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Development and marketing of a cadastral software – co-operation to reach the international market

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SUMMARY

Three years ago Lantmäteriet decided to replace the software being used for many years for topographic and cadastral mapping in order to increase efficiency in handling all kinds of spatial data. The new product – ArcCadastre – has been developed on the latest proven technology platform and in close co-operation with the GIS and surveying industry as well as with national and international users.

Functionality, which may vary between different user categories, or from country to country because of different legal, organisational or other requirements, can be added by customisation. Hereby ArcCadastre will be able meet the needs of many user categories.

The paper describes the background and preparations for the development, strategic choices being made concerning technology and functionality, methods for the development, the organisation of marketing and sales as well as conclusions and findings.

INTRODUCTION

In recent decades the IT-development has had an increasing influence on the business of land information and on the cadaster evolution. The Internet boom has created a new and rapidly changing environment for the further development of spatial data infrastructures in general and for land information systems in particular.

In order to increase efficiency in handling of all kinds of spatial data, Lantmäteriet has developed ArcCadastre together with its partners ESRI and Leica. ArcCadastre is designed to be a tool specially adapted for cadastral and mapping activities with different kinds of spatial management and in different situations around the world. ArcCadastre is a rather unique solution that extends mapping functionality with survey and cadaster functionality.

LANTMÄTERIET

Sweden has a very long history of mapping and cadastral activities, with Lantmäteriet's history going back to 1628. This also means that we have a long experience in the field of using up-to-date technology and working methods. Swedish organisations within the different fields of surveying have been something of pioneers in developing and using Land Information Systems (e.g. through the introduction of the Land Data Bank System) and GIS (as Lantmäteriet e.g. was one of ESRI's first customers).

The tasks of Lantmäteriet, the National Land Survey of Sweden, is to contribute to an efficient and sustainable use of Sweden's real estate, land and water. It also has the task to develop services to exploit the potential of existing and new markets by meeting the needs of the customers – public as well as commercial – concerning geographic information and land information.

Lantmäteriet thus possess specialists in geographic information, land information, cadastral services and geographic information techniques. Together these four fields of operations put our organisation in a rather unique position. Within these areas Lantmäteriet has the national responsibility and also a dominating role. Also internationally, this combination has given Lantmäteriet a prominent position.

Valuable experience has been gained from active participation on the international arena, notably in FIG, WPLA, ICA and Eurogeographics. Through Swedesurvey Lantmäteriets cadastral and mapping specialists have for some 25 years been engaged as consultants in a large number of countries world-wide. Customised solutions for land management and the use of geospatial data have always been the focus of these activities.

Thus, Lantmäteriet in itself possess a good knowledge and understanding of the many different environments, where the new software might be introduced and used. The software has actually been developed in a cadaster and mapping environment. It has been built by users for users.

THE BACKGROUND AND PREPARATIONS

As part of our experience in the development of tools for carrying out the tasks of Lantmäteriet, in-house software for topographical and cadastral mapping was developed at a very early stage. The information contained in various cadaster and legal land registers, utilities registers and map databases is a key, infrastructure component with an immense capital value, in both the public and private sectors of a nation's economy. A well-functioning map and land administration system is one of the essential corner stones in a market economy. So it has been quite natural to make sure that Lantmäteriet has good and reliable tools when building up such registers and databases.

These original systems (the AutoKa family) have been enhanced over the years, and many new facilities have been added. Three years ago we decided to develop a totally new product, and to replace the existing ones in order to increase efficiency in handling all kinds of spatial data. The prime target group was of course to be Lantmäteriet itself, and other users carrying out the same activities in Sweden, i.e. within the municipalities. The intention was to provide software solutions for capturing, maintaining and managing survey data and cadastral information.

After some initial planning it was realised that Lantmäteriet and the product could gain considerably by establishing partnerships for this development. Lantmäteriet has therefore developed ArcCadastre together with its partners ESRI and Leica. With such international partners it was soon obvious that the product should be developed not only with a Swedish focus, but also with a more global target group in mind. As the AutoKa products already had a number of users in different parts of the world, the international focus was quite logical also for Lantmäteriet.

CHOICE OF TECHNOLOGY AND FUNCTIONALITY

ArcCadastre has been built on the latest, proven high technology platforms that are available within the respective technological fields:

- ArcGIS from ESRI Inc. has been used as the base for the development of ArcCadastre.
- Survey Analyst developed by ESRI and Leica Geosystems AG is used for survey and computation functionality.
- FME from Safe Software Inc. is used for import and export to and from various data formats.

ArcCadastre has been designed to support cadaster surveying activities, to handle geographical data and for map production. It is well suited for customer and/or country-specific extensions. The core product is the basic cadastral software and the tool for all mapping activities in the fields of large scale, small scale and utilities map production. The product contains all functionality needed for surveying and mapping purposes and for the greater part of the functionality that is common to cadastral workflow in different countries. With ArcCadastre the users work sequentially from field measurements via computation, processing, presentation of various maps and reports, to a final storage of objects in databases. ArcCadastre has been designed as a multi-purpose tool for handling geographic data together with non-spatial data from other databases. ArcCadastre's extendibility is excellent due to the technology that was chosen for its development.

Functionality, which may vary between different user categories, or from country to country because of different local legal or other requirements, can be added by customisation. Hereby ArcCadastre can meet the needs of many user categories and for a wide range of applications including municipal mapping, managing cadaster systems, the production of cadastral index maps, public utilities companies, surveying and mapping, major real estate owners, land taxation purposes and land use planning.

The handling of cadaster data is often regulated to follow predefined processes. In this way, data integrity, from a legal aspect, is preserved. When working within a process, a predefined workflow is followed. A number of documents may be produced and sent to the involved parties. Likewise, a number of features in a database may be subject to changes. Several data files may be used as input and/or output. This emphasises the need for methods for organising the work in order to keep track of all elements of it.

In ArcCadastre, a job is the basic mechanism and all work in ArcCadastre is executed within the context of a job. The function of a job is to keep track of all relevant information and settings that belong to a certain job, for example, program settings such as custom toolbars, data sets and features in Geodatabases, as well as amendments and references to documents belonging to the job. Furthermore, a job has a lifetime and supports the overall handling of all items affected by it. Jobs are saved with unique names and a job has a workflow.

Access to a job is regulated by the overall access rights system. This facility can be used to restrict access to a complete job, or parts of a job, to specified users.

As the newly released ArcCadastre is based on COM technology, it provides a completely open solution for developers and is, therefore, fully customisable by both end-users and developers. COM allows the software components to be reused at a binary level, which means that third party developers do not need to have knowledge about or access to source code, header files, nor object libraries to extend the system, even at the lowest level. Any development tool supporting COM, such as Visual Basic, Visual C++ or Delphi, can be used to develop components.

All this makes ArcCadastre very open for customisation and also for communicating with external applications.

METHODS FOR DEVELOPMENT

The development phase has engaged a large number of potential users outside Lantmäteriet.

The development work has been based on object-oriented design and analyses, and the latest system development methods have been adopted. This means:

- That a number of so-called “use cases” have been created to describe the user requirements – the real key-processes of the users. These “use cases” describe the desirable system performance from the user’s own point of view – and in the user’s own terminology.
- That a standardised method or language has been adopted to describe the requirements, i.e. the Unified Modelling Language.
- That the users will handle objects that are closely related to their working environment.

The final result is that “intelligence” has been added to the data, which to a large extent will facilitate the user’s daily work and help secure the quality level of the work performed.

MARKETING AND SALES

The marketing plan for ArcCadastre has been developed in close co-operation with our partners, Leica and ESRI. The main idea is to combine the resources of ESRI and Lantmäteriet/Swedesurvey in order to reach significant impact on the international market. ESRI, through its national distributor in Sweden, co-ordinates the marketing activities, which normally are carried out by the world-wide net of ESRI distributors. Cadastral specialists from Lantmäteriet/Swedesurvey form a stand-by resource, which can be called upon by the ESRI distributors.

If and when a national cadastral project is launched, the local ESRI distributor will normally take the lead in the bidding procedure with back up from Lantmäteriet/Swedesurvey and ESRI Inc. If a bid is successful, the local distributor will be responsible for customising the software, for its implementation, the training and – perhaps especially important – for the front line support of the software. Again, backup resources will be provided by Lantmäteriet/Swedesurvey and ESRI Inc.

This marketing and sales approach is intended to facilitate for the customers to manage the customising process and to secure a reliable, long-term support and maintenance of their investments.

CONCLUSIONS

Throughout the ArcCadastre development process and the following marketing and sales efforts, the ambition has been to maintain a sharp focus on the customers and their working conditions. At an early stage our own cadastral professionals provided the inputs, later professionals from the Swedish municipalities, Leica and ESRI took part in specifying the requirements and in the design of the software. Also in the other stages, e.g. in choice of software platform, in choice of development tools and methods, testing procedures, and also in the marketing process, the decisions have been governed by the need to comply with the customers requirements. Whether these efforts have been successful or not, it’s perhaps too early to tell, but a great interest has so far been shown from cadastral and mapping organisations all around the world. Despite the complexity involved in deciding to introduce new cadastral software in a national or local authority, ArcCadastre is already now being implemented in some 15 Swedish municipalities, in cadastral projects in Africa, Asia, Latin America and Europe. Still, it will probably take another few years until we can determine the ultimate success for the project.