GEOGRAPHIC INFORMATION BUSINESS IN THE NEXT CENTURY

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Abstract

Geoinformation business today is seen mainly as traditional consulting, often by surveyors and cartographers. In most countries, the collection of spatial data, especially property surveying, is organised as a technical consultancy centered around understanding the data collection techniques.

In the years to come, demand for property surveying, often the major activity of surveyors, will not likely increase. Geoinformation, however, can be used in various contexts and for many different activities - it is a field with a large growth potential. The same data, once collected, can be used by and sold to several organisations. These growing business opportunities are open to all: town administrations, utilities, surveyors, planners, and geographers, may profitably sell Geoinformation products from their own data bases.

Designing and marketing a *Geoinformation Product* requires an approach which does not start from the data collection methods but from the user's needs: The Geoinformation Product must provide an information useful and valuable to the user. Content, appropriate data quality and presentation must meet the user's expectations. The price must be commensurate with the benefits the users derive from the information. The price of a product is not linked directly to the cost of its production, thus the cost of a Geoinformation Product, i.e. digital geographic data, is not linked directly to the cost of collecting and providing the information. To sell the same data to different user groups to be used for different purposes requires product differentiation, in order to reap maximal benefits.

The specialists for Geoinformation are challenged by the new market opportunities to sell data for car navigation support, marketing and distribution services, emergency services, and, last not least, leisure activities like travelling.

1 Introduction

Several traditional business sectors are now being regrouped and labeled as Geoinformation Business. This includes cartography, surveying in many forms, the AM/FM (automated mapping and facilities management) groups in public

utilities and many more. Reports regularly describe this business sector as growing extremely fast; for individual countries, 20 to 30% of annual growth are predicted. At the same time, some of the traditional professions in this sector, often surveying companies, do not show much growth and some companies encounter economic difficulties.

An analysis of the situation of the Geoinformation business helps to resolve the apparent contradiction between the phenomenal growth rates reported and the difficulties encountered at the same time. The presentation here is a condensed form of two studies, which I have presented to a surveyors' and a GIS conference respectively (Frank 1996a; Frank 1996b). For the purpose of a clear message, I have to paint an overdrawn picture, which is not true for any particular case, but captures and hopefully communicates the essence of observations I have made in many places in the past years.

2 Traditional Geoinformation Business

In very simplified terms, and generalizing, in the past, Geoinformation has been collected by surveyors and distributed by cartographers. There are typically three major players: surveyors collecting spatial information for small areas, mostly property and construction surveys, National Mapping Agencies which collect data for national coverage with topographic maps, and last, the local authorities and public utilities, which maintain their own records describing their facilities.

The situation in Europe varies enormously and many different situations are encountered. There are clearly other businesses and other organisational structures in the Geographic Information arena. For the argument which is intended here, the sectors considered are sufficient.

2.1 Surveying

Surveyors collect spatial information for small areas and deliver the collected information as maps and plans to their clients. There are two major application areas: property surveys and construction surveys.

For property surveys, the boundaries of a parcel are identified and its position described with measurements. There are generally very strict rules about the procedures and techniques to use and in most countries only licenced surveyors are allowed to perform property surveys. The result of a property survey is, together with other documents, filed in a registry (registry of deeds, title registry, cadastre etc.). The form and content of the survey is regulated by public law and the client cannot influence the result. Indeed the client is - strictly speaking - only interested to receive a survey which fulfils the registration requirements, but not interested in the details of content and presentation.

Surveyors collect data to facilitate a construction process. This starts with a site survey, may include to stake out the building when it is started, follow the construction process if the building is large and complex, and produce a final survey, when the building is completed. The surveyor is closely integrated into the building process and contributes to the result.

The surveying profession is usually organised as a liberal profession. Access to the profession is restricted with licencing regulations, requiring certain levels of education and professional experience. The work is carried out as a consultancy or as a contract to produce a work of art. Professional organisations often set a schedule of fees or give other indications how prices for services should be calculated. Surveyors - like other liberal professionals - are not concerned much with marketing of their services; often some aspects of marketing, especially publicity and price competition, are explicitly banned by professional regulations.

Surveying services are not a growing market; property surveys will not likely increase in the next years. The demand for construction surveys fluctuates with the amount of construction carried out, but it is, seen over a long period of time, rather decreasing in most European countries. For a large share, the client for surveying services is the public, and this budget - both for survey work and constructions - is generally limited and slowly decreasing.

In this situation, prices paid for survey work often do not reach the levels fixed in the schedules of fees, which are covering cost plus a fair return on the capital invested. Many surveying companies perform work for a remuneration, which does not cover their cost. This is typically observed in markets where the quantity offered is fixed - by the number of surveying offices with their permanent staff - and the demand is fixed or slightly decreasing (it seems to be generally true for the construction industry in several countries).

The surveying professionals - and similar strictly regulated, liberal professions - have difficulties to argue for higher prices for their services. It is believed, by surveyors and their clients, that the product the client receives is fixed and does not vary in quality between different producers. The potential to redefine the product - taking a perspective from the client’s side - and to increase its value for the client, is often not seen. It is possible for the surveyor to provide a product which is further developed and closer to the decision process of the client. This product has more value for the client and can fetch a better price. Additionally, the value of the product can be increased by improving its quality - and by quality not only precision is of interest, but timeliness of work delivered, results delivered in electronic form in the format the client uses, etc.

2.2 Mapping

In most European countries the National Mapping Agencies have a mandate to establish a national coverage with topographic maps, usually starting from 1:25000. Most countries have achieved national coverage. Data collection is reduced to maintenance, but personnel is reassigned from original data collection to the digitalization of the data collected in analog form. Given today's budget situation, public administration can hardly expand and full digital coverage is achieved within a few years.

National Mapping Agencies sell topographic maps, similar to private mapping companies, but are national agencies, controlled by the rules of public administration and not organized as private enterprises. The structure of national agencies and in particular their accounting rules, limit the business decisions the leaders of National Mapping Agencies can take. The amounts fixed in national budgets must pay for all expenses; income from sale of maps or digital data is in most cases not added to the budget and cannot be used to cover additional expenses. Indeed, every sale is a loss to the National Mapping agency, as it constitutes an additional cost to produce and distribute the map, which is not offset by income from the sale. This clearly limits plans to expand aggressively into digital Geoinformation business.

2.3 Local Administration and Public Utilities

Geoinformation applications in local administration and public utilities are a large share of the Geoinformation market. Mostly large scale (larger than 1:25,000) and very detailed data are used. The data is used for administrative purposes and must be highly reliable. They collect and manage Geoinformation - often even have their own surveying and mapping divisions - but they also trade Geoinformation with others (e.g., public utilities buy data from local administration or the National Mapping Agencies) (Frank 1992).

Interest is only in local data, and the few potential providers and users are well known. Economic reason enforces cooperation and data sharing. Business relations are tailored to the particular situation, there are few but large contracts and they imply long-term relations. There are often 'barters', where both partners of a contract contribute and no money is exchanged (e.g., one party collects data initially and provides it to the other free of charge, if the other will maintain the data and return free updates in regular intervals to the first).

3 New Geoinformation Markets

It is said that 80% of all decisions contain a spatial component (Albaredes 1992). Therefore in most decisions spatial information could make a valuable contribution. But most of the potential users are not currently clients of surveyors and only rarely consult published maps. New enabling technologies

lead to novel products, especially the presentation and distribution of Geoinformation in other forms than printed maps.

The analysis of these emerging business opportunities demonstrates that the new and rapidly growing market for Geographic Information does not follow the rules of the traditional surveying and mapping business, but obeys the rules of the mass production of Geoinformation products.

3.1 Examples

Three examples of emerging markets for Geoinformation business should be sufficient to have a base to draw some general conclusions about this new type of business:

- Clearly visible is a very rapidly growing use of Geoinformation for in-car navigation aid. It combines the GPS technology with a geometric database and provides guidance to the driver to find his way to a desired location. The system depends on reliable and up-to-date data describing the geometry of the road network of a city or country. The data required is not exactly what is available on a topographic map - even if provided in digital form. The precision is usually sufficient, but topographic databases lack the information about one-way streets, turn restrictions etc.; without these, reliable advice to the driver cannot be produced.
- Another emerging market is in geomarketing: using spatial and demographic data related to spatial units to improve marketing decisions. Here readily available data from the national statistical bureaux is combined with basic geometric data about the administrative subdivision of the land. The data can be used to optimize the locations of the outlets of large commercial chains (e.g., banks), it can be used to reduce the distribution of publicity material in areas with few potential customers, and generally to focus publicity on potential customers.
- Geoinformation can contribute to decisions about leisure activities: where to go during vacation time, where to spend a week-end practicing a particular sport, etc. In all cases, spatial information is important for the decision, which must be made available in a bundle: information about the topography must be combined with data about accommodation, restaurants, sports facilities, hikes and bike routes etc.

3.2 Characteristics of these Emerging Businesses

3.2.1 Growth

These businesses are growing with the technology. As the base information technology, first PC and then access to the Internet, becomes accessible to an increasing number of people, also more uses for this technology are found. The application fulfils a need for information, but potential clients do not yet know, that this information is available in this form. For example, if companies are

properly informed about the use of demographic data for marketing, they will quickly understand the benefits achievable with a small investment.

Growth potential is large, because market saturation is far away. This is different from the traditional surveying and mapping markets, where growth is very limited.

3.2.2 Large number of clients

There are a great number of potential clients - every car owner is a potential client for a car navigation system and will need road data together with regular updates. A large number of companies could benefit from geomarketing and virtually everybody is a potential client for a system which helps in selecting places for leisure activities.

This is fundamentally different from the traditional businesses, where few clients requested sizable efforts (most often more than ECU 1000 per job, and very often much larger). The sheer number of potential customers demands a radical change in the marketing strategy.

3.2.3 Prices not dependent on data collection cost

In the traditional Geoinformation businesses the price for data is set with respect to the cost of collecting and maintaining the data, sometimes divided by the small number of certain clients. This automatically leads to very high prices, which exclude the use of Geoinformation in all cases when the benefits for the user are small: a user will not buy spatial information if the benefit drawn from it is less than the cost for it.

3.2.4 Low price per customer

The price per customer must be moderate and in relation to the benefit a user draws from the information. The benefits of spatial data for geomarketing can be clearly demonstrated and assessed. Prices may be set, based on estimates of benefits and 'return of investment'. Benefits drawn from navigation-aid are in small savings in gas and time; a leisure information system improves the quality of my weekend plan; both are obviously difficult to assess monetarily. Prices can be set in relation to the cost of the main activity - e.g., owning a car, which costs several thousand ECU per year, or the cost of a weekend. The price for the decision making aid must be a small fraction of the total cost.

3.2.5 Easy access

These emerging businesses are only possible if the Geoinformation is readily available to the customer. The data for car-navigation systems will be picked up at the local gas station, replacing the road atlas you buy there now! It must be self-explanatory and not depend on extensive efforts by sales representatives - at least not for the low-price products for car navigation and leisure. The product must not require training nor a manual for its use.

The effort for access to the data can be all considered as cost and must be added to the price. This includes the difficulty to buy the data, the problems to incorporate the data in one's own Computer environment, and finally the difficulty to use the data with the user interface provided , all require time and are therefore a cost. The decision to acquire a product and use it depends not only on the list price, but on the total cost.

Many current products fail in the user interface. A difficult user interface makes training necessary - this costs at least the user's time and this expense is added to the total cost of using this Geoinformation. Required training or a complicated manual to read may quickly upset the balance and have users refrain from buying.

Most of the future Geoinformation products will be sold without assistance and the price will not allow for extensive training or use of a help line. This is drastically different from current surveying practice, where a job starts and ends with a discussion with the client.

4 The Geoinformation Product

These new, emerging and rapidly growing applications for Geoinformation create demand for Geoinformation Products. The concept of a Geoinformation Product (and in general of an information product) is radically different from the traditional view of providing Geoinformation as a service. The concept of an industrially produced product, e.g., a car or a pocket calculator, is here applied to the information field.

4.1 Information is Used in the Decision Process

Information is used in a decision process; it helps to improve decision and to reduce uncertainty. When I know if a swimming pool is available in my prospective vacation hotel, I have removed one uncertainty from my decision where to spend my vacation time. When I have demographic information for an area, I can optimize the distribution of publicity materials to reach only potential clients. The navigation information in a car navigation system helps me decide, for example, if I want to turn left at the next crossing.

Information produces value, but it does so only if it is used in a decision. The value produced is the improvement in the decision made. Many GIS projects fail today, because the linkage between information produced and decision process is not made: sometimes no decision process is clearly identified, sometimes the information is not contributing substantially to the decisions.

4.2 Information Product

Products are designed to fulfil the needs of the customers; better products will fulfil the needs better. Products are not simply the result of the production

process, hoping that they will satisfy some customer's needs. Products are designed to serve many users.

Information Products are products which provide mainly information to the user; traditional information products are telephone directory services, printed maps, etc. Information technology makes new products and new forms of distribution possible.

The information product must be designed to satisfy many users. It provides information for decision processes, which often occur in a similar form. The information must be provided in a format, to be readily used for this decision.

4.3 Design of an Information Product

The design of a product starts with an idea and is followed by a market study. How many potential customers are there? What is exactly their decision process? In what form can they use the information best?

From understanding the decision process of the user follows which data constitute the information the user needs. This in turn determines the data necessary in the system to deduce the required information (Frank 1995).

The form factor for the product also follows: should it be a pocket guide, a CD-ROM to be used with a computer, or a separate appliance to be built into a car like the car navigation system etc. And finally the user interface, the input possibilities for the user and the presentation of the output directly follow from an analysis of the information needs of the user in the decision process.

4.4 Price

The price of traditional Geoinformation products is most often set according to the cost of the production. The effort to produce the service is calculated and determines the bill. Prices for Geoinformation goods on a mass market must be set with respect to the value the product represents for the user. The estimate of the value for the client considers the improvement of the decision, which follows from using this information, and an assessment of the monetary value of the improvement. In a feasibility study, an enterprise tries to determine if for a potential product with an estimated market and value for the client, a price can be set which covers cost.

4.5 Product differentiation

The information products are designed for use of the information in a specific decision process and the prices are set according to the value this information contributes in this decision process. The same base data may be used to produce valuable information for another decision process. The value of the data in this process is most likely different and thus a different price must be set. In order to maximize income from selling this data, different products must be created,

such that each can be priced properly. The products must be differentiated to make it difficult for the user with the decision process producing the higher value to use the product designed (and priced) for the lower value decision process. With flexible information technology the data content, the access methods and the data quality can be set to fulfil exactly the requirements of each process, but make it difficult to use one for the other. This is radically different from the efforts made in the past to produce topographic maps, which serve as many uses as possible.

5 The Challenge

Geoinformation professionals face a challenge: the traditional ways of doing business are organised on the principles of liberal professions providing services to the public. This market will continue, but will not increase. The rapidly increasing**,** emerging new markets are organised on the concept of a (mass market) Geoinformation product.

The traditional Geoinformation professionals are not experienced with the design of Geoinformation products for a large number of similar clients. Currently services are tailored to the needs of the individual clients, but the base decisions for the content and presentation of the Geoinformation products provided today follow from technology and law more than from user needs. For example, rules for the presentation of parcel information on a plot respect the surveyor's needs, but are difficult to read for the paying client. The surveyor's services are fixed and marketing is not necessary.

Local administration, public utilities and National Mapping Agencies are often fixed in a straight jacket of public administration rules, which makes it difficult for them to enter the market-oriented rules for the new Geoinformation products.

Three major difficulties with moving into this new business are:

Risk: The risk involved in the development and introduction of a new product is large. It may take several years till a product sells well to make a profit. This is difficult to carry out in an administrative setting with a one-year budget cycle and impossible if the income from the product is not a cost-covering income for the organisation. Administration is generally and intentionally adverse to risks.

Size of groups: Surveying and similar consulting firms are small. They can possibly develop a product, but in order to organise industrial production and marketing - which often costs 10 times more than product development - they need potential partners. Surveyors often lack the commercial know-how to carry out such projects.

Education : The traditional surveying professionals, the geographers and cartographers, are oriented towards the production of the Geoinformation. At

the universities, we teach the engineering aspects of surveying: data collection, data management, map production etc. There is little discussion of user needs and the adaptation of a product to the requirements of the user. Business aspects are hardly ever mentioned.

The emerging, rapidly growing Geoinformation business will be captured by the groups which face these challenges and produce the Geoinformation product large user groups require. Traditional Geoinformation professionals have the technical knowledge to collect, manage and present the data. They often have also access to data already collected. If they can package this data as a Geoinformation product and adapt to the practice of mass market production and leave behind the limitations of the liberal profession, they can be successful. The race is open.

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