

Access to Geographic Information: A European Perspective

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Abstract: This article is offered to stimulate the formulation of a cross-Atlantic research agenda on access to geographic information. The article is organized in four sections. The first sets the context for the article. The second reviews at some length recent developments in Europe in relation to access to public sector information and the development of the Information Society. The geographic information dimension of these developments and the emergence of a strong environmental policy framework are also discussed. The third section focuses on developments in data policy at the national level using the United Kingdom as an example, as this country has often been depicted as being, in policy terms, at the antithesis of the United States federal policy. The fourth section concludes the article and identifies three main strands of research on access to geographic information that deserve a concerted effort by the research community in Europe.

Introduction

The purpose of this article is to identify key issues that need to be researched further to support policies aimed at maximising access to geographic information (GI). To do so, it sets access to GI into the wider policy developments in Europe which today strongly focus on promoting the re-use of public sector information through more transparent conditions on access and exploitation. These developments are also starting to affect those parts of public sector information, such as geographic and meteorological data, that have traditionally been seen as commercially more valuable and therefore exempt from open-access policies. We are thus starting to move away from the polarization between the United States (federal) position in favor of open access and a European position in favor of cost recovery (Weiss 2002) toward greater convergence on both sides. With these considerations in mind, the following sections will consider recent developments at the European level, then focus on national developments, and then explore recent policy changes through a case study of Great Britain. On the basis of this analysis, the article identifies key research areas that deserve a concerted effort.

European Developments

Background

Recent policy developments on access to GI in Europe cannot be separated from the much broader issues relating to access to public sector information and the development of an Information Society. Before summarizing such developments, however, it is useful to consider some of the key facts and challenges that characterize the decision-making process at the European Union (EU) level.

The EU currently comprises 15 sovereign Member states, with a total population of almost 400 million, representing three

quarters of the total European population (Russia excluded). Negotiations are almost complete for the enlargement of the Union to another 10 countries in 2004, with a further three countries to follow once they have met the relevant criteria. By the end of the decade, the EU may have up to 28 member countries and a population of some 550 million inhabitants. The challenges entailed by such massive enlargement are far from trivial and consume a significant amount of political energy within the EU.

The decision-making process in the EU is complex. The key institutions are the European Council, which includes the Prime Ministers and Heads of State of the member countries, and the European Parliament, which is elected by universal suffrage and has co-decision powers on some issues. Sectoral policies are decided by the Council of Ministers (i.e., a collection of the competent ministers of the Member states) in co-decision with Parliament. The European Commission (EC) is the other key institution. The responsibilities of the EC are threefold: it initiates Community action; it ensures that the Treaties are correctly implemented; and it is the executive body for Community rules and programmes. In other words, the Council and Parliament must wait for a Commission proposal before they can legislate, and it generally falls to the Commission to apply or enforce the decisions taken and Community law. Therefore, the EC is not like a fully fledged national or federal government. Although powerful, it is essentially a relatively small administrative body, with a staff of 15,000, 20% of which are devoted to translate key documents in the 11 languages of the EU, managing a budget of € 97 billion (1999), which is just over 1% of the combined gross domestic product (GDP) of the Member states (www.europa.int).

The main policy areas of the EU in financial terms are agriculture policy (€ 43 bn. per annum) and regional policy (€ 31 bn.), representing 45% and 33%, respectively, of the EU budget. Given that some 4% goes to administration, all other internal policy areas, external actions, and aid to the accession countries combined absorb only 18% of the budget. Given the relatively

small size of the EU budget compared to national budgets, its key role is one of coordination and support in leveraging public and private sector investments in the Member States. The competences devolved from Member States to the Union are set in Treaties that are signed by the European Council and are subject to ratification through the national Parliaments or national referenda. For the purpose of this article, one of the key developments is the 1993 Maastricht Treaty, which gave the Union responsibility in matters of trans-European networks in the transport, energy, and telecommunications sectors, thus providing the legal basis for the development of the Information Society.

Toward the Development of the Information Society

The Commission's White Paper on Growth, Competitiveness, and Employment published in December 1993 (Commission of the European Communities 1993) stressed the urgent need for a pan-European infrastructure to help boost economic growth and competitiveness at a time in which Europe was facing significant problems of industrial restructuring and long-term unemployment. The development of a society strongly based on the creation and use of information-related knowledge, products, and services was seen as the key to the creation of new job opportunities in Europe in the medium and long run. The term "Information Society" has since come to encompass the set of policies, initiatives, and investments needed to achieve this goal.

Acting on proposals made in the White Paper, the Brussels European Council of December 1993 asked a group of high-level experts and industrialists under the chairmanship of Commissioner Martin Bangemann to draft a report on the Information Society suggesting practical ways in which its objectives could be achieved. The Bangemann Report (Commission of the European Communities 1994a) stressed the need to speed up the process of liberalization of the telecomm sector in Europe, hitherto largely in the hands of state monopolies, and reinforce universal service. It proposed a list of 10 initiatives to demonstrate the utility of new Telematics applications, including: distance learning and teleworking, traffic management, health care, trans-European public administrations networks, and city information highways. It is worth noting that the report stressed that financing the information infrastructure should come from the private sector, while the role of the EC would be to help target long-term investment in the exploitation of available technology. These proposals were incorporated into an Action Plan entitled *Europe's Way to the Information Society* (Commission of the European Communities 1994b) and were also supported by a number of funding streams in the Fourth Research and Development Framework Programme 1994-98, with € 3.6 billion allocated to the Information Society Technologies programmes.

The European approach to the development of the Information Society hinged on the twin track of liberalization of the telecomm sector to achieve physical access and the "liberalization" of public sector information to achieve social access and economic objectives. Consequently, a key

milestone was the publication in early 1999 of the Green Paper entitled *Public Sector Information* (Commission of the European Communities 1998). This consultation article has played a major role in raising the debate across Europe on the opportunities created by the increased availability of public sector information (PSI) in digital format for its reuse beyond the purposes for which it was originally collected. The article recognized existing barriers to accessing PSI, including different legal frameworks and pricing regimes, and posed pertinent questions on the extent to which such frameworks should be harmonized across Europe differentiating between administrative and non-administrative data, and "essential" versus value-added data.

After extensive consultation, this Green Paper was followed-up by a Communication (Commission of the European Communities 2001a) and a draft Directive (Commission of the European Communities 2002a), which make the case for action at the European level to remove the identified barriers and create a minimum level of harmonization on the commercial and noncommercial re-use of PSI. The draft Directive does not address issues of access to data, arguing that these are best dealt with at national, regional, and local levels. Instead, it focuses on ensuring a level playing field, transparency, and nondiscriminatory practices in the conditions for the re-use and exploitation of accessible data.

The increased emphasis on access to PSI has also benefited from the privatization of state-owned telecomms across Europe and the success of the European standard for mobile telephony (GSM), which was promoted by the EC in 1994, and has resulted in a multi-billion euros industry. This is a notable European success and its implications for future access to the Internet and through this to a wide range of public and private sector information may well be significant. In particular, the high penetration of mobile phones across all segments of society in Europe, coupled with the development of third-generation phones providing high-speed Internet connections may give Europeans a different way of accessing information than Americans. This is shown in Figure 1, which clearly demonstrates not only the high level of use of mobile phones compared to personal computers (PCs) in Europe, but also that the U.S. and Canada stand out for being the only countries of this group where PC use outstrips mobile phone use. The survey by The

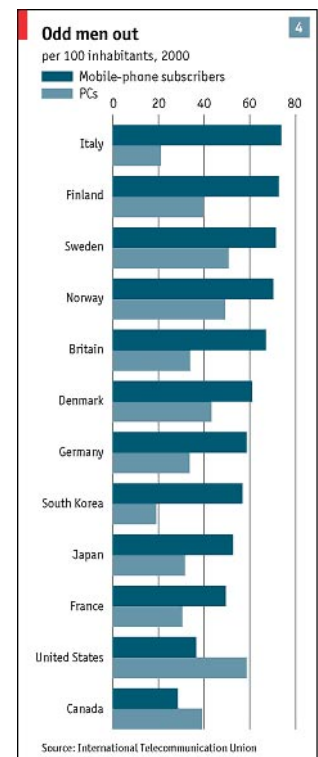


Figure 1 Source: Economist, 13th October 2001

Economist (2001) on the developments leading to a mobile Internet explains these differences as follows.

America's enthusiasm for PCs, and lack of enthusiasm for mobile phones, is due to a combination of factors, but mainly to the relative prices of fixed and mobile calls. In Japan, expensive access to the fixed Internet drove users to mobiles; in America it was mobiles that priced themselves out of the market. Local calls are free, and PCs are cheap. Mobile phones, on the other hand, suffer the huge drawback that users are charged to receive calls, so Americans tend to leave their mobile phones switched off to avoid having to pay for unwanted incoming calls. Mobile network coverage is patchy and rates until recently were high. So teenagers who want to keep in touch with their friends are given their own phone line, a PC and a dial-up account with AOL, the world's largest Internet-access provider. Soon they are happily sending and receiving instant messages through their PCs.

Their counterparts elsewhere in the world, in contrast, are brandishing mobile phones and sending text messages. Mobile phones have become even more appealing to teenagers in Europe since the advent of "pre-paid" phones, which can be replenished with vouchers on sale at newsagents and corner shops. Pre-payment, which originated in Italy to exploit a tax loophole, means that even people without bank accounts (such as children) can have mobile phones. It also enables users to control their spending. (The Economist, October 13, 2001:11)

It is against this backdrop that there continues to be a significant political momentum behind the development of the Information Society in Europe. This was clearly shown by the adoption of a new "eEurope" political initiative by the European Council in 1999 (Commission of the European Communities 1999a) whose key objectives are to bring all citizens, business, and administrations online, promote education, the availability of venture capital, and ensure that the whole process is socially inclusive.

The eEurope initiative has been followed by Action Plans for 2002 (Commission of the European Communities 2001b) and for 2005 (Commission of the European Communities 2002b) focusing on cheaper Internet access, education and skills, and key application areas including e-commerce, health, and the delivery of government services and information. Of particular relevance for this discussion is the increased emphasis on e-government, with binding agreements among Member States to reach set targets for the delivery of public services on line by 2005, and as a corollary, much increased access to public sector information by all citizens. The Action Plans are largely funded by national governments, with some core EU funding.

The developments reviewed above indicate the concerted effort made in Europe for the development of the Information Society, key planks of which have been the privatization of the state-owned telecomm monopolies, the steps toward a common legal framework including issues of Intellectual Property Rights (IPR) and data protection, and the agreement of common technical standards such as GSM that have fostered a multi-billion euro industry that is creating millions of new jobs. It is against

this backdrop that the developments relating specifically to GI need to be understood.

The GI Dimension

Recent European policy developments relating to GI have been reviewed by Craglia and Masser (1997), Masser (2001), and Longhorn (2001), among others. These centre on the initiative taken by the European Commission in 1995-97 to develop a policy framework for GI in Europe (GI2000), which was intended to take the form of a Communication to the European Council and Parliament on the importance of developing core reference data, metadata standards, and catalogues, and a mechanism for co-ordination through a High-Level Working Party.

These three main elements echo the main features of the national spatial data infrastructure (NSDI) in the U.S., although the relatively small budget of the European Commission and the lack of European agencies with a mandate to collect pan-European data make it difficult to take a strong lead. Hence, the development of a Strategic Defense Initiative (SDI) in Europe has to be supported essentially by the Member States in partnership with the private sector, while the role of the EC is one of political coordination.

The discussions of the GI2000 drafts held with the various stakeholders in government agencies, industry, research, and user communities were helpful in finding common ground and raising awareness of the issues involved. Although the intended Communication did not materialize due to a perceived lack of support from industry and the low political visibility of this initiative, there have been several projects funded or co-funded by the EC to support key elements of a future infrastructure. With respect to the development of policies for access and dissemination, the focus shifted for a few years away from GI per se toward the broader context of public sector information, in which GI is singled out as one of the major, and potentially more valuable, components (Pira International et al. 2000). Very recently, however, we have started to see a renewed recognition that GI is crucial to informed policy-making, particularly in the context of environmental policy as reviewed below.

The Environmental Dimension

During the last 20 years, there has been an increased awareness across Europe of environmental issues. This is due to global developments such as the Brundtland Report on sustainable development, the 1992 Rio Earth Summit, and the 1997 Kyoto Protocol on Climate Change, local developments including the increasing profile of environmental activists and pressure groups, and European developments with the accession in 1995 of Sweden, Finland, and Austria, which have traditionally held the local environment in high regard. In recognition of these pressures, environmental policy was identified as a competence of the EU in the 1993 Maastrich Treaty, and "sustainable development" was added to the core objectives of the EU in the Amsterdam Treaty of 1996.

As a result, there has been a noticeable shift in emphasis in European policy from a sectoral, vertical approach to a more integrated horizontal one that pays much more attention to the cumulative environmental impacts of policies such as agriculture, transport, and regional development. Therefore, spatial planning at the regional scale has emerged as a powerful framework for analysis, co-ordination of intervention, and evaluation of impacts. The formulation of the European Spatial Development Perspective (Commission of the European Communities 1999b) is the most clear embodiment of this approach, but its principles are also present in the other areas of policy. These include, for example, the shift in agricultural policy from direct support to farmers toward integrated rural development and the new requirements for integrated plans for coastal zone management.

The regional approach to planning, the increasing recognition of the importance of local issues and local stakeholders, and a tightening of the requirements for monitoring and evaluation have also increased the importance of more focused interventions, and hence the importance of geographic information to assess needs, target intervention, and monitor effectiveness. The increasing requirement to adopt GIS for policy monitoring and evaluation in fields such as agriculture and water management are examples of this increasing importance.

As the need for better monitoring and evaluation in complex environments is recognized, so are the current deficiencies in harmonized, consistent datasets and indicators at the appropriate geographic scale and time series. To address these data limitations, we are starting to see a major shift in emphasis toward a more decentralized approach to data management, leaving the data at the level at which it can be more easily collected and updated, with an attempt to integrate information flows from local to global and vice versa more cohesively. Assuring access to such geographic and environmental data becomes an absolute pre-requisite in this scheme. Hence the initiative announced by the Directorate General for the Environment toward the development of an Infrastructure for Spatial Information in Europe (INSPIRE) to be embedded in Community legislation (www.ec-gis.org/inspire).

The legal basis for the development of INSPIRE is in the Water Framework Directive 2000/60/EC of the 23rd October 2000 which established a framework for community action in the field of water policy. This Directive has a strong spatial impact, as it defines river basins as the most appropriate spatial framework for a comprehensive approach to water protection. All Member States have to define such basins by 2003 and prepare management plans within the following 6 years. Such plans require the collection, integration, and analysis of a large body of data which the Directive specifies need to be in GIS format, including the physical, environmental, and socio-economic state of the basin.

Given the legal backing of this Directive, which is mandatory on all Member States, and the extent of spatial information it requires in GIS format, it is clear that a coordinated framework is needed to avoid duplication and ensure compatibility of layers. Moreover, the data collected are seen as a foundation for other

thematic policies such as agriculture, transport, and regional policy. In this way, a process has been launched to develop a new legislative framework addressing "common base data collection, definition and use of standards, establishment of co-ordination bodies, information gaps, harmonizing community geographic information reporting requirements, metadata, and access conditions" (Perera 2001). These are, in essence, all the elements envisaged by the GI2000 proposals but this time there is strong political support and a legal basis from which to operate.

Summary

"Europe works in mysterious ways" could be the title of this section, as it is often baffling to Europeans, let alone external commentators. What is clear from the above review is that Member States remain the focal point for decision-making in Europe, even in those areas where competence is granted to the EU through international treaties. This is all the more clearly demonstrated when considering that EU funding is just over 1% of the combined GDP of the EU 15, compared, for example, to 18% of the GDP spent by the federal government in the U.S. (<http://www.whitehouse.gov/omb/budget/fy2002/balances.pdf>). EU funding is therefore used for direction and coordination and to leverage funding from the public and private sector in the Member States.

With respect to access to information, the review has shown that a key priority has been given to increasing physical and economic access through the privatization of the telecomm industry and the development of common standards. More recently attention has turned to public sector information, with a focus on services to the citizen and government-to-consumer relationships. Although geographic information is part of this, it is not the primary focus at the European level, although changes may occur with the new emphasis on environmental information.

The European success in relation to the use of mobile cell phones may have major implications for future access to the Internet by the majority of the population. Thus, many of the research questions that are dominant in the U.S. (see, for example, Sheppard et al. 1999) may need revisiting from a European perspective based on the widespread access through mobile phones rather than through PCs.

When it comes to access to data, it is also clear that parallels with the U.S. context need to be viewed with great caution as there is no such thing as European data in terms of ownership, given that there are no European-wide agencies collecting data. All data come from the Member States and, although EU agencies may do a significant amount of work in harmonizing such data, the resulting IPR is at best mixed, and conditions of access are often unclear, given the variations in national policies. This may also change in the future with an increasing convergence of national policies as discussed in the following section.

National Policies On Data Access: A Case Study of Great Britain

Overview

In recognition of the rapidly evolving picture with respect to policies for access to public sector information and GI in particular in Europe, the European Commission and European Umbrella Organisation for Geographic Information (EUROGI) organized workshops in 1999 and 2000 to identify similarities and differences in policy in the EU Member States and the accession countries, respectively.

The first meeting looked at 10 of the 15 countries in the EU [Austria, Belgium (Walloon Region), Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, and the United Kingdom] plus Hungary and Norway. The key findings (Craglia et al. 2000) are summarized below:

1. There are many national initiatives across Europe concerned with the development of data policies in general and GI policy in particular. In some cases (for example, in Portugal and the Netherlands), the GI dimension is very strong. In other countries, such as France, GI is recognized as an important element of public sector information, which highlights the potential conflicts between economic and social objectives.
2. Whilst in most countries the emphasis is on the national level, it is important to recognize that in other countries the regional/local dimension is particularly important, as in Germany, Italy, and Belgium.
3. Whilst some countries display a higher level of awareness than others, there is a sense to which the very rapid developments brought about by technology and the Internet are forcing governments to come to terms with the opportunities and challenges that these developments create. At the present time, most countries seem to have adopted policies in respect to access to public sector information. These may in some cases take the form of Freedom of Information legislation. There is, however, a quite different set of policies that needs developing in respect to a pro-active dissemination of public sector information. The Mandelkern (1999) report in France is a good example of the difference between access and dissemination. Disseminating information has major implications in respect to the organisation of work in the public administration, intellectual property, metadata (i.e., the first step in active dissemination is to declare what is available), relationships with the private sector, and pricing.
4. In respect to pricing, there are significant variations among the countries analysed. In some cases, a distinction has been drawn between essential data that is free of charge (i.e., paid for through general taxation) and value-added data for which there is a fee. In other cases, a policy has yet to emerge, and individual organisations act independently. Where a policy exists, a general principle that seems to emerge is that,

whatever the pricing policy, price should not deter use of data but on the contrary should encourage it.

What we are witnessing therefore is significant variation in a number of areas, the importance attributed to GI-related initiatives, the conditions of access, pricing, overall awareness, but a distinct sense that no government can afford to do nothing, and that this realization is sinking in even among those countries that are less advanced.

The second meeting focused on 12 accession countries. The findings (Craglia et al. 2001, Craglia and Masser 2002) show the tremendous effort that all 12 countries are making in moving from the command economy that characterized the last 50 years of their history to an open market economy benefiting the whole of society and not just small parts of it. It is a huge challenge that involves not only the adoption of new legislation, but also a major reorganization of administration with decentralization at regional and local levels, and the development of new skills, procedures, and ways of working to be able to benefit fully from integration in the Union, administer wisely the funding opportunities that arise from this process, and guide the whole of society through this transition process.

With respect to the development of NSDI strategies, it is important to note that the vast majority of the countries analyzed have taken a very strategic view of GI infrastructures by formulating and adopting national strategies either on their own or as part of a National Information Strategy and/or an Information Society Strategy. These are very significant initiatives because they are not related to the level of economic development of the countries involved, but show a genuine awareness of the strategic role of government in enabling the development of an Information Society, and the key role of geographic information for both public policy and service provision. The degree of vision and political commitment displayed by most of the countries analyzed is admirable and significantly higher than that of many governments of the existing EU Member States (Craglia et al. 2000).

Whilst these overviews give a snapshot of the situation in different countries at the turn of the millennium, it is also worth looking very briefly at the direction of change in policy by focusing on one country, Great Britain, which has often been portrayed as the other extreme to the U.S. approach to freedom of information.

Policy Shifts in Data Access in Great Britain

The situation in the Great Britain in the mid-1990s was described and evaluated by Masser (1998). The position at that time was still very much coloured by the 1986 Tradable Information Initiative, which was taking a robust commercial line asking all government departments to evaluate their information holdings and to charge market price where there was already an established market and where a market was yet to be developed to charge only for the costs incurred over and above those associated with handling the information for their own purposes. The other key policy initiative, the Next Steps Programme in 1988 (Chancellor of the Duchy

of Lancaster 1996) was to increase the efficiency of the public sector by turning many government departments into Executive Agencies with defined efficiency, financial, and customer service targets. These agencies include the Ordnance Survey (OS), HM Land Registry, and the Central Statistical Office, which were given cost recovery targets varying between 40% for the Meteorological Office to 100% for the Land Registry, the OS being somewhere in between at 80% (Masser 1998). Whilst the OS had made notable successes in completing the national topographic database in 1995, its licencing system was cumbersome and geared to satisfy few large corporate users such as the utilities and local government rather than the mass market. This evaluation indicated many opportunities but also significant variations in the policy framework for access to government data, with tensions between the desire to promote the use of information and to raise capital at the same time. With respect to the development of an NSDI-equivalent framework in the U.K., Masser argued that, whilst the core data were already largely in place, the metadata was rather limited and the coordinating mechanism rather weak. The development of a National Geospatial Data Framework promoted by the OS appeared promising, but had yet to deliver at that time.

The Labour government that came into power in 1997 started putting in place a number of major initiatives and reviews that have significantly changed the approach to government information. The key ones are itemized below:

Freedom of Information Act (Home Office 2000). The Act was passed in November 2000 after 3 years of consultation and debate. While the first draft of the Act in 1997 was welcomed for its liberal approach, successive drafts have significantly restricted the scope of the Act, creating a long list of exemptions which caused public outcry (see, for example, *The Economist* 1999). The final version passed by Parliament took on board some of the comments, but by most European and U.S. standards is still a rather restrictive legislation. For example, Sections 36-2c and 36-4 exempt government-held information, including statistical information, from disclosure if it “would otherwise prejudice, or would be likely otherwise to prejudice, the effective conduct of public affairs.” This clause is potentially much more restrictive than the simple harm test proposed in the 1997 original proposal. Moreover, the Act will not be implemented in full until 2005.

More progress has been made within the framework of the Modernising Government initiative (Cabinet Office 1999), which set out to increase collaboration across all government departments to deliver better and more efficient services, and set the target for all government services, including those by local government, to be available online by 2005. This was followed by Modernising e-Government in 2000 (Cabinet Office 2000), which laid down the four basic principles of public services in the information age:

- Building services around the citizens’ choices;
- Making government and services more accessible;
- Social inclusion; and
- Using information better.

An Office of the e-Envoy was created as part of the Prime Minister’s Cabinet Office to coordinate the achievement of the objectives set above (<http://www.e-envoy.gov.uk/>). Central to its strategy is the one-stop government portal UKOnline (<http://www.ukonline.gov.uk/>). Underpinning this portal is the requirement to all government organisations to document their information resources using an agreed-upon metadata standard and register them on the Information Asset Register. A search engine, Inforoute, then enables trawling through these assets (<http://www.inforoute.hmso.gov.uk/>). A separate Government Gateway portal is used for secure transactions between citizens and government (<http://www.gateway.gov.uk/>).

Government pricing policy and licencing systems have also been greatly simplified as a result of the review of Crown Copyright (HMSO 2001) and the Cross-Cutting Review of the Knowledge Economy by the Treasury in 2000 (HM Treasury 2000). A Green Paper on the Crown Copyright (1998) set out a series of options including abolishing Crown Copyright, retaining it but with waivers in particular conditions, or waiving copyright as a general rule except for specified categories of information (<http://www.hmso.gov.uk/copy.htm>). The outcome of the consultation was a new regime whereby copyright is retained as a statement of the authoritative nature of the information. For “essential” information such as legislation, forms, and so on, copyright is waived and access is free. For basic or “raw” information, a simplified user licence easily available on the web is needed and the information is charged at marginal cost with no restrictions on reuse. For value-added information, and information from the Trading Funds, individual licences are needed and prices are set by the individual organisations.

The move toward a marginal cost charge for all “raw” information (unless otherwise specified by Government) was recommended by the Cross-Cutting Review of the Knowledge Economy (HM Treasury 2000). This recognized that “The current policy of average cost pricing creates a significant barrier to the re-use of information because it requires parts of government, where this is not core business, to make assessments and attributions of relevant costs and negotiate individual contracts in an area in which many departments and agencies are ill-placed to operate. Marginal cost pricing would remove this burden from both the department concerned and the private sector” (*ibid.* para 1.15). Additional reforms adopted by the Government as a result of this review include:

- Freedom for all government bodies to produce value-added services charged at market prices provided that this can be achieved in a transparent manner and with a level playing field with the private sector.
- Reposition the HMSO as a regulatory body for government content to ensure fair competition, including the overseeing of trading funds.
- Request all public sector copyright owners other than the Crown Copyright, such as local authorities, to review their charging, licencing, and access practices and align

them with the new reforms (<http://www.hmsso.gov.uk/keyreforms.htm>).

These changes have had two positive results. First, they provide a much clearer framework for all government agencies at central and local levels, and more importantly for users on access, charges, and licencing. Second, they enable a much increased provision of government information in electronic form free of charge or at affordable costs than was hitherto the case and, equally important, a mechanism through which this information can be easily found and accessed.

Whilst Trading Funds were exempted from the rule of marginal cost recovery and are allowed to charge market prices for their value-added products, there has been a significant move toward developing a light-touch regulatory framework that ensures transparency of procedures and pricing, promotes fair trading and a level playing field, and reassures the market that dominant players do not exploit their position to the detriment of others (Tullo 2002). The "Fair Trading Scheme" promoted by the HMSO in its new position as regulator requires the Chief Executives of the Trading Funds to publicly agree to these principles and publish their pricing policy. This is backed-up by an independent auditing mechanism to ensure adherence to these principles (<http://www.hmsso.gov.uk/regulation-outcome-anxb.htm>).

Compared to the situation described by Masser in 1996, there is now a much more proactive engagement and leadership by central government in respect to access to public sector information. While in the past, government information was primarily seen as a commodity, there is a real sense to which the concept of custodianship is gaining ground, particularly given the extent to which access to information underpins key government policies for improving services delivery and departmental cooperation. This process, however, is not without some setbacks and some resistance as shown in the case of the Freedom of Information Act. On the whole, however, the policy changes described bring the U.K. much more in line with the developments in other parts of Europe, and we can see clear convergence with the policies formulated in e-Europe (Commission of the European Communities 1999a) and with other national governments in respect to a distinction between essential, core, and value-added information (Craglia et al. 2000).

Accessibility to GI has also increased, not only through the OS, but through other government departments such as the Office for National Statistics (see, for example, <http://www.statistics.gov.uk/neighbourhood/home.asp>) and through the repackaging of government information by the private sector (see, for example, www.upmystreet.com). These developments have largely been driven by the market, technology, and broader government policy, rather than through the development of a specific NSDI. In fact, the closest policy that the U.K. had in this respect, the National Geospatial Data Framework, has now been abandoned, while its metadata service is now managed by the AGI, the Association for Geographic Information (www.agi.org.uk).

Summary and Conclusions

Tosta and Domaratz (1997) made the point that the success of the NSDI was not so much due to a splendid enlightenment of American decision-makers on the value of GI, but to the NSDI fitting the political agenda of the Clinton administration to "re-invent" the federal government (Gore 1993) and was thus included in a packet of recommendations "focused on establishing accountability and control at the lower levels of Federal agencies, as well as at state and local government agencies" (Tosta and Domaratz 1997:21).

In the two main sections of this article, we have indicated that, in Europe, access to GI is part of a much broader picture on access to public sector information and the development of the Information Society. This was launched in the early 1990s as a policy that was aimed at job creation in the face of massive structural changes in the European economy. Over time, the achievement of social and environmental objectives has also strengthened the momentum behind this policy, thus providing a virtuous alliance of interest.

The policy environment is very dynamic and moving toward a much increased provision of public sector information, often through paths that could not be envisaged even a few years ago as the case-study of Great Britain demonstrated. Moreover, the enlargement of the Union and the very proactive policies being pursued by the accession countries in respect to the Information Society and the development of spatial data infrastructures (see the Overview in the section entitled "National Policies on Data Access: A Case-Study of Great Britain") suggests a number of important research strands that ought to be developed at the present time, which fall under three main strands: institutional, organisation, and economic/legal.

The first strand should focus on the role of governments in developing appropriate frameworks for sharing information horizontally across government departments and between public and private sector organisations and vertically from central to local government and individual citizens. As this article indicates, the great variety of approaches at national and regional levels across Europe and the U.S. create an excellent laboratory on which to study such processes. The focus on governments is particularly appropriate, given that they are at the same time the major producers, consumers, and regulators of public sector information in general and geographic information in particular.

The second strand should focus at the organisational level because this is the level at which major challenges exist to engender a culture of information documentation, sharing, and re-use. Over and over again, we witness that the best-intentioned policies flounder in their implementation not due to technical difficulties but organisational ones. At the same time, some of the rapid progress made in many central European countries appear to be related to the greater ability to change organisational behaviour and cultures during a time of rapid societal transition and change (Pauknerowa and Corbin 2002). Therefore, the relationship between organisational cultures and access to GI, in both private and public sectors should be studied in greater depth relation to

the ability to adapt and change, and the incentives or disincentives for data sharing. Rigorous models exist to undertake cross national comparative studies in this area that should be built upon (e.g., Hofstede 1997 and Wehn de Montalvo 2003), as well as existing work in the field of information management.

Finally, the emergence and impact of regulatory frameworks, such as the one in Great Britain (see the section "Policy Shifts in Data Access in Great Britain") which seek to protect the intellectual property rights of data providers while promoting wider access and the use of GI, trust among stakeholders, and a level playing field need to be closely monitored and carefully evaluated in both national and trans-national contexts. This is important because such frameworks are emerging throughout Europe, and are heavily promoted by European Commission policies such as those on the environment (INSPIRE) and the exploitation of Public Sector Information (Commission of the European Communities 2002a). Therefore, an evaluation of their impacts is absolutely necessary.

In promoting these key areas of research, there are opportunities to be exploited in the forthcoming 6th Framework for Research, Technology and Development of the European Union, which promotes the development of European-wide networks of excellence to help coordinate research effort and achieve critical mass. Therefore, it is important to consider how existing geographic information research networks established by organisations such as the European Science Foundation and the Association of Geographic Information Laboratories in Europe can be utilised to create a European network of excellence in the geographic information policy field and join forces with our American counterparts to build a programme of international comparative research.

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