Geoinformation in Optimized Business Processes

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Key words: Geoinformation, Business Processes, Spatial Information Management.

SUMMARY

Looking back in history of Spatial Information Management shows the progress made and explains better the current challenges as well as next steps to be gone. During all these years our focus was shifting from **software** and **data** to **information management** and nowadays we discuss about **integrated business processes** bridging even professions. **Business Process Reengineering** seems to become the catchword. After a decade of streamlining internal processes the strategy must be more customer-oriented; and it must be based on "thinking in terms of **whole systems**." This is not done by just integrating data or software tools.
The paper focuses on the possibility and good practice of clustering procedures of an integrated maintenance of spatial information. Finally the role of surveyors in the field of geodata management will be discussed.
"I believe that technology is the easier part. The more challenging parts are keeping business processes and business models built upon it, in sync with the radically changing business environment and the evolving psyche of modern organizations and knowledge workers", [Malhotra, 1993]

ZUSAMMENFASSUNG

Ein Rückblick auf die kurze Geschichte von Geographischen Informationssystemen der letzen dreißig Jahren zeigt sowohl den Fortschritt also auch die momentanen Herausforderungen und die bevorstehenden erforderlichen Integrationsschritte. Der Fokus hat sich verschoben: Anfangs waren Software und Daten im Mittelpunkt des Interesses; später war es dann das Informations-Management.
Heutzutage treten Aspekte der integrierten Geschäftsprozesse in den Mittelpunkt – auch die Zusammenschaltung von Geschäftsprozessen mehrerer Firmen betreffend. Das Schlagwort der nächsten Jahre könnte damit **„Business Process Reengineering"** heißen**.** Nach einer Dekade von Prozessoptimierung ist es nun an der Zeit einen gesamtheitlichen Denkansatz zu finden statt einfach nur neue Werkzeuge zu integrieren.
Das vorliegende Papier behandelt die Möglichkeiten und Erfahrungen mit integrierten Geschäftsprozessen im Räumlichen Informations-Management. Letztlich wird die Rolle des Vermessers auf dem Gebiet des Geo-Informations-Management diskutiert.
„Ich glaube die Technology ist der leichtere Teil des Ganzen. Die wirkliche Herausforderung stecken doch darin wie die Geschäfts-Prozessen und die darauf aufbauenden Geschäfts-Modelle in Einklang gehalten werden mit den radikalen Änderungen in der Geschäftswelt und dem Berufsbild der ‚Knowledge Worker'" [Malhotra, 1993].

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1. THIRTY YEARS OF SPATIAL INFORMATION

Looking back in history of Spatial Information Management shows the progress made and explains better the current challenges as well as next steps to be gone.
Thirty years ago we learnt about GIS. We focused on implementing and tuning a stand alone tool - a unique GIS-package adopted for the internal needs within the company. We were happy to ride the horse and accepted frictions caused in our production processes.
Twenty years ago we were focusing on transferring data into digital form – everything had to become digital. We stuffed our information into bits and bytes. Everybody did it his own way without discussing it, which turned out to be a hindrance for data exchange.
Ten years ago we realized that we work on similar things with the demand to share data and we realize that the frictions in sharing information are not only caused by data, but by institutional settings.

During all theses years our focus was shifting from **software** ("how to use GIS?') to data **acquisition** (from were I can get more data?), to **data quality** ("why all these different data do not fit?') and **data integration** (Why you have used a different reference model than me?). As a result of that a lot of effort was invested in standardization (ISO, OGC and within all the GIS-companies), but still there are frictions. Nowadays we look for improving our institutional setting looking for cooperation – some even for merging organizational unit, which does not solve so much, because there is always a additional organizational setting to cope with.

1.1 Development was Mainly Technology Driven

All these changes become more obvious when we look back to the development of the surveying business - and software tools during the last thirty years.
Thirty years ago surveying equipment started to get an innovative push by the computer technology. Developing equipment became more challenging and more expensive.

1.2 Cooperation Forced by Technical Improvements

Within the last decade a lot of changes took place in the field of data collection and data processing (GPS, Laser Scanning, digital Imaging, and Image processing). The competition on new technologies ended in merging of companies and establishment of partnerships between companies. At the beginning of this process companies of similar profiles merged (like Wild and Kern). Later on companies of rather different background merged. Surveying equipment met software (Leica, Helava, System9). In the meantime cooperation is seen under a wider perspective (*e.g. www.leica-geosystems.com/about/partners/*) and goes beyond the approach to integrate software into some hardware (surveying equipment).

Also the business models are slightly different. It seems that mergers are out of fashion because causing too many frictions. A flexible cooperation can bring more benefit than just merging companies. As a first step this business approach resulted in combining - but not yet integrating - tools like "Total Management Systems (SAP) with GIS.

2. INTEGRATED BUSINESS PROCESSES

Nowadays we discuss a lot about **integrated business processes** bridging departments, companies and even professions to provide a common language for the modeling and execution of business processes. **Business Process Reengineering** seems to become the catchword for the next years to come. After a decade of streamlining processes for efficiency within institutions, companies are adopting a more proactive stance toward the future. The strategy must be customer-oriented; based on "thinking in terms of whole systems."

In general the traditional procedure of data assessment is well optimized within institutions. The use of new technologies leads on the one hand to an increasing effectiveness of data acquisition and data quality. In detail the results of progress in technical development of equipment for geodata assessment can be seen in benefits like *Increased Data Acquisition Rates, 'Higher Resolution' of Objects, Time and Weather Invariant Acquisition Methods, Reductions of Staff for Data Acquisition, Automatic Algorithms for Measuring Objects*
Nevertheless the costs for the acquisition of spatial data are very high.

On the other hand we collect geodata without any awareness about their potential additional use to other spatial databases. The focus of potential improvements in the efficiency could focus more on administrative measures such as interfirm cooperation with optimization of workflows of the particular units. This approach leads finally to the concept of clustering procedures for an integrated maintenance of spatial information.

It became obvious that the survival and growth of organizations in an increasingly turbulent environment would depend upon effective utilization of information technology for aligning the organizational structure for creating symbiotic inter-organizational structures "***Turbulent environment drives organizations to actively seek inter-organizational (interfirm) relations to leverage their core competencies and to use more IT-effort to establish coordinating mechanisms with other firms.***" *[Malhotra, 1993].* Also Ramstrom (1974) has foreseen that work tasks would be grouped in organizational units created around a common program for information processing.

2.1 Data - a Burden or an Opportunity

An enormous amount on data about the earth has been collected within the last decades. Many aerial and satellite photographs in different scales had been taken several times from many regions and many databases were filled with geometric and thematic information about land. The scale of gathered data ranges from local to global and the date of data assessment spread over several decades and centuries too.
Today we possess a multi-resolution, multi-thematic, multi-dimensional and multi-temporal representation of our planet, into which we can embed vast quantities of geo-reference data.

However isn't it still a vision to overlay information from different sources to obtain knowledge and make decisions? There is a common base of geodata used as fundamentals for e.g. land use planning, land administration, distribution of subsidies, traffic control, positioning of business and for long the list of potential customers.

2.2 Knowledge is Information in Action

The realisation of a 'Digital Earth' is based on at least two ingredients: data and knowledge. Data and knowledge about the melioration of datasets provide high valued geoinformation [Mansberger and Muggenhuber, 1998].

Many efforts had been to improve the procedures of spatial data acquisition and a lot of progress was reached within the last years. However the real challenges are in the workflow:

- to **organise business processes** that support the availability of, and accessibility to geo-information in the right place, at the right time and for the right person
- to **create and maintain data models and databases** from which information can be extracted, processed and shared by many stakeholders at any given time.

How can we, for example, deliver the right information to the right people at the right time if the right information must be derived from here-and-now parameters that change daily? The answer comes from business model innovation. In other words the result of human activities on different locations are integral part of information required and should be considered as part of our modelling processes.

3. GOOD PRACTICE

In many European countries the customer of land related information accessing legal and cadastral information of a property through the web enjoys completeness and correctness of data deriving from different administrative procedures, involving, notaries, surveyors, Land Registries and Cadastre Offices. In future this may also work across different countries – see www.eulis.org. This approach has already successful been applied for the 'European Business Register' information - see www.ebr.org.

3.1 The Role of Surveyors

Finally the role of the surveyors will not stay untouched by the modern information management including data acquisition methods and distribution technologies for streamlining inter-organizational workflows. Surveyors have to mutate from pure **data collectors** to **information managers**.

3.2 Improved Workflow for Geodata

In the past technical development of equipment was the main component for economic improvement in data acquisition and resulted in a faster and more cost-efficient data

production. Improvements focused on optimised production processes within individual companies. In the meantime organizational improvements can be observed by streamlining procedures as inter-institutional "Clustering" processes.

'Geodata Cluster'
"Paradoxically the lasting competitive advantages of a global economy are increasingly focusing on local conditions – knowledge, partnerships, motivation: components which hardly can be reached by afar rivals" according to [Porter, 1998].

The consequence of Porter's statement can be seen in the establishment of clusters of regional potentials within several professions. Examples for such an attempt to establish "geodata clusters" are:

- "The **GeoData Alliance (**www.geoall.net/) is a innovative, nonprofit organization open to all individuals and institutions committed to foster trusted and inclusive **processes** to enable the creation, effective and equitable flow, and beneficial use of geographic information. The design of the GeoData Alliance is chaordic, modelled on the fundamental organizing principles of nature. It harmoniously blends apparent opposites such as competition and cooperation, self-organization and coherence, and freedom and concern for the common good" [GeoData Alliance, 2002].
- In Austria the **GIScluster** (www.giscluster.at) is a fusion of companies that offer a broad selection of know-how and services around the chain of added value around Geoinformation. This approach ensures interdisciplinary cooperation within the business of 'spatial data management', including data acquisition, data management and the visualisation of data.
- The 'Three **Ordnance Surveys'** of Great Britain, Ireland and Northern Ireland announced during the "agi conference at GIS 2001" a joint activity on building national databases" [Murray et al., 2001]. They intend in the long run standardisation of data structures, identifiers and formats – in short term:
- To make it easier to compare current data & products across the organisations To provide support information including common glossary and technical papers To provide central access to common papers and information. The Austrian software company Progis (www.progis.com) is applying new approaches in 'Precise Agriculture'. Their decentralized approach of shaping the business procedures supports the dataflow between farmers in the field and the regional agricultural administration centers to be used also for updating. "Updating has to involve the farmer who knows about the actual changes in the field."

3.3 NSDI as a Synonym for Improving Business Processes

Similar approaches of **tuning business processes** are developed under different names like '**Geodata Policy**' and '**NSDI**' (National Spatial Data Infrastructure). Their main focus is in inter-firm cooperation, which is far more than just to agree on data exchange standards.

4. CHANGING ROLE OF SURVEYORS

In the past dramatically changes in our geodata business resulted mainly from technological innovations. In the meantime however changes are more and more caused by improved business processes with a sever impact on our surveying business. Some of our customers and even some partners like National Mapping Agencies started innovative Reorganization Processes, which has some drawbacks:

- Reorganization takes time and resources – during that time customer contacts are weakened.
- The renewed organization may again not fit because the business world is under a continuous changing process.

Even running the tradition change script faster **does not work**. The reaction on increased business pressure with organizational changes is often the wrong way. The most dynamic firms shift **business models** without organizational changes. Instead of shifting organizational blocks we have to shift mindsets!!!!

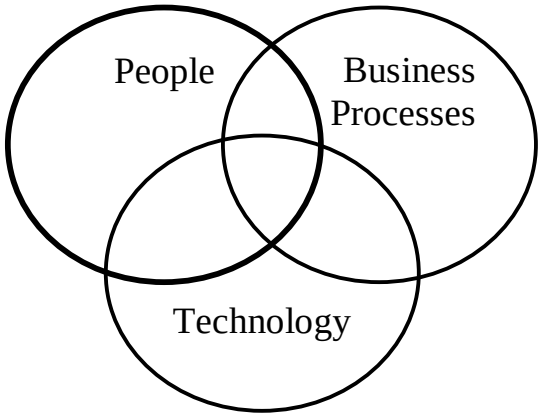

Fig. 0: Integration of processes

Some decades ago the strong position of surveyors with almost a monopoly in geometric data acquisition was mainly based on Technology and People - technological innovation combined with highly skilled experts.

In the meantime the technology is used by a wide user community: point coordinates are computed automatically using the measured and registered data sets. Geodata are more detailed in their "thematic resolution" and so the required knowledge for geodata assessment shifted from geometric issues to thematic issues. This requires involving others than surveying experts. Simultaneously with this shift the costs for surveying equipment and photogrammetric soft copy stations decreased with the final result that thematic experts themselves acquire geodata [*Mansberger et al., 2000*].

But nevertheless surveyors are needed more than ever. The merge of global geodata requires well-based knowledge about coordinate systems and map projections. In the future four additional main activities have to be realized by professional surveyors in the field of "Spatial Data Management":

- Coordinator of the workflow for geodata sets
- Information Manager (including documentation: metadata)
- Quality Manager (QM) for geodata
- Expert for integrating business data, thematic data and geodata across different professions for generating "geoinformation for decision making".

Or with other words: the surveyors have to mutate from "Geodata Samplers" to "Managers in Geodata Clusters". Training those skills communication skills – understanding demand and language of other professions will be essential for success as a surveyor. Surveyors contributing to the consulting business experience already today the wide range of skills and inter-professional cooperation needed.

5. SUMMARY AND CONCLUSIONS

In the paper improved business processes for management of geodata are outlined and trends for further developments are shown up: The interval for launching new products will decrease and business models has to be adopted to the faster and more automated sampling of geodata. The trend to lower costs for surveying and data capturing will continue.

Due to the broad thematic orientation and huge amount of geodata needed for a wide spread field of users the organisation of data acquisition requires new strategies. Co-operations and partnerships of companies and/or institutions on a local or regional level (Public/Private Partnerships) in so-called "Geodata Clusters" could be the key development. "Geodata Clusters" will need a core group for the managing of geodata: Surveyors with their education and knowledge in geodata management have to take this position: Providing service for our customers bridging contributions from different professions. From that point of view I wonder how long it will take that national surveying associations open up their communication to other profession e.g. by organizing joint for developing a better service to the customers.
Finally the author will end this article with a comment of the director of the Open Planning Project in New York, *Rob Hranac*, (published in [*Corbley, 2002*]):
"GIS users spend 90 percent of their time searching for datasets and 10 percent of their time actually using them. Can you imagine how the industry would grow if those numbers were revised?"

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BIOGRAPHICAL NOTES

Gerhard Muggenhuber has some 20 years of professional experience in management of cadastre and Geo-Information in Austria as well as abroad. Therefore he has an excellent knowledge in the management of geoinformation.
In his present function as Vice-head of international affairs of BEV – Federal Office of Metrology and Surveying - he contributed to international initiatives in Eastern- and Central Europe like the Word Bank "Initiative on Real Property Rights". Gerhard Muggenhuber is elected Chairman of FIG-*Com.3 (Spatial Information Management)* and representative of the commissions in the FIG Council.
From 1996-2001 he was member of bureau of the Working Party on Land Administration, an advisory body on land registration matters to the UN-ECE in Geneva.

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