

Demand of Financial Service Providers for GI Products and Electronic Marketplaces

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Abstract: Given the central role of space in political and economic decisions, geographic information (GI) should have a high market potential. But in reality, market growth does not seem to achieve this potential. Some impediments are inappropriate products, old-fashioned business models, and high transaction costs. Often, user segments have very specific needs for GI that are not met by the generally available digital maps. This paper will identify the demand for GI products of financial service providers, testing how their needs are currently fulfilled. The test results will show that most internet providers of GI do not offer an appropriate access to GI products to potential customers of this vertical segment: The offer mostly consists of geographic data while the demand mostly targets GI services applied on geographic data and software. For better GI market growth, we suggest to realize vertical GI marketplaces as parts of NSDI's, designed to meet the needs of specific market segments.

1 Introduction

Too long geographic data and GIS were considered as usable products. However, they mostly do not fulfill the user requirements, because they are not ready-to-use. Human, technical, organizational, and institutional services have to be added to the raw products data and software. These we call *information services*, which we assume more successful on the market.

The technological step forward in GI is interoperability. The OpenGIS Consortium promotes the combination of technical GI services versus the ancient model of monolithic GIS (Buehler and McKee 1998). However, technological evolution forces economical evolution as well; interoperability has to be transferred from technology to business. The shift goes from single, monolithic companies to business networks. Companies in the GI value chains of a specific economic sector cooperate in ad hoc projects in order to generate the desired product (Malone and Laubacher 1999).

In all economic sectors the transition to e-commerce and e-business is *the* success factor. In addition to pure information, electronic marketplaces initiate transactions between buyers and sellers and offer mechanisms for transactions via the marketplace (Spiller and Wichmann 2000). Today's GI market targets e-business, but until now just a small percentage of the annual turnover is transacted via the Internet (Fornefeld and Oefinger 2001). What are the reasons why e-business does not attract more customers?

Our paper focuses on the grounding of GI business: demand for and offer of GI products. We will analyze the specific branch of financial service providers (banks and insurance companies). This branch is a valuable potential customer of the GI market: Financial service providers need geographic information, and they have the financial resources to pay for it (Fornefeld and Oefinger 2001).

Section 2 identifies the demand for complex GI products of financial service

providers. Then, we test how the GI market fulfills this demand (section 3). We chose a scenario of a bank that needs GI for evaluating its branch offices. The test results prove that existing internet solutions do not provide an appropriate access to GI products to the potential customer. Section 4 suggests electronic GI marketplaces as tools for coordination and growth of the GI market, and points out the key role of NSDI's in realizing vertical GI marketplaces.

2 Demand for complex GI products

This section will investigate the demand of financial service providers for GI products. We will describe a case study evaluating the specific demand of an insurance company in Muenster, Germany. Case study 2 will evaluate existing GI products for banks, provided by a Swiss GI company. Finally, we will summarize and discuss the results.

2.1 Method

The *first case study* focused on the demands for GI products of a big *insurance company* in Germany. Our approach was to lead personal interviews in order to evaluate the demand for GI products:

1. Two ifgi staff members interviewed 90 minutes the vice-director of a consultant and software development company for insurance companies. This company is a 100% daughter company of the insurance company. Thus, it has insight into the insurance company as well as into other insurance companies in Germany and Switzerland. The interview was not structured. The goal was to define demands of insurance companies for GI products. The interview minutes were checked and commented by the vice-director. The result was a list of GI products usable for insurance companies.

2. The insurance company was investigated within a high-level students' course in cooperation of ifgi and Department of Information Systems, University of Münster. Ten students had investigated the insurance company's profile, products, clients, workflows, and existing use of geographic information. In a structured interview (two hours, ten students with supervisors, six employees of the insurance company) the students provided suggestions for GI application in the insurance company's business. These suggestions were discussed concerning their usefulness. Then, the students asked the employees for additional GI products to be used in the insurance company. The interview minutes were checked and commented by the marketing chief officer. The result was a list of GI products usable for the insurance company (Ahmann, Becker et al. 2002).

The *second case study* focused on GI products for *banks*. The idea was that the need for these products is shown best by its realization, because banks were willing to pay for it. Endoxon AG is a Swiss GI company with a broad spectrum of GI products: data, data adoption, software, software adoption, GI consulting, integration, and training. A key client is Credit Suisse, a blue chip bank in Switzerland. The partnership of Suisse Credit and Endoxon AG bases on a master agreement, which figures Endoxon AG as a non-exclusive geo-competence center for the bank's GI projects (Widmann 2001). The master agreement covers consulting in data delivery, information and functionalities, technical requirements, licenses, development, and implementation.

We evaluated the online descriptions of reference projects (www.endoxon.com, July 10, 2003). Additional information came from a presentation of S. Widmann, Endoxon AG, at the InGeoIC conference "Use of geographic data for the branch of commerce, banks, and insurance companies", 2001 (Widmann 2001).

2.2 Results

The first result was a general observation: GI could be usable for insurance companies, but they use it rarely. A typical statement was: "We tried to find out if we could use a geographic data set. But we gave up, because we had no idea if the data set is usable for our purposes, matches our quality requirements and if could be integrated into our data and software system." There was a lack of information about the access to GI products and how insurance companies could produce added value.

Some of the typical GI products/GI applications demanded within the case studies are:

Insurance company:

- The company requested a *geographical user interface* on top of its own software. They targeted to fulfill a concrete request of an insurance company. The insurance company wanted to realize a regional map for entering the internal data warehouse.
- The success of insurance companies depends on space. An insured risk represents the relation of an insured object with its distribution of risks in space. Consequently, an insurance company needs a *tool for risk predictions* of potential clients, e.g., for floods and storms.
- Insurance companies need a better evaluation of its branch offices. A *tool for spatial analysis of distribution of branch offices*, distribution of potential clients, and trading areas as well as the spatial analysis of existing internal clients' data would support this evaluation.
- Acquisition of clients and marketing initiatives require a detailed knowledge of targeted customers and areas. A *geo-marketing tool* would optimise these actions. E.g., in an advertisement campaign would be much more cost effective, if leaflets are distributed in streets or quarters with young people of high income instead of those of low income.
- *Location based services*: Claims and loss processing can be supported by location based services. For example, a broken-down car can be localised by mobile phone or GPS. By this, police and towers can exactly be directed to the customer. Side services, e.g., information about closest hotels, garages, or doctors, can be added (Ahmann, Becker et al. 2002).
- *Route planning for clients and employees*: Route planning for clients, i.e., how to get to the insurance company or its dependencies, has become a wide-spread means of customer relationship management. In addition, this service would help the field-staff visiting their clients. An integration of public and private transport is targeted (Ahmann, Becker et al. 2002).
- *Control of accumulation of risks*: Insurance companies need to have an exact knowledge about the worst-case of their insured risks. Else an insured risk would ruin the company. Geographic analysis of historic damage events or simulations of future damage events, e.g., floods, provide a more precise calculation. Based on this, reinsurances and tariffs could be calculated more precisely (Ahmann, Becker et al. 2002).

Bank:

- The real estate platform of Credit Suisse Bank (<https://entry.credit-suisse.ch/csfs/p/rb/de/hypo/index.jsp>) is a tool for locating the right property in the right place. Various views of the surrounding area together with important utilities and services enable the potential client to assess suitability.
- The service portal of New Aargauer Bank (<http://www.nabhome.ch>) enables users to make informed decisions when searching for a property in the canton of Aargau.
- The branch locator of Credit Suisse (www.creditsuisse.ch) visualizes Swiss branch offices of Credit Suisse Group by photos and city maps.
- The GIS tool for real estate analyses for Credit Suisse Research & Consulting provides macro- and micro scoring, risk classification, and automatic reporting. It contains typical tools of Geomarketing, e.g., analysis of service infrastructure (schools, shops, public transport), and demographic trend analysis (http://www.endoxon.com/en/kno/kno_mar.asp).

2.3 Conclusions

Two case studies of an insurance company and a bank analyzed the demand of financial service providers for GI products. The findings support the idea of “information services”. Geographic data sets and software are not the required type of products. Financial service providers require GI solutions to be established in their information systems and workflows. GI services (human, organizational, institutional, technical) have to be added to data and software in order to provide GI products which will be successful on the market.

The parallel approach of asking financial service providers for their demand, and analyzing existing – and therefore in reality demanded - GI products, assures a sufficient coverage of the needs of the targeted branch. Our institute’s all-day experience by customers’ requests and ongoing projects shows the need for GI information services in many other branches, e.g., local authorities, transportation, real estate, marketing, and network providers. We consider the findings a general need of potential business customers of geographic information.

3 Current offer of GI marketplaces

Section 3.1 will describe our methodological approach for testing. Section 3.2 will evaluate three existing internet-based GI platforms as test objects. Afterwards, we will summarize the test results (section 3.3) and discuss limitations of the test (section 3.4). Section 3.5 will compare the offered products with the costs of the demanded GI product. Finally, we conclude a mismatch between offers and demand (section 3.6).

3.1 Method

We developed a scenario around a typical GI product required by a financial service provider. The product was a set of GI services supporting an in-house evaluation of existing and planned branch offices. The evaluation should compare

costs and market potentials of the offices.

Introducing the GI product into the financial service provider's business environment required the completion of several tasks. From these tasks, we derived intermediate GI products, supporting the composition of the required end product.

Tab. 1: Service-based categories of GI products

Tasks of scenario	Technical service	Human service	Organizational service	Institutional service
Define in-house requirements and goals			Provision of knowledge about possibilities of GI, Marketing	
Find business partners	Provision of information		Information about GI products and GI providers, Communication	Establishment of business network, Quality assurance of business partners
Define needed information from marketing and GI perspective		GI consulting, Marketing consulting		
Define needed data sets, geographic and non-geographic		GI consulting, Marketing consulting		
Define needed functionalities, geographic and non-geographic		GI consulting, Marketing consulting		
Elaborate project plan (detailed definition of end product, processes, milestones, responsibilities)		Integrative consulting		
Provide data sets	Data provision		Provision of Internet access	Standardization of data, Rules for the use of data, Security
Search data sets	Data search			Standardization of functionalities
Select needed data from data sets	Data selection			Standardization of functionalities
Order and pay data	Data ordering, Data payment		Provision of tools, Security assurance	Standardization of functionalities
Buy geographic analysis tool			Sale of software tool	
Adjust geographic analysis tool to needed functionalities and integrate tool into enterprise system	Adjustment of software tool, Integration of software tools	Adjustment of software tool, Integration of software tools	Adjustment of software tool, Integration of software tools	
Execute evaluation of existing and planned localities of branch offices	Execution of analysis	Execution of analysis		
Train employees with the new tool and processes.		Training		

We evaluated three of the most advanced GI marketplaces in Germany, and then tested how they fulfilled the customer's demand.

The test goal was to analyze if a bank executive manager could decide whether or not to introduce geographic information into the bank's workflow. The test was carried out within a student block course in May, 2003, at University of Münster, Germany. The author supervised the course, using the scenario described above.

Three students served as test persons. They got the task to evaluate marketplaces in the role of a bank executive manager. Each test person tested one marketplace for one hour. The test executives provided questionnaires for evaluation. The questionnaires contained questions of three categories (Gossilin 2003):

- Website (layout, navigation, usability, help, search functions)
- GI products (information about data, data quality, data categories, data formats, providers, data distribution, price, software, integration support, consulting)
- Marketplace services (payment, contact, help, costs).

We evaluated the test results according to German school graded.

Finally, we compared the costs of the demanded GI product with the quality and ease of access to this product.

3.2 Evaluation of GI marketplaces

Screening of the internet for GI marketplaces resulted few hits. Most of providers of GI products (data, software, services) related to the scenario were single companies. Only some internet solutions met at least some of the criteria of GI marketplaces:

- Virtual matching of buyers and sellers
- Openness to many providers and many clients
- No portal, sell-side solution, or extranet
- B2B marketplace.

In addition, we were looking for marketplaces that offer all types of GI products, data and software as well as GI services. We evaluated five candidates for testing:

1. www.geodaten-online.de is run by the company con terra. They market geographic data sets of their business partners, i.e., authoritative organizations. They offer services for searching and buying geographic data.
2. www.geodatenzentrum.de is an initiative of German authorities (Bundesamt für Kartographie und Geodäsie, BKG). They provide authoritative topographic-cartographic data. They also provide a metadata information system. Targeted clients are authorities and others.
3. www.geomarktplatz.de claims to be "Europe's first geomarketplace". They target the marketing of GI and geodata management. They offer online search and ordering as well as help and contact for non-GI experts. They want to link providers and users of geographic data.
4. www.ingeoic.de serves as a portal for geographic data. The core is a metadata information system, which informs the potential user about attributes and quality of data sets. In addition, they target gaining information from geographic data.
5. www.terramapserver.de serves as a "platform for geodata". They provide services for data users (search, Web-services, services for geodata integration) as well as for providers offering their geodata.

The business model of www.geomarktplatz.de fulfilled the criteria of a GI marketplace, and is supposed to provide GI services required in the test scenario. Consequently, it was chosen for the test. Terramapsver (www.terramapsver.de) does not completely fulfil the criterion of providing GI services needed in the test scenario; their business model focuses on geodata. But the lack of alternatives and the services for acquiring additional data provider made them relevant for being integrated into the test.

www.geodatenzentrum.de and www.geodaten-online.de can be considered as sell-side solutions. Although marketing data sets of different providers, those are limited to authoritative organizations of a similar business background. The criterion of openness to many providers does not seem to be fulfilled. In addition, the clear focus on data excluded the providers from being chosen for the test.

www.ingeoic.de clearly claims a non-marketplace business model. Still we chose the internet portal for testing. One reason was the lack of alternatives. Another reason is the portal's statement of "making geoinformation from geodata" and the internally known cooperation with InGeoForum (www.ingeoforum.de). Both encouraged the estimation that the portal could also provide additional services to their core competence in geographic data relevant for the test scenario.

3.3 Test results

The following paragraphs show the detailed test results of www.ingeoic.de, www.terramapsver.de, and www.geodatenmarkt.de. Finally, we present an overview table of the results.

www.ingeoic.de (based on (Janowicz 2003c)

Layout and navigation in the *website* were evaluated good to satisfactory. Positive were the clear structure, negative the requirement of using JavaScript and many pop-up menus. The usage of the website was evaluated sufficient. The navigation bar could be handled intuitively. Negative were long time for loading, mistakes in map functions, and the lack of background information for non-GI experts. The search functions were described well, but the functionalities were evaluated sufficient. Negative were missing catalogues, unclear content information, and results.

In the context of the scenario, the *product offer* was not satisfactory. Mostly, the product offer consisted of data sets. Metadata data were available, but very different in quantity, quality, and presentation. The quality of data sets was partly good and up-to-date, and the delivery was evaluated very well. But sometimes important information, e.g., contact, and information about use, were missing. Quite few providers were present on the platform, and different application fields of geographic information were hardly covered. Prices for data and services were not available. There was no information about software, software services, and additional services, e.g., data integration.

The *services of the internet platform* were evaluated satisfactory. Contact information and contacting were good. The customer was supported sufficiently in searching data. The billing modalities were evaluated negative.

www.terramapsver.de (based on (Knieper 2003)

Layout, navigation, and usage of the *website* very evaluated good. Positive were the clear structure, intuitive navigation, and few requirements to user software.

Sometimes, the map server was not working reliably.

The *product offer* was evaluated not sufficient. The offer focused on data. Geodata were mostly offered by surveying authorities, and the lack of competitors was criticized. The coverage of data was very different, rarely Germany was completely covered. The marketplace offered some thematic data, e.g., socio-demographic data, which were relevant for the scenario, and German-wide available; but again the lack of competitors was criticized. In addition, most of the geodata were offered in TIFF format, which cannot easily be combined with the offered socio-demographic data. A non-GI-expert as the bank manager of the scenario was not able to evaluate needed data sets. Some software products were offered, which were not relevant for the scenario. Additional services, e.g., data integration, or links to GI service providers were not offered.

The *services of the internet platform* focused on selling data. In this sense, it was evaluated satisfactory. Information about products, help functions as the map server were good. Negative were unclear or missing contact options. In the context of the scenario, the services were not satisfactory, e.g., links to additional GI providers were missing.

www.geomarktplatz.de (based on (Koch 2003))

Layout, navigation, and use of the *website* were evaluated satisfactory, especially for the clear structure and intuitive operations. Search functions looked quite usable, but during the test they were not available.

Theoretically, the GI marketplaces offered the broadest variety of GI products, including additional services, e.g., data adaptation, converting, and integration. But during the test, the marketplace was not working. By email the provider provided the information that the marketplace was subject of re-structuring.

As a final result of all tested internet platforms, the test persons could not get sufficient information for the decision whether or not introducing GI into the bank environment.

The following table provides an overview of the criteria and results of the tested internet platforms using German school grades from 1 (best) to 6.

Tab. 2: Test results overview (based on (Janowicz, Knieper et al. 2003))

Criteria (Weight of criterion in %)	www. InGeoIC.de	www. terramapservers .de	www. geomarktplatz. de
• Webdesign/Layout (25%)	3,2	2,8	4,4
Layout and navigation (20%)	2	2	2
Usage (20%)	4	3	3
Help functions (20%)	2	3	5
Search engine (40%)	4	3	6
Product offer (40%)	4,25	3,4	6,0
Quality (50%)	3,5	3,0	6,0
Metadata (50%)	3	4	6

Criteria (Weight of criterion in %)	www. InGeoIC.de	www. terramapserver .de	www. geomarktplatz. de
Data quality (50%)	4	2	6
Quantity and range (50%)	5,0	3,7	6,0
Scale/format (10%)	3	5	6
Provider/assortment (10%)	4	3	6
Delivery (10%)	1	2	6
Price of data (20%)	6	2	6
Software and related services (20%)	6	4	6
Support integration services (30%)	6	5	6
Marketplace Services (35%)	2,5	3,5	5,7
Billing (10%)	6	5*	6
Contact options (30%)	1	4	5
Help for data search (40%)	3	2	6
Registration (20%)	2	5*	6
• Total	3,375 (3,4)	3,3	5,495 (5,5)

* Website without registration

3.4 Limitation of test

For testing, we chose three internet solutions, which differ by their business models. For example, www.geomarktplatz.de claims to be a geomarketplace, while www.ingeoic.de is a portal. Thus, we did not compare three times the same thing. A negative test result was not necessarily negative in terms of internet providers' own business models. For example, www.ingeoic.de claims to be a portal. Not selling geographic data sets is an obvious part of a portal's business model. The test results strictly refer to the test scenario and the task of a bank manager to decide whether or not starting the introduction of GI in his/her business environment. Still we chose the approach testing three "marketplace-similar" providers because a lack of alternatives, and to give some hints to the providers for adding services in order to acquire additional customers.

Another limitation was time. The test focused on a limited time for testing websites. The test neglected the (sometimes more, sometimes less obviously offered) contact options via email or phone. However, we considered the approach justifiable, because executive managers require information in limited time. The setting is relevant for the all-day working practice.

On first sight, a weakness of the test was that students played the roles of bank managers as test persons. For U Münster's students of Geoinformatics you could have argued that their GI knowledge was too high to play the role of a non-expert in GI. However, the key test results based on the observation that required marketplace services, i.e., product information, and GI products were almost non-existent. We considered the test results that explicit that the original plan acquiring real bank

managers as test persons was cancelled.

3.5 Comparison of demand and offer

The three tested providers lacked content, which was required for the test scenario. The offer of GI products as well as the access to them was not sufficient (Janowicz, Knieper et al. 2003):

1. *Data*: The tested providers focused on selling geographic data sets, i.e., authoritative topographic-cartographic data. They provide search and buy functions, and some information about quality (metadata). However, we observed the following impediments:
 - a. For a non-GI-expert it is difficult or impossible to decide about needed data sets and its quality and usability
 - b. The geographic data do not necessarily cover the targeted area.
 - c. The thematic data sets are not necessarily provided.
2. *Software*: There was little information about needed GI software, its utility and prices.
3. *GI services*: There was almost no information about additional GI services, neither about the product offer nor the access to them. There was a severe lack of information about fulfilling the tasks of the scenario, e.g., GI consulting, integrating data sets and software into the bank's system and business work flows, and training of employees on the new GI environment.

The overall test result is that the bank executive managers could not decide whether or not starting the introduction of GI products into the bank environment. He/she could not even calculate a rough estimation of costs and benefits. He/she could not calculate the costs because he/she did not even knew the needed products. He/she could not calculate the benefits, e.g., higher workflow efficiency, or improved quality of evaluation processes, because this information was not presented, e.g., by reference projects using GI,.

Offer and demand differed widely. The following calculation will compare the marketplaces' offers of GI products with the costs of bank introducing them. We will exemplarily specify GI products needed within the bank scenario. Cost estimations will base on prices of online offers and estimations of the author:

Tab. 3: Offer of GI products and costs of their introduction for the bank

GI products	Offer of GI marketplaces	Product specification	Estimated project costs (€)
1. Data	Some information, access, order and pay functionalities	<ul style="list-style-type: none"> • Topographic data, 1:25.000 (TK 25), 300 km² (Muenster, Germany) • Socio-demographic data (GfK data for Muenster, Germany) • Purchasing power data (GfK data for 	<p>300</p> <p>2.000</p> <p>2.000</p>

GI products	Offer of GI marketplaces	Product specification	Estimated project costs (€)
		Muenster, Germany)	
2. Software	Some information	Single ArcView licence	3.000
3. GI services	Almost no information		
<ul style="list-style-type: none"> • GI consulting • Project planning and controlling for GI introduction • Integration of data • Adaptation and integration of software • Integration of into business workflows • Training of employees 		<ul style="list-style-type: none"> • 20 person days • 20 person days • 5 person days • 10 person days • 4 person days • Two employees, one-week training 	<ul style="list-style-type: none"> 30.000 30.000 7.500 15.000 6.000 4.000
Subtotal			92.500
Total	-		99.800

Still data sets are marketed as THE GI products. Most information offered by GI marketplaces deals with data. Functionalities for search, order, and payment of data exist. However, data only made less than 5 % of the costs of the GI system. The bank of the scenario did not get information about the most expensive part of its targeted introduction of GI (> 90 %).

The table neither contains the additional costs of the bank for internal personnel introducing the new system within the GI project, nor future costs for data and software updates, system maintenance, and personnel costs of employees working with the system. Including these costs would even enhance the cost relation of GI services vs. data and software.

In contrast to the offers of existing GI marketplaces, the generation of the needed end product required the integration of various services. A bank does not want and cannot put all these pieces together. The combination of data and services ("interoperation") is a key concern to develop a GI business. The future market for geographic information is not a market of data but a market of *information services*. Applying technical, human, organizational, and institutional services on data sets generates an information service. Marketplaces of geographic information mediate this process.

The test scenario of a bank is generic. New business customers of the most promising branches for selling GI products (GI applications, navigation, geomarketing, emerging markets (Fornfeld and Oefinger 2001)) will rather introduce a GI environment. They require information services instead of buying data. Neglecting this demand will mean neglecting potential and potent GI customers.

3.6 Conclusions

The tested GI internet providers focused on information about and sale of geographic data. They offered few services for accessing GI software. They offered almost no information and access to additional GI services, such as consulting, integration of data into the company's business system, and training employees in the new GI-enabled environment.

The costs of data and software were about 10 % of the required GI end product. Additional GI services cost about 90 % of the sector-typical GI end product. In contrast, the offers focused on data.

Thus, the potential customer could not get sufficient information about costs and benefits of the required GI end product. Already the first step of a business transaction – information – was hampered. The transaction costs for getting information were too high to realize the scenario.

The demand for GI products from the potent financial sector is currently not fulfilled appropriately. Internet providers of GI products focus on GI raw products: data and software. They neglect the need for human, technical, organizational, and institutional GI services.

4 The need for realizing electronic GI marketplaces by NSDI's

Currently, the mayor goal of the GI market in e-commerce and e-business is to search, order, deliver, and pay geographic data sets via the Internet. The challenge is to exploit the further potential of the medium Internet: the process-oriented production of services, the exchange and the integration of services to information services, and the coordination and cooperation of the business players of the GI market.

You could argue that single companies instead of GI marketplaces could fulfill the demand for complex GI products. However, the disadvantages are obvious: The customer does not get a market overview, he cannot compare prices and quality, and probably products will be offered to him/her, which are not the best and cheapest ones according to his/her requirements. For example, a company with a business partnership with Autodesk will not easily sell other GI software, even if other software would be better or cheaper. The same disadvantage occurs with the sell-side solutions www.geodatenzentrum.de and www.geodaten-online.de. They provide a distinct set of data sets. Thus the market does not get transparent to a potential user; he/she will not be informed about alternative products.

Consequently, the GI market needs new business models and a more effective tool for coordination and cooperation of geospatial value chains. E-business is emerging in the GI market in order to promote GI products, e.g., Terramapserv (www.terramapserv.de) and On-geo GmbH (<http://www.on-geo.de/>). However, currently e-business does not affect the crucial needs of a prosperous market: the provision of demanded products in an appropriate way.

Geographic information is ubiquitous, applied in many specific domains for many different purposes. Compared to non-spatial markets there are many data formats, semantics, software systems, providers, and users with extremely different requirements (Abel 1997). The most important consequence is that GI products are often not ready-to-use as, for example, a book that can be marketed as it is. GI products have to be generated on demand in ad-hoc processes from intermediate

products, data and services.

Therefore, GI marketplaces must be different from transaction-oriented marketplaces with auctions and bursaries. We consider GI marketplaces as tools for coordination of the GI market and cooperation. Also in general economy, (Klein and Gogolin 2002) and (Gogolin 2003) suggest the shift from transaction-oriented marketplaces to cooperation platforms.

Marketplaces go along with cooperation and competition. On the one hand side, marketplace users profit by an enhanced transparency of the market, which affects lower prices and higher quality of offered products. On the other hand, providers profit as well. By the cooperation in an electronic marketplace, the critical mass of providers (data producers, software developers, integrator, consultants, brokers, infrastructure providers) and customers is achieved. Customers would be able to find the required product in appropriate way, which evokes an enhanced request for products. GI-Marketplaces can be considered as a middleware, particularly in an organizational sense but in the technical meaning as well.

For technical cooperation and standardization, the non-profit organization OpenGIS Consortium executes the coordination of business partners. Successful as it is, technical interoperability is not sufficient. In addition, the GI market needs interoperable business processes, provided by GI marketplaces as tools for coordination and cooperation. Business interoperability by GI marketplaces also requires need non-profit organizations for its realization.

The GSID cookbook defines an “SDI as more than a single data set or database”; “an SDI facilitates the conveyance of virtually unlimited packages of geographic information” (Nebert 2000). Apart from rather technical issues, e.g., metadata access and software applications, conveyance require an organizational framework for improving GI business. From an economic and social point of view, NSDI’s have a key role to play in realizing vertical electronic GI marketplaces, supporting the needs of potent sectors, and providing simple interfaces to interconnect such marketplaces across national as well as sectoral borders.

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