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Aspects of a Licensing and Pricing Model for a Multi-Producer pan-European Data Product*

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Abstract

A customer-driven pricing and licensing model is a prerequisite for the business success of EuroDEM. Additionally, the implementation of the pricing and licensing model underpins the goals of INSPIRE and PSI Directives. EuroDEM is a pan-European geoinformation product that covers 40 countries in Europe. National Mapping and Cadastral Agencies own the DEM but EuroGeographics, whose activities focus on promoting the European Spatial Data Infrastructure, represents it collectively. A systemic approach to the development of the pricing and licensing model is introduced. The customer's needs, competing products, national pricing and licensing rules and principles, and the European Union's information policies have an effect on the model. Furthermore, the will of human beings to act and contribute to common goals is crucial. As a result, a proposal for a new pricing and licensing model is presented.

Keywords: geoinformation, competitive position, information policies, value chain, systems intelligence

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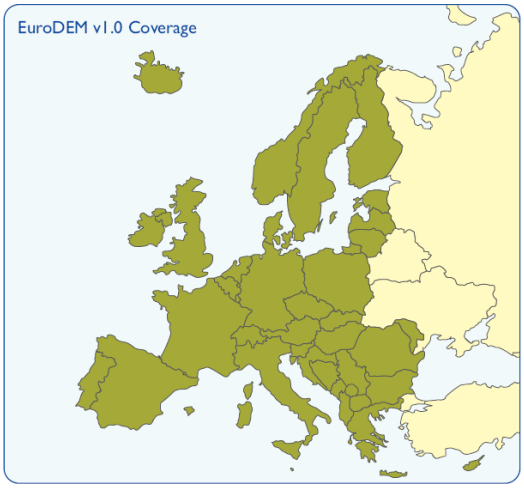
1. INTRODUCTION

The production of geoinformation is, without exception, expensive and this fact is often used as a basis for the valuing and pricing of geoinformation. Nevertheless, the same information may have different values. The value of geoinformation is tied directly to its use and the value that it adds to a certain product or service (Longhorn and Blakemore, 2008). The challenge is to define the pricing of information according to the value to the user of that information (Krek, 2002) and at the same time keep the price level profitable for the information producer. A good business model makes possible powerful and extensive information usage. Unused geoinformation has no value to anyone.

EuroGeographics represents 56 National Mapping and Cadastral Agencies (NMCAs) from 44 countries across Europe. The organisation has four pan-European geographic data products that are based on national datasets. One of these products is EuroDEM, which is a digital representation of the ground surface topography of Europe on a scale of approximately 1:100,000 (EuroGeographics, 2009). EuroDEM is a mosaic of national elevation data and version 1.0 covers the 27 EU countries, the four EFTA countries, and Croatia, Bosnia-Herzegovina, Serbia, Montenegro, FYR Macedonia, Albania, Moldova, and the Kaliningrad area (Figure 1). Member countries such as Russia, Ukraine, Turkey, and Georgia are not yet covered. EuroDEM is owned by the contributing NMCAs and collectively represented by EuroGeographics.

Figure 1: EuroDEM Coverage



Source: from EuroDEM brochure

The advantage of EuroDEM is that it is a seamless and harmonised elevation model, including at the borders of the countries. EuroDEM can be used in, among other areas, environmental change research, hydrological modelling, the ortho-rectification of imagery, topographic mapping, vehicle navigation, flight simulation, and in road and railway network planning. The purpose of EuroDEM is to promote environmental and economic welfare in Europe (EuroGeographics, 2009).

The NMCAs, which own EuroDEM, have agreed on the existing licensing and pricing principles and the price level of EuroDEM. A customer can purchase a single user licence, a multiple user licence, or an internet licence. The minimum licence period is five years and the customer pays an annual fee for the use of the data. EuroDEM is offered as a whole dataset and in four standard European regions: Northern, Western, Central, and Eastern Europe. The NMCAs offer Digital Elevation Models (DEMs) of individual countries.

EuroGeographics wants to maximise the commercial use of EuroDEM. In order to achieve this goal the association wanted to have a proposal for a rational and easily understandable commercial pricing and licensing model for EuroDEM. According to the business experience and studies of the author (Mäkelä, 2008), a versatile and flexible pricing and licensing model is the best way of serving the commercial goals of both the information provider and the customer. But several issues govern this model: customers' needs and expectations, existing and future competing products, the European Union's general information policies, national pricing and licensing policies, and finally, a person's will to contribute to common goals have an impact on the new model and its implementation.

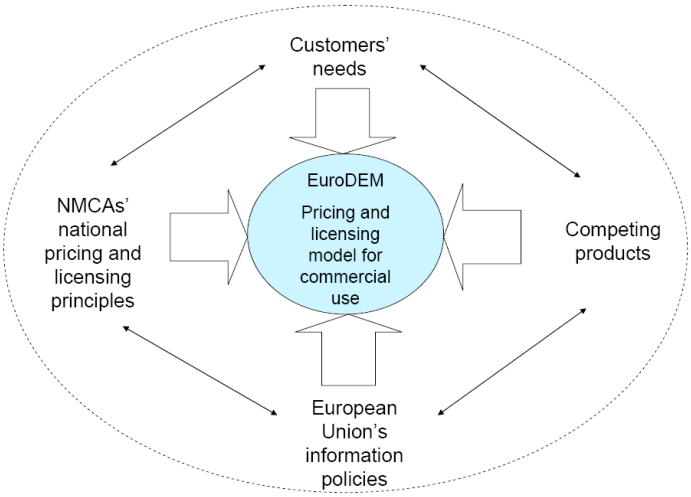
2. A SYSTEMIC APPROACH TO THE DEVELOPMENT OF THE MODEL

The pricing and licensing model of EuroDEM is at the core of a complex system, as illustrated in Figure 2. Customers' needs and expectations, national pricing and licensing policies, existing and future competing products, and the European Union's information policies have a great impact on the new pricing and licensing model that should increase the commercial use of EuroDEM and satisfy all stakeholders.

The many parties, with their conflicting opinions and goals, and the continuously changing market conditions make the system dynamic and complex. It would be simple to study only the commercial part of the system: the customer needs and competing products. However, European and national information policies play an important role in this context. The core idea of systems thinking is that the only way to fully understand and solve a problem is to understand a part in relation to the whole and the effect of the whole on the part. According to Senge (1990), systems thinking is a conceptual framework, a body of tools that makes the full

patterns clearer and helps us to see how to change the patterns effectively. Systems thinking takes a holistic, rational, and external point of view of a system. In this context, the commercial and political considerations of different stakeholders establish a basis for the system analysis and for the proposed outcome, a commercially attractive pricing and licensing model. To develop a new model is the first step but a more important step is that EuroGeographics and the NMCAs, which own EuroDEM together, accept the commercial implementation of the model. Even if it seems as if the national pricing and licensing policies for geoinformation in the member countries bog down or hinder the development of new pricing and licensing principles of EuroDEM, progress is achievable. People in the NMCAs play a key role in this context. The will of human beings to work and act towards common goals is crucial. From the systems intelligence point of view the ability to see oneself and one's active role in the system, also through the eyes of other stakeholders with different framings of the system, is crucial (Hämäläinen et al 2006).

Figure 2: Pricing and Licensing Model is Part of a System



Experimental data were collected through questionnaires to EuroGeographics' members with business experience and through interviews among existing and potential EuroDEM customers (Mäkelä, 2008).

2.1. Competitive Position of EuroDEM

In a commercial market, the attractiveness of an industry and the determinants of the relative competitive position within an industry define the choice of a company's competition strategy (Porter, 2004). EuroGeographics wants to

maximise the commercial use of EuroDEM and therefore the competitive position of the product has to be analysed: potential customers and their needs, competing products that are already on the market, and possible new entrants. Are customers satisfied with the existing pricing and licensing model, or is the model a barrier that prevents EuroDEM from competing in the market to a full extent?

The attractiveness of the geoinformation industry is high and the industry has been growing continuously in recent years. According to a PIRA study (Pira International Ltd, 2000), the economic value of the commercial exploitation of Public Sector Information in Europe in the year 2000 was 68 billion euros. The share of the geoinformation industry was 36 billion euros. The geoinformation sector was the biggest single information sector. The easy access and use of PSI at minimal expense support the value-adding industry. The global sales volume of geoinformation was 677 million dollars in the year 2004 (Daratech, 2006). The market growth from the year 2004 to 2005 was based on the sales growth of geoinformation. The demand for public sector geoinformation is continual. On the basis of the development of the market the EuroDEM product could have good opportunities to succeed in the European market.

Five competitive forces determine an industry's profitability: buyers, suppliers, alternatives, potential entrants, and industry competitors (Porter, 2004). Buyer power influences the prices companies can charge their customers. Buyer volumes, concentration, and their price sensitivity determine the buyer power. The bargaining power of suppliers determines the cost of raw materials. Geoinformation has a similar cost structure to other information. It is expensive to produce but the cost of reproduction is low (Krek, 2002). Nagle (2006) introduces three tactics for pricing: cost-plus pricing, customer-driven pricing, and competition-driven pricing. Even national DEMs have been very expensive to produce and cost-plus pricing would lead to the overpricing of EuroDEM. Customer-driven pricing reflects the needs of market conditions and indicates what the product is really worth. Shapiro et al (1999) introduce three different product pricing methods: personalised pricing, product versioning, and group pricing. Commercial companies can define a personalised price for different customers but a government organisation must comply with fairness in information pricing. Group pricing involves setting different prices for different groups of customers. Brand identity or the reputation of the information product (Shapiro et al 1999) determines whether customers are willing to buy a product or service. According to Nagle et al (2006), customer-driven pricing can even raise customers' willingness to pay a high price.

Even if the NMCAs are public authorities, they can shape the attractiveness of the industry and strengthen the position of geoinformation with the right licensing and pricing policies that reflect the market conditions.

2.2. Competing Products

The usability of a DEM can be evaluated by technical requirements such as geographical coverage, resolution, vertical and horizontal accuracy, and time frame. EuroDEM is a mosaic of national DEMs. The resolution is two arc seconds, which is approximately 60 m at the equator. The horizontal accuracy is about 10 m and the vertical accuracy is 12 m at a 95% confidence level. EuroGeographics has plans to update the current EuroDEM to EuroDEM30, which has a 30-m resolution and 5-m vertical accuracy. The timetable of the update is open. The competitive advantages of EuroDEM are its proven quality, continuity, and comprehensiveness (EuroGeographics, 2009; Miseretz et al 2009).

EuroDEM is not the only digital elevation model on the European market. At least six commercial DEM products – GTOPO30, SRTM, SPOT Reference 3D, NextMap, ASTER GDEM, and TanDEM-X – are available. GTOPO30[1] is a global DEM and ASTER GDEM[2] covers the Earth between 83 degrees North and 83 degrees South. Because the Shuttle Radar Topography Mission (STRM)[3] covers the Earth between 60 degrees North and 56 degrees South, parts of the Nordic countries are not covered. It was difficult to find exact coverage information from SPOT Reference 3D[4], NextMap[5], and TanDEM-X[6]. At the moment, the DEMs do not cover all EU Member States but SPOT Image, InterMap Technologies, and Infoterra have plans to expand their DEMs in the future.

The resolutions of the DEMs vary from 5 m to 1 km. The 5-m horizontal resolution of NextMap is the highest and the 1 km of GTOPO30 is the lowest. The next highest resolutions are the 12 m of TanDEM-X and 30 m of SPOT Reference 3D and ASTER GDEM. STRM has a 90-m horizontal resolution. Most of the producers have described vertical and horizontal accuracies using the quality measures LE90 or LE95 (linear error at a significance level of 90 or 95) or CE95 (circular error). Some of the producers describe positional accuracy as absolute accuracy and some as relative accuracy and therefore direct comparison of the DEMs is difficult. According to the product information, the positional accuracy (vertical: 2 m LE95, horizontal: 4 m CE95) of NextMap is the best. The vertical and horizontal accuracies of TanDEM-X and SPOT Reference 3D seem to be on the same level as EuroDEM, whereas the positional accuracies of ASTER GDEM and GTOPO30 are worse. One important factor that contributes to the usability of

[1] GTOPO30 home page:
http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info
[2] ASTER GDEM:http://asterweb.jpl.nasa.gov/gdem.asp
[3] STRM home page: http://www2.jpl.nasa.gov/srtm/
[4] SPOT 3D: http://www.spotimage.com/web/en/810-spot-3d.php
[5] NextMap: http://datastore.terrainondemand.com/
[6] TanDEM-X: http://www.dlr.de/hr/desktopdefault.aspx/tabid-2317/3669_read-5488/

the DEM is whether it includes vegetation and buildings, as STRM does, or is a digital terrain model that represents the bare ground surface.

All other competing DEMs except TanDEM-X are distributed to users online from the internet. All users can get GTOPO30 free of charge. STRM is available free of charge for non-commercial use, but a commercial licence is charged for. ASTER GDEM is free for users who utilise the DEM for work or research in the nine societal benefit areas that are defined by GEOSS. The prices of SPOT Reference 3D and NextMap are expressed in terms of euros per square kilometre. Even when users acquire one of the free DEMs they have to register and accept the conditions of data use. When a user purchases a SPOT Reference 3D he can choose between a standard licence for internal needs for the end user or a multilicence when more than two people use the data. A NextMap user can choose between a perpetual use licence, a project use licence, and a managed account. The diversified pricing and licensing principles of the six competing products support their attractiveness in the market.

2.3. Customers' Needs are Important

In Europe companies that develop products and services using PSI meet barriers such as difficulties in learning about and finding existing information, the complexity of the licensing and pricing structure, the prohibitive cost of geoinformation, and the lack of standardisation of data formats and data quality (Pira International Ltd, 2000; European Commission, 2003b). These barriers hamper small companies in particular in developing their business but large companies too may give up their plans to use geoinformation. The results from the Comparison Workshop on a European Digital Elevation model (Miseretz et al 2009) and the ESDIN (Underpinning the European Spatial Data Infrastructure with a Best Practice Network) project (Hartnor and Eriksson, 2010) confirm that new licensing and pricing arrangements that maximise the potential use of pan-European data products such as DEM are needed. Many users prefer to acquire elevation data as an online service where data from specific areas can be accessed on demand rather than acquiring the whole dataset in one go.

Directors and managers from four international commercial companies and one international organisation were interviewed in a study (Mäkelä, 2008) in order to get detailed information about their business plans and needs in relation to EuroDEM. Because of their positions, these people had a good view of the present situation and they were competent to analyse the future possibilities and benefits that the new licensing and pricing models would bring. Even if all the interviewees were working in large companies, two of them had earlier experience from small companies. The companies that were interviewed represented different areas of business such as map publishing, IT and business services, products and services for risk management, and the distribution of

remote sensing-based products and services. The market areas of these companies varied from global to covering only a few European countries. EuroGeographics chose three of the interviewees because it already had business contacts with them. The author chose two of the companies because they both have a large customer base and they had used digital elevation data in their products and services. The questions dealt with the following issues:

- products or services in which EuroDEM could be used
- the importance of EuroDEM in these products or services
- the life cycle of the products or services
- potential end customers and their locations
- the advantages and disadvantages of the current licensing and pricing model of EuroDEM
- the most important aspects that should be taken into account in the new licensing and pricing models

The customers had plans to use EuroDEM in their internal business or utilise it in value-added products and services that they sell to their own customers. The Value-Added Resellers (VARs) had a very strong opinion that the existing licensing and pricing principles of EuroDEM do not respond to their business needs. Product life cycles continue to shorten (Nagle et al 2006) and commercial companies do not want to commit themselves to long-term agreements. It is difficult to predict how products and services will develop and what the market potential in the future will be. Small value-added companies in particular appreciate low economic risks in their initial geoinformation investments. The customers hoped that the new pricing and licensing model would fit all of their customer cases. One interviewee said that the main principle of his company is to sell online geoinformation services to all kinds of customers, both to small and large organisations that have different capabilities to pay for the service. Another interviewee said that they would like to use EuroDEM in their consumer products, such as printed maps and digital mobile maps. One customer said that if they pay a high price for EuroDEM they should be able to use the data in many different products.

The customers who were interviewed accept that geoinformation has a price. Some of them are even ready to pay a high price if they can buy only the data they need and they do not have to pay for data that they do not use at all. This disproves the common statement that customers will always try to get geoinformation as cheaply as possible or even free of charge. Customers act in a systems intelligent way. They do not want to paralyse the system, but want commercial cooperation, but on new terms that are favourable for them. If EuroDEM is important for a product or a service and the financial risk associated with investment in EuroDEM is at an acceptable level, there seem to be no

barriers to commercial cooperation between EuroGeographics and the customer. Customers want to connect the payment for the data to the sales of their products or services. They do not want to make high-priced initial investments in data. In addition, when the lifecycle of the customer's product is from two to three years he cannot commit to a five-year licence agreement. When EuroDEM is a part of a map product or map service, royalty-based pricing is, according to the VARs, the only realistic pricing that they are willing to accept. However, in royalty-based pricing, the vendor and the customer have to agree on the value and the share of the DEM in the final product.

The preceding viewpoint is the opinions of large companies. If the managers of small or medium-sized companies had been interviewed, they might have had partly different opinions on the pricing and licensing policies.

2.4. European Union's Information Policies

Digital content and services are the core of the European Information Society. The Information Society brings benefits to European society and the European economy. Online businesses, such as mapping and navigation services, are not restricted to national markets but are available to all customers throughout Europe (European Commission, 2009).

The European Union's information policies, especially the INSPIRE, PSI, and Services Directives, can be regarded as constraints or enablers. The directives impose requirements on member states but also promote opportunities to harmonise national information pricing and licensing policies and fit them better to both national and European user requirements. Both the INSPIRE directive and the PSI directive contribute to the re-use of public sector geoinformation.

The NMCAs are public authorities and they must follow the laws and regulations that Member States bring into force to comply with these Directives. The PSI Directive, Directive 2003/98/EC on the re-use of public sector information (PSI), wants to facilitate the creation of Europe-wide information products and services based on public sector information. The aim of the Directive is to enhance the effective cross-border use of public information by private companies for added-value information products and services (European Commission, 2003). The European Parliament wants to create conditions that are conducive to the development of Community-wide services. Harmonisation of the prices that are charged for PSI across the EU increases the ability of small and medium-sized enterprises (SMEs) to take full advantage of the European market (Pira International Ltd, 2000). Also with the Services Directive, Directive 2006/123/EC on services in the internal market, the Commission wants to reduce the barriers that SMEs meet in cross-border trade.

The spatial data infrastructure (SDI) is a core infrastructure supporting economic development, environmental management, and social stability (Williamson et al 2003). At the European level, Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) obliges each Member State of the European Community to create a national spatial data infrastructure (NSDI) that is compatible with common implementation rules and usable in the Community and the transboundary context (European Commission, 2007). The Directive obliges Member States to offer network services that make it possible to discover, transform, view, and download spatial data held by public authorities. If public authorities want to charge for viewing, transforming, or downloading services, they have to ensure that e-commerce services are available for users. The main purpose of INSPIRE is to create an infrastructure that promotes the usage of spatial data Europe-wide. INSPIRE also challenges Member States to develop their national spatial information strategies in such a way that the strategies support the implementation of SDIs. In this process, the interaction between spatial data users, suppliers, and value-adding agents drives the development of SDI. A functional SDI facilitates the development of innovative business applications.

According to the European Commission (European Commission, 2003a), "...there are considerable differences in the rules and practices in the Member States relating to the exploitation of public sector information resources, which constitute barriers to bringing out the full economic potential of this key document resource". On one hand, the current national rules, such as geoinformation pricing rules, are politically agreed and difficult political decisions are needed to change these rules. These practices tend to mould people's minds and actions in such a way that they tend to trust only these safe practices. This is very human but not a very systems intelligent way to think. EuroGeographics' activities focus on underpinning the European Spatial Data Infrastructure. Its vision is "to achieve 'interoperability' of its Members' national land and geographic information assets in order to provide Europe with an information asset that will support its goal of becoming the most competitive and sustainable economy in the world". Cooperation in the development of the new pricing and licensing model of EuroDEM is one important step toward the goals of EuroGeographics.

2.5. EuroGeographics' Members' Points of View

The NMCAs, as the producers and owners of EuroDEM, are in a powerful role in the system and in the development of the model. Their national customer bases are extensive and versatile because they generally serve both public organisations and commercial companies. It was important to get information about the prevailing practices in the pricing and licensing of geoinformation in EuroGeographics' member countries and to get their points of view on EuroDEM.

The pricing and licensing principles in six member countries – Finland, France, Germany, the United Kingdom, Sweden, and Switzerland – were studied (Mäkelä, 2008). These countries were chosen because they provided the documents in languages (Finnish, Swedish, English, and German) that were understandable for the researcher. The main observations were:

- all six NMCAs have direct user licences and partner licences;
- in internal use, the price is related to the number of users/workstations and the data licence fee is an annual fee, a ten-year licence fee, a disposable licence etc.;
- in value added products, the royalty is a certain percentage of the selling price. The percentage depends on how valuable the data are for the product or service (the producer cannot make the product without the data or it is just "nice to have" the data in the service);
- in online Web Map Services the price is based on the number of pixels or is transaction-based where the amount of pixels on the map display is restricted;
- data are distributed both offline and online.

In the study (Mäkelä, 2008) a questionnaire was sent by email to fourteen members of the Business Interest Group of EuroGeographics. Members from Belgium, Denmark, France, Finland, Germany, Malta, and Switzerland answered questions that dealt with the commercial use of EuroDEM. They described their visions and viewpoints with regard to the following issues:

- the most important and probable ways to use EuroDEM commercially
- the most probable and significant customers of EuroDEM in the near future
- prioritisation of customer groups
- new technical ways of distributing geoinformation
- revenue development from EuroDEM sales

Members named navigation products and services, solutions in the military and insurance sectors, environmental modelling and analyses, and computer games as important application areas. They also expect to get customers from the tourist and sports industries. Traditional map production and publishing will also retain its business position in the future. However, the opinions about the most promising and profitable business areas and customer sectors varied between the respondents. All respondents agreed that as public authorities they must serve all their customers equally. They found it difficult to give opinions about the new technical ways of distributing geoinformation.

One important aspect is the expected revenue from EuroDEM sales. National funding policies and attitudes to cost recovery vary significantly in different

countries (Pira International Ltd, 2000). Because of that, both public funds and commercial revenue are very important to some members. For some of EuroGeographics' members non-constant annual revenues are a risk, whereas some members were ready to accept variable annual revenues if future expectations of an increase in revenues were presumable. The conflict of short-term and long-term business goals is an obvious challenge in this context. One member stated that the revenue should not play such an important role but "the aim has to be to bring EuroDEM to the customer and to have highly flexible licensing models that serve the user's needs".

Olson (1965) writes about collective action: "If the members of a large group rationally seek to maximize their personal welfare, they will not act to advance their common or group objectives unless there is coercion to force them to do so, or unless some separate incentive distinct from the achievement of the common or group interest is offered to the members of the group individually." In this context the INSPIRE and PSI directives could be regarded as coercion. Even if the directives do not legislate the commercial pricing of geoinformation, they do put pressure on national information pricing and licensing policies. However, the answers of most respondents indicate that the goal of maximising the commercial use of EuroDEM does not harm the welfare of an individual NMCA. On the contrary, they think that they are able to get something more by working together towards a common goal. The organisations and people have already started a WE story (Stone Zander et al 2000) by creating a common EuroDEM. In a WE story, a human being seeks to contribute and is engaged to togetherness. It points to relationships and movements. As one member commented: "Now when WE have EuroDEM it is important that we undertake marketing actions in the near future." It is obvious that a pan-European product attracts customers who would not buy separate national products. This gives EuroGeographics a pricing opportunity.

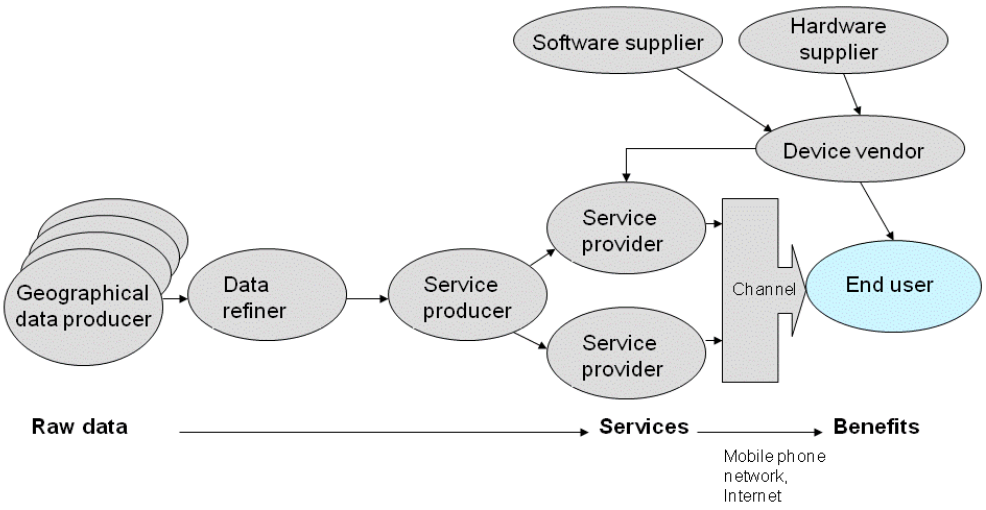
According to some of EuroGeographics' members, the most significant customers would be private companies such as companies in the military and civil engineering industry, global service providers, and added value producers. Some of the members named public organisations such as European agencies, cross-border organisations, universities, and the military as important customers. The fact that the members had partly conflicting opinions about the importance of customer target groups sets challenges for the new pricing and licensing model. Cases where an end customer purchases EuroDEM for internal use and where a company adds value to EuroDEM and sells the new product or service to its end customers or other VARs require different pricing and licensing principles. The next chapter describes the challenges of the pricing and licensing of geoinformation in a value chain.

2.6. Geoinformation in a Value Chain

When a market is increasingly complex, just selling data is not likely to generate significant income (Lash, 2002). Information such as geoinformation, which generates added value through reuse and repacking, has a special value. In an information society, much more revenue is generated through use value. Networking is becoming more and more important in business. Companies must focus on their collaborators (Shapiro et al 1999) and assemble a powerful group of strategic partners. Many of the NMCAs named the VARs as their most important partners.

EuroDEM could be utilised in products and services that are a part of a value chain. The business model of the chain is conclusive in whether the chain will succeed or not. In earlier times, companies used to carry out all the processes in a value chain themselves. Now they network with various subcontractors and service providers or even with their competitors. Geoinformation application areas have grown dramatically in the last decade and geoinformation can be part of a very long and complex value chain, such as the LBS chain in Figure 3. One actor cannot control the complete chain. You just have to trust the other actors. It is easy to cooperate with trusted partners at a national level. In a complex international chain you seldom have influence over the other actors and whom they choose for their own partners.

Figure 3: Actors in a Value Chain of Location-Based Services (adapted from Herrala, 2007)



In the LBS information value chain, value is added to information by various activities as the information progresses from raw data to a new form of information or information service. The value chain consists of several actors: one or several data producers, data value adders, location-based service producers, service providers, and end users. Equipment suppliers such as handheld computer and mobile phone suppliers may also be part of the chain when the service provider bundles the information and equipment together. The last producer who is closest to the end user in a value chain creates the final value of the product (Krek, 2002). “The farther back one goes in the value chain, the lower is the value of the product”.

When you are selling one component of the system, you cannot compete if you are not compatible with the rest of the system (Shapiro et al 1999). When your component is at the beginning of the value chain, as in the LBS chain, the terms the data provider lays down regarding the use of the data are crucial. An unsatisfactory pricing and licensing model can destroy the chain, whereas an adaptable model can make the value chain flourish. If all the actors want to maximise their profit, the value chain will not work. It is systems intelligent to understand the value of geoinformation in different contexts. In dynamic business environments product and service life cycles shorten, and companies are merged. New value chains arise and old chains come to an end. The business environment is increasingly challenging for decision makers. A good sense of situation and an eye for the game help a human being to decide whether it is worthwhile to join the chain or not. A flexible pricing and licensing model plays an important role: it helps EuroGeographics to respond quickly to business cases where EuroDEM would be part of a value chain. It can prevent unnecessary delays in business negotiations when, for example, a customer wants to use the data in an innovative way in web or mobile services. EuroGeographics may even lose business opportunities of this kind if it cannot react quickly enough to customers’ needs.

3. THE PROPOSED PRICING AND LICENSING MODEL

The study (Mäkelä, 2008) highlighted the need for changes in the current pricing and licensing model of EuroDEM. A new model was developed that was based on customer needs, the pricing and licensing principles of competing products, the EuroGeographics’ members’ points of view, and the requirements and recommendations of the INSPIRE and PSI Directives. In this new model, the existing model was extended by new pricing and licensing principles. In the development of the model the national pricing and licensing principles of EuroGeographics’ member countries, the practices in the trade of statistical information and weather and climate information, and the business experience of the author were utilised.

3.1. Licensing Principles

The proposed licensing principles are based on the segmentation of customers into two categories: customers who use the data in their internal businesses and customers who add value to the data. The proposed four options are:

- licence for internal business use
- licence to produce value-added professional products and services
- licence to produce paid-for value-added consumer products and services
- licence to produce free-of-charge consumer products and services

These options respond to customer needs and comply with the prevailing practices of NMCAs. The options should thereby be acceptable in the member countries. In this model, the end customers of VARs can be professional users or consumers.

A customer can choose from three different licence periods: a one-year licence, an open-ended annual licence, or a five-year licence. The one-year and open-ended annual licences support the usage of EuroDEM both in consumer products or services and in professional projects.

3.2. Pricing Principles

Customers' geographical market areas vary and they want to decide for themselves which EuroDEM coverage to purchase. Good options are:

- full European coverage
- regions (Northern Europe, Western Europe, Central Europe, Eastern Europe)
- customised country packages (two or more countries)
- area-based (km^2) data download or integration from an online ASP (Application Service provider) service

In area-based use, the customer must utilise EuroDEM from at least two countries. The customised country packages and area-based data use should support and encourage both small and medium-sized companies to use EuroDEM in their innovations and businesses. Large companies and organisations too should benefit from these options, for example in different projects. Web service-based delivery is possible for all options.

Customer-driven group pricing is the basis for the proposed pricing model by setting different pricing options that satisfy several customer groups, such as VARs and professional end users. EuroGeographics and the owners could base the pricing on the existing price level or one set for another volume.

Pricing options:

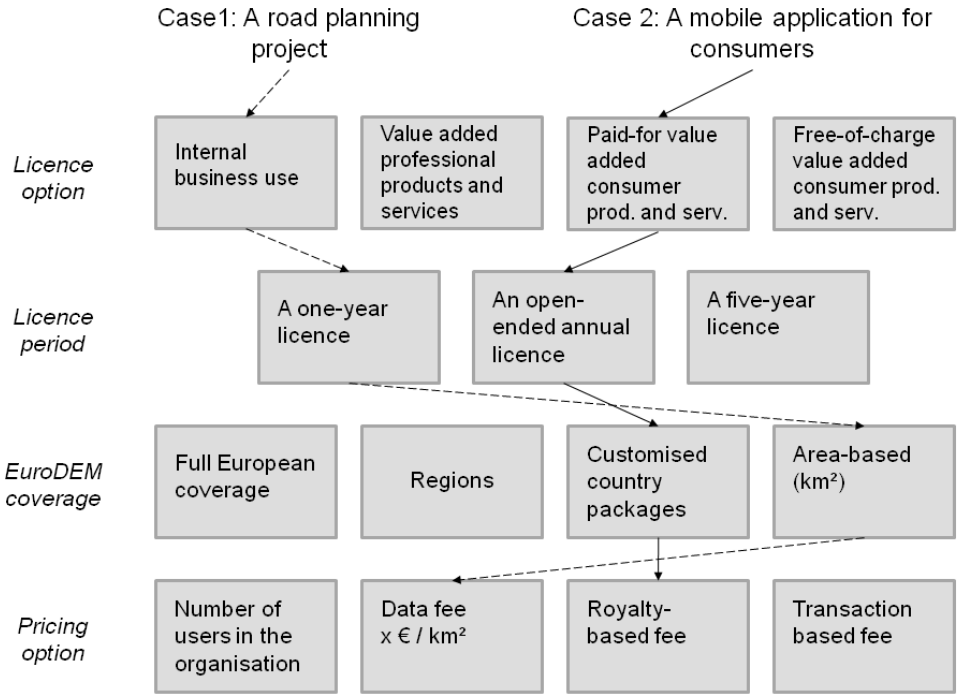
- the fee is based on the number of EuroDEM users in the organisation
- data download fee: x € / km²
- royalty-based fee: X% of the products' or services' wholesale price (depends on the value and share of EuroDEM in the product or service)
- transaction-based fee

In internal use, the price generally depends on the number of data users or on the number of workstations where EuroDEM is stored. Royalty-based pricing is normally used in professional and consumer products and services, The price is based on the value and share of EuroDEM in the product or service. If the product cannot be produced without EuroDEM, its value is very important. If EuroDEM is just in the role of "nice to have", its value is less important. Royalty-based pricing is fair, because product and service prices vary a lot in different regions in Europe. If a flat rate is applied to all customer cases, this prevents the effective and comprehensive commercial usage of EuroDEM.

Transaction-based pricing is often used in internet and mobile services. The price is based on "hit packages". The general pricing tactic is that the more hits that take place in the service, the bigger the price discount to the customer. The number of hits depends on the success of the service and on the geographical market area. In some sparsely populated market areas, a very successful service can generate only a fraction of the number of hits of a corresponding service in a populous area. However, both services might be important for the economic development of Europe and the pricing model should support both of the services.

One licensing and pricing option cannot satisfy all customers. Therefore, several options are needed. As an example, licensing and pricing models for two fictitious business cases are described (Figure 4). The first case is an international road planning project which covers areas in Lithuania, Poland and Germany. The consulting company, which is in charge of the planning project, uses EuroDEM for a one-year period. In the second case, a company wants to market a mobile application to consumers. The company wants first to test the attractiveness of the application in a market area that covers Finland, Sweden and Norway.

Figure 4: Pricing and Licensing Models for Two Business Cases



3.3. More Advantages than Disadvantages?

During the research, it was not possible to test the model in real business cases. The testing would have given objective estimations about the suitability of the model. However, EuroGeographics wanted to get some estimation about the possible advantages and disadvantages of the new model. Because the author had worked for twenty years in the GIS business and she had been marketing GIS services, map products, internet services, and mobile applications both to professionals and to consumers in the Nordic countries and in Europe she tried to identify the advantages and disadvantages of the model on the basis of her professional experience. The following points of view are not facts but subjective opinions. The opinions were presented in a seminar to EuroGeographics members with business experience and they seemed not to disagree with the viewpoints.

For the present, a customer can buy either the pan-European EuroDEM or that for one of the European regions, regardless of the purpose of use. EuroDEM is simple to sell but this practice favours large international companies whose market area covers the whole of Europe or major parts of it, and which have good economic resources. It seems obvious that if this is the only option EuroGeographics might lose several potential customers. Customised country packages would attract companies whose market area covers only a few countries. Country packages are also simple to sell but some extra work may be needed to compose these personalised packages and to deliver them to a customer. The advantage for the customer would be that he pays only for the data he needs and gets. The disadvantage for the NMCAs would be that in the short term they might get less revenue, but the more customers EuroGeographics got, the more revenue the owners might get in the long term.

The possibility of buying an area-based EuroDEM from an ASP service would certainly attract potential customers. For example, international road planning projects may cover many countries but the DEM is often needed only for a limited sector around the centreline of the road. An ASP service makes possible the online downloading of data covering a selected area. The customer could download and pay for only the DEM that covers the project area. EuroGeographics could make agreements with their partners that they would offer this kind of service to customers. This model would require a good and confidential business relationship between EuroGeographics and the partner. EuroGeographics should trust the partner so that the partner could store the pan-European EuroDEM in its data server and sell the data through an ASP service to customers. The service should compile access statistics automatically and these statistics would serve as the basis for their billing (Fornefeld, 2005). Royalty-based pricing would favour customers because it is economically safe for them. However, it might be difficult for EuroGeographics to estimate the future revenue from the EuroDEM sales because it would depend on the market success of the customer's products.

A customer's commitment to a five-year licence agreement would be an advantage to the owners of EuroDEM because it would guarantee a regular annual revenue stream to them. However, if this were the only option, it would prevent potential customers from buying EuroDEM. An open-ended annual data licence would be an easy way to test how well EuroDEM suits a customer's purposes. If the DEM were useful, the customer would probably become a long-term customer. The disadvantage of an annual licence would be that EuroGeographics might get many short-term customers. In that case, it would be very difficult to estimate an annual revenue stream in the long term, which some EuroGeographics members regard as very important. Some customers who were interviewed hoped that they could buy a one-off licence: pay once and use the information for ever. This option would, of course, be an advantage to those

customers who were ready to make an outright payment. It may be a disadvantage to the owners unless they can reach agreement on an adequate price.

Since the research was conducted, the technical development of web services has made possible more user-friendly data delivery and licensing applications. For example, a web service for a modular licensing system that integrates the licensing terms of NMCAs has been developed in the ESDIN project. In addition, measures to open public data have started. For example, the Ordnance Survey and National Land Survey of Finland have opened some of their small-scale map products for all users for free. These new opportunities and development trends should be observed in the future business development of EuroDEM.

4. CONCLUSIONS

This paper considers the challenge of developing commercial licensing and pricing principles for a multi-producer pan-European geoinformation product. Where European information policies promote the effective use of public sector information such as geoinformation, national rules and principles may restrain the versatile commercial use of such harmonised products. A study revealed that customers are even ready to pay a high price for geoinformation if they have to pay only for the information they need in their business.

Therefore, a flexible, customer-driven pricing and licensing model for EuroDEM corresponding to the current and future needs of the geoinformation market should be adapted. The owners should have a mutual understanding that EuroDEM is a product for the European market and the product can and shall have different values, prices, and rights of use from corresponding national products. This is a prerequisite for the business success of EuroDEM. Success does not come overnight. Organisations' and people's will to cooperate and act towards a common goal is crucial.

In the future, more and more national geographic datasets will be part of a European information product or service. The European SDI challenges public data producers and owners to establish common principles for data use. The implementation of the proposed pricing and licensing model of EuroDEM is one important step in underpinning the European SDI and in creating flourishing and successful cooperation.

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