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Report

Pricing policy and legal issues: 6th and 7th EOPOLE workshops

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Abstract

The following report presents the main conclusions of the sixth and seventh EOPOLE workshops, held in Hydra, Greece, 3–4 May and Leiden, the Netherlands, 3–5 July 2000, respectively. The objectives of the first workshop were to evaluate different approaches to pricing policy and to assess how new developments in Earth observation and information technology are having an impact on Earth observation data pricing policy. Those of the second were to assess the constraints that legal frameworks impose on Earth observation and to explore ways in which they can be used to its advantage. © 2000 Published by Elsevier Science Ltd.

1. The Earth observation market

The market for Earth observation data and products is relatively small, fragmented, immature and complex. A report produced by ESYS for the European Commission showed that the European market for Earth observation data, products and services in 1998 was 207 million euros. A recent report by Merrill Lynch has forecast the growth of the Earth observation market to US$6.5 billion by 2007, mainly based on the introduction of very high resolution (VHR) data. Increasing the size of this immature market is still the key to developing Earth observation into a sustainable sector, where 'sustainable' in this context means funding by customers and users rather than sponsors.

The Earth observation market has seldom been developed as a mass market, although there is evidence that a mass market is possible. At the workshop DLR presented information about a CD-ROM, developed by the German company Scout Systems (www.scout-systems.de), which contained 2 m pixel satellite data coverage of all Germany plus digital aerial photography of selected German cities. The CD-ROM sold for 30 euros each, and total sales of 12 million euros were achieved. Applying this German experience (by theoretically scaling up based upon population size and country wealth) to the European scale could achieve revenues of ca. 35 million euros, which is comparable with the 30 million euro sales of all Earth observation data in Europe in 1998. The Earth observation sector is not set up to sell to the mass market, but comparison with the sale of music CDs and software on CDs, particularly concerning issues of copyright and royalties, could significantly help the Earth observation sector.

2. The market and the industry

Within the Earth observation market, the European Earth observation industry itself may be a contributory factor to the immaturity of the market, along with the latter's limited size. One difficulty is the intensity of rivalry among companies, particularly for standard Earth observation products. One reason for the low profitability of the Earth observation sector may be structural, which could be tackled by structural change and merging, specialisation in order to discriminate, or greater formal cooperation. A further reason for low profitability is that the development and marketing of downstream products and services is highly specialised and requires extensive and detailed knowledge of individual customer requirements.

3. Price and value

The price of Earth observation data is a function of the true cost to the supplier and the willingness to pay by the buyer. At present the willingness to pay dominates.

The prices charged for Earth observation data are broadly related to pixel size. Fig. 1 shows a log/log linear relationship between price and spatial resolution,

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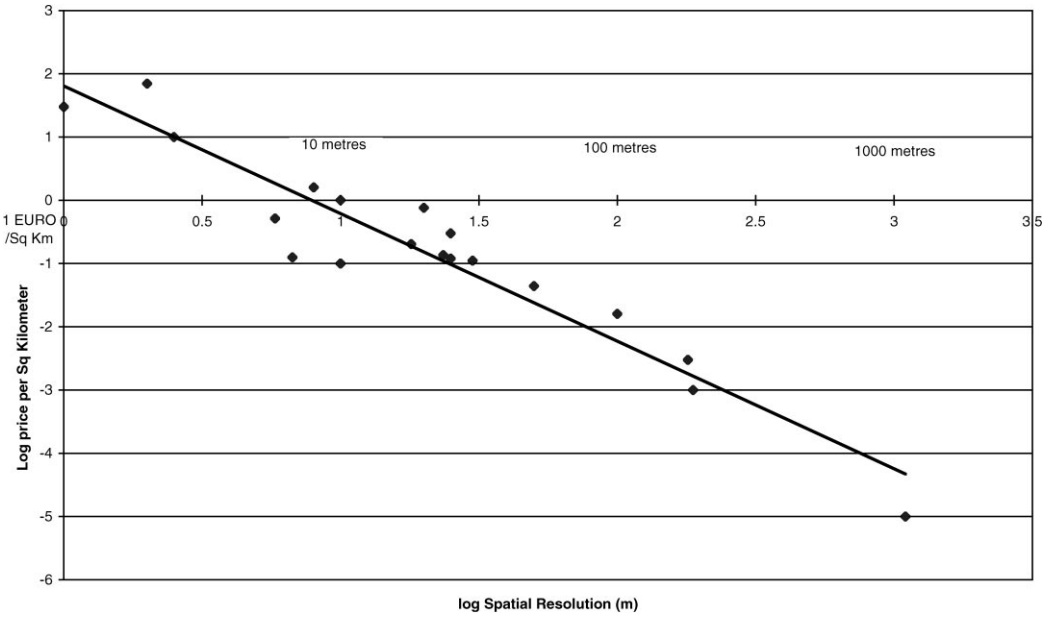

Fig. 1. Linear relationship between price and pixel size. Note: Both axes are on a log scale.

although beyond this broad statement it is difficult to identify any further relationships.

Space Imaging initially identified the following considerations when developing its pricing approach: value of the geographic area (urban vs. rural), level of licence, accuracy and context of product, temporal frequency, dedicated collection, delivery time and nature of processing. Its current pricing approach has been simplified to focus on licence fees per sq. km, minimum order value, product type, and a differentiation of prices for data of North America compared with data of the rest of the world. At present no satellite tasking fees are charged, but Space Imaging foresees their addition in the future.

The question of price vs. value remains consistently unsolved in Earth observation. While categories of value can be identified (for example, economic, social, environmental, physical), because the Earth observation market is small and immature the detailed identification of value can only be assessed in direct relation to a customer's information needs and willingness to pay. The prices charged by some data suppliers therefore reflect a negotiation with a customer based on estimates of the value of that data to the customer. There is at present very little brand identity in Earth observation to convey value.

While some legitimately argue that the price of Earth observation data is a substantial barrier to their use and therefore to the growth of the market, it is also clear that in most or even all applications the cost of Earth observation data constitutes a maximum of 10 per cent of project costs. Therefore, a price of zero for Earth observation data will not unlock the market because the users still have to provide the remaining 90 per cent of project costs in the form of staff, data processing, other geo-information and so on.

Because the Earth observation market is not well developed, so Earth observation data pricing policy is not well developed. The arrival of new VHR satellites will alter Earth observation data pricing policy, in part through their ability to compete with aerial photography. The cost of orthorectified aerial photography in Europe is roughly 15 euros per sq. km, which gives a useful benchmark for the price of comparable VHR satellite data. While current attention is on commercial VHR systems, in a few years time Japan will launch ALOS with a 2.5 m pixel size in stereo: the pricing policy (yet to be determined) for ALOS data may well have an impact on the pricing policies of other VHR data suppliers.

4. European strategic considerations

Price policy should be the servant of mission objectives. Europe at large has strategic objectives in supporting Earth observation, including the contribution it makes to environmental security, technology security and independence. There is a case for the European Commission Structural Funds to be used to contribute positively to these broader European strategic objectives through a rebalancing of government funding. At present in Europe funding for Earth observation is provided by governments largely for the building and operation of Earth observation satellites. An alternative model is to

provide funds to local and regional users — in this case via the European Structural Fund, or via support to global scale environmental monitoring — who then buy Earth observation data, products and services and so assist the growth and maturity of the Earth observation market, including the construction of satellites. The 'anchor tenancy' model organised through large-scale pilot projects could be useful here.

5. New business models

There is extensive interest in Earth observation through the Internet. For example, DLR saw 1.2 million hits per day at its web site for 10 days during the SRTM mission in February 2000. This showed a very high public awareness of at least one Earth observation mission.

The Internet is providing opportunities for new business models which Earth observation can exploit. These new models could include the following:

- Deliver only the Earth observation data an individual user requires by specifying a geographic area and a spectral domain.
- Provide Earth observation data for free and achieve revenues through using the web site for advertising or for developing peripheral business.
- Use emerging satellite TV broadcast channels to disseminate encrypted Earth observation data, provide the access keys via the Internet and price by access key rather than by data quantity.
- Hold Earth observation data auctions over the web, or inverse auctions driven by user needs.
- Bundle GIS and data access tools in with Earth observation data, and use the tools to control data use.
- Provide meters to measure the amount of information extracted from Earth observation data.

6. Law and sovereignty

The relationship between law and policy is complex and the issues are arguably even more important to Earth observation than is creating a workable pricing policy. On the one hand, law is a parameter or boundary condition for policy development, while on the other hand law is an instrument for policy makers to give substance, transparency, coherence and stability to policy instruments. Legal instruments therefore reflect policy decisions of the past.

International law revolves around the sovereignty of states, as reflected in the United Nations Principles on Remote Sensing, where many of the core issues concern the rights of a sensed state. However, once agreed, international law supersedes national law: this means that European Community law (for example) is supreme over national law.

7. National law

National laws and policies provide an explicit or implicit framework for Earth observation. A case of an explicit framework is seen in the USA, where Congress agreed on the Global Change Research Act of 1990 to develop and coordinate

> a comprehensive and integrated United States research program which will assist the nation and the world to understand assess, predict and respond to global change arising through both human-induced and natural processes of global change.

The Global Change Research Act is seen in action through the US Global Change Research Program (USGCRP) with a budget in FY2000 of US$ 1.8 billion, of which more than 70% is spent by NASA on Earth observation. The USGCRP has agreed a set of seven policy statements on data management for global change research. This is a clear example of a law (the Global Change Research Act) flowing through to policy statements.

Europe has no similar legal framework for global change research. However, Europe is developing its plans for Global Monitoring of Environment and Security (GMES). The GMES concept may benefit from further work on the policy and legal factors which can influence major environmental programmes.

Earth observation can contribute positively to the monitoring of national laws. The legal framework in Italy for example is explicitly defined, with many more prescriptive laws than in other countries. These laws, such as those for land planning and environmental protection, can be used in a monitoring sense through using Earth observation data as a key resource. An important question here is the evidential quality of Earth observation data. There is not yet a universal agreement on the admissibility of Earth observation data in a court, and the *Aperture* project, funded by the European Commission, is examining this issue.

8. Civil and military context

The availability of 1 m data from the Ikonos satellite has raised questions about the interactions of civil Earth observation systems with personal issues and with military security. In Germany, for example, a photographer has to request permission to take a picture of an individual person, unless that person is a public person. Earth observation data at 1 m resolution may be able to

resolve individual people, at least with their shadows, but as (1) the purpose of the image acquisition is to take an image of the whole environment in a scene which includes that person; and (2) the data are anyway available to all on a non-discriminatory basis, the question of whether 1 m data violate personal rights has yet to be fully evaluated. If such very high resolution data are misused then a revision of laws and regulations protecting individual freedoms may be required.

The ability of satellite Earth observation to collect data about militarily sensitive areas may mean that the prohibition of ground level photographs of military facilities and areas becomes obsolete.

9. European community

The existing and emerging legal framework of the European community offers some opportunities for Earth observation. Two new 'pillars' were added at the agreement of the Treaty of the European Union: the Common Foreign and Security Policy (Title V) and the Cooperation in the Fields of Justice and Home Affairs (Title VI). At present these two new pillars remain almost completely outside the established legal structure of the European Community, but a higher profile to a Common Foreign and Security Policy could provide a much firmer policy (and ultimately legal) basis for many Earth observation activities in Europe, including those covered by the GMES initiative.

The central and most comprehensive aim of European Community integration is the creation and maintenance of a common market. The efforts to create a common market resulted in what is termed the Internal Market, a single, free market regime in Europe. To the extent that Earth observation activities are clearly covered by provisions of Community law, any competence to legislate with respect to them can be exercised by Community organs. Thus, Earth observation activities fall within the Community legal order essentially because, and to the extent that, they form a category of economic activities in general. One important element of the internal market is the competition regime. It may be that the Earth observation market is too small and immature to be exposed to competition law, but in the future competition law may be useful to ensure no abuse of a dominant position by an enterprise or a group of enterprises.

10. Public service

Earth observation remains essentially a public sector activity in Europe. Earth observation is perhaps at its best when dealing with geographically extensive issues. Such issues often require public services, which in turn engages the state. So far European governments have funded Earth observation directly, but initiatives such as public–private partnerships (PPPs) provide a possible way forward both to allow the state to retain democratic control and to encourage the private sector to share the risks and the rewards of Earth observation investment. In Europe the EC structural funds can help underpin such PPPs.

The state is involved at the policy level because of inter-governmental treaties (such as the Kyoto protocols) as well as at the level of competition law. The value of Earth observation has not been sufficiently well established in this government and inter-governmental context to encourage the construction of mature PPPs. Better definitions of value may help to improve the public service offerings of Earth observation.

On the side of the value added industry, while the specifications of required products have been elaborated in great detail (such as by the World Meteorological Organisation), few of these products have ever been realised since the value-added industry has not become interested or involved. As a consequence, the cost of Earth observation has never been sufficiently well balanced against its value to result in successful applications. An improved and systematic assessment of the required products, their value and their cost may help to improve the public service offerings of Earth observation.