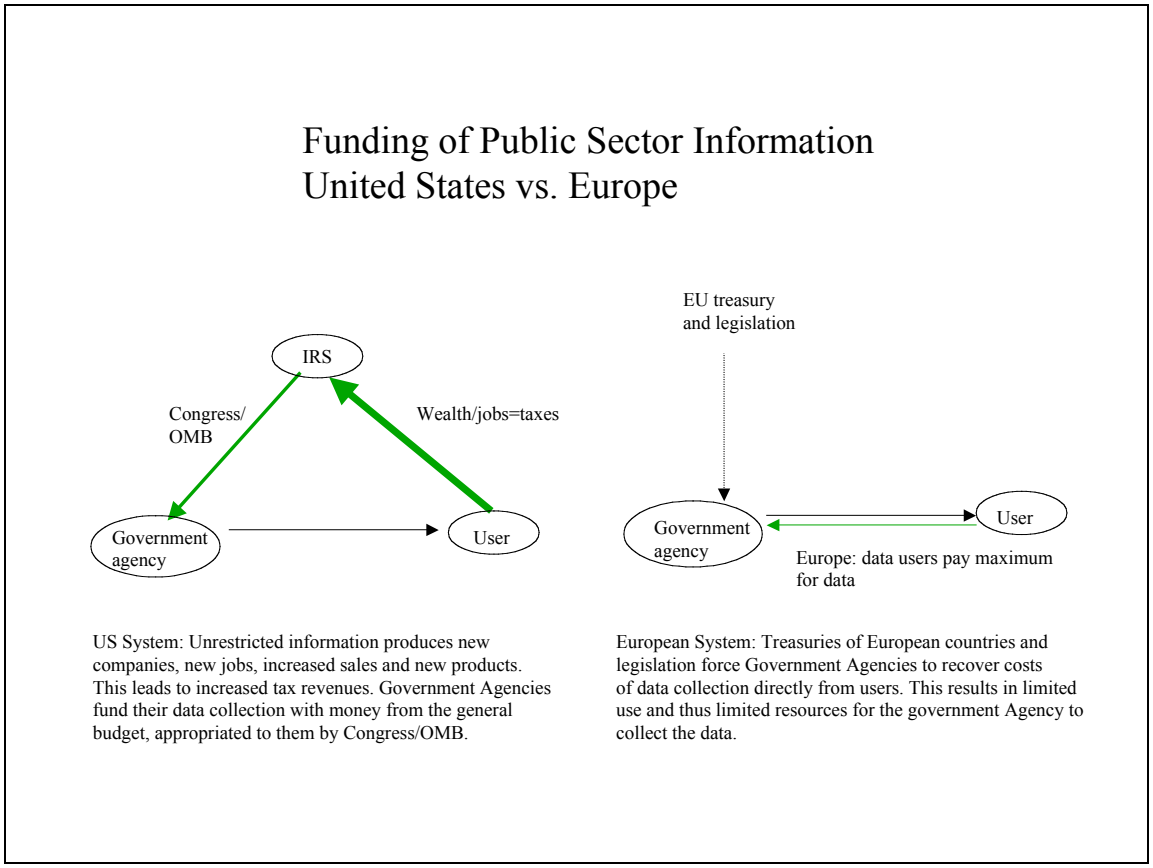
[13] National Research Council (2001) Resolving conflicts arising from the privatisation of environmental data. National Academy Press.

[14] In May 2001, a consultation document was published by DTLR for a statutory instrument that softens the existing legislation with regard to this mandatory use of the Ordnance Survey map. See

rather a combination of monopoly rent and a reallocation of public money from one public sector ledger to another. At the same time, the growth of the geographic information industry in the UK is stunted in comparison to the U.S.

Even in Britain, the anomalies are gradually being recognised: the UK Meteorological Office, which gets 50% of its revenue as transfer payment of taxpayer funds from the Ministry of Defence, recently decided to make significant categories of basic observational ("synoptic") data available for free due to negligible revenue from data sales and a growing recognition of the benefits of open access policies. The Office of National Statistics has also decided to make data from the 2001 census available on an open access basis. Other European governments, especially in Scandinavia and the Netherlands are questioning the economic basis for charging for public sector information as if it were a commodity.

In sum, the essential difference between the US and European approaches to information policy is one of funding sources. The EC Green Paper, its follow-on research discussed below, and the recently issued Communication, supports the fundamental argument that open access policies maximize social and economic benefit. The following chart highlights the differences in approach.



http://www.roads.dtlr.gov/consult/newroads.index.htm . However, we seriously doubt that the Utilities would switch away from OS data, as the investment to date has been significant.

The economic viability of government efforts to control and sell public sector information is highly uncertain. In the U.S. experience, a number of attempts by governments to generate short-term revenue from public sector information have failed due to the high elasticity of demand for information products and the human propensity openly to "share" information. In contrast with Europe, the US Geological Survey sets its prices for information products to cover only the costs of reproduction, handling, packaging, and distribution. Its copyright-free and low-cost data policy allows the USGS to focus on strategic planning without being distracted by attempting to assert protective copyright and worrying about possible data "misuse" by private sector "competitors".

Nations are free to adopt either approach, but conflicts can and do arise when governments with such disparate information policies attempt to collaborate in data-sharing initiatives. Issues regarding the global sharing of meteorological information, discussed throughout the paper, illustrate this central problem.

Over the long term, we doubt that the cost recovery goal of some European governments' commercialisation approach can succeed. The private user base that can be charged is probably not large enough to support a comprehensive information service. Charging government users the bulk of these costs merely shifts the expenses from one agency to another rather than actually saving the national treasury any money. Generally, we question whether any governmental entity can successfully raise revenue adequate to pay not only for the dissemination of its information but also for the costs associated with creating the information for governmental purposes in the first instance. This is due to some of the fundamental economic characteristics of information as a commodity: its high elasticity of demand, its difficult to control "public good" characteristics, and the fact that high prices for information ultimately lead to predatory and anticompetitive practices.

We have not considered in detail the arguments put forward by some governments, which believe that an internal market that forces government agencies to trade amongst themselves promotes a more efficient allocation of public resources. However, it is worth noting that where government departments are forced to procure their data from another government agency that is the sole supplier of such data, the internal market can disguise even gross inefficiencies in the performance of that supplier[15].

Restrictive government information practices also fail to recognize the positive economic and social potential of commercial exploitation of public sector information. The European Commission Green Paper and its follow-on study, and the recently issued Communication have shown that the market for value added information products and services makes a significant contribution to economies in terms of employment and tax revenue generation. The scale of this market is only now beginning to be measured, but early evidence suggests

[15] A British observer commented that Ordnance Survey currently employed around three times as many staff as it really required, but was under no pressure to reduce this over-staffing, thanks to its continuing success is extracting a monopoly rent from both the public and the private sectors. Other internal markets promoted by UK governments in the 1980s and '90s, in healthcare for example, have been increasingly challenged for the layers of bureaucracy created to oversee the operation of these markets and their low efficiency in allocating resources to meet clear public needs.

that the present value of European public sector information is EUR 68 billion annually or approximately 1 percent of GDP, making this sector of the economy already as important as established industries such as legal services, printing or textiles. By comparison, the economic value for the whole information sector (much of which is built on exploiting public sector information) in the US is EUR 750 billion. Presuming roughly equivalent market size, the Commission study concludes that an open and unrestricted public sector information policy should result in significant and rapid growth of the information sector in Europe, with corresponding job formation and taxation revenues.

The big issue is how to forge an international consensus that supports the widest possible access to and use of government information. There is a critical need for further research on this important aspect of the evolving information economy. The unrestricted flow of information is necessary for science and commerce and may prove critical in the context of the development of a global information infrastructure. The conflict between differing national information policies will continue to boil as the commercial value of data products is more fully recognized and government budget pressures remain severe.

Part 1. Information Policy: the Art of Applying Economics to Decision Making

> "A national information policy is to ensure the effective and efficient flow of information for economic, social and political functions, and to ensure universality and access for all citizens."[16]

This section of the paper applies economic theory to public sector information policy. First, it reviews relevant research on the economic effects and benefits of open access policies. Research in this area has developed rapidly in the last two years, since the beginnings of a global information infrastructure built around open access and connectivity principles began to come into conflict with various efforts at "government commercialisation". Failed attempts in the United States at aggressive cost recovery are described. Arguments in favour of cost recovery are discussed along with suggestions from existing research that these arguments do not hold.

1.1 Benefits of Open Access Policies

1.1.1 Research on the Potential of European Public Sector Information

As follow-on research to the "Green Paper", The European Commission's Directorate General for the Information Society commissioned a study "Commercial Exploitation of Europe's Public sector information", the "PIRA study"[17]. The study attempts to quantify the economic potential of public sector information in Europe and the extent to which it is being commercially exploited and suggests policy initiatives and good practices. Although some of the qualitative data that was used had to be extrapolated, the study should be sufficient to persuade policy makers of the need for serious rethinking of European information policies and its high priority.

The study looked at government investment in public sector information ("investment value") and the value added by users in the economy as a whole. It then characterized that part of the national income attributable to industries and activities built on the exploitation of public sector information (i.e. economic value). Economic value could not be directly obtained, so aggregated data was used. The investment value in public sector information for the entire EU is 9.5 billion EURO/year. The economic value is estimated at 68 billion EURO a year. By comparison, the investment value for the United States is 19 billion EURO/year and the economic value is 750 billion EURO/year. This gap between the USA and the European Union offers opportunities and challenges for European companies and for their governments. As the study states:

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[16] See: Low, Linda (2000) The Economics of Information Technology and the Media. World Scientific Pub. Co.

[17] PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information.* Final Report for the European Commission, Directorate General for the Information Society.

> "Cost recovery looks like an obvious way for governments to minimize the costs related to public sector information and contribute to maximizing value for money directly. In fact, it is not clear at all that this is the best approach to maximizing the economic value of public sector information to society as a whole. Moreover, it is not even clear that it is the best approach from the viewpoint of government finances. […] Estimates of the US public sector information market place suggest that it is up to five times the size of the EU market."

PIRA Conclusions

- Charging for public sector information may be counter-productive, even from the short term perspective of raising direct revenue for government agencies.
- Governments should make public sector information available in digital form at no more that the cost of dissemination.
- The fledgling EU market would not even have to double in size for governments to more than recoup in extra tax receipts what they would lose by ceasing to charge for public sector information.
- Governments make two kinds of financial gain when they drop charges:

1. Higher indirect tax revenue from higher sales of the products that incorporate the public sector information
2. Higher income tax revenue and lower social security payments if there are net gains in employment

From the perspective of economic theory, the focus of government information policies should be on using limited national labor and capital in a way that maximizes output and consumption capacity. Creating jobs in information production and information using activities may divert these inputs from other uses, but whenever marginal social benefits in information exceed marginal social benefits in other uses there is a net gain.

Of course, there remains the policy tension between the open access and "government commercialization" models. This will not be resolved until central governments recognize that while some user fee regimes can well be expected to be successful, e.g. corporate security reporting fees or patent application fees, for many government agencies the only marketable services are data and information products which cannot reasonably be expected to generate revenue anywhere close to "full cost" recovery. Whether the belief that "public activities should be publicly funded", at least in the information arena, will prevail in the EU is an open question. As PIRA noted:

> "The concept of commercial companies being able to acquire, at very low cost, quantities of public sector information and resell it for a variety of unregulated purposes to make a profit is one that policymakers in the EU find uncomfortable."

1.1.2 Research on Prosperity Effects of Open Access Policy

The Netherlands Economics Institute (NEI) and consulting company Berenschot performed a study for the Dutch Ministry of the Interior on the effects of open access policy for public sector information in the Netherlands[18].

NEI looked for both qualitative and quantitative prosperity effects of different pricing models for public sector information: no cost, marginal cost and full cost recovery (total cost, including cost of data). Their hypothesis was that open access policies for public sector information would lead to prosperity effects. Their research concentrated on four government datasets: the large-scale base map of the city of Rotterdam, the elevation dataset from the Ministry of Transport and Water Management, the 1:10.000 vector dataset of the Dutch Topographic Service and the Law and regulation dataset from the Ministry of the Interior.

NEI/Berenschot Conclusion

- Prosperity effects will be maximized when data are sold at marginal cost. Marginal cost is defined as all costs related to the dissemination of public sector information. This includes shipping, promotional costs, personnel and IT costs[19]. Although NEI only researched four datasets, they suggest that by extrapolating their results to all public sector information, enormous additional economic activity can be expected.

- The report suggested that reverting to a marginal cost pricing policy would at least in the short term increase the burden on the public purse. NEI quantified micro-economic effects and looked at meso and macro economic effects qualitatively. NEI claims it is impossible to reasonably quantify economic prosperity effects at the macro level. It is however consistent with the PIRA research which expects enormous revenue increases due to additional economic activity from open access to public sector information.

Compared with PIRA, the NEI study seems less concerned with job growth potential from exploitation of public sector information, apparently due to the low unemployment levels in the Netherlands. NEI argues that only the net effect counts toward growth. Growth in one area might mean reduction of wealth in other sector. Transformation is a shift from one to another. Real growth is innovation, efficiency from competition and a growing market of customers, and NEI argues that this will result from open access policies. It is particularly hard to quantify the impact of improved information across society and the economy. A great deal of discussion today focuses on knowledge management. It isn't often recognised that while one can have information without any knowledge or understanding, it simply isn't possible to promote knowledge and understanding without the relevant information.

[18] Berenschot and Nederlands Economisch Instituut (2001) *Welvaartseffecten van verschillende financieringsmethoden van elektronische gegevensbestanden*. Report for the Minister for Urban Policy and Integration of Ethnic Minorities.

[19] This definition includes the same as the OMB definition of cost of dissemination.

NEI also concludes that some public sector information, like geographic information, has technologically-based barriers to entry. In these instances, it appeared that the cost of information did not form the barrier to entry the market for the private sector, but rather the high investments in technology and specialization needed to work with the data. The cost of the information seemed to be relatively less important.

Even if disseminated for free, certain levels of technology and knowledge are needed to be able to use a number of important government datasets. NEI questions the interest of citizens in these datasets and questions whether use of these datasets will increase should an open access policy be applied. The study seems to ignore the professional private sector companies that can make this type of public sector information into usable products for both specialized and general audiences. In general, the role of private sector companies in the so called "data vendor" business is underestimated. Governments collect and store information in certain technical formats, which is often different than needed by end users. Data vendors are specialist companies that decode, reformat and 'cut and paste' the data into formats that are desired by end users. This has been shown by the emergence of a specialized GIS industry in the US, particularly firms such as ESRI and DeLorme. NEI does recognize that "lower prices for geographic data may result in increase of turnover and possibly increase of users". Indeed, "high end" government data sources, such as real time access to geographic and meteorological data may be the most significant category in stimulating prosperity growth for society as a whole.

This confusion of data brokering with information publishing is typical of official attitudes in Europe. The editorial function of infomediaries, as they are sometimes called, is generally ignored. Companies like Landmark Information Group, which is growing at around 40% a year in the United Kingdom, are beginning to demonstrate a new paradigm for the processing and resale of public sector information, often the face of official indifference (at best) and hostility (at worst).

NEI finally argues that the starting point in public sector information policy should be the public sector collecting data solely for government purposes. This is consistent with US policy. This is called the "upstream market". The downstream market is the sale of government data to others. In the case of the downstream market the marginal cost of dissemination is socially optimal. Even if governments succeed in cost recovery, NEI concludes that they work at a sub optimal level.

1.1.3 Research on Resolving Conflicts Arising from the Privatization of Environmental Data

A recent study by the National Research Council[20] on conflicts arising from the privatisation of environmental data analyses the problems associated with attempts to "privatize" environmental data, in both the truly "private" context (e.g. the emerging commercial land remote sensing industry) and the European context of "government commercialization." In addition to the problems that stem from restrictions on the use of data, a primary concern

[20] "Resolving conflicts arising from the privatisation of environmental data", Committee on Geophysical and Environmental Data. Board on Earth Sciences and Resources. Division on Earth and Life Studies. National Research Council. Washington, DC. National Academy Press, 2001.

for the scientific community and the public good is the lack of "transparency" of private firms and commercialized government entities, which generally precludes independent assessment of the validity, reliability and fitness for use of the data.

The report concludes that the public welfare is best served by information systems that establish the relevant facts and enable the widest distribution of facts and knowledge derived from them to the public.

National Research Council conclusions

- Environmental information systems that are created by the US government to serve a public purpose should continue to establish facts that are accessible to all. To facilitate further distribution, these facts should be made available at no more than the marginal cost of reproduction, and should be usable without restriction for all purposes.

- The practice of public funding for data collection and synthesis should continue, thereby focusing contributions of the private sector primarily on value-added distribution and specific observational systems.

- Before transferring government data collection and product development to private sector organizations, the US government should ensure that the following conditions will be satisfied:

(1) Avoidance of market conditions that give any firms significant monopoly power;
(2) Preservation of full and open access to core data products;
(3) Assurance that a supply of high-quality information will continue to exist; and
(4) Minimized disruption to ongoing uses and applications.

1.1.4 Research on Economic Benefits of Open Access Policy

Another attempt to quantify the economic effects of open access policies for spatial data was performed by the Dutch Federal Geographic Data Committee (RAVI)[21]. The goal of the research was to identify the potential benefits of open access policies within the community of geographic information. Possible economic effects can be efficiency effects, potential for income, jobs, product innovations, market development and economic growth.

RAVI conclusions

- Consumers as well as private business can profit significantly from freely accessible public sector information.

- Growth potential: lowering the price of public sector geographic data by 60% would lead to a 40% annual turnover growth plus growth of employment of approximately 800 jobs. The idea behind this is that companies paying a much lower price for public sector

[21] Ravi Bedrijvenplatform (2000) Economische effecten van laagdrempelige beschikbaarstelling van overheidsinformatie. Publication 00-02.

information will invest these savings in the development of new products, thereby expanding the potential market.

Several types of benefits would occur from open access policies: efficiency: faster policy decisions and decision making in general. More efficient logistics, less duplication of effort by various entities independently entering similar datasets; Quality and effectiveness: makes value added services possible, particularly those relevant to business and industrial siting; Use of information and communication technologies and geographic information systems: use will increase particularly among small and medium enterprises; New applications, products and services for businesses as well as consumers will be developed.

Although short on quantitative data, the conclusions are consistent with those of PIRA.

1.1.5 Research on the Effects of the Freedom Of Information Act

At the request of the Ministry of the Interior of the Netherlands, RAND Europe tried to quantify the economic effects of open access policies in the United States[22]. The Ministry needed this data to back up the need of an open access policy in the Netherlands. The report discusses various qualitative effects that arose from implementing FOIA, but does not contain significant additional data. Some of its conclusions are:

> "[…], the general belief is that in the long run, making government information available electronically either in reading rooms or on request will pose less financial burden than their paper-based counterparts"
>
> "The implementation of E-FOIA introduces a number of opportunities for information technology (IT) firms to provide services (e.g., Web site design, database maintenance) or software applications (e.g., redaction programs) to agencies. New companies are FOIA service groups that: (1) undertake reading room searches and prepare and track specific information requests across operating units and across agencies for individual or organisational clients who seek government information, and (2) locate and (re) package available government information for customers in value-added ways on a one-time purchase or subscription basis."
>
> "US enterprises have long used data from government agencies to inform their business strategies and tactics. Making that information available more quickly and easily through e-FOIA allows it to be used more effectively and efficiently."

We believe that quantifying the economic effects of FOIA in the United States is very difficult, and maybe even impossible, because there is no actual "before" and "after" comparison possible. The United States has had federal Freedom of Information legislation since 1966 and various versions of the Paperwork Reduction Act since 1980, and the States

[22] RAND Europe (2000) Implementation and effects of U.S. Freedom of Information Act. Report of a study for the Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.

have all enacted variations. This is before the "information revolution" which was fostered in large part by the development of open networks providing timely and efficient access to unrestricted public sector and other public domain information.

However, in other countries that just recently have adopted open access policies, or countries that intend to do so in the near future, a "before" and "after" comparison may be possible. However, methodological suggestions are needed. One potential difficulty may be finding a methodology to compare similar industries and /or companies in the EU and the US to test the hypothesis that information dependent firms in the EU, such as those in the emerging commercial meteorology sector, are at a disadvantage with regard to their U.S. competitors due to more efficient, timely and open access to valuable public sector information in the U.S.

1.1.6 Research on Comparative Analysis regarding the Dissemination of Spatial Data

This is a North American-European comparative study on the impact of government information policies[23]. It focused on spatial databases produced by national mapping agencies (in the United States, Canada, France and the United Kingdom), the economic, legal and policy frameworks with which national policies are formulated, as well as government dissemination practices and the structure of processes of value-added networks are presented in great detail in the study. Lopez also conducts an analysis of the academic and commercial geographic information industry's level of satisfaction with national mapping agency dissemination policies through survey and case study research. The analysis focused on the effects of government information policies on the GIS research community and the commercial geographic information community[24].

The survey results show that respondents in Canada, France and the United Kingdom all identified significant impediments to accessing and commercialising spatial data from their national mapping organizations. In contrast, U.S. respondents identified very few information, legal, or pricing impediments to access or commercialisation.

The case studies were performed on the UK Ordnance Survey, the French Institut Géographic National, Canadian Geomatics, Hydrographic Service and Statistics and the U.S. Geological Survey and the National Oceanic and Atmospheric Administration. Results show that the pricing and use of intellectual property controls were most similar in Canada, the United Kingdom and France, where dissemination strategies were driven by revenue-generation objectives imposed by central government. These were in stark contrast to U.S. information policies and dissemination practices, which were motivated by legal and statutory requirements mandating government suppliers to disseminate their information resources into the public domain.

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[23] See: Lopez, Xavier R. (1998) The dissemination of spatial data: a North American-European comparative study on the impact of government information policy. Ablex Publishing Corporation. See also: Lopez, Xavier R. (1996) The impact of government information policy on the dissemination of spatial data. PhD Thesis. University of Maine, Department of Spatial Information Engineering.

[24] See also: Onsrud, H.J., In Support of Cost Recovery for Publicly Held Geographic Information. GIS Law, 1992, 1(2): 1-7 and Onsrud, H.J., In Support of Open Access for Publicly Held Geographic Information. GIS Law, 1992, 1(1): 3-6

Lopez describes why agencies try to recover their costs, and in most of these cases cost recovery does not work:

> "Recent political and economic factors have led to pronounced efforts to privatize, reinvent, and outsource government information. Strong efforts toward cost recovery in Canada and France are the result of fiscal pressures placed on national mapping agencies by central treasury offices. In the UK, the goal of privatising the Ordnance Survey has directly resulted in aggressive revenue-generation policies. Even in the United States, there have been pronounced efforts to privatise federal information-handling activities, outsource federal mapping functions, and undertake cost recovery-based dissemination. […] In all four countries there is increased pressure on national mapping agencies to generate revenues. However, the level of cost recovery that is achieved in each setting is strongly determined by central-government initiatives and pre-existing legal and policy frameworks regulating such endeavours. Without explicit and clearly articulated public policies to balance out the competing public, private, and government interests and goals, it is very likely that bureaucracies will implement practices that are most suitable to their own interests. Unfortunately, the underdeveloped status of most national information policies, coupled with the rapid growth of government publishing activities, has resulted in ad-hoc policy development that reflects narrow bureaucratic interests, rather than national priorities."

Finally, Lopez examined how the dissemination policies of national mapping agencies affect end-users and commercial intermediaries. His empirical analysis focuses on academic and commercial users and other intermediary users of spatial data from government sources. His major findings are:

Lopez conclusions

- There is a direct association between pricing and its effects on public access and commercialisation of government agency information. Current pricing problems are having a deleterious effect on the affordability of spatial data in Canada, France, and the United Kingdom;
- There is a direct association between the application of intellectual property rights and its degree of public access and commercialisation of government agency information. The greater the restrictions on access, the less successful dissemination programs will be;
- Survey and case study findings demonstrate that reducing prices and relaxing intellectual property restrictions on government datasets are significant factors for greater opportunities for access and commercialisation for stakeholders in the geographic information community.

However, Lopez acknowledges that the study does not empirically measure any increased opportunities for access and commercialisation resulting from alternative dissemination

approaches. Such analysis would require an analysis of national econometric data that currently does not exist in the GIS sector.

1.1.7 Research on the Impact of Database Legislation in Europe

In 1998, the EU gave database owners a so-called "sui-generis" legal protection against copying. The main argument for this right was a perceived market failure inhibiting database companies from producing databases out of fear of others copying them.

Looking at the protection of public sector databases, in the U.S. the general belief is that any database protection law generally should not protect government investment in generating data. There are three reasons for this conclusion. First, database protection proposals are premised on the need to provide an incentive for investment in data gathering; in the case of government-funded information, no incentive is needed. If a government decides that it is in the public interest to collect information on smog levels, education scores, or solar flare activity, it will do so. Second, there is a widespread sentiment that once data generation has been paid for with government funds; taxpayers should not have to pay "twice" for the same data. Finally, the U.S. Government has historically pursued policies that strongly favour public funding of the creation and collection of information. These policies have contributed greatly to the success of America's high technology and information industries as well as the strength of the United States democratic society.

However, the European Database Directive does not exclude governments from using this right, nor does the member states' legislation that implements this Directive. This gives European governments an extra argument for cost recovery policies. For instance, the Database Protection Law in the Netherlands is already being used by many government agencies. Further, European governments sometimes express the view that the Directive actually requires them to pursue cost recovery policies. As a matter of law, this view is incorrect.

Uhlir and Reichman explain why database protection legislation can pose a threat to the availability of public sector information[25]:

> "Public interest users in the United States are likewise concerned about the applicability of the E.U. Database Directive to government data and the potential restrictions on access to and use of European public-sector data. Moreover, even though the proposed U.S. legislation does expressly exempt government data from its scope of protection, there are concerns that, as drafted, this exemption could be circumvented in several ways. This can occur, for example, if the contractors or grantees are not expressly required either to provide their data back to the government for public dissemination, or to make the data publicly available themselves under appropriate terms and conditions. Absent such universal vigilance by the government, a lot of data produced as a direct result of public funding could end up under proprietary control of researchers or their institutions. Because most of the non-copyrightable databases generated with government funding in the United

[25] J.H. Reichman and Paul F. Uhlir, "Database Protection at the Crossroads: Recent Developments and Their Impact on Science and Technology," Berkeley Technology Law Journal, Vol. 14 No. 2 Spring 1999, pp. 703-838.

> States are actually created by non-government employees, whether in academia or industry, the failure of government agencies to enforce this exemption could have a far-reaching impact on the full and open availability of publicly funded data. Indeed, there is some risk that government agencies could increasingly view database protection as an income-generating opportunity, like their European counterparts. As more university research is funded by private sources, more data will likely be removed from the public domain in the form of income-producing products."

The initial design for the European database directive included an article on requiring member states to adopt a compulsory licensing scheme to assure that public sector information was not overly restricted. The initial intention was to balance the creation of this sui-generis right by setting up a compulsory license scheme in case data could not be obtained through another channel. Public sector information was particularly in mind here. However, the original article did not hold due to various reasons, of which the most important one was that competition issues are not the responsibility of DG Information Society.
By implementing the Database Directive, both short and long-term growth in European database production was expected. Maurer presents extensive research including a detailed comparison of over 1,000 database providers and attempts to find out whether the database protection legislation has had a significant quantitative impact on European database production[26].

Maurer conclusions

- During its first year, the new right seems to have produced a one-time boost in database production and the number of new firms entering the industry. Since 1999, however, growth rates have returned to previous levels.

- European database protection has also produced unfortunate side effects:

1. Excessive protection for certain databases (e.g. phone directories)
2. New barriers to data aggregation
3. New opportunities for dominant firms to harass competitors with threats of litigation
4. Increased transactional gridlock due to so-called "anti-commons" effects
5. Inadvertent impediments and disincentives for non-commercial database providers, e.g. universities and other research institutes

Maurer finally recommends:

> "If Canada had to decide its database policy today, most of the available evidence would be against adopting EU-style legislation. Fortunately, no immediate decision is necessary. Although frequently discussed, threatened discrimination by European courts will have a minimal impact on Canadian firms. For this reason, Canada should

[26] See: Maurer, Stephen M. (2001) *Across Two Worlds: Database Protection in the US and Europe.* A paper prepared for Industry Canada's Conference on Intellectual Property and Innovation in the Knowledge Based Economy. May 23-24, 2001. See also: Stephen M. Maurer, P. Bernt Hugenholtz, and Harlan J. Onsrud. Intellectual Property: Europe's Database Experiment. *Science* 2001 October 26; 294: 789-790. (in Policy Forum).

> adopt European-style protection laws for reasons of domestic policy or not at all. The most prudent course is for Canada to wait until the results of Europe's database protection experiment become clearer."

We believe that the same argument holds for the United States, and most particularly in the area of public sector information.

1.1.8 Research on the Economics of Meteorological Information

John Zillman, Director of the Australian Meteorological Department and John Freebairn of the University of Melbourne recently performed extensive theoretical research on the economics of meteorological information[27]. They state that non-rival consumption and non-excludability make many meteorological services classic public goods whose provision is widely accepted as the responsibility of governments.

Zillman and Freebairn subdivide meteorological public sector information services based on the major user sector that is served, in (1) basic infrastructure, data and products, (2) basic services and (3) specialized services. By basic infrastructure, they mean information that forms a foundation for a range of further information processing activities and generation of more useful "secondary" or "value added" forms of information. An example of basic infrastructure would be core weather data. By basic services, Zillman and Freebairn mean services that are a fundamental government responsibility, and ought to be made freely available to the community at large. An example of a basic service would be a meteorological forecast or a storm warning. Finally, by specialized services, they mean services that go beyond basic services, value adding and tailoring to the special needs of individual users or groups of users. These services may include the provision of special data and products, their interpretation, distribution and dissemination, and consultation advice. An example would be a tailor made weather forecast on demand for a specific group of farmers in a specific region.

Benefits of these meteorological services to society are maximized the more widely they are consumed. Based on economic efficiency and practicality considerations they argue that:

"Basic infrastructure, data and products for national and international use, and basic public weather and climate forecasts and warnings […] should be provided free of charge to actual and potential users. General taxation revenue should provide most of the funds for public good meteorological services."
On the other hand, Zillman and Freebairn identify other types of meteorological services:

> "There are clearly other types of meteorological services (such as hour by hour temperature forecasts for an energy utility seeking to maximize its market share and revenue relative to other energy providers) where consumption is rival (the benefit of an accurate forecast for one utility is reduced if the competitors also have the

[27] See: Zillman, J.W. and J.W. Freebairn (2000). *Economic Framework for the Provision of Meteorological Services.* Also see the background papers: Freebairn, John W. and John W. Zillman (2000). Economic Benefits of Meteorological Services. In: *Meteorological Applications*. And Freebairn, John W. and John W. Zillman (2000). Funding meteorological services. In: *Meteorological Applications*.

information) and costs of exclusion are low (the information can easily be provided on a confidential one-to-one basis). Such meteorological services have the characteristics of "private goods" and economic analysis suggests that they are most economically produced and provided through the market forces."

In sum, the research advocates direct government funding and free provision to all for basic meteorological services and the provision of special services should be left to the private sector.

Zillman and Freebairn conclusions

- Direct government funding and free provision to all are favoured with their contribution to national welfare maximized at the point where marginal benefits equal marginal costs.
- "Private and Mixed Goods" meteorological services are most economically produced and provided through market forces.

1.1.9 Commercial Meteorology in the US and Europe

To illustrate the economics of meteorological information, let us look at real life examples. In some cases, weather data are vital to human survival. In case of major climate-related events like el Nino, la Nina and the monsoons, weather services provide necessary information concerned with the safety of life and property.

> "Weather is big business. It can help or hurt a community. 1/7th of the United States economy, about $1 trillion a year, is weather sensitive"[28].

The yearly revenue of the commercial meteorology industry is between $400 million and $700 million, composed of approximately 400 firms with 4000 employees in total[29]. This is compared to the EU commercial meteorology market, which amounts to between $30 million and $50 million annually, comprising approximately 30 firms and 300 employees in total. Since the size of the US and EU economies are approximately the same, there is no reason for this disparity other than the difference in public sector information policies and practices.

Commercial Meteorology in the US and Europe		
	US	Europe[30]
Gross receipts	400-700 million	30-50 million
Number of firms	400	30

[28] Quote from William Daley, former Secretary of Commerce. Dean John Dutton of Pennsylvania State University puts the economic sensitivity to weather data at $2.7 billion (Dutton 2001).

[29] Source: Commercial Weather Service Association

[30] Source: Meteoconsult

Number of employees	4000	300

The best recent example of a business opportunity created by increased availability of weather and climate information is the weather derivatives industry, which has now mushroomed to a $7 billion industry[31]. This financial sector, which grew from energy deregulation, uses weather data to predict risks due to the daily weather. For instance, ski-equipment manufacturers and sellers will have more than average income during a more than average cold or snowy winter. On the other hand, the bathing apparel industry will not do as well in an unusually cool summer. The weather derivative industry ultimately seeks to hedge the risks of both.

Companies in this business are represented by the Weather Risk Management Association (WRMA), which conducted the first survey of this emerging industry through PricewaterhouseCoopers. The results show that the weather risk management industry is booming in the United States (almost 7.3 billion USD in contract value in the last 3 years) whereas the European market is very small (120.3 million USD in the last 3 years) when compared to the American market.

Notional Value by Contract Coverage Period and Region, All Contract Types (Thousands of US Dollars)						
Coverage Period	North America	Europe	Asia	Australia	Other	Total
Winter 1997	169,410	0	0	0	0	169,410
Summer 1998	733,932	0	0	0	0	733,932
Winter 1998	1,101,306	320	0	0	300	1,101,926
Summer 1999	639,861	0	1,561	0	0	641,422
Winter 1999	2,242,562	70,690	2,799	0	1,689	2,317,740
Summer 2000	623,553	183	15,920	594	262	640,512
Winter 2000	1,785,632	48,146	29,147	1,929	10,279	1,876,133
Total	**7,296,256**	**120,339**	**49,427**	**2,523**	**12,530**	**7,481,075**

Value of executed weather risk management instruments[32]

We believe that a significant contributor to these disparities is the difference in information policies between Europe and the United States. In Europe, there is little commercial meteorology or weather risk management activity because most European governments do not have open access policies resulting in data not being readily, economically and efficiently available. A striking example of this is the fact that the US National Climatic Data Center sells most historic US daily observational data – a total of at least 15 gigabytes for the period of record 1948 to present on multiple CD Roms – for only the cost of dissemination: $ 4290. The weather risk management and commercial meteorology community fully

[31] See: Kelly, Jack (2000) *Opportunities for 21st century meteorology: New markets for weather, water and climate information.* And Weather Risk Management Association (2001) http://www.wrma.org

[32] Source: PricewaterhouseCoopers (2001) *The weather risk management industry: survey findings for November 1997 to March 2001.* Prepared for the Weather Risk Management Association, June 2001.

understand the need for a seamless global information infrastructure of meteorological and climate data.

Beyond just weather and climate information, open and unrestricted access to taxpayer funded government information – from corporate data from the Securities and Exchange Commission to patent data from the Commerce Department's Patent and Trademark Office – is contributing to the spectacular growth in the information retrieval and database industries[33]: From a $4 billion industry in 1994 to an expected $ 57 billion industry in 2004. From 900 database vendors in 1991 to 2400 vendors in 1999[34].

The weather risk management example also raises the question whether restrictive data policies can have "ripple" effects on firms who could otherwise benefit from specialized services. The data generated by the weather risk management industry shows a sharp disparity in the value of risk instruments (primarily "hedge" contracts, and increasingly insurance) between the U.S. and the EU. Can weather sensitive firms (e.g. energy related firms as well as certain retailers and manufacturers) in the U.S. be at an advantage with regard to similarly situated EU competitors due to the wide availability of weather risk management instruments in the U.S. and their relative unavailability in the EU?

1.2 Cost Recovery Experiments in the U.S. not Successful

As is clear from the research discussed in the previous section, open access policies are economically and socially superior to cost recovery, government commercialisation and competition with the private sector. However, in the last decade we have seen a move, sometimes even aggressive, towards cost recovery. Many have failed. This section describes failed attempts at cost recovery in the United States. The next section explains why cost recovery did not work in those cases and will not work in general.

1.2.1 The FMC's "Automated Tariff Filing and Information" System [35]

The Automated Tariff Filing Information System (ATFI) was an information system maintained by the Federal Maritime Commission (FMC) with data on tariffs filed by common carriers, including information on cargo types, shipping destinations and service contract terms. In November 1992, Congress passed the "High Seas Driftnet Fisheries Enforcement Act" Public Law 102-582. It included a requirement that FMC collect user fees from anyone directly or indirectly accessing ATFI data.

The reason for this was a scramble to meet budget and revenue targets due to a failed attempt to impose fees on recreational boats to compensate Coast Guard emergency services. Because this "boat tax" was so unpopular, it did not pass Congress. However, the

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[33] See: Kelly, Jack (2000) *Opportunities for 21st century meteorology: New markets for weather, water and climate information*.

[34] See: U.S. Industry and Trade Outlook 2000 and Gale Directory of Databases 2000.

[35] Based on: United States General Accounting Office, Accounting and Management Division, March 10 1995 GAO/AIMD-95-93R ATFI User Fees. Also see: Washington Post Editorial, August 4 1992, *Boats, Budgets and a Bad Idea.*

expected revenue had to be replaced by some other source. The FMC thus started collecting user fees for access to the ATFI. The goal was to raise $810 million over three years by charging 46 cents per minute to retrieve the information directly or indirectly. However, the actual user fees collected were $438,800, which was only 0.05% of the original mandate.

Reasons for this dramatic failure were (1) optimistic assumptions about the perceived inelasticity of tariff data, and (2) not considering the possibility of users obtaining tariff data from other sources. Indeed, this is an excellent example of commercial information providers actually replacing government providers when the government charges prices for data that exceed the barrier to entry in the particular marketplace. The same technology that made tariff information timely and efficient for the government to collect – the Internet – also made it possible for a non-governmental data provider to collect the identical data from shippers as reported to the government by promising to make available a directly competing database at a cost to users less than that set by the government[36].

1.2.2 United States Geological Survey

The United States Geological Survey (USGS) is the national topographic mapping agency. Their base product is the 1:24,000 topographic map. Currently, USGS charges only the dissemination cost of supplying data to users.

However, during the early years of computerization, when the cost of transition from paper to digital maps was significantly higher than it is now, USGS made an attempt to move towards more significant cost recovery. In 1981, the USGS increased its prices for digital data products in order to recover more of the primary costs of producing the data. Some managers thought it was a way to raise revenues that could be used to improve and in some cases revitalize the infrastructure to support not only dissemination but production as well. As a result, demand dropped so precipitously that the Survey was forced to quickly reduce its prices to recapture the previous market for paper maps. After reducing the charges, sales took three years to return to their previous level[37]. This clearly demonstrates that this information product exhibits high elasticity of demand.

After this attempt to move towards aggressive cost recovery, the USGS struggled for several years to find a balanced method to recover dissemination costs, suggesting limiting cost recovery to dissemination costs is itself not always easy[38].

Before the promulgation of OMB Circular A-130, USGS charged user fees for data, information and products sold to the public. Prior to 1984, the USGS returned all receipts to the Treasury. In 1984, the USGS requested and received authority to retain receipts from the sale of map products. In return for this authority, Congress removed $8 million from the USGS budget. That year, the USGS also increased paper topographic map prices from $2.00

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[36] As the private sector provider was not a publicly traded corporation, detailed market and revenue information is not available.

[37] Based on the description of the USGS case by Blakemore, Michael and Gurmukh Singh (1992) Cost Recovery Charging for Government Information. A false economy? pp. 30-34

[38] Based on internal information from USGS.

to $2.50. Sales declined, which resulted in USGS never recovering to the $8 million level of 1984.

In 1992, USGS management decided to review prices and policies, on the strong urging of Congress. After USGS better understood cost recovery and its limitations within government, they adjusted accordingly. In 1995, after years of research on what the correct price for data would be in order to recover dissemination costs, the Survey raised their price for topographic maps to $4.00. The following happened:

- Demand declined by 20%
- Revenues increased 40% for the first year
- Complaint letters were answered full time for over 6 months

As a result, USGS has recovered close to 100% of its dissemination costs for the past 4 years. However, they realize that this is the limit. USGS cannot recover any significant share of costs related to the production of their data even if they tried aggressively to do so. However, USGS is constantly under pressure from the upper management and Congress to "increase revenues", which is based on a misunderstanding of what cost recovery is all about. If USGS increases revenues, then either their costs have increased accordingly, or they will have to reduce their prices. Cost recovery is not a scheme to "get rich".

The economic lesson from the USGS case is that demand as well as the revenue seems to decline in a linear fashion as price increases. However, the decline in sales (demand) that was initially steep eventually levelled off. And the declining revenue after a while started to rise again, though not to initial levels. This can be explained by the existence of a "captive" market, users that have no alternative but to use the digital topographic base. Some users are bound by legislation to use high definition topographic data, like is the case with the UK utilities that are required to use Ordinance Survey large scale data. Others have product lines that are heavily tied into using the data, and no viable alternative exists to compete even though prices rise substantially. But even these "captive" users exhibit significant elasticity in their demand[39].

1.2.3 State of California

A spectacular example of the failure of cost recovery for data comes from the state of California. In a recent e-mail discussion from the National States Geographic Information Council on "Fees for Data", the State of California disclosed that charging for data has proven disastrous for California[40].

First, they experienced a loss of cooperation because of unequal exchange.

> "In an open data system cooperation is simple, because data are exchanged without restriction, cost sharing arrangements are also easy to construct and public and private entities are simply working together to reach a common goal. When the free

[39] An example of this is the Dutch National Spatial Planning Agency who refused to buy and use the topographic base map from the Topographic Service (Ministry of Defence) simply because it was to expensive. They did without the map for several years using whatever inferior alternatives they could find.

[40] National States Geographic Information Council (2001) *Fees for Data discussion.* Informal e-mail discussion.

> data exchange system and a fee for service system try to work together serious problems often emerge. In California one of the data centres set up a fee for service data integration service generally using data produced by others as a base. The system led to a long -term misallocation of resources. For example if the department of Forestry produced a layer[41] for $500,000 and put it in public domain the data centre could then update the layer spending $50,000 and lay claim to the new layer. When Forestry then needed to use the layer they would be put in a very strange position. They had done 90% of the work and would receive no compensation for their efforts but would need to purchase the updated product. Worse yet, they could not now get funding to do an update of their layer themselves since the update work had already been captured by the fee service. If they were to somehow find the funds they would be criticized for undercutting the cost basis of the data centre GIS operation. The layer once transferred to the "fee system" could not be recovered by the free system. Funding could not be made available since the fee system would vigorously defend its "profitability"."

This has to do with the fact that government is a monopoly and almost by definition does not experience competitive pressures. Once the layer is "owned" by the fee system there is not much incentive to perform another update. Sadly, often in government there is incentive to make a profit rather then to work exclusively for the public interest. In a fee system this incentive is more pronounced since the system itself pushes the manager to behave in ways that may be contrary to the public interest, but in effect encouraged by the job description. This phenomenon is not limited to California. Recent investigations by a number of European national competition authorities (e.g. Finland and Switzerland) suggest that the moral hazard of fee generating public bodies engaging in anticompetitive practices is real.

One issue identified by the California experience is the "disincentive to update" problem:

> "If the entire user community can't get funding to update a shared layer then that community is forced to buy out of date information. The same revenue arrives if the fee service performs updates or puts the money elsewhere. It is then revenue optimising to move on to another layer grab more material from the free sector then pick up new "customers". The fee operation then grows ever larger but the downside to society is that it becomes quite difficult to update framework data. Over time in government, fee services often become unintended pyramid schemes. The fee for service is in effect a government subsidized monopoly that can thrive even if the customer base is desperately unhappy."

A second problem that the State encountered was that other governments followed their example of charging:

> "When one government entity charges for data other governmental entities retaliate by charging for their information. Consequently when the fee for service bubble bursts (ultimately this seems to happen with few exceptions) it can be quite

[41] Terminology in Geographical Information Systems, meaning sub-dataset containing data on specific subject, e.g. layer with roads or layer with forest data. Generally, all layers put together form the full dataset.

> expensive to recover. In California we had to face a combination of outdated framework data and a GIS community divided by the free/fee divide. Now that our State government has returned to a free system, local governments that charge for data are in a sense trapped. A user fee once established is difficult to curtail. It is obviously unfair for a State agency to pay for data from a local government agency that charges and to expect data free from local government that does not charge. It looks like we will be able to get out of this ethical box by careful cost sharing but we are in for a long a difficult negotiation."

A third problem California experienced had to do with incomplete datasets:

> "When some local governments charge for information but most do not, State regional plans have a sort of "Swiss cheese" look. There are areas for which that State cannot include information in public documents because the State does not have intellectual property rights to make public information for which counties charge. Similarly, another class of problem shows up when the private sector maps an area in exchange for the right to sell the information to others. This gives regional plans a kind of "chicken pox" look. Chicken pox maps are particularly painful during a public emergency - the prices go up when the vendor knows the State either has to buy the information at a high price or risk human life."

The California experience suggests that since most of the value of a data set comes from analysis and value added by those other than the entity that produced the data[42], it is economically most efficient to have the largest possible number of data users. It is interesting to note that in countries where the government has an unrestricted data policy there are many value added information companies. In places where the government sells and otherwise restricts information the ability to value add is cut off at the root. State entities that do not have an essentially "entrepreneurial" mission then arrogate to themselves this role.

Also, California itself does not have State/Private sector partnerships with California companies like other States do, because partnerships are difficult to establish without access to the intellectual property rights to the own State's framework data. Due to the cost recovery policy, California also experienced disadvantages towards cost sharing with the Federal government. The Federal government requires open access in most cost sharing agreements, e.g. grants and cooperative agreements.

In sum, if a State entity charges for information it risks being isolated from other levels of government, cutting off partnerships with private sector companies and creating a number of perverse incentives within the government. California has experienced all this and decided to move to open access policies rather than cost recovery.

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[42] Also see: Perritt, Henry H., Jr. (1994) Unbundling Value in Electronic Information Products: Intellectual Property Protection for Machine Readable Interfaces. In: Rutgers Computer & Technology Law Journal 20:415 (1994).

> "Charging for data is not creative, it is playing Russian roulette with your State's mapping systems".

Christopher Roper, founder of the Landmark Information Group, who has worked at the interface of public-private information exchanges in the United Kingdom over the past 10 years, said,

> "All the negative phenomena experienced in California will be instantly recognisable to anyone dealing with similar issues in the United Kingdom. The only difference is that our government hasn't yet admitted that the problems are inextricably bound up with the cost recovery issue and the operation of internal markets."

1.2.4 A Tale of Two Counties[43]

An unintended controlled experiment in cost recovery was performed by two counties in Wisconsin. Clark County adopted a cost of dissemination policy for its digitized aerial photographs (digital orthophotos); and Brown County adopted a full cost recovery policy for its identical products using a formula which equates to $24 per section, or about $13,000 for the entire county (with some exceptions).

The inexpensive data in Clark Co. facilitated or encouraged use by individuals who might not otherwise have even tried using the data. As there were no financial roadblocks that prevented or discouraged people to use the data, people invested in the CAD/GIS software and availed themselves of the County data for a broad range of applications. There was much very positive feedback. People got "hooked" on using the data and kept coming back for more. Some even went as far as to talk to County Board members and others and tell them what a good program land records modernization was. Since most County Board members did not have a good understanding of the usefulness of the data, this resulted in the Board fully supporting the modernization program.

The contrast with Brown County was striking. The cost recovery pricing did not discourage a small number of specialized users such as professional surveyors or others who have site specific projects where only one section or two of data was needed. However, those needing much larger areas, e.g. entire townships or cities were deterred by the high pricing. One example was a firm that was doing a stream restoration project, and needed the orthophotos for an entire watershed which included many sections.

> "Some of the responses from people requesting data is, 'I can't afford that! That blows the entire budget for this project'. So they choose not to buy ANY of the data, hang up the phone, and generally go away with a bad taste about the entire program. I don't think we're generating much support this way".

> "True, we have generated extra revenue but even at this price it appears we're not going to come close to getting even 50% cost recovery. We have come a long way in

[43] E-mail from Jeff DuMez, Coordinator, Brown County Land Information Office (Dec. 2001).

putting together the software, data, personnel, and other things that are helping us reach our goals. We now have the technology to effectively create, manage, distribute and use products such as digital orthophotos. With these advances, are we putting up new barriers by charging so much? Do we really need to see data cost recovery, given the other revenues the Program has allowed?"

"When people choose not to use our data because it is too expensive, what are the implications? Most people who want to use the data are doing something to the land which affects the community that we all live in. Without good, accurate data, are these people able to make the best decisions? Just a few thoughts. I've seen it from both sides of the fence, and I plan to work on revising our policy."

1.3 Limitations on Cost Recovery in Europe

- The Ordnance Survey of the United Kingdom was chartered as a semi-independent Executive Agency in 1990, and is required to maximize its reliance on revenue from customer entities. However, Ordnance Survey does not come near to full cost recovery. Of the £100 million annual OS revenues, only £32 million comes from actual product sales. The remainder comes from other central, regional and local government departments and agencies as well as from entrenched usage of large scale maps by the recently privatised utilities. These revenues cannot reasonably be considered "commercial", but rather a combination of monopoly rent and a reallocation of public money from one public sector ledger to another, with no net benefit to the taxpayer or the Treasury.
- Similarly, the UK Meteorological Office gets 50% of its revenue as a transfer payment of taxpayer funds from the Ministry of Defence. The Met Office recently decided to make significant categories of basic observational ("synoptic") data available for free due to negligible revenue from data sales and a growing recognition of the benefits of open access policies.
- The Deutscher Wetterdienst (DWD) was reorganized in a 1998 statute that explicitly authorized its commercial activities with a mandate that it minimize reliance on general state funding. However, an audit report issued October 25, 2000 by the German Federal Accounting Office (Bundesrechnungshof), shows that this cost recovery policy has not met expectations[44]. Also, in spite of years of expensive consulting assistance, DWD has not been able to set up transparent accounting standards. Data sales only recover less than 1% of total expenditures. In sum, DWD has yet to minimize the expenditures that are not covered by income and decrease the burden on the general budget. The report finds that without significant new revenue sources, for example new charges on aviation users of meteorological data, DWD will not achieve its statutory cost recovery mandate.
- The European Centre for Medium-Range Weather Forecasting is losing private meteorology firm customers of its operational model outputs due to unaffordable prices

[44] See: Bundesrechnungshof (2000) Gebühreneinnahmen aus Flugwetterdienstleistungen des Deutschen Wetterdienstes and Entwicklung der Ausgaben und Einnahmen des Deutschen Wetterdienstes. Press Release October 25 2001.

required to be charged by its national meteorological service members. The emerging European commercial meteorology industry is rapidly taking advantage of increasingly inexpensive computational capacity to run their own localized versions of freely available US atmospheric models, and are using freely available US data to initialise those models.

1.4 Government Competition with the Private Sector

Although attempts at aggressive cost recovery generally fail, there may be instances where it would work. Carl Shapiro and Hal Varian describe these instances as "profit centres", and they might occur when public sector information is extremely inelastic[45]. In general, the demand for information products is highly elastic. Rhind[46] has researched this phenomenon for geographic information:

> "It seems clear that no one has yet found a logical basis for charging for the use of topographic data. The price elasticity of geographic information is limited [sic], especially where competitive products exist and except where the use of "official" products is required by statute."

In other words, only when use of the information is mandatory can the demand be less elastic. Examples are data from land registry offices that is required for ownership transactions and weather data required for instrument flights. Our suggestion that public sector information products that are less elastic might have more chance of being "commercialised" by government holds in these instances.

An example of successful full cost recovery of land information comes from South Australia where the operation of the Land Ownership and Tenure System (LOTS) has generated revenue that is around 300 per cent of its operating costs. The reason for this success has been the mandatory enquiries about titles and ownership files for real property transfers[47].

Another example of less elastic information products having more chance of being commercialised by governments comes from Germany. In its review of the German Weather Service, the German Federal Accounting Office ("Bundesrechnungshof") notes that only instrument flights are required by law to use certain weather data during the flight. Planes flying on visual means are not required to obtain this data. Because the German Weather Service does not succeed in recovering its full costs, the Accounting Office indicates that there might be an opportunity for further cost recovery if not only instrument flights, that are already required to use safety weather data, would use this data, but visual flights as well. In short, FAO raises the idea of a mandatory regulatory initiative to require

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[45] See: Shapiro, Carl, Hal R. Varian (1997) US Government Information Policy. University of California, Berkeley. July 30, 1997. Presented at Highlands Forum, Department of Defense, June 8, 1997, Washington, DC.

[46] See: Rhind, D. (1992) Data Access, Charging and Copyright and their Implications for Geographical Information Systems. In: *International Journal of Geographical Information Systems*. Vol. 6, No. 1, pp 13-30.

[47] See: Dale, P.F. (1991) Land Information Systems. In: Maguire, D.J., Michael F. Goodchild and David W. Rhind (eds.) (1991) Geographical Information Systems. Longman Group.

visual flights to use this data for the sole purpose, unrelated to any articulated safety concerns, of having them pay user fees for it to lighten the burden on the German general budget[48].
A third example of low elasticity is the utilities sector in the United Kingdom. This sector is dependent on large scale geographic datasets produced by the Ordnance Survey. Because they have no choice in whether to purchase the data or in where to purchase it from, they form a captive market for Ordnance Survey that makes up over 15% of its total income.

In the rare cases of inelastic categories of government information, a larger public policy issue needs to be raised: whether or not commercial government activities that compete with the private sector are proper for a government agency funded primarily by the taxpayers. While this paper is aimed primarily at providing economic arguments for open access policy, the authors also need to address this social policy. In this context Rhind states:

> "[…] However, a practical difficulty arises when a government organization, which needs data for its own statutory or government-defined purposes, is also charged with the requirement to generate substantial income from commercial activities as part of its on-going funding. To confound the national need and cost recovery in this way seems both unwise and unreasonable."[49]

And Low states:

> "The government's role in a market economy is best seen in the context of its overall macroeconomic objectives to attain full employment, price stability and a desirable rate of economic growth. Real sustainable growth is necessary to generate a certain standard of living and welfare. The government must also view economic growth in the context of non-economic goals in social and political areas. Economic efficiency may thus have to be weighed or traded-off against socio-political aims[50]."

The larger public policy issue behind public sector information policies is whether or not commercial government activities that compete with the private sector are proper for a government agency funded primarily by the taxpayers[i]. In 1995, European national meteorological services prevailed in the World Meteorological Organization on the issue of replacing the organization's previous policy of full and open exchange of meteorological information with a scheme (WMO Resolution 40, CgXII) which sanctions charging and use restrictions on broad categories of data. In the words of the National Academy's "Privatization" study, summarized above:

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[48] See: Bundesrechnungshof (2000) Gebühreneinnahmen aus Flugwetterdienstleistungen des Deutschen Wetterdienstes and Entwicklung der Ausgaben und Einnahmen des Deutschen Wetterdienstes. Press Release October 25 2001.

[49] See: Rhind, D. (1992) Data Access, Charging and Copyright and their Implications for Geographical Information Systems. In: *International Journal of Geographical Information Systems*. Vol. 6, No. 1, pp 13-30.

[50] See: Low, Linda (2000) The Economics of Information Technology and the Media. World Scientific Pub. Co.

> "The change of policy was aimed at preventing private sector entities from competing with national meteorological services in Europe, which recoup costs through sales of data and services."

The National Academy of Sciences concludes:

> "It is generally in the economic interest of private sector [and commercial government] organizations to restrict competition and to establish a monopoly over information sources. Such monopolies are not in the interest of the public, which deserves a good return on its investment[51]".

The question of government competition has been addressed recently in Sweden and the Netherlands.

1.4.1 Swedish Statskontoret

In April 2000, The Swedish Agency for Administrative Development (Statskontoret) published a seminal study "The State as Commercial Actor," which identified the range of issues associated with government entities entering the commercial field and the effects on the private sector. Five cases were studied in detail. In the most relevant of the case studies, they found that the National Land Survey (NLS) (which maintains and attempts to commercialise both basic geographic as well as land use -- "cadastral" -- data):

- Had an unfair competitive advantage over emerging commercial firms;
- Was the dominant player in the geographic information market;
- Is the "preferred" provider in the market due to its "official" status;
- Has access to taxpayer-funded "strategic infrastructure", including government-owned information technology assets;
- Has copyright and other rights over public sector data;
- Is partly funded by taxpayer Kronor and partially engaged in monopolistic practices;
- Obscures the demarcation between government and private activities.

In light of these findings, they recommend that the commercial arm of the Land Office – as well as some of the other entities studied -- be completely privatized, subject to open public audit and oversight by an independent government body, and their data holdings placed in the public domain for access by the general public and competing private sector entities.

The Swedish Statskontoret is presently examining the operations of the Swedish Meteorological and Hydrological Institute (SMHI), and it is likely that similar recommendations for severing the commercial arm from the public arm of the SMHI will emerge, rather than developing a "trading fund"-like solution, after the British model.

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[51] National Research Council (2001). Resolving conflicts arising from the privatisation of environmental data. National Academy Press.

When dealing with this separation issue, the Swedish government realized that an open data policy was needed in order to make the privatisation of the commercial arm (Metria) succeed:

> "The databases managed by NLS can thereafter be offered to Metria and other actors in the marketplace on the same conditions".

Either when spinning off the commercial arm or when encouraging the private sector players, the only way to succeed is open access policy.

Similarly, the New Zealand government recognized that an open data policy was needed to successfully corporatize the Meteorological Service of New Zealand, and the Dutch government also realized the necessity of open data policy to successfully privatise the commercial part of the Royal Dutch Meteorological Institute.

1.4.2 The Netherlands: Market and Government

In 1997, the Dutch Ministry of Economic Affairs produced the "Governments and Markets" Directive, a report on unfair competition with the private sector by the government[52]. In 1998, the Ministry published a report on the application this Directive to public sector information. Based on the findings in case studies with several government organizations, the main conclusions were:

- Public sector databases should be made available to third parties on a non-discriminatory basis and at uniform prices.
- The public sector should not make unnecessary modifications to databases to create unfair competition, in other words, only extra information services directly linked with the "public task" are allowed, all other (commercial) services are forbidden.
- Additional (commercial) information services are only allowed by the public sector when there is a large need for such services by the public and no private sector company is already providing that service and it is unlikely that any private sector company is going to pursue it in the near future.

This Dutch Directive points out very clearly that when talking about public sector information policy, it is very important to realize that the type of information makes a difference: Raw (base) data, collected for the "public purpose" (e.g. U.S. topographic framework data) versus application data, also called additional or value-added information (e.g. route planner).

Both studies agree generally with consensus views in the US, which are restated by Stiglitz, et al., "Role of Government in a Digital Age," Computer and Communications Industry Association (October 2000).

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[52] Ministry of Economic Affairs (1997). *Markt en Overheid; spelregels voor gelijke concurrentieverhoudingen tussen overheidsorganisaties en private ondernemingen.*

1.4.3 Unfair Competition in Practice

In addition to these studies, national competition authorities in a few countries are beginning to take notice of unfair competitive practices by commercialised government agencies.

In Switzerland, a commercial meteorology firm alleged that the Swiss national meteorology office was engaging in price discrimination by offering its own commercial arm data at deeply discounted, nominal prices. The Swiss competition authority held:

> "Anyone engaging in the sale of meteorological [data] as well as providing sovereign activities, is acting as an independent party in the commercial process and, as a public undertaking, is subject to the provisions of the Antitrust Act…In the Swiss market, [the Swiss Meteorological Institute] has a market-dominating position. It must make available to interested third parties on a non-discriminatory manner all the data and products which it uses for its own services."

In Finland, the Finnish Meteorological Institution (FMI) was recently charged by the Finnish competition authority for anticompetitive practices based on government providing commercial services. In an attempt to take commercial weather companies out of business, the Finnish Meteorological Institute deliberately lowered the quality of its radar images between June 1999 and December 1999 when delivering them to the Scandinavian Composite consisting of radar images for Finland, Sweden and Norway, used by the private sector in the production of its own weather services. The radar images delivered by the FMI to the Composite contained false radar signals ("clutter"), which users of the weather services mistook for rain. In its own commercial weather service operations, the FMI has still been able to use the original high-quality radar observations. The Finnish Competition Authority found that the FMI has abused its dominant position in the national meteorological data market and imposed an infringement fine of FIM 200,000 (33,500 Euro) on the FMI for the breach of competition legislation. The Finnish government recently made a determination to completely sever the commercial arm of the FMI from its public arm.

In Germany, the leading news magazine Der Spiegel recently published an expose of the German meteorological service, Deutscher Wetterdienst (DWD)[53]. It claimed that the DWD was also engaging in price discrimination in an attempt to drive its newly emerging commercial weather service "competitors" out of business. DWD was said to be offering completely produced and ready to air weather forecasts to television and radio stations at lower prices than charged the commercial meteorological firms for the raw data on which to base their competing broadcast forecasts. According to atmospheric sciences professor Dr. Michael Sachweh of the Ludwig-Maximilians University in Munich:

> "This is for sure no fair competition… The commercial companies are pushed to the wall."

From the competition cases, the question rises whether or not the negative effects of "government competition" between "commercialised" public bodies and emerging

[53] Der Spiegel, Issue 47 at p. 230 (November 19, 2001).

information dependent firms, as identified, for example, by the Swedish Statskontoret, can be quantified, or adequately described for the purposes of making sound competition policy.

In sum, the most sensible solution for government commercialisation would be to separate commercial activities into a commercial entity. Separation of commercial activities would be the basis not only for a market in accordance with competition law, but also guarantee market structures with maximum overall economic potential.

However, there is a Dutch example of how separation, if not handled properly, can lead to even worse situations. The Dutch cadastre separated its commercial activities into a separate business entity that did have to pay for the core data provided by the cadastre, but had sole rights to access the data. Moreover, this company was 100% funded by the cadastre itself and was the only company that had access to the data and the cadastre systems (exclusive licensing). In other words, this company had a monopoly position in commercial cadastre products. The Dutch government finally decided to eliminate the commercial company and bring the commercial activities back within the public Cadastre. Opinions differ if this is the right solution or not. The fact remains that the Dutch Cadastre is instructed by the Dutch government to fund their own information collection by recovering costs of data through users. Meanwhile, several local governments that bought the information for their own use have put cadastral information on their websites for free.

This example illustrates that separation of budget funded and commercial activities can only work under an open competition regime accompanied by open data policies. Other companies have to have the same access to the data and the same user privileges as the original commercial part of the public entity.

Part 2. European Union and Specific Country Case Studies

This part contains information regarding recent developments at the EC level, as well as the policies and practices of four European countries regarding the availability of public sector information[54]: the Netherlands, United Kingdom, Finland, and Germany[55].

On the basis of these country case studies we agree with PIRA that the Netherlands and Finland come closest to a policy model within which companies should in theory find it easy to maximize the value of public sector information[56]. This is not always the case in practice, however, particularly as it relates to meteorological information in Finland. In The Netherlands, the application of the "Governments and Markets" Directive[57] to public sector information specified that public sector databases must be made available to third parties on a non-discriminatory basis and at uniform prices. In Finland, the 1999 Publicity Act together with a Council of State decision in May 2000 includes provisions to encourage uniform practices for commercial exploitation of public sector information. The recent report by the Finnish Competition Authority on the Finnish Meteorological Institute confirms this policy.

This part starts with the European Commission in general.

2.1 Europe's Public Sector Information Initiatives

"Over the past decade, there have been a number of studies about public sector information, initiated both by the European Commission, and by European Union Member State government administrations."[58]

2.1.1 Publaw Report

The first attempt to chart the diverse information policy landscape of the EU was the "Publaw III" report, which examined the relationship between the public and private sectors in the European information market[59]. The following six maps show the status of European countries regarding open access policies in 1995 as described in the report. The maps are based on an analysis of the following factors as disclosed in the study:

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[54] This part draws from previous studies as well as from country visits of Peter Weiss and Martin Yerg during June and October of 2000, and the visits that Yvette Pluijmers and Peter Weiss undertook in September 2001.

[55] The Swedish case was only described in the policy part of the paper section 3(4) above since it is limited to government competition issues.

[56] See: PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

[57] Ministry of Economic Affairs (1997). *Markt en Overheid; spelregels voor gelijke oncurrentieverhoudingen tussen overheidsorganisaties en private ondernemingen*.

[58] Quote from preface from PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

[59] Publaw III. Final report. Prepared by PSI, London and CRID, Namur, under contract with EU DGXIII (now DG Information Society). November 1995.

1. Right of Public Access: Is there a Freedom of Information Law or similar policy?
2. Government Copyright: Do governments assert copyright over taxpayer-funded data?
3. Price Structure: Do governments seek to recoup costs of dissemination only, or do they attempt to raise significant revenues as in "full cost recovery"?
4. Government Competition: Do governments encourage a robust private data industry, or do they compete as through "Government Commercialization"?

[[Maps attached in separate Powerpoint file]]

In sum, Scandinavia tends generally to be the most "liberal" while UK, France and Germany tend to be the most restrictive, with the others falling in various categories in between.

While the "Publaw III" report was merely a high level survey of then-articulated government policies, it provides a valuable starting point for analysis and against which to gauge progress over time.

2.1.2 Digital Geographic Information Market in Europe

One of the first attempts to examine the potential of public sector information in Europe, "Digital geographic information market in Europe" was commissioned by Conseil National de l'Information Geographique (CNIG) and Association Française pour l'Information Geographique (AFIGEO) and was performed by PricewaterhouseCoopers and Urbatique in 1997[60].

The general conclusion of the study was that the European market's size for geographic information (GI) is difficult to measure, considered worth between FF1.5 and FF8.4 billions ($200 million and $1.1 billion), depending on what is included in the calculation. The market's growth was estimated (in 1997) to be maintained at 14% per year until at least 2001.

Major users of GI data include States and local governments (30 to 40% of the market), network managers (10 to 20%) and telecommunications companies (5 to 10%). The growth potential for these major users is considered low. In all countries, the offer of theme/non-basic data (socio-economical data for geo-marketing for example) is increasing rapidly. Banks, insurance companies and distribution services are significant potential users (for geo-marketing purposes), but they are slowed by the lack of ready-to-use "off-the-shelf" data. Available data often lack detailed socio-economic information. Laws protecting individual privacy also impede use of such data. These potential users come from sectors that are much larger than those of established users (government,), and their impact on the GI market could be significant. Other sectors rarely utilize GI data, because they lack knowledge about such data (finance, industry), or because they lack financial and technological tools to get such data (e.g. agriculture, whose main activity is by essence geographical – to optimise the production of a land – and which could therefore be a potential frequent user).

The use of GI data is regulated in all countries of this study by laws protecting author's rights and competition. All countries, with the exception of the United Kingdom, established

[60] Urbatique and Coopers and Lybrand (1997) *Etude du marché européen de l'information géographique numérique*. For Conseil National de l'Information Géographic (CNIG) and Association Française pour l'Infromation GEOgraphique (AFIGEO).

rules allowing access to public data for personal (non-commercial) usage. The European Commission recommended in 1989 that public and private sectors work together towards the release of public data; the EC recommendations were not applied at the national level, except in the UK. As of today, the relationship between public and private sectors when it comes to GI is more of competition than cooperation. Public agencies are under pressure to recover costs, and turn to more "value-added" products and services in an attempt to generate revenues. The only exception to the domination of public agencies is with the creation of road map databases, whether online or on CDs, triggering the arrival of many, often small size, new companies on the GI market.

The main barriers to the development of the GI market were identified as:

- The lack of knowledge about the existence or application of GIS data by many potential users
- Difficult access to data and to metadata; restricted use of data (due to laws protecting the individual or licenses protecting the author)
- Poor adaptation of available data to the users need (often too complicated raw data for non-expert users).
- The price of data is also considered an important barrier, mainly for new commercial users.

The European GI market looks more like a mixture of national markets than a unified market. European data providers are rare, and most GI companies are strictly operating in their own national markets. Some companies fear the possibility of international competition. In all countries, the lack of clear regulations, stating the distribution goal of public organizations and the conditions under which these data can be accessed, is slowing the development of a GI value-added sector.

2.1.3 Green Paper on Public Sector Information

In late 1998, the EC Directorate General for the Information Society (then DG XIII) issued a Green Paper "Public Sector Information: A Key Resource for Europe COM(1998)585.[61]". That paper made four essential points:

- Public sector information is fundamental to the economy.
- Ready availability of public sector information is prerequisite for competitiveness of European industry.
- Public sector information is critical to success of Small and Medium Enterprises.
- Information policy harmonization is needed among EU member states.

The purpose of the Green Paper was to initiate discussion on public sector information both in society as well as at the political level. It is clear that significant political sensitivity accompanies the Green Paper. Policies regarding freedom of information, as well as

[61] European Union Directorate General Information Society (1998) *Public Sector Information: A key resource for Europe.* Green paper on public sector information in the information society.

exploitation of public sector information, differ greatly between member states in legislation, but also in daily practice as well as perceived national economic interests[62].

The Green Paper provided the stimulus to get policy discussions moving. Most member states are at least thinking about public sector information and open access policies at a political level and some are already beginning policy development processes.

2.1.4 Communication from the European Commission

On October 23rd, 2001, the European Commission issued a communication to the Council, the European Parliament, the economic and social committee and the committee of the regions[63]. This communication combines the findings of both the Green paper and the follow-on research by PIRA (see below). The communication proposes actions to develop a co-ordinated approach addressing a range of issues contributing to putting the right conditions in place. In particular a directive for the commercial and non-commercial reuse of public sector information is considered, addressing barriers caused by differences in the national regulations and practices.

2.1.5 Commercial Exploitation of Europe's Public Sector Information

As follow-on research to the "Green Paper", European Commission's Directorate General for the Information Society commissioned a study "Commercial Exploitation of Europe's Public sector information"[64]. The Commission wanted the report to:

"Serve as an instrument for reflection triggering discussion between major players in the content industries and in the public sector

Prepare the field for the involvement of private and public parties in a proposed follow-on programme of info2000"

The objective of the study was to:

- "Quantify the economic potential of public sector information in Europe
- Provide the state of the art of exploitation of public sector information
- Provide examples of good practices of public-private partnerships
- Identify promising areas for action and obstacles to overcome
- List existing policy initiatives for private exploitation of public sector information
- Provide recommendations for improving private exploitation of public sector information."

As discussed in section 2(1) above, the study represents the first major attempt to estimate the contribution made by public sector information to the economy of the European Union. The central estimate of the economic value of the public sector information (68 billion

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[62] See: Vries, Marc de (2001) *Met elektronische overheidsinformatie het nieuwe millennium in: hoe het was, hoe het is en hoe het worden moet*. Den Haag: Rathenau Instituut, Study 42.

[63] Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions. *e*EUROPE 2002: Creating a EU Framework for the Exploitation of Public Sector Information. Brussels, 23.10.2001. COM (2001) 607 final.

[64] PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

Euro) is a factor of ten less than corresponding figure for the United States (750 billion Euro). The large difference between the two would, according to PIRA, represent the potential growth in EU industries that use and add value to public sector information. Another important conclusion is that a doubling of market size resulting from eliminating cost recovery fees would produce additional taxation revenues to more than offset the lost income from public sector information charges. The detailed results of the study were further described in part 2 above.

2.1.6 The Difficulties of Commercial Weather Services in the EU

Comments from two commercial meteorological firms, the German commercial weather service Meteofax Wetterdienste and the Swiss commercial weather service Meteomedia, filed with the Finnish Competition Authority, demonstrate that in almost every EU country, the area of meteorological data is still far from being liberalized[65]. Since the first appearance of private meteorological services in Europe about 15 years ago, the structure and role of the NMS's have hardly changed and with the non-separation of public and commercial activities block further development of the private sector as well as innovation of services. In the US, liberal market structures since the 1950's led to a powerful and innovative private sector with an annual turnover of around US$ 500 million. The private met sector within the EU has not been able to grow correspondingly.

PIRA uses both companies as a case study[66]:

> "Meteomedia and Meteofax act as full-service-providers for a range of customers. Corporate customers in industries such as energy, transport, insurance, legal, construction and travel receive customized data delivery and related consulting services. Private customers are supplied with various services like dial-a-fax information, telephone services and consulting. Meteomedia and Meteofax buy data from various sources including NMSs in Germany, Switzerland, France, Britain, as well as the European Centre for Medium-range Weather Forecasts and AccuWeather (a private US weather company). The cost of the data as a percentage of the turnover generated by the products ranges from 11% for polished, broadcastable products requiring large levels of added value to 80% for corporate customers, where the relevant, timely meteorological data are required rather than high levels of presentation. In spite of enormous growth of both companies, they believe that their operations and expansion are severely hampered by the national meteorological services that supply their data. The problems they encountered when entering the market included the following:
>
> - As a result of the traditional role that the NMSs had as the monopoly information creator and supplier in their respective countries, private companies had to develop unique products and services to compete.
> - NMS had the advantage in the competitive market of being able to combine commercial services with their official duties. They used the data, infrastructure

[65] See Kamps, Michael (2001) Statement by Meteofax Wetterdienste GmbH and Meteomedia AG.

[66] See PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

and staff used to carry out their official services to compete with the private sector in their commercial ventures.

- In the early years the NMSs tried to prevent private sector companies from entering the market by not making available the relevant data. As they were, and still are, the monopoly suppliers of much of the data, the NMSs could control the activities of the private sector by setting the conditions for data licensing contracts and thereby restricting access to the data. An organization called Ecomet was specifically established to support this. An opaque pricing policy and structure inhibits private sector meteorological firms from entering the commercial market.
- Being at least partially publicly funded, NMSs did not have to develop pricing structures for their commercial services to cover their costs. As a consequence, NMSs were ably to offer their products and services at lower costs than their private competitors, who could not rely on public funding.
- As NMSs were not obliged to separate their commercial and official activities, no policies could be established to guarantee equal access to the market for both NMSs and private sector companies."

The World Meteorological Organization (WMO) since 1995 categorizes meteorological information in "essential" information versus "additional" information.

> "The change in policy was aimed at preventing private sector entities from competing with national meteorological services in Europe, which recoup costs through sales of data and services[67]."

The large disadvantage of this subdivision, however, is that it is highly subjective and up to the WMO countries themselves to decide what information falls under which category. An example of this is the contrast between the United States and Australia on the one hand which designate all their meteorological data as "essential" and therefore open and unrestricted, and Finland and France on the other, which identify broad categories of similar information as "additional" with the intent of limiting its use to "government commercialisation". The National Academy of Sciences found that

> "WMO Resolution 40 substantially decreased the amount of data member nations made freely available."[68]

2.2 The Netherlands

[67] National Research Council (2001). Resolving conflicts arising from the privatisation of environmental data. National Academy Press.

[68] National Research Council (2001.) Resolving conflicts arising from the privatisation of environmental data. National Academy Press.

2.2.1 Freedom of Information in the Netherlands[69]

In the Netherlands the legal basis for access to public sector information is the Government Information Public Access Act (Wet openbaarheid van bestuur (WOB)). It was first enacted in 1978 and amended in 1991. It specifies both passive public access, disclosing information on request, and active access, with pro-active disseminating of information. Prices are based upon the direct costs of making the information available. Copyright (auteursrecht) in the Netherlands is primarily regulated by the Copyright Act of 1913. In principle, copyright is applicable to all government information, with the exemption of official texts of legislation, judicial decisions and administrative decrees, although copyright must be claimed explicitly for the protection to be effective. Commercial use of the data for which the copyright is claimed by the administrative agency is only allowed when the right holder (e.g. the administrative agency) gives its consent. Based on the European Directive on the legal protection of databases (96/9/EC), of the European Parliament and of the Council of March 11, 1996, the Dutch Copyright Act of 1912 was amended and a Dutch version of the European Database Directive, the Database Law (Databankenwet) of 1999, was enacted.

2.2.2 Move towards open access policy

The state of the Dutch move towards open access policy was described in detail in a research report by Marc de Vries commissioned by the Rathenau Instituut[70]:

> "The Dutch government has launched three important policy initiatives in which some principal policy choices are discussed. This concerns: the plans "Towards optimum availability of government information" and "Contract with the future" and the report "Constitutional rights in the digital era". These documents will be submitted to Parliament in winter 2001."

The report on Constitutional rights in the digital era proposes to add articles to the Dutch Constitution, including the right to government information. This requires subsequent statutory implementation over a period of four to six years.

> "In 1994, when the first policy document was produced, the basic subjects were rather cautiously explored through the established channels (telecommunication, technology and the government's protection of information services). After the subject became better known to policymakers, attention was given to the almost unlimited possibilities of Information and Communication Technologies (ICT). This was translated into all kinds of new projects and new types of organizations such as OL2000 (one stop shop for Government Information). At the same time, there was an increasing awareness that everything is not all roses: ICT began to shake the foundations on which established patterns were built and, simultaneously cutting straight through all types of organizations, alarming and uniting those in control. Within that context the plan "Naar toegankelijkheid van overheidsinformatie"

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[69] Based on: PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information.* Final Report for the European Commission, Directorate General for the Information Society.

[70] Vries, Marc de (2001) Met elektronische overheidsinformatie het nieuwe millennium in: hoe het was, hoe het is en hoe het worden moet. Den Haag: Rathenau Instituut, Study 42.

[Towards accessibility of government information] (1997) was drawn up in which rather defensive (probably heavily lobbied) viewpoints were expressed."

"There are now three documents under consideration in the Lower Chamber which will have an impact on the policy framework on making government information available in this new millennium. The plan "Towards the optimum availability of government information", which has chosen an ambitious and brave starting point. Government information must be easily and widely accessible and available. It contains a clear analysis of the judicial framework concerning the use of government information. As far as effectivity is concerned, unfortunately the plan has a certain degree of "try not to step on anyone's toes" especially in the category of "remaining information[71]"."

The Netherlands has completed this comprehensive policy review under its Electronic Government Action Programme, "Towards Optimum Availability of Public Sector Information." Theoretically, this brings the information policies of the Netherlands into close harmony with those of the United States.

In the Netherlands, three categories of public sector information are acknowledged[72]:

- Basic information of the democratic constitutional state. This is information containing the rules and regulations on how society must and on the democratic decision-making process. Without proper accessibility to those rules, participation is difficult.
- Information that is public on the grounds of the Dutch Freedom of Information Act. It includes administrative information that is information held by a government body and pertains to policy proposals, decision-making and implementation. Databases also come under the "Wob"[73], unless such database has no relationship with, or the contents thereof have no relationship with, the "administrative tasks" of the public sector body in question. Databases, or the information therein, may therefore fall outside the scope of the Wob[74]. When the access to certain databases is provided for differently in specific legislation, that information does not come under FOIA information either.
- "Other" information. To be more precise: (1) Information from government bodies of which the openness and use (usually including pricing) are provided for separately in specific legislation. This sometimes results in the information not being public (Police Records Act, Security and Information Services Act), and sometimes being accessible and usable (the Kadaster Act [governing land registry], the Act on the Central Bureau and the Central Committee of Statistics and the Municipal Personal Record Database Act); (2) Information from public sector bodies that is not related to administrative tasks. This class of information would appear to be fairly comprehensive. It includes

[71] See first part of this paper for explanation of the term 'remaining information'

[72] Minister for Urban Policy and Integration of Ethnic Minorities (2000) *Towards optimum availability of Public Sector Information.* Memorandum presented to the Lower Chamber of the Dutch Parliament. April 26 2000. Lower Chamber, session year 1999-2000, 26 387, no. 7.

[73] Wet openbaarheid van bestuur (Wob) is the Dutch Freedom of Information Act.

[74] Unlike the case in the U.S., where databases do fall under FOIA.

information of research institutions (research reports and database files) and cultural institutions (catalogues); (3) The software with which public information can be read and processed.

The policy objective that is pursued with the Action Programme is to ensure that public sector information is as widely accessible and available to citizens as possible. First of all because citizens need that information in order to participate in the democratic process. Secondly, national welfare is likely to benefit from public sector information being made available in an open and unrestricted manner. Thinking in terms of the new knowledge-based economy implies that the societal value of this information will increase as more people use it.

The Action Programme expressed concern that public sector bodies had been reserving copyright and database-right on a large scale, and that this was contrary to the spirit of the Wob. It proposed that no license fee should be charged for the use of public databases, and that where copyright and database-right required conditions to be set for external use, these should only be to protect the public interest and third party rights.

The "Government and Markets" Directive[75], specified that public sector databases could be made available to third parties only on a non-discriminatory basis and at uniform prices. It also indicated that the public sector should not make unnecessary modifications to databases to create unfair competition. There is a proposal to supplement the Copyright Act with a provision that the supply of information on the grounds of the Wob does not constitute copyright infringement. There are current concerns about the need to modify (impoverish) databases to remove sensitive and personal information and the question of liability for any inaccuracies in information that is released. There is also the question of how to address the growing demand for daily or constantly updated rather than just one off access to a database.

2.2.3 Royal Netherlands Meteorological Institute

It was this Governments and Markets report by the Commission Cohen that led to the separation of the commercial arm of KNMI. In light of this policy development, the Royal Netherlands Meteorological Institute (KNMI) has in 1999 taken the following steps in coordination with the Ministry of Internal Affairs and the Ministry of Water and Transportation:

- Full privatization of its "commercial" arm as a limited liability corporation (no public sector employees);
- Stepwise designation of all meteorological data as "essential" under WMO Resolution 40;
- Adoption of an "open and unrestricted" data dissemination policy with charges limited to distribution costs only. This policy is in line with current Dutch trends towards open access policies.

However, KNMI says it needs some level of budgetary considerations in order to achieve this goal.

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[75] Directive on market activities conducted by government departments, Dutch Official Journal 1998, no. 95.

The KNMI commercial arm was privatised into a company called Holland Weather Service. The figures below show that indeed cross subsidization took place when KNMI still had its commercial arm, although KNMI honestly believed that they competed in a level playing field without cross subsidization[76].

Cost units of Holland Weather Service compared to KNMI commercial arm		
	1998 (before separation)	2000 (after separation)
Salaries	100	104
General Office	100	424
Office Space	100	891
Hardware/software	100	178
Data	100	311
Communication	100	337
Depreciation	100	341
Total Cost	100	127

The Dutch Parliament passed a law on September 13, 2001 on KNMI activities after the separation. This law does not yet address open access policy. However, after the law has passed KNMI will push for a change in the law to codify open access policies. Meanwhile, KNMI already practises open access policies. A good example of that is that at the moment, 30% of KNMI hourly observation data is now declared "essential" under WMO Resolution 40 and available for free. Also, they placed all available historical data (since 1901) on the Internet to which they received positive reactions from the weather risk management industry.

2.3 United Kingdom

2.3.1 Public Sector Information Policy

The United Kingdom government is the most consistent in setting high cost recovery goals for its public sector information agencies. The United Kingdom government is well known for directing its agencies to recover costs through charges and other income-generating activities. PIRA states that some agencies even have rates of "cost recovery" in excess of 100%. HM Land Registry tops the list with 119% cost recovery, followed by the Hydrographic Office (110%), the Meteorological Office (107%), Registers of Scotland (106%) and Companies house (101%).

However, it is unclear what PIRA exactly means by cost recovery. In the case of the UK Meteorological Office, approximately 50% of the income comes from the Ministry of Defence. This can thus not be called cost recovery in the sense of government commercialization, but rather transferring public funds from one government agency to another. Ordnance Survey, as well as the UK Met Office, does not come near to full cost recovery. Of the £100 million annual OS revenues, only £32 million comes from actual sales

[76] Tour through the evolution in the Dutch weather market. Presentation given by Jan Dekker at Budapest Conference September 2001.

of the products. The remainder comes from other central, regional and local governments as well as from mandatory usage of large scale maps by the utility industry. This revenue cannot be called a commercial payment, but rather a shift of public funds from one column of the public accounts into another, with no net benefit to the taxpayer or the Treasury.

In addition, the OS annual report for 2000/2001[77] shows that the value of collecting, compiling, and maintaining data in the national interest (i.e. "public task") is only approximately 13.5% of its annual operating turnover.

Thus, internal government accounting practices tend to mask the true results of "government commercialization" through inflated claims of success. This phenomenon of intra-government cross-subsidies needs to be explored further in order for governments to be able to make rational public policy choices regarding the perceived short term benefits versus the negative macroeconomic effects of "government commercialization" and to ensure compliance with established competition policies.
PIRA[78] further concludes that:

> "Perhaps more than any other country within Europe, the UK has tried to import commercial and entrepreneurial values into its public sector agencies. The results of this are mixed. On the one hand many of the agencies producing public sector information are now heavily customer-focused. On the other hand, they are monopolies and often charge accordingly. The economic value of public sector information for the UK is particularly concentrated in the geographical sector which accounts for nearly two-thirds of the total."

This bias can probably be accounted for by the fact that it is easiest in the GI arena to maintain exclusion, and hardest to produce an alternative.

Contrary to this growing trend towards government commercialization and cost recovery in the UK, there is, however, a distinct trend to greater openness and transparency, at least for the non-"cost recovery" entities. There has been a legal right of access to some local government information since 1985, a right of access to environmental information held by central and local government and bodies under their control since 1992, and a voluntary Code of Practice on Access to Government Information since 1994. Rights of access do not typically include any right to republish or repurpose information obtained in this way. The Improvement and Development Agency for Local Government has been particularly active in warning publishers that the collection and resale of, for example, planning applications was illegal. One test case was brought in Scotland and won by the publisher, but the legal position still has to be tested in court in England and Wales.

In a recent Cabinet Office Report[79], the government committed itself to electronic commerce and recognized that it was the largest producer of information for that purpose. It

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[77] See http://ordnancesurvey.co.uk/downloads/annual-report/annreport2001.pdf

[78] PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

was also conscious that there are barriers to the commercial exploitation of public sector information, most notably through the application of Crown copyright. The information industry had been pushing government to move more towards the US model where all public sector information is made openly available to the private sector to repackage in innovative ways that add value for the customer. The government has not been willing to go that far, but has agreed to remove or ameliorate some of the barriers to commercial exploitation. Greater liberalization is promised but Crown copyright will not be abolished. Industry would like to see more class and standard licensing, better administrative procedures, greater freedom to publish, and a refined charging regime. The Prime Minister has pledged that the government will work with industry to get the balance "right".

To improve openness and cultural change, the present government is committed to freedom of information legislation and a Freedom of Information Act was enacted in November 2000. It will be implemented starting fall 2002, and become effective in 2005. The main body of the Bill provides a right of access to any information held by public authorities, publicly owned companies and other designated bodies, subject to specific exemptions. The Bill has attracted criticism particularly from the press, especially regarding the long list of exemptions and the right of ministers to veto disclosure. But once fully implemented, it could have a significant impact upon the release of public information by both central and local governments.

Three features of the law could be of particular interest to the private sector. First, public authorities must provide information by any requested means, including electronic, that are "reasonable in the circumstances". Second, public authorities may charge for disclosing information but any fee must be in accordance with regulations to be made by the Secretary of State and disclosure can be resisted if "the cost of doing so exceeds a threshold prescribed by the Secretary of State". Third, public authorities are given no powers to impose conditions on the use to be made of any information disclosed under the Act – however Crown copyright is retained. The real world experience of publishers in the United Kingdom suggests that, in the absence of strong leadership from the very top, the bureaucrats will continue to frustrate any legislative moves to open access policies. Royal Mail has recently become a public corporation (PLC) with the government as its sole shareholder, and immediately sought to increase license fees for using the Postcode Address File; and Ordnance Survey is very likely to move to a similar status, thereby protecting it from any shift to an open access regime.

2.3.2 E-citizens, e-business, e-government

Recently, the Prime Minister issued a draft document outlining a "Strategic Framework for Public Service in the Information Age", entitled "e-citizens, e-business, e-government"[80]. The preamble stated:

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[79] E-government: A Strategic Framework for Public Services in the Framework Age", April 2000, Published by the Central IT Unit, available on-line at http://www.e-envoy.gov.uk/publications/pdfs/Strategy.pdf.

[80]E-government: A Strategic Framework for Public Services in the Framework

> "The information age revolution has already brought huge changes to both manufacturing and service industries all over the world. It has driven down costs, brought suppliers closer to customers, and made them more responsive to their needs. Our vision is to make the same revolution happen in government. We want to give everyone better access, greater convenience and services increasingly tailored to individual needs. And at a lower cost to the taxpayer".

However, many comments were received on the draft document, raising issues from intellectual property in government information policies generally[81] to more specific threats to emerging SMEs regarding exclusive licensing of channels for information based services[82].

2.3.3 HM Treasury Spending Review 2000

A review of government information was carried out by HM Treasury during the Government's "Spending Review 2000" as part of the "Cross-Cutting Review of the Knowledge Economy", co-chaired by Andrew Smith, the Chief Secretary to the Treasury, and Patricia Hewitt, Secretary of State for Trade and Industry. It was concerned particularly with the availability of information subject to Crown copyright for reproduction and reuse by the information industry.

The review accepts that the development of the government information sector is of considerable importance in the growth of the UK's information sector and that information intermediaries have the key role to play in delivering products and services based on government information. In spite of these sentiments, Treasury questions the benefits to the economy of a marginal cost pricing policy and feels that marginal cost pricing would shift the burden of covering fixed costs from consumers to taxpayers, especially in the case of trading funds[83]:

> "The most important point is that trading funds (e.g. UK Hydrographic Office, Meteorological Office and Ordnance Survey) are commercial bodies that are delivering services which go considerably beyond the scope of government's own needs while they also provide value added services as well as raw data. This makes the demand for their products much more price elastic and the case in favour of more service users contributing to the fixed costs of the business all the stronger."

One of the final conclusions is that all government bodies should be encouraged to develop value-added services charged at market prices without regard to concerns regarding unfair government competition raised by private sector entities. This conclusion seems to be based

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Age", April 2000, Published by the Central IT Unit, available on-line at http://www.e-envoy.gov.uk/publications/pdfs/Strategy.pdf.

[81] See: Barr, Robert (2000) comments on e-citizen, e-business, e-government

[82] See: Roper, Christopher (2000) comments on e-citizen, e-business, e-government

[83] See: HM Treasury (2000) Cross Cutting Review of the Knowledge Economy. Review of Government Information. Spending Review 2000. http://www.hm-treasury.gov.uk/Spending_Review/Spending_Review_2000/Associated_Documents/spend_sr00_ad_ccrcontents.cfm?

on a chapter in the review called "the economics of government information", in which the argument for full cost recovery for trading funds is weakly built and supported by misunderstood arguments from an article by Shapiro and Varian[84].

From the country visits, however, it became clear that there were clear policy tensions between DTI and Treasury. DTI strongly asserted the need for open data markets in an information society to foster a robust information service industry. Treasury insisted that these concerns be balanced with the continued need for revenue generation by public entities, without any apparent concern for government competition issues[85]. However, the differing views of DTI and Treasury on the economics of public sector information were deferred. Economists of both departments are to seek an accommodation.

In July 2001, the Treasury Charging Guidance followed the SR2000[86].

2.3.4 Click-Use(-Pay)

On September 6, 2000, a policy initiative was announced by Secretary of State for Trade and Industry Patricia Hewitt as part of the Spending Review 2000 that was intended to result in the liberalization of restrictions on public sector information and a move toward dissemination cost pricing[87]. Under new plans businesses would be able to repackage and re-present government information, providing new products for their customers. Such information includes data about health, house prices, schools performance tables, crime, census results, navigational charts for shipping, maps and meteorological data.

> "Government information is the largest information resource available to the UK. It must be widely available to businesses so they can develop it for the full benefit of the UK economy."

However, the initiative specifically reserves the issue of "trading funds," e.g. the UK Met Office and the Ordinance Survey, for further work:

> "Departments and agencies, other than those which are trading funds, will move to a policy of marginal cost pricing for their basic information (unless, in any specific case, a statutory enactment indicates otherwise)".

As for these trading funds, the policy states that they will "improve" their pricing and dissemination policies under Her Majesty's Stationery Office and Treasury guidance. In addition, the UK government is actively encouraging government bodies to develop value-added services charged at market prices:

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[84] Shapiro, Carl, Hal R. Varian (1997) US Government Information Policy. University of California, Berkeley. July 30, 1997. Presented at Highlands Forum, Department of Defense, June 8, 1997, Washington, DC.

[85] Compare with: Statskontoret (2000). *The State as Commercial Actor.*

[86] See: http://www.hm-treasury.gov.uk/docs/2001/charging_for_info.html

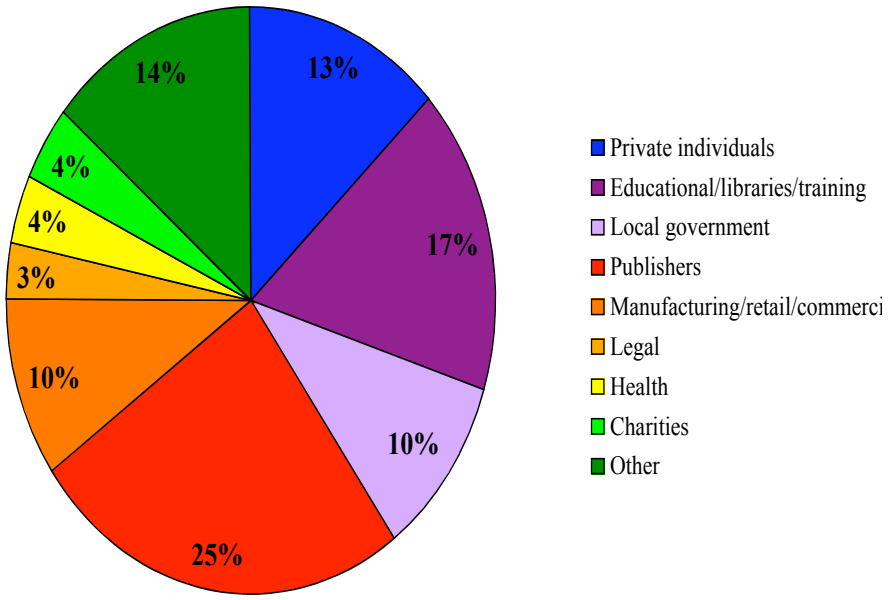
[87] Department of Trade and Industry (2000) Click-Use-Pay – Hewitt. News Release September 6, 2000, P/2000/602.

> "All government bodies will be free to offer value added products and services providing this is done in a transparent manner in a level playing field among all market participants"

Note the contrast here with e.g. Sweden and the Netherlands, where the government is forbidden to provide any products and services that do not belong to the "public task" unless there is a large need for such services by the public and no private sector company is already providing that service and it is unlikely that any private sector company is going to pursue it in the near future. We feel that a level playing field without unfair competition and cross subsidization is impossible in the case of commercialized government agencies.

The click-use license is successful because it provides a high level of transparency to what was previously a very difficult process to find and get access to government information. However, the issue is not necessarily with governments charging reasonable and generally affordable prices for information, but primarily with the notion that government agencies must control what users do with it downstream[88]. That leads to monopolies and what economists call "moral hazard".

On average, 25-30 licenses are taken out each week, broken down as follows:



[88] See also the National Academy study on resolving conflicts arising from the privatisation of environmental data.

2.3.5 Government Information and the UK Information Market

The Department of Trade and Industry recently presented a paper on "Government Information and the UK Information Market" as part of the Treasury review of the Knowledge Economy contributing the views of the information industry to the Review. It valued the market at £4.4 billion in 1997, and saw the wide uptake of the Internet as the driving force, with e-commerce a key application. It went on to point out that "information derived from the normal workings of government forms the largest single primary information resource" yet is neglected for the purpose of re-use in fresh value-added products. It put part of the blame on the historic debate about Crown copyright. High cost licensing and red tape were seen as other barriers. In conclusion, it called on government to implement quick reforms including a rapid roll out of the Information Asset Register initiative, the introduction of a class licensing system, a cultural change encouraging the commercial re-use of government material, and a benign approach to revenue generation.

In general, it is believed that the current policy developments in the UK will have no effects on the special category of the Trading Funds and thus are not going to change the way the Trading Funds operate.

The only thing that the Trading Funds have to accomplish is to "improve" their pricing in an as yet unspecified manner. For that, HMSO will soon install a regulatory body. Roles will be defined in consultation with the Trading Funds themselves. Industry set up a user panel to advise HMSO. Under accepted EU competition policies, the pricing needs to be more transparent, without any hidden income or expenses and no cross subsidization or exclusive licensing. However, the cost recovery policy is not likely to change in the near future.

In the field of geographic information, the private sector industry players are often dependent on the large government data providers for getting work in the area of surveying. Hardly any company is solely engaged in the data processing area. Therefore, none of the private sector companies dares to stand up against the Ordnance Survey or Land Registry monopolies, in fear of losing projects. The same situation is present in the Netherlands, where companies that do surveying projects for the Cadastre do not dare to stand up against their monopolistic data regime.
The structure of the GI industry in the United Kingdom is, as you would expect, heavily skewed to reflect the way things are. Since there is no "Right" to process or republish public sector information, the main players are contractors and consultants, heavily dependent on government agencies for their next meal. This culture of dependency and complicity is being extended through efforts to turn value added resellers or publishers into "licensed partners" or "franchised channels", controlled by the government agencies concerned. This greatly limits the room for entrepreneurial and competitive activity.

2.3.6 UK Meteorological office

The UK Met Office is now openly disseminating some categories of meteorological observations which are of potentially great public benefit but which did not generate significant revenue for the agency. Specifically, the total annual budget of the UK Meteorological Office is approximately £170 million. Total data sales only account for £700

k of which £500 k is an internal transfer payment from its commercial arm in order to ensure compliance with the EU competition policy against cross-subsidization. Thus, only £200 k are the net data sales to external customers (0.12% of the total budget).

One of the particular absurdities of the Cost Recovery argument in the United Kingdom became evident in the 1990s, when a number of government departments chose to save money by not using the data arising from the 1991 Census organized by the Office of National Statistics at a cost of around £250 million. Successive governments of every political hue have decided since the late 19th Century that efficient planning and allocation of resources by Central Government require a census every decade. It follows logically that it is in the interests of good government that this information is used as widely as possible, whether or not individual departments are willing to provide for it in their expenditure estimates. It has therefore been decided that information from the 2001 Census will be made freely available to all comers. It may be relevant that the head of ONS comes from New Zealand, where they have a much more open approach to these issues. This decision will provide a test case on which, over the next decade, it should be possible to provide the UK Treasury with evidence for the elasticity of demand for public sector information."

2.3.7 Ordnance Survey to become PLC

In December 2001, the UK government preliminary decided to transfer the entire Ordnance Survey from a "Trading Fund" to a government-owned public limited company (PLC) with government owning 100% of the shares. This decision was based on the recommendations made in the independent Quinquennial Review of the Agency. The final decision will be made in spring of 2002.

By contrast, in Sweden (land office), Holland (met office) and soon Finland (met office), discussed elsewhere in this paper, the approach is full privatization (i.e. no government ownership) of the "commercial arm" while retaining the "public interest" arm in the government. The belief in Holland and Finland is that the basic observing systems and the official forecasts and warnings generated from their data are inherently governmental, as are the public interest mapping and land registration functions of the Swedish land office. This approach inevitably leads to an open data policy since the new "spin off" will need to fend for itself against the competition, and the only way to guarantee a "level playing field" is through an open data policy.

In the OS situation, whether "full privatization" or a government owned corporation (as analyzed by the Swedish Statskontoret), if the entity performs both governmental and commercial functions it will tend to have a natural monopoly position due to economies of scale, and will continue to need infusions of taxpayer funds (even if under contract rather than as a direct appropriation) as "commercial" revenues will not be adequate to fund the "public interest" aspect. If this is accompanied by the right to control the underlying data, funded in part by the taxpayers, healthy competition from other private entities and the overall growth of the particular sector will be impeded.

2.4 Germany

2.4.1 Public Sector Information Policy

PIRA gives an excellent description of the current situation of public sector information policy in Germany[89].

> "There is no Federal access to public sector information law in Germany. The Federal Government is discussing the necessity of an access law between the Federal and the State Governments and looking closely at developments in this area from the Council of Europe. Germany does not have a law dealing with the commercial use of public sector information. However, in practice commercial exploitation has been developed by different authorities separately. There are examples of successful cooperation between the public and private sectors. In other cases there have been difficulties. Pricing policies also differ widely, depending on the legal basis, the authority, and the intended use of the information. These differences are accentuated by the federal structure. There are no current initiatives at the federal level to move to standard licensing and pricing for the resale of public sector information. A Freedom of Information Act is being considered and is expected to be in place in 2001. As regards access to public sector information, the official view of the Federal government is, 'People should be able to access original documents at any time on-line and perform transactions which are important for their daily lives with the administration via the Internet. The public authorities need to make increasing use of the technical possibilities now available to make their administration work transparent for everyone.' According to the Federal government's action plan, 'In the information society the public administration will become one information server among others. This will expose it to competition.' In fact, the German weather forecasting sector already faces competition from its Swedish counterpart."

In early July 2001, a potentially significant interesting competition case in the information field arose in Germany[90]. The European competition commissioner ordered the German company IMS health to license its geographical "brick" system to competitors due to abuse of its dominant market position. The "bricks" are blocks that break down countries and cities into meaningful geographical units for analyzing e.g. doctors' prescriptions and drug sales. In the view of the commission, the "bricks" constitute a de facto industry standard in Germany, also known as an "essential facility", and that for there to be fair competition it must license its copyright. Interesting about this case is the analogy with those types of public sector information that form the "essential information infrastructure". The case raises the intriguing question of whether compulsory licensing of essential government databases on equitable terms is necessary to foster a robust private sector information industry.

The same issue was raised during the consideration of the European Database Directive. Initially, serious consideration was given to requiring member states to adopt a compulsory

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[89] See PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

[90] See: The Economist August 25th 2001. "Battling over bricks. A growing row over intellectual property rights". P. 54.

licensing scheme to assure that public sector information was not overly restricted. The initial intent was to balance the creation of this sui-generis right by setting up a compulsory license scheme in case data could not be obtained through another channel. Public sector information was particularly in mind here. However, the original article was dropped, probably because competition issues are not within the purview of DG Information Society.

2.4.2 Deutscher Wetterdienst

In the late 1990's, the German government concluded that revenues from the commercial activities of the Deutscher Wetterdienst (DWD) were inadequate. The German government concluded that it could do two things: (1) Leave the DWD a publicly funded entity but encourage it to engage in aggressive commercialisation or (2) put the commercial activities in a separate entity. At the time, the German government found that there was no need to separate the commercial activities of the DWD out of the structure. Instead, DWD was reorganized in a 1998 statute that explicitly authorized its commercial activities with a specific mandate that it minimize its reliance of general state funding. This statute also stated the responsibility of the DWD to do specific accounting in order to make their business more transparent, and ensure no cross subsidisation was taking place.

However, an audit report dated October 25, 2000 from the German Federal Accounting Office (Bundesrechnungshof), shows that this cost recovery policy has not met expectations[91]. Also, in spite of years of expensive consulting assistance, DWD has not been able to set up a transparent accounting system. At the moment, the Federal Accounting Office is performing a more detailed audit on the DWD, with results expected in 2002.

DWD is required by law to minimize the expenditures that are not covered by income and to calculate the compensation for products based on business management calculation methods. In an attempt to decrease the burden on the general state budget, the plan was to go towards aggressive cost recovery. However, instead of a decreased burden on the state budget, taxpayer funding rose from DM 253 million (67% of total expenditures) in 1995 to DM 453 million (76% of total expenditures) in 1999. In other words, in 1999 DM 450 million of expenditures were not covered by income, mainly because of the contributions that had to be made to international organisations for using meteorological satellites. If not counting these increased donations to Eumetsat, the report shows that operating expenses stay steady from 1995 to 1999 at approximately 300 million DM per year. On the other hand, the income also stays steady over these years. Sales of flight safety measures to Eurocontrol are steady at 100 million DM per year, carrying approximately 33% of operating expenses. All other income, meaning mostly data sales and services, stay at a rate of approximately 20 million DM per year, which is only 7% of operating expenses. This is accounted as follows (for the year 2000):

- 890.000 DM/year other aviation services
- 830.000 DM/year marine services

[91] See: Bundesrechnungshof (2000) Gebühreneinnahmen aus Flugwetterdienstleistungen des Deutschen Wetterdienstes and Entwicklung der Ausgaben und Einnahmen des Deutschen Wetterdienstes. Press Release October 25 2001.

- 726.000 DM/year general forecasting and data sales
- 1.12 million DM/year agricultural services
- 7.18 million DM/year media services
- 6.41 million DM/year climate and environmental consulting
- 430.000 DM/year hydro meteorological services
- 3.2 million DM/year Ecomet data sale income

The expenses are not categorized, and also, no clear distinction is made between public and commercial services.

A European private meteorological firm decided to enter historic observational data manually from archived books for DM 30,000 in labour cost instead of paying the several millions quoted by the DWD.

In sum, DWD has yet to minimize the expenditures that are not covered by income and decrease the burden on the general budget. Our conclusion is that DWD's attempt to go towards aggressive cost recovery is failing.

Another interesting remark is that from the preliminary report, we can conclude that the Federal Accounting Office indicates that there might be an opportunity for further cost recovery if not only instrument flights, that are regulatorily required to use safety weather data, would use this data, but visual flights as well. In short, FAO actually raises the idea to make worldwide visual flights require to use this data, have them pay user fees for it and collect income to lighten the burden on the German General Budget without articulating any particular aviation safety requirement.

2.5 Finland

2.5.1 Public Sector Information Policy[92]

Access to public information in Finland is based upon the Constitution. Section 22 of the Constitution of Finland states that public authorities shall guarantee the observance of basic rights and liberties, and human rights. The right of access to public documents is a basic right, unless access to them has, for unavoidable reasons, been specifically restricted by an Act of Parliament. In 1951, this basic right was implemented with the enactment of the Publicity of Official Documents Act. This has now been replaced by a new Publicity Act (Act on the Openness of Government Activities (612/99)), which came into effect in December 1999. This provides for a general right of access to legally defined administrative documents created by a government agency, or sent or received by a government agency, including electronic records, on condition that the document is in the public domain. In the case of information that is in an unfinished state, the authority has the right to determine if it should be made available to a requester.

Any charges are defined in section 34 of the Publicity Act, which permits charges in accordance with the 1992 Act on Charging Criteria for the State, for some defined forms of

[92] See PIRA International (2000) *Commercial Exploitation of Europe's Public Sector Information*. Final Report for the European Commission, Directorate General for the Information Society.

access, with others free of charge. Section 21 in the Act makes it clear that the exploitation of public sector information is possible. A public authority can collate various databases and make them available. Where permitted by the authorities concerned, data from various public sources can be combined and reused. When considering the dissemination of information, the authorities have to pay attention to the secrecy regulation and the protection of personal data. Thus any document, information or data must not be disseminated if it is to be kept secret by any Act of Parliament.

In the 1999 Publicity Act, specific terms were included, linked to the European Union Information Society project, to make the possibility of commercial exploitation clear and to encourage uniform practice by authorities in this area. Under this Act authorities are under an obligation to implement good practice in their document and information management. The authorities also have to promote public access to information and they are expected to pro-actively publicize their activities and to make sure that all relevant documents are readily available. They must also take the right of access into account when planning their operations and to organize their document management and other data processing systems in a manner that does not hamper or prevent access to public information. Authorities have to ensure that their officials are aware of the legislation and their responsibilities. It is considered that this will support the commercial exploitation of public sector information, by helping the private sector to gain knowledge of the information that is available. On 3rd May 2000, the Council of State in Finland published a decision about the development of data management in public administration. This included the definition of duties that may, among other things, assist the commercial exploitation of public information. It covers matters such as compatibility of standards, and includes complementary regulations relating to the dissemination and use of public information. There is a plan to draft new legislation in this area by the end of 2000.

2.5.2 Finnish Meteorological Institute[93]

The Finnish Competition Authority has made a proposal to the Competition Council on the operations of the Finnish Meteorological Institute (FMI) as a producer of weather observations for Finland. The FCA had chosen the FMI as one target of investigation in its Government and Markets project that started in 1998.

Even though competition has opened up with respect to weather services, the FMI is the sole producer of weather observations concerning Finland needed in the production of weather services. In this context, the FCA has paid attention to the prerequisites of competitors to obtain FMI's weather observations for their use.
A private company offering weather services, Weather Service Finland Ltd (WSF), now Foreca, Ltd., lodged a complaint with the FCA in August 1999 on the operations of the FMI as a provider of meteorological data. The company claimed that the FMI lowered the quality

[93] This paragraph is based on: Saarikivi, Pirkko, Daniel Söderman and Harry Newman (2000) Free information exchange and the future of European Meteorology: A Private Sector Perspective. In: *Bulletin of the American Meteorological Society*, Volume 81, Number 4, pp 831-836, and Competition Council (Finland) (2000) *Abuse of dominant position by FMI to be decided by Competition Council*. Press release 21 June 2000.

of its radar images when delivering them to the Scandinavian Composite consisting of radar images for Finland, Sweden and Norway, which the company had used in the production of its own weather services. The radar images delivered by the FMI to the Composite contained false radar signals ("clutter"), which users of the weather services mistook for rain. The FMI allegedly delivered the poorer-quality radar images to the Scandinavian Composite from June to December 1999.
In its proposal to the Competition Council, the FCA found that the FMI is the sole source of information on weather observations for Finland and administers them. The FMI has admitted to the FCA that it has lowered the quality of the radar observations it has delivered to international distribution. In its own commercial weather service operations, the FMI has still been able to use the original high-quality radar observations.
The FCA found that there are no economic or technical grounds for the FMI's behaviour. The FMI ceased the procedure in early December 1999. However, the FCA finds that the FMI has abused its dominant position in the national meteorological data market by lowering the quality level of the radar images it has delivered to the Scandinavian Composite. The FCA proposes that the Competition Council impose an infringement fine of FIM 200,000 (33,500 Euro) on the FMI for the breach of competition legislation. However, this fine is to be paid with taxpayer money to another government office, and does not compensate the aggrieved firm. Unlike many other sectors investigated by the FCA in the Government and the Markets project, the meteorological sector is expansive and innovative and its long-term prospects for all incumbents are favourable, provided the possibilities for workable competition are ensured. This requires that meteorological data be available on reasonable and equal terms to competing weather service producers.

Recently, the Ministry of Transport and Communications announced that FMI's commercial business would be separated to a state owned company starting July 1st 2002. As is the case in many other countries, the Ministry of Defense was not very pleased with this decision.

Treasuries generally only care about the increment that contributes directly to the general budget, and not so much about long term social and economic benefits. Ministries force agencies to go off the general budget, which, because government information services cannot work in a competitive market, leads to agencies finding all kinds of ways to avoid private sector competition. Sometimes the fear of private sector competing with the agency's commercial activities is so significant, that the agency will involve in illegal or sometimes even criminal activities. A summary of these activities contains price dumping, prices that no one can pay, cross subsidization with public (tax-payer funded) activities, data degradation, creative bookkeeping (no hours are being charged on commercial activities), transfer payments between agencies, preferred franchises or exclusive licenses (preferably with small companies) that lead to disadvantage of larger companies and arguments between private sector competitors.

There is a trend in European commercialised government agencies to enter into strategic business relationships with particular private sector entities. While these relationships may benefit those private sector firms, they tend to perpetuate some of the anti-competitive issues related to government as a commercial actor as defined by the Swedish Statskontoret.

2.6 Country Conclusions

In sum, from the country cases we can see significant movement of the Netherlands, Finland and the UK towards open access policies. However, we also see increasing concern with competition issues in Sweden and Finland. From the Finnish meteorological case we clearly see abuse of dominant market power. As said before, in the UK it is believed that the positive policy developments are not going to change the way the trading funds work, while clearly the types of information held by these monopolists have the most significant economic potential.

In Germany, to date, no particular interest has been shown to open access policies as well as government competition issues outside of the auditing community. The only thing that is clear from the German meteorological case is that cost recovery has not succeeded there.

The only way to guard against cross subsidization seems to be to either spin off the commercial arm or start with transparent calculation of costs and revenues. The UK Met Office has chosen the second option, which has now led to declaring most observational data as essential. The Netherlands has already spun off its commercial arm, whereas Finland has taken the decision to do so and Sweden is considering that same possibility.

Although the authors had hoped to add a case study regarding France, we could not find any publicly available information on the subject. There is no indication of where France stands in this emerging debate. However, in June 2001 the French sent a new proposal for a law on the Information Society to Parliament. The proposal contains an extensive article (article 3) on amongst others the re-use of public sector information[94]. This article has been inserted following the "Mandelkern report" on public sector information[95] that was published in October 1999. The article may be a step forward and creates some clarity, although re-use is still subject to an agreement with the data-holder. The law specifically says that an agreement must be reached if the data recipient intends "commercial reuse." The law however does nothing to liberalize downstream uses, and therefore cannot be called a liberalization over current French practice.

As for the meteorological industry, in France, there seem to be no significant private sector weather services. Only two small private sector companies exist, with a total of approximately 20 employees.

France has a population of 61 million, and MeteoFrance has approximately 3500 employees. This gives a rate of 1 weather service employee for every 17,500 French citizens. Compared to the US, the US population is 285 million, and the National Weather Service has approximately 4000 employees. This gives a rate of 1 weather service employee for every 71,000 American citizens. The disparity is in approximately a factor of four. This is an excellent example of our earlier point that not only do governments fail to make cost

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[94] See: http://www.assemblee-nationale.fr/projets/pl3143.asp

[95] See: Diffusion des donnees publiques et revolution numerique. October 1999
http://www.plan.gouv.fr/publications/mandelkern.html

recovery work on the revenue side, they spend more than they have to, both in a vain attempt to compensate for the absence of private sector investment and because the illusion of cost recovery (shifting taxpayers' money from one pocket to another masks gross inefficiencies.

Part 3: Conclusions and Recommendations

3.1 Conclusions

- The consensus of recent research is that charging marginal cost of dissemination for public sector information will lead to optimal economic growth in society and will far outweigh the immediate perceived benefits of aggressive cost recovery. Open government information policies foster significant, however not easily quantifiable, economic benefits to society.

- Open access policies are beneficial in the short term as well as in the longer term for the general public, the private sector and also for government entities.

- In general, public sector information is highly elastic, meaning "government commercialization" cannot succeed in the face of economic realities and evenhanded application of competition policies, though limited exceptions may exist.

- Such exceptions are: when the use of the information is mandatory, e.g. land registry information needed by conveyors, meteorological information required by regulations for commercial instrument flights, large-scale topographic data required by utilities, or when the market is otherwise "captive".

- In those cases of inelastic demand for government information, we agree with the Swedish Statskontoret that it is inappropriate for government to play a commercial role and recover total costs (or more) through displacement of and competition with the private sector.

- The most sensible solution for government commercialisation is to separate commercial activities into a truly commercial entity separate from the government. Separation of commercial activities would be the basis not only for a market in accordance with competition law, but also guarantee market structures with maximum overall economic potential. In the meteorological field, this has been achieved in the Netherlands, is being planned in Finland and is being studied in Sweden.

- Government entities that have already separated their commercial activities into a private entity have realized that an open access policy is necessary in order to make privatisation of the commercial arm a success.

- In Europe, recognition is slowly emerging that open access to government information is critical to the information society, environmental protection, and economic growth. Several initiatives have risen which will contribute to taking European countries towards exploiting data, information and knowledge for the benefit of all in society. Current developments are encouraging and may have considerable impact on the European economies.

- However, recent trends towards more "liberal" policies still face opposition from entrepreneurial civil servants in charge of "government commercialization" initiatives, who are tempted and incentivised to engage in anti-competitive practices to thwart the growth of perceived private sector competitors.

- A transition towards more open information policies will create some disruption primarily with regard to the practice of commercialized government agencies and with regard to firms which have developed a relationship with those agencies. Some thought needs to be given to transitional issues.

3.2 Recommendations

- Recognizing the scale of the opportunity and the speed of enabling technological change, the US and the EU should make an explicit commitment to move forward together to take the practical steps necessary to establish harmonized open and unrestricted data policy for all public sector information. We believe the principles listed below are critical to allowing public sector information to contribute to its full potential to the development of our economies and societies.

- Governments should support full, open and unrestricted international access to scientific data for public interest purposes -- particularly statistical, scientific, geographical, environmental, and meteorological information of great public benefit. Such efforts to improve the exploitation of public sector information contribute significantly to maximizing its commercial, scientific, research and environmental value.

- Governments should let the private sector lead in using public sector information to meet the diverse needs of citizens and users for such products and services. Meeting these needs demands entrepreneurial and publishing skills that are most evident in the private sector. Market needs are best served by open and unrestricted access to public sector information.

- Governments should avoid the imposition of government copyrights, limit fees to recouping the cost of dissemination, and eliminate restrictions on reuse. This will allow diverse entities to make new and innovative uses of public sector information. However, attribution of data sources should be made, e.g. through the use of trademarks or source mentioning.

- Governments should avoid asserting a monopoly on public sector information. Governments and societies both lose when governments treat their information as a commodity to be sold.

- Governments should avoid implementing revenue based licensing models for public sector information. Such regimes operate against the interests of the private sector and those of consumers as well as of the scientific and research communities by impeding the development of new integrated databases and information products and services.

- Governments should remove barriers, in a timely way, that hinder exploitation of public sector information. Public sector information practices should allow the private sector to respond rapidly and effectively to the swift deployment of the Internet and other technological developments.

- Governments should commit themselves to developing and implementing a fair international trading environment for public sector information. In this way the benefits of public sector information can be realized globally.

- We believe that many government agencies are willing to liberalize their policies, but that they fear that they will suffer budgetarily when they do so. Therefore, Treasuries must understand that open data policy creates wealth and therefore they should fully fund agency information activities in order to provide the open access incentive. Governments need to develop a strategy to remove present dependencies on information charges and their accompanying restrictive practices in order to achieve the larger economic benefits. Those strategies may well involve some initial investments in supporting agency information activities.

- In order to demonstrate our shared commitment to maximizing the positive impact of public sector information, we recommend that a possible joint U.S.-EU project be discussed that will focus on a very specific area of practical economic, public safety and/or environmental need.

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Appendix I. Economics of Public Sector Information

I.1 General Economics of Information Products

An information product is a collection of symbols. Its utility, and benefit for the users, depends on their arrangement, not on the material form that they take. Information products have a number of characteristics that make them unique when looked at from an economic point of view[96].

Dependence on a Medium

First, information products cannot be bought, sold, given away or preserved except in conjunction with some medium. The specific arrangement of symbols in an information product that gives the product utility has to be recorded or expressed in some material form.

High Fixed Costs, Low Reproduction Costs

Since the information product is sold in conjunction with some medium, the cost of the information product itself is largely independent of the number of copies sold in the various appropriate media. From the viewpoint of the seller, the costs of the information product itself, the data collection and processing, are fixed and the only variable costs are those of the media. The variable costs of the media, being the marginal replication and dissemination cost, are always recurring, and depend on the number of copies sold. Generally:

- "Information is costly to produce and maintain but cheap to reproduce.
- Once the first copy of an information good has been produced, most costs are sunk and cannot be recovered.
- Multiple copies can be produced at roughly constant per-unit costs.
- There are no natural capacity limits for additional copies."[97]

The underlying costs of the information product itself, the data collection and processing, are said to be non-recurring, meaning that the producer only has to incur them once. This is not always the case, but depends on the kind of information. For instance weather data are a fast changing type of data that continuously needs to be updated. The costs of operating the observing infrastructure are significant and constantly recur. However, in the case of geographic information, this type of data generally does not change very fast. Usually, maps are updated at most once a year. In this case one could argue that the initial, fixed costs, are non-recurring. As mentioned before, the fixed costs of an information product, the collection and processing of information can be extremely high. In the case of weather data, it comprises all temperature, wind, pressure etc. observations that are made using expensive technology. In the case of geographic information, collection is done by surveying, photogrammetry, laser scanning or remote sensing, and data processing is a time consuming and extensive process. This cost structure with relatively high fixed costs is similar to that of public utilities and might have a tendency to give rise to monopoly, because not many

[96] See: McCain, Roger A. (2001) *Essential Principles of Economics: A Hypermedia Text*. Lecture notes for Economics Courses at Drexel University. http://william-king.www.drexel.edu/top/prin/txt/EcoToC.html

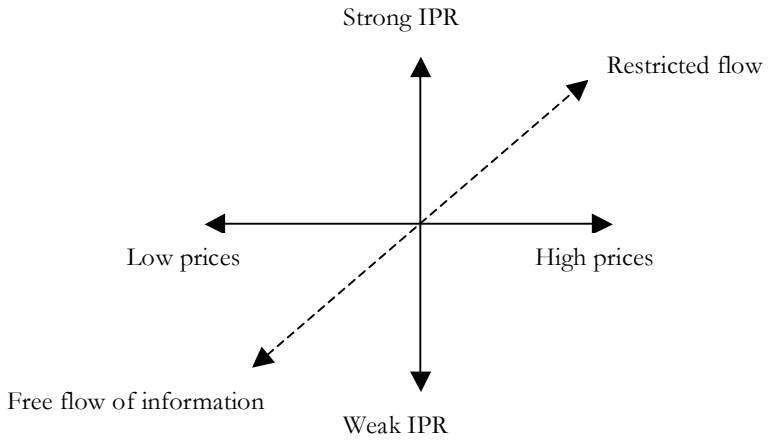
[97] See: Shapiro, Carl and Hal R. Varian (1998) *Information Rules: A Strategic Guide to the Network Economy*. Harvard Business School.

different parties are able to afford these usually very high initial fixed costs. Land and property information, looking at titles and changes of land use, also requires constant maintenance and access to large scale mapping.

Easy and Cheap to Copy

Because the arrangement of the symbols gives the utility, it is generally very easy and cheap to duplicate an information product. However, to a certain degree this depends on the characteristics of the medium. Information products in electronic form, particularly those disseminated on the Internet, are much easier and cheaper to copy than information products on paper. Imitators usually do not contribute to the fixed cost of the original information product, but only the variable cost of the media. Originators of information products therefore may have difficulty recovering these fixed costs. Also, imitators can undersell the originator. This raises the so-called incentive problem. Originators of information products will have no incentive at all to create their product if there is no way of gaining any benefit from it. Intellectual property protection is generally used to motivate originators in creating their product. The law may give the originator of an information product some exclusive right to control use, or sell the information product regardless of the media in which it is expressed. However, in practice it is difficult to simultaneously encourage the free flow of information, low prices, and strong intellectual property protections.

The following figure captures the point[98].



[98] See: Pace, Scott, Brant Sponberg and Molly Macauley (1999) *Data Policy Issues and Barriers to Using Commercial Resources for Mission to Planet Earth*. Washington, DC: RAND Science and Technology Policy Institute. Prepared for the National Aeronautics and Space Administration and the Office of Science and Technology Policy.

The free flow of information may benefit society as a whole but discourage private investment in acquiring the information as the benefits may not be appropriable. Low prices are good for consumers but may not provide the returns necessary to attract private investment. This argument however, has a short-term view as well as a long-term view. Low prices might be better in the long run, because more users will appear. Having strong intellectual property rights protects private investment but may increase the costs of information products to the consumer and restrict the flow of information to the broader society.

Non-rivalry and Non-exclusion

One consequence of the fact that information products are easy to duplicate is that several people can benefit from the same information at the same time, and that one would not notice if someone else copied it because the original is not lost. The use by one set of users does not reduce the information available to others. This phenomenon is called non-rival consumption: the economic benefits to society are the sum of the benefits reaped by the very many and diverse users of the information.

Another result of the fact that information products are easy to duplicate is that, in general, preventing them from being copied can be very expensive and administratively burdensome. It might not be feasible to exclude those who do not contribute to the fixed costs from the benefit of the information product. This phenomenon is called non-appropriable, or non-excludability. Although information can be protected by passwords, encryption etc, once it is provided to someone, it is likely to leak to others.

In general, products that contain both characteristics, non-rival and non-appropriable, are referred to as public goods. This is the focus of the next section.

High Price Elasticity of Demand

Price elasticity of demand measures the sensitivity of quantity demanded to price changes. The demand for information products is usually highly elastic, meaning that consumers are very sensitive to price changes. When the price goes up, the effect will be that users tend to do without it. This case is illustrated by the United States Geological Survey's (USGS) attempt at aggressive cost recovery. By increasing prices, the demand for USGS products, and with it the revenue stream, dropped dramatically. The Federal Maritime Commission (FMC) experienced the same phenomenon when it started collecting user fees from anyone accessing their Automated Tariff Filing Information System (ATFI)[99]. Only 0.05% of the Congressionally mandated revenue goal of $810 million was achieved. Both the USGS and the ATFI case are discussed in greater detail below.

Similarly, when price decreases, demand increases. This was demonstrated in a recent Dutch research project, which concluded that lowering the price of public sector geographic data by

[99] See: United States General Accounting Office, Accounting and Information Management Division, March 10 1995 GAO/AIMD-95-93R ATFI User Fees. Also see: Washington Post Editorial, August 4 1992, *Boats, Budgets and a Bad Idea.*

60% would lead to a 40% increase in annual turnover in the entire sector[100]. This research is also discussed in the country cases below.

The elasticity of demand for an information product might be less if the product is a "basic need" or might be greater if the product is a "luxury product". Those goods consumers consider to be "necessities" may have inelastic demands. Users of "indispensable" data, that may be almost as necessary to survive as food and shelter, might not stop buying it when prices increase. However, the authors are not aware of types of data that exhibit these "basic need" characteristics unless its use is mandated by unrelated requirements of law or regulation. Although it is true that for instance weather data can be crucial to human survival, it still appears to be highly elastic, meaning for example that developing countries are actually doing without because it is too expensive. For example, basic research by the India Institute of Technology on monsoon prediction is being hampered by the prices quoted for historic atmospheric model data by the European Centre for Medium-range Weather Forecasting (ECMWF); the researchers being limited to using free US data, which is arguably less suitable for their purpose[101].

Another factor influencing the relative level of elasticity is whether or not an alternative or substitute is available. When more substitutes for a specific information product are available, the demand becomes more elastic. This effect is illustrated by the Federal Maritime Commission example.

There may be situations where there are no substitutes available, and elasticity of demand might decrease. This is called a "captive" market, a market of users that has no alternative but to use the specific data. This can be due to legislation, which binds certain users to use certain data sets. A good example of information with relatively low elasticity of demand due to legislation or regulation is the mandatory use of land ownership data from a land registry office when transferring property. Another hypothetic possibility is that the high elastic data are somehow tied to a product with less elasticity of demand, be it the medium, or another data product, making the combined product less elastic. Finally, there might be users whose product lines are heavily tied into using specific kinds of data, and no viable alternatives exist even though prices rise substantially. In general, when dealing with a captive market, decline in the level of sales due to price increase will eventually level off. Declining revenue streams will start to rise again after a while, although probably not to initial levels[102].

Beside the availability of substitutes and the necessity of the product, elasticity of demand for an information product might also be affected by[103]:

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[100] See: Ravi Bedrijvenplatform (2000) *Economische effecten van laagdrempelige beschikbaarstelling van overheidsinformatie*. Publication 00-02.

[101] See: P. Goswami et al. (2001) Association between quasi-biweekly oscillation and summer monsoon variables. In: International Conference on Forecasting Monsoons from Days to Years. 21-22 March 2001.

[102] See: Blakemore, Michael and Gurmukh Singh (1992) *Cost Recovery Charging for Government Information. A False Economy?* London: Gurmukh Singh and Associates Ltd.

[103] See: Wessels, Walter J. (2000) Economics. 3rd edition. Barron's Educational Series.

The fraction of income spent on the product: The more people spend on a good, the more important it is in their budget. So if the price goes up, they are more willing to search long and hard for substitutes.
How narrowly defined the product is: "Bread" is a more narrowly defined good that is "wheat product"; "white bread" is more narrowly defined than "bread". The narrower the definition, the more substitutes the product is likely to have and thus the more elastic its demand will be. For example, the demand for Fords is more elastic than the demand for automobiles; the demand for automobiles is more elastic than the demand for transportation.
How easy it is to find out about substitutes: The easier consumers can find out about the price and availability of substitutes, the more elastic demand will be. Advertising plays a crucial role in increasing the availability of substitutes to consumers.
How much time is available to adjust to price changes: The more time consumers have to find out about substitutes, the more elastic demand becomes."

In sum, the demand for information products is generally highly elastic. Only when use of the information is mandatory or somehow indispensable might the demand be less elastic. This phenomenon is further explained below.

Time Dependent

When dealing with general consumer products, there is always price resistance in the market. People tend to resist price increases, and will make do with an older product model for longer than otherwise. However, in the case of information, some kinds of information degrade more quickly through time than others, and it is not a matter of updating the database less frequently. Old data might affect strategic decisions that would have adverse social and economic impacts. For instance weather data would be much more time dependent than geographic data. On the other hand this also depends on the user. The average citizen probably would not mind using a five-year-old highway map. However, the state planning agency needs up to date data for strategic planning decisions and could never do its job with five year old data.

Barriers to Entry

Monopolies are protected from competition by barriers to entry or by having lower costs than any potential rivals. A monopoly may have a cost advantage because no one else can produce the good as cheaply. This may be due to economies of scale or technological superiority. Barriers to entry keep potential competition out so that a monopoly can make a profit in the long run without worrying about new rivals coming on the scene. The main barriers to entry are: Legal restrictions, patents and control of strategic resources[104]. In the area of information, an important barrier to entry for the private sector is the high initial cost of gathering data. This cost structure with relatively high fixed costs might have a tendency to give rise to monopoly, because not many different parties are able to afford these usually very high initial fixed costs. However, when the price charged by an information monopolist approaches the costs of the barriers to entry in the particular market, meaning the price approaches the cost to independently replicate the information or "steal" it, other information providers will enter the most lucrative information markets.

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[104] See: Wessels, Walter J. (2000) Economics. 3rd edition. Barron's Educational Series.

I.2 Public Sector Information

The previous section examined the general economic characteristics of information. This section narrows the discussion to public sector information. Does public sector information have unique or unusual characteristics as compared to information products in general? Does it behave similarly, economically speaking? This section explains that public sector information might fully qualify as a public good and examines the implications of this finding.

The distinction between a public good and a private good lies in two consumption characteristics[105]:

- Non-rivalry: where the cost of providing the good does not depend on the number of consumers that benefit from it. A public good is indivisible; someone using it does not leave less of the good available for the next person.
- Non-exclusion (sometimes called non-appropriable): where it is not feasible or not intended to exclude those who do not pay from the benefit of the good. Non-exclusion in consumption means that the pricing mechanism cannot be used or is not used to exclude people who do not pay from enjoying a public good.

Because of these two features, market failure occurs in the sense that the price system, as the invisible hand that matches demand and supply, cannot or does not operate. As such, public goods have to be produced or provided, for example by contract, by the state, using consolidated tax revenue, rather than being priced according to the quantity demanded. Well-known examples of public goods include City Parks, unencrypted radio or television broadcasts, non-toll highways and museums and galleries that do not have an entry charge.

In contrast, a private good can be excluded by price and its consumption is rival. Private goods are always rival, which means that the cost of providing the good increases proportionally to the number who benefit from it. Further, private goods are relatively easy to exclude: it is always feasible to exclude from the benefit of the good those who do not pay for it.

Somewhere between public and private goods are quasi-public goods, also called "mixed goods". A mixed good has one but not both characteristics with respect to exclusion and rivalry in consumption. The cost of providing a mixed good increases less than proportionally to the number who benefit from it. And, there are some difficulties in excluding those who do not pay from the benefit of the good. One could actually speak of a gradual degree of publicness, along a continuum[106].

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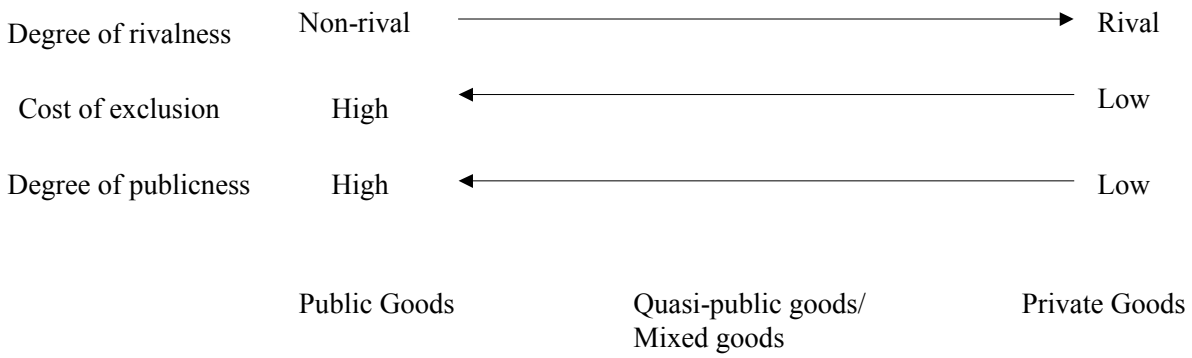
[105] See: Low, Linda. (2000) *Economics of Information Technology and the Media.* World Scientific Pub. Co.

[106] See also Zillman and Freebairn, who agree generally, but note that the degree of exclusion and rivalry may not move together.



For pure public goods and mixed goods, the government intervenes when the market fails, that is, when the price mechanism does not work.

In general, information products exhibit both characteristics: non-rival and non-exclusion. However, Perritt[107] argues that information is a special category of public good. Unlike the light of a lighthouse (the traditional example of a public good), information can be appropriated, and someone can limit the distribution or access only to someone who has paid for the information. However, although digital information can be protected by passwords, encryption etc, once it is provided to someone, it is likely to leak to others. In sum, information is totally non-rival, but not always impossible to exclude.

In considering whether or not public sector information is or should be a public good, we have to keep in mind that information is always dependent on a medium. Therefore we argue that an information product is a public good if the medium is a public good[108]. Excludability of information would depend on the medium. For instance, information on

[107] Perritt, Henry H., Jr. (1996) *Law and the Information Superhighway*. Wiley 1996.

[108] This argument is based on McCain, Roger A. (2001) *Essential Principles of Economics: A Hypermedia Text*. Lecture notes for Economics Courses at Drexel University. http://william-king.www.drexel.edu/top/prin/txt/EcoToC.html

the Internet is, provided it is not access controlled, very difficult to exclude. Information on paper, however, is easier to exclude because the medium in itself, the paper, is not a public good. However, every medium will weaken the public good characteristics.

Thus information exhibits public goods characteristics, but whether it behaves as a public good in a particular case depends on the medium.

These concepts explain that information is not a normal good in the economic sense, and that basic economic laws of supply and demand work differently in the information world. This has resulted in failed attempts at government commercialisation, as described in the next part.

I.3 Value of Public Sector Information

To determine the value of public sector information, we look at both the cost of public sector information (how much is invested) and the benefits of public sector information.

Cost of Public Sector Information

The costs of public sector information depend largely on the type of information. For instance direct costs such as data collection, processing infrastructure and dissemination are involved. As discussed earlier, the cost of the information product itself is largely independent of the number of copies sold in the various appropriate media. The costs of the information product itself are fixed costs and are also non-recurring, meaning that the producer only has to make them once. However, these initial data collection and processing costs are usually very high.

> "The paradox with information products is that the investment is high at the beginning of the chain where the value to the user is very low. Further on the chain one goes less investment is necessary to produce high value. This paradox explains partially the emergence of many "low-value mass market" geographic information products on the market in the USA. US topographic and road sets, which result from the cooperation of USGS and US Bureau of the Census (TIGER files), became available at very low entry prices and without copyright restrictions in the early 90s. Several companies acquired this data, refined it and repacked the data for mass-market use, for example to help with planning trips. Low-quality versions are offered "free" over the Internet and higher quality systems are sold as a growing business. Similar developments in Europe are hindered by combination of applicable intellectual property right restrictions and prices set by data owners [particularly government entities]. Therefore in Europe the geographic information business is restricted to high-quality, high value markets"[109].

Public sector bodies tend to have little concrete information on the "costs" of the information they gather. This is because gathering information is usually not their mission focus, but a by-product of their core responsibilities. In the United States, information on the cost of public sector information is not particularly relevant because public purposes are

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[109] Krek, A., & Frank, A.U. 2000. The Economic Value of Geo Information. In: *Geo-Informations-Systeme - Journal for Spatial Information and Decision Making*, 13 (3), pp: 10-12.

funded through tax revenue and the open and unrestricted policies of OMB Circular A-130 and the Paperwork Reduction Act apply.

One relevant issue that is often neglected is that in the absence of high private sector investment in adding value to public sector information, European governments often have to invest more public money down the value chain than is required in the United States. So the argument is not just about how much money they can eventually recover through charging users, but how much more they have to spend initially in the absence of a robust private information services sector. One negative effect can be seen in frequent one-off exercises to collect information required to answer the question of the moment, information that then isn't maintained by anyone, public or private.

Benefits of Public Sector Information

Several different classes of individuals, organizations and groups can benefit from open availability of public sector information. First, there is the individual, both in his role as consumer as well as citizen. The citizen will benefit by being informed about what is happening in his surroundings and by using information from the government to maximize the impact of his decisions about where to live, where to go to school, how to vote etc. Second, companies and entire economic sectors can benefit enormously from public sector information. Companies that publish add value and create new products for end-consumers benefit directly. Those companies that are consumers of public information realize greater efficiencies in accessing and utilizing public sector information where open access policies are in place. Thirdly, government entities will benefit from public sector information, since they are heavy consumers of government data. With open access policies better informed government will develop at lower cost. Also, the private sector will generate a diversity of services and information products that would otherwise never develop. The initial benefits of lower business costs due to open access policies are passed-on, in time, as lower prices to final consumers as competition by firms drives prices down.

Government officials, often seem to regard companies that take public sector information as the raw material of their information services as being no more than distributors or brokers of that information. They ignore the editorial function of private sector information publishers, who:

- Select information that is relevant to particular users;
- Filter out redundancy, noise, and irrelevant information;
- Combine information from many sources;
- Maintain the currency of information;
- Offer convenient access to particular sets of user; and
- Create derived data sets through processing the raw data.

The resulting information services, as can be easily seen through the workings of the financial information services market, benefit not only private sector consumers but also government policy makers and analysts, who are better informed than they would be if they had to rely on unprocessed public sector information services.

Finally, given the broad range of beneficiaries, one can argue that national economies and even the global economy will benefit from openly accessible public sector information.

Also, different types of data have different types of benefits. Depending on the possibilities for use and value adding, some information will have much larger economic impact possibilities than the benefit that will ever be achieved using other data.
It is also possible that information can have a "synergistic" or "cascading" value in that if basic public sector information is being disseminated in an open manner it could stimulate diverse and value added users not contemplated by the originators.

TIGER files

A good example of this phenomenon are the TIGER files (Topologically Integrated Geographic Encoding and Referencing system) developed at the Census Bureau originally only to support the mapping and related geographic activities required by the decennial census and sample survey programs. The TIGER/Line files are a digital database of geographic features, such as roads, railroads, rivers, lakes, political boundaries, census statistical boundaries, etc. covering the entire United States. The data base contains information about these features such as their location in latitude and longitude, the name, the type of feature, address ranges for most streets, the geographic relationship to other features, and other related information.

However, with the appropriate software a user can produce maps ranging in detail from a neighborhood street map to a map of the United States. To date, many local governments have used the TIGER data in applications requiring digital street maps. Software companies have created products for the personal computer that allow consumers to produce their own detailed maps. There are many other possibilities. The availability of TIGER files has made possible low-cost municipal land information systems and most importantly has created a major advance in the field of geographic information systems.

The value added to TIGER files by the private sector illustrates the point that open access can reduce the investment that has to be made by the government. GDT, the New Hampshire company founded by Don Cook, invests millions of dollars each year upgrading the TIGER files, most recently by improving the positional accuracy of road intersections, using aerial photography, so that the data could be used more effectively in vehicle navigation systems.

A further benefit of maximising the involvement of the private sector in processing and disseminating public sector information is the need to adjust rapidly to changing requirements. Public sector procurement cycles often so slow that by the time a solution has been delivered, the problem has changed.

Finally, the same data might have different value for different users. This boils down to willingness to pay and elasticity of demand issues as discussed in the previous section.

Funding and Pricing

There are several funding and pricing policies that can be applied when dealing with public sector information. As is apparent, the different pricing policies form a continuum. The question is where the social benefits are maximized.

- Government funding from taxation revenue and zero pricing

- Cost recovery of dissemination costs for information only (OMB A-130)[110]
- Marginal cost pricing for value adding services
- Marginal cost pricing plus a loading on value added services (contribution to overhead costs)
- Two-part tariffs for value added services involving a contribution to the costs of provision of the basic infrastructure.

As will become clear in the next section of the paper, social benefits are maximized when dissemination costs only are being recovered. A good example of the effects of different pricing policies comes from Alenka Krek[111]:

> "US and Canadian markets of geo-marketing services are better developed than the European market. The price of raw data has substantial influence on the further development of the geo-information market. The US Statistical Bureau, Bureau of the Census and USGS give a certain amount of reports, statistical and demographic data for free or charge a very low price. The final integrators acquire datasets from different sources, sort, filter, and combine them, and offer the possibility of executing an analysis as a geo-marketing service. The user is willing to pay for the result of the analysis. This approach successfully serves the mass market. For the US and Canadian market we observed the characteristics of a commodity market where several providers offer very similar or equal products at similar prices. The competition among them drives prices down. With low prices they are able to attract different segments of the market. The structure of the market has characteristics of oligopoly. The European approach is mostly determined by the high prices of datasets and restrictions on the copyright forced by the National Mapping Agencies. This prevents further production and creation of geo-information products and serves only a narrow group of users with high willingness to pay."

Comparing the different funding and pricing options depends importantly on understanding the rivalry and excludability prospects of the service. The information value chain concept suggests that the activities of transforming raw materials and other inputs to final goods can be viewed as a collection of complementary and sequential tasks, each adding value to the final product. The information value chain is the sequence undertaken by one or more producers, transforming data into the final product. In fact, the non-rival nature of information makes it more meaningful to speak of a value net or a value web, with exchanges taking place in many directions simultaneously, rather than a value chain.

The particular cost structure of information has many important implications. For example, cost based pricing tends not to work; goods must be priced according to perceived consumer value and subjective willingness to pay, not according to production cost. Since

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[110] Incremental cost differs from cost of dissemination. NAS vs OMB

[111] See: Krek, A. 2000. Efficient Pricing of Geo-Marketing Internet Services: European vs. American Approach. In: *Proceedings of The Spatial Information Society: Shaping the Future*, 6th EC - GIS Workshop, in Lyon, France.

people have widely different values for a particular piece of information, value-based pricing leads naturally to differential pricing[112].

Differential Pricing

One option of dealing with differing values for information is differential pricing. Price differentiation is charging different prices based on perceived differences in goods[113]. This should not be confused with price discrimination, which is the ability of producers to charge different categories of consumers different prices for similar goods.

There are three types of differential pricing[114]:

- Personalized pricing: Sell to each user at a different price
- Versioning: Offer a product line and let users choose the version of the product most appropriate for them
- Group pricing: Set different prices for different groups of consumers

Efficient pricing in information environments involves prices that differ across users and types of service. Non-linear pricing arises naturally and is closely related to the efforts of providers to satisfy different needs of users with different willingness to pay.

Economists say that an economic situation is Pareto efficient if there is no way to make one consumer better off without making some other consumer worse off[115]. A necessary condition for so-called Pareto efficiency is that the marginal willingness to pay must equal marginal cost. Furthermore, an examination of what is socially optimal is found by defining aggregate demand. We want to find where, in general, net benefits are maximized in a market. For example, each point on the demand curve measures marginal willingness to pay or a represented value of what individuals are willing to pay. The sum of these values represents aggregated demand. The supply curve represents costs to society. Each point on the supply curve is equal to marginal cost. Therefore, at what level of production are net benefits to society maximized? This, in a competitive market situation is an efficient point referred to as Pareto optimal. Pricing at marginal cost may or may not be "Pareto" efficient: it depends on how consumers' total willingness to pay relates to the total cost of providing the good. At the first stage of the production of datasets, they have low value to most users and low willingness to pay for them. The high cost of producing the dataset therefore cannot be recovered.

The availability of the raw data for value added information products at low or zero cost is one of the crucial conditions for Pareto efficient non-linear pricing of services. High prices

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[112] See: Shapiro, Carl and Hal R. Varian (1998) *Information Rules: A Strategic Guide to the Network Economy*. Harvard Business School.

[113] See: Low, Linda (2000). The Economics of Information Technology and the Media. World Scientific Pub. Co.

[114] See: Shapiro, Carl and Hal R. Varian (1998) *Information Rules: A Strategic Guide to the Network Economy*. Harvard Business School.

[115] See: Varian, Hal R. (1996). Differential Pricing and Efficiency. In: *First Monday, Peer-reviewed Journal on the Internet*. Vol.1 No.2 - August 5th. See also: http://www.firstmonday.dk/issues/issue2/different/index.html

of datasets consequently lead to high prices in final products. This tends to disadvantage occasional users and users with low willingness to pay[116].

I.4 In Sum

We can make the following conclusions about the economic characteristics of public sector information:

- The demand for public sector information products is usually highly elastic, meaning that consumers are very sensitive to price changes.

- Public sector information is non-rival, meaning that the use by one set of users does not reduce the information available to others, and that the economic benefits to society are the sum of the benefits reaped by the very many and diverse users of the information.

- Public sector information exhibits public good characteristics, but whether it behaves as a public good in a particular case depends on the medium in which it is expressed; and the exclusion policies followed by the relevant public sector authority.

- Public sector information has high fixed costs and very low variable costs of reproduction. This means:

1. Information is costly to produce but cheap to reproduce.
2. Once the first copy of an information good has been produced, most costs are sunk and cannot be recovered.
3. Multiple copies can be produced at roughly constant per-unit costs.
4. There are no natural capacity limits for additional copies.

[116] See: Krek, A. (2000) Efficient Pricing of Geo-Marketing Internet Services: European vs. American Approach. In: Proceedings of The Spatial Information Society: Shaping the Future, 6th EC - GIS Workshop, in Lyon, France.

Appendix II. Arguments for Cost Recovery

The previous section described three failed attempts by state and Federal entities at aggressive revenue generation from selling information. There are, however, arguments both in the United States and Europe, and increasingly in developing nations, regarding the benefits of "government commercialisation". The arguments sometimes seek to justify direct competition between government and commercial entities[117]. This section summarizes the arguments given and explains why they generally fail.

II.1 Cost Recovery can Cover the Expense of Gathering Public Sector Information

When looking at the micro economic level, it seems fairly logical that governments try to recover costs associated with the expensive gathering of public sector information.
For the Treasury of the United Kingdom, the high fixed costs are reason to support full cost recovery[118]:
Because the marginal cost of making information available is low and the fixed costs of production are high, marginal cost pricing would shift the burden of covering fixed costs from consumers to the taxpayer. Raising taxation to meet these costs generates further distortions in the economy.
The review concludes that the benefits to the economy of a policy of marginal cost pricing for all government information are far from certain. HM Treasury even goes so far as to say that prices should exceed costs whenever the market permits.
However, when looking at the macro economic level, cost recovery is clearly sub optimal[119]. Both PIRA and the Netherlands Economics Institute studies discussed above argue that overall economic and societal benefits will be maximized when only the cost of dissemination is charged, and that charging for public sector information may even be counter productive, even from the narrow perspective of raising revenue for the governments.

II.2 Cost Recovery provides Incentives for Government Customer Service

Another frequently used argument is that "giving public sector information away" decreases incentives for customer service. From Dutch research (RAVI 2000), it appears that Dutch government organizations see cost recovery as an incentive for their own organization. They believe healthy provider-customer relationships will exist. Some Dutch government organizations feel that a certain level of accessibility, data quality and service has its price. Therefore, they argue, it can never be totally freely accessible. The NEI research states that open access policies might lead to a decrease in market incentives (less profit per product means decreased motivation to deliver good quality products) and decreased job satisfaction,

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[117] See e.g. Swedish Statskontoret (Agency for Administrative Development) (2000). *The State as Commercial* Actor for case studies of this phenomenon outside of the information area [available in Swedish only].

[118] HM Treasury (2000) *Cross Cutting Review of the Knowledge Economy. Review of Government Information.* Spending Review 2000. http://www.hm-treasury.gov.uk/Spending_Review/Spending_Review_2000/Associated_Documents/spend_sr00_ad_ccrcontents.cfm?

[119] Vries, Marc de (2001) Met elektronische overheidsinformatie het nieuwe millennium in: hoe het was, hoe het is en hoe het worden moet. Den Haag: Rathenau Instituut, Study 42.

and that "giving away" services will be looked down upon by users of these services. Rhind[120] claims that putting a price on information will lead to more efficient operations and forces consumers to specify exactly what they require. While a case can be made that relatively small "nuisance fees" will deter frivolous requestors, this does not suggest that aggressive cost recovery will necessarily succeed.

The immediate question that rises here is whether the government needs a "profit", "competition" or "market" incentive to do its job? According to the experience in the State of California, however, the truth is that too often in government there is incentive to make a profit rather then to work solely for the public benefit. In a fee system this incentive is more pronounced since the system itself pushes the manager to behave in ways that may be contrary to the public interest. Over time in government, fee services become unintended pyramid schemes. The fee for service is in effect a government subsidized monopoly that can continue at some substantial level even if the customer base is desperately unhappy.

II.3 Internal Government Funding Structure makes Open Access Policies Impossible

In many European countries, Treasuries and legislation force government agencies to go "off the budget", and find their own ways in funding their agencies. For information producing agencies, this increases the incentives to engage in full cost recovery in order to be able to recover the expensive costs of data collection. As a result, public servants have the feeling it is "my money" that they are spending, and have to recover costs in order to be able to operate at all. A good example of this is the Dutch Topographical Service. The Topographic Base Map 1:10.000 is being subsidized by the Department of Defence for half of the production costs. The other half has to be "recovered" from buyers of the data. Thus, about seven government buyers (other Departments) each pay 1 million Dutch guilders of appropriated tax revenues to get access to the base map. This amount is by far too high for any private sector party, and has therefore precluded a commercial market for value added products. Furthermore, this is not "commercialisation" at all, but only a matter of moving taxpayers' money around government agencies, from one Department budget to another. This has been reason enough in the past for the National Spatial Planning Agency, an agency of the Ministry of Housing and Spatial Planning, to refuse to spend this amount of money for using the topographic base map. They have done without it, using potentially inferior alternative datasets for planning purposes, with possible negative effects on the agency's ability to carry out its public interest purpose in the most efficient manner.

Christopher Roper says, "There are two major reasons why the Civil Service in the United Kingdom has opposed any shift to open access policies. The first is a cultural commitment to job retention and job creation schemes that provide work for otherwise redundant civil servants. This is obvious when you look at employment patterns in National Mapping Agencies and National Meteorological Services that employ significantly more staff than their North American equivalents. The second reason is that entrepreneurial individuals have been appointed to manage these data producing agencies and their objectives have been linked to cost recovery targets. People do what they are incentivised to do, even when it isn't in the wider public interest. In order to change existing cost recovery policies, you would

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[120] Rhind, D. (1992) Data Access, Charging and Copyright and their Implications for Geographical Information Systems. In: International Journal of Geographical Information Systems. Vol. 6, No. 1, pp 13-30.

have to convince the two men at the head of affairs, Tony Blair and Gordon Brown. It's that tough."

In the US, agencies recoup only a small fraction of the actual cost of dissemination of information under FOIA and related information dissemination policies. Further, any revenues so generated usually go to the general treasury rather than to agency budgets. As a result, it is sometimes claimed that agencies have no incentive to charge for their information provision efforts[121]. From a macroeconomic perspective, this bureaucratic disincentive may prove socially optimal.

These arguments contrasting direct budget funding with indirect revenue sources can be illustrated together with the categories "Basic" versus "Other" information to represent most preferred and least preferred situations as to public sector information policy in different countries.

	Funding	Information
Most preferred	Direct (general revenue funds)	Basic, e.g. legislation, court decisions, official gazettes
Least preferred	Indirect (Dep. Budgets / cost recovery)	Other

According to De Vries:

> "So called "basic" information on the democratic constitution (such as legislation, court decisions etc.) is just beginning to become available. However, lots of this type of information, which ought to be public, is hardly available… As regards the "remaining" types of information, the information providers are, to put it lightly, not that enthusiastic about disclosing electronic information.[122]"

II.4 Open Access Policies will Decrease Data Quality Because of Lack of Incentive

An argument often used in European countries is that data quality will decrease where there is no economic incentive to maintain high quality data for a non-government customer base. However, where a government agency has a clear public mission which it is expected to perform and that mission involves the creation of information, e.g. health statistics, urban planning etc., that agency has adequate incentive to do a good job. To the extent that there may be a private sector demand for more detailed, comprehensive, or differing information, the question becomes whether the government should be the provider of non-mission related services. Does the government agency need the quality data itself, or it is just maintaining it for its customers? In the latter case, the government may unfairly be competing with the private sector in creating value added products, and the overriding

[121] RAND Europe (2000) Implementation and effects of U.S. Freedom of Information Act. Report of a study for the Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.

[122] Vries, Marc de (2001) Met elektronische overheidsinformatie het nieuwe millennium in: hoe het was, hoe het is en hoe het worden moet. Den Haag: Rathenau Instituut, Study 42.

public policy question is whether or not it is appropriate for governments to do so[123]. Also, the exact opposite appeared in the Finnish situation, where the Finnish Meteorological Institute was found by the Finnish Competition Authority to have deliberately degraded radar image data, making it unusable for the purpose it was sold. We believe the reason the Finnish Met did this was the fear of private sector competitors rather than making significant amounts of money.

II.5 Open Access Policies will lead to Extra Taxation

Advocates of open access policies argue that the public sector, having collected data for its public purposes and disseminating it for the good of society, should not charge more than short run marginal cost. The UK's HM Treasury argues that if government does that, they would need to fund the resulting public expenditure from taxation. The NEI research suggests a similar effect. Similarly, others have argued that cost recovery will lead to reducing taxes:

> "Any legal method of reducing taxes through the recouping of expenditure is generally welcomed by the citizens."[124]

HM Treasury even suggests that the economic benefit of long run marginal cost pricing may be of a lesser order of magnitude and there will be no net benefit to the economy:

> "The case for a general move to any form of marginal cost pricing is unproven because the efficiency gains from improved resource allocation in the information market are likely to be broadly offset by fiscal burdens elsewhere in the economy.[125]"

HM Treasury based their arguments for aggressive cost recovery in the 2000 spending review on a paper by Varian and Shapiro[126]. However, the authors feel that the point of the

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[123] See e.g. Statskontoret (2000) *The State as Commercial* Actor for case studies of this phenomenon outside of the information area [available in Swedish only].

[124] See: Rhind, D. (1992) Data Access, Charging and Copyright and their Implications for Geographical Information Systems. In: *International Journal of Geographical Information Systems*. Vol. 6, No. 1, pp 13-30.

[125][125] HM Treasury (2000) Cross Cutting Review of the Knowledge Economy. Review of Government Information. Spending Review 2000. http://www.hm-treasury.gov.uk/Spending_Review/Spending_Review_2000/Associated_Documents/spend_sr00_ad_ccrcontents.cfm? Section 5.8

[126] HM Treasury based the justification of total cost recovery for Trading Funds and commercial competition by government, as well as the shifting of fiscal burdens on a paper by Hal Varian and Carl Shapiro: Shapiro, Carl, Hal R. Varian (1997) US Government Information Policy. University of California, Berkeley. July 30, 1997. Presented at Highlands Forum, Department of Defense, June 8, 1997, Washington, DC. This paper talks about the possibility of government profit centers, but only in the case of inelastic information, which is generally not the case. Unfortunately, the paper has been incorrectly interpreted as a justification for total cost recovery, commercial government activities and competing with the private sector.

> "Once information has been created, it is typically quite inexpensive to make it available to a wide audience, especially in a digital age. Indeed, *ex post* efficiency in the dissemination of information calls for the information to be made available at incremental cost to all potential users. One advantage of government creation of information noted above is that the government can, in principle, open the information to the public at no cost, something a private party might well not choose to do. Principle and practice can differ greatly, however. The rosy picture of government agencies creating valuable information and making it available freely to all begs the question of how the government initially finances the creation of this information. Indeed, the government could

paper has been misunderstood, because it relates only to instances where the demand for the government information is in fact inelastic. The authors are aware of only rare instances where this may be the case: e.g. mandatory use of ownership information from land registry offices and mandatory use of weather data for instrument flights. In general, information services differ fundamentally with other public services, e.g. patent filings and passport applications, which are in fact relatively inelastic.

The argument of extra taxation is also severely undercut by the PIRA research. PIRA strongly suggests that open and unrestricted access to government information will lead to a net boost in jobs, and additional business formation leading to increased overall tax revenue. We believe this has been demonstrated in the United States, however, empirical research on this topic would likely be helpful.

II.6 Change Towards Open Access Policies will undermine Private Sector Investments

HM Treasury states that

> "A rapid change in policy which involved free access to government information could undermine private sector investments in the development of parallel capacity, made in good faith against the background of existing government policy."[127]

This actually did happen in the Netherlands. After years of pleading for affordable raw topographic data a private firm, TeleAtlas, decided to make its own dataset of streets. However, not long after that, the Dutch government decided to make its own street database available at very low cost, thus "competing" with the private sector. This argument holds only if governments wait too long in changing their policies. Clearly that is what has happened in the UK and the Netherlands. Because of restrictive public sector data policies the relatively small number of government data dependent firms have either had to accede to

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choose to make information a "profit center" to help finance its other operations. Should basic government functions subsidize information, or the other way around?

If the government could raise tax revenues without distorting economic activity (e.g., by discouraging work and employment through payroll and income taxes), it might make some sense to increase taxes to finance the creation of information, which could then be distributed freely. However, as noted above, government taxes inevitably cause their own inefficiencies. Also, with free dissemination of information, there is no independent test of the value of that information, making it more difficult to determine which types of information are worthy of government funding. For these reasons, *we think the proper and practical approach is for government agencies to charge at least incremental cost*, and often more, of those using the information. Recovery of at least incremental costs through user fees reduces the need to raise funds through taxes, and generally insures that those using the information value it sufficiently to justify incurring costs to generate the information. As usual, defining "incremental costs" depends upon the increment. A single user accessing a government web site imposes tiny extra costs, except perhaps from congestion costs. Setting up the web site involves greater costs, but it may not be cost effective to charge for access to cover these costs. *In fact, we are not advocating such fees as a general matter*. However, if the government incurs significant additional costs to generate more accurate or timely information for use by private parties, we would advocate charging the cover those costs, so long as the administrative costs involved in setting up a collection mechanism are not large relative to the anticipated revenue stream. We would not rule out using certain information as a "profit center," *if the demand for that information inelastic*, making this information a better source of government funding than general taxes, *but we are wary that this approach may be overused*." [Emphasis added]

[127] HM Treasury (2000) Cross Cutting Review of the Knowledge Economy. Review of Government Information. Spending Review 2000. http://www.hm-treasury.gov.uk/Spending_Review/Spending_Review_2000/Associated_Documents/spend_sr00_ad_ccrcontents.cfm?

the government demanded terms, get the data elsewhere, or do without. We recognize that a change to more liberal data policies may have the perverse effect of disadvantaging those few firms in the short term. However given the magnitude of systemic economic and societal benefit from open access policies identified by PIRA and others it would be unfortunate if this concern were to impede liberalization. Also, more liberal data policies open new markets for private sector 'data vendors'. The data vendor reformats and repackages government data into a usable form for end users. In sum, a change towards open access policies might lead to a disadvantage for commercial firms that were there first, but it also means extra opportunities and new markets.

There are very few genuine examples of parallel capacity, especially in the high-value areas of mapping and meteorology. A more frequent phenomenon is that companies will have invested in an effectively exclusive private-public partnership in order to share in a monopoly rent extracted by a government agency. There are several examples of that in the United Kingdom, and a concerted attempt within the National Land Information Service to create new monopolistic franchises that will seek to exclude existing market operators, who are very likely to be forced into litigation under European competition directives that are now embodied in UK legislation.

II.7 Open Access Policy requires Extra Investments to make Data Accessible.

Rhind provides an example of this argument:

> "The packaging, documentation, promotion and dissemination of data invariably cost considerable sums of money and government agencies are not well suited to such activities; in particular, encouraging and stimulating the market are needed to ensure that maximum use is made of data and information, and commercial firms will only do this if substantial profits are to be made. Thus nothing can be free.[128]"

However, open access policies do not mean that data are always given away for free. According to the "cost of dissemination" standard of the Paperwork Reduction Act and OMB Circular A-130 open access policy means, "open and unrestricted at a cost no more than that of dissemination." This is very important distinction that many government agencies fail to realize. Any "extra" investments to make data accessible can be recouped by dissemination fees (the incremental cost of dissemination). For example, the US National Weather Service recoups about $330,000 annually in dissemination costs from subscribers to its high bandwidth "family of services" using dedicated connections. There may be situations where recouping dissemination fees can actually outweigh the fees itself, for example by attempting to collect small sums over the Internet. So, in practice a free data policy might be optimal, subject, of course, to the potential benefit of nuisance fees also hinted at by Rhind. Moreover, as stressed before, the increased benefits of open access policies will far outweigh any increased costs.

We believe that many government agencies are willing to liberalize their policies, but that they fear that they will suffer budgetarily when they do so. Therefore, Treasuries must

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[128] See: Rhind, D. (1992) Data Access, Charging and Copyright and their Implications for Geographical Information Systems. In: *International Journal of Geographical Information Systems*. Vol. 6, No. 1, pp 13-30.

understand that open data policy creates wealth and therefore they should fully fund agency information activities in order to provide the open access incentive. This is a very important conclusion of this study.

Appendix III. Suggestions for Further Research

Research in the area of "the economics" of public sector information still needs to be done. Here, we propose further research in the form of hypotheses that need to be tested.

- Contrary to the situation in the US, in countries that just recently have adopted open access policies, or countries that intend to do so in the near future, a "before" and "after" comparison may be possible. However, methodological suggestions are needed. One potential difficulty may be finding a methodology to compare similar industries and /or companies in the EU and the US to test the hypothesis that information dependent firms in the EU, such as those in the emerging commercial meteorology sector, are at a disadvantage viz. their U.S. competitors due to more efficient, timely and open access to valuable public sector information in the U.S.

- Restrictive data policies can have "ripple" effects on firms who could otherwise benefit from specialized services. The data generated by the weather risk management industry shows a glaring disparity in the value of risk instruments (primarily "hedge" contracts, and increasingly insurance) between the U.S. and the EU. This is attributable to open data policies in the U.S. fostering this new economic sector with restrictive policies in the EU hampering it. Can weather sensitive firms (e.g. energy related firms as well as certain retailers and manufacturers) in the U.S. be at an advantage viz. similarly situated EU competitors due to the wide availability of weather risk management instruments in the U.S.?

- Negative effects of "government competition" between "commercialised" public bodies and emerging information dependent firms, as identified, for example, by the Swedish Statskontoret, can and should be quantified or clearly characterized in order to convince governments not to engage in unfair competitive practices.

- One of our central conclusions is that in general, demand for public sector information is highly elastic. There may be a need for determining more specifically the relative elasticity for different kinds of public sector information.

- Many EU "commercial" or "cost recovery" government entities derive significant "revenue" from transfer payments from other government agencies. To that extent, they cannot truly be considered "cost recovery". Rather, internal government accounting practices tend to mask the true results of "government commercialization" through inflated claims of success. This phenomenon of government cross-subsidies needs to be explored further in order for governments to be able to make rational public policy choices regarding the perceived short term benefits versus the negative macroeconomic effects of "government commercialization" and to ensure compliance with established competition policies.

- We believe that open and unrestricted access to government information will lead to a net boost in jobs, and additional business formation leading to increased overall tax revenue. We believe this has been demonstrated in the United States, however, empirical research on this topic would likely be helpful. It is unclear, however, whether tax

revenues that the US Government receives from private sector commercial exploitation of government data can be estimated.

- The extent to which public sector commercial interests prevent the emergence of Europe-wide data sets, covering all the countries of the European Union, let alone global data sets. This is a major emerging problem, which will undoubtedly hamper any Europe-wide policy making and the operation of European institutions.

- Restrictive practices around Postal Geographies that are created for the purpose of delivering the mail, but then are re-purposed for demographic analysis. Competition among state-owned postal services within Europe is intensifying, with the British and Dutch services leading the way. (See letter to FT in separate file.

- The way in which information services covering the operation of financial and stock markets have largely escaped the dead hand of government, largely because international capital markets couldn't operate without the free flow of financial information. For individual civil servants, "

- One of the main problems when trying to find evidence of economic growth caused by open access policies is to find statistics at a desired level of desegregation, e.g. economic sectors at the service level. We are missing reasonably long time-series that may show the growth trend in economic sectors highly dependent on public sector information for their production activities. Another important area of further research is surveying the willingness to pay, and determining the elasticity of demand for public sector information.

[i] See also Stiglitz and National Academies Study