Advances in Modern Land Administration – Cadastre 2014 in the Year 2006

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SUMMARY

FIG Commission 7 Working Group 7.3 deals with the impact of advanced technology on land administration systems and has a special focus on the role of the cadastre in national and regional E-Government programs. Cadastre is part of E-Land Administration and plays a growing significant role in the implementation of national and regional Spatial Data Infrastructures (SDI). A major requirement for all data and systems in a SDI environment is that they follow well defined standards. Standards are a key element in SDI and E-Government. Otherwise inter-operability of data and services in SDI will be impossible.

A lot of countries in the developed world have to change their current IT environment in order to meet these current and future requirements. All have the task of executing the renewal process while 'the shop stays open', which means that the migration process must have no negative influence on normal business.

Commission 7 organised seminars and workshops on these topics. The paper summarizes the experiences and outcomes of these events and tries to evaluate whether the FIG paper Cadastre 2014 is still up to date or needs modification in some points.

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1. INTRODUCTION

In most developed countries administrative reforms are on their way motivated by privatization of governmental tasks, reduction to core business, centralization or decentralization of institutions etc. Along with this the administrative bodies have to meet the requirements of customers' satisfaction and cost recovery. These common trends have great impact as well on land administration bodies in Europe.

Technological developments in computing over the last thirty years have resulted in land administration jurisdictions introducing Information and Communication Technology (ICT) into their systems, starting with mostly textual records in the late nineteen-sixties. Graphical components were migrated into digital cadastral maps and databases in the early nineties; there were no technical links established between textual and graphical records. Hard- and software operating these systems is more or less outdated and needs to be replaced by a modern technology based on international standards "while the shops are open". Strategies how to deal with this issue were discussed on an international FIG seminar in 2003 (van der Molen, Lemmen 2003).

The renewal strategies are affected by E-Government projects in all parts of the public administration. An important part of these projects is the introduction of European, national, regional and local Spatial Data Infrastructures. Of course cadastral data play an important role in SDI projects because especially their graphical data are basic elements in SDI. Digital cadastral and land registration data are the major part of E-land administration. These data as part of geographic information have developed to a new tool for decision making and are crucial for political, economic and legal decisions. Commission 7 organised an international seminar on these topics in 2004 (Schennach 2004).

The paper summarizes the experiences and outcomes of these events and tries to evaluate whether the FIG paper Cadastre 2014 (Kaufmann, Steudler 1998) is still up to date or needs modification in some points.

2. IT RENEWAL STRATEGIES

Two major strategies can be identified for the renewal of an IT environment in cadastre and land registration:

- the 'step by step approach' following an overall 'road map' and
- the 'big-bang-approach'.

Both strategies have their strengths and weaknesses. Which strategy will be most appropriate for any individual jurisdiction is a difficult decision. General advice cannot be given. The individual circumstances in each country, current systems, budget, time-frame, pressure from government and/or customer side and many more factors may influence the decision in a direction that meets most requirements of the individual organization. Beside these strategies for the complete replacement of existing systems, two less stringent strategies were identified:

- a re-engineering within the existing infrastructure focusing on improvement of maintainability and adaptability but without changes to infrastructure and functionality;
- conversion of existing mainframe solutions into a client-server architecture. This strategy improves the technical infrastructure but does not allow major improvement in functionality.

The chosen strategy in any particular country takes into account the individual situation in that country. For both strategies counts that the renewal of a long time running successful system is a task which needs patience on the side of customers and employees, money and on the management side of the organization optimism and the ability to stand painful and suffering periods during the development and implementation phase. Without a renewal of the outdated hard- and software it will not be possible to meet future requirements in SDI projects.

2.1 Current situation

The software systems which are currently in operation in most cadastral authorities in Europe are quite old, dated from a time where international standards didn't exist. The software has been continuously maintained. The situation in most countries is that they are happy to process data with reliable hard and software but are not really able to meet future requirements like e-commerce, internet solutions and standards. A lot of jurisdictions in Europe are now facing these problems more or less simultaneously and need now to change their IT environment. Some countries began this renewal process a few years ago, some are in the middle and some are just at the beginning of this quite complicated procedure. All have the task of executing the renewal process while 'the shop stays open', which means that the migration process must have no negative influence on normal business.

2.2 Need for renewal

Reasons for the renewal of the existing software are on one hand technical and economical aspects and secondly customer driven. Maintenance of the software is laborious because very often the software is not well documented and written in languages only the developers still know. The hardware platforms are old and maintenance is more or less not possible anymore because computer manufacturers do not guarantee support for their products over a long time. In addition to that in most cases the software was developed very close to the hardware platform, on which it was processed, so changes of the hardware are normally not possible.

Customers require data access via internet, so technical solutions have to be designed for E-Land Administration and E-Government requirements. With old hard- and software solutions this is mostly impossible or at least difficult to realise.

2.3 Step-by-step approach

The step-by-step approach is complex and time consuming. Normally parallel data capture and processing has to be done both on the old and the new system for a quite long time which is very cost-intensive. On the other hand it is a smooth process in which as well customers and employees have time enough to switch from the old to the new system. A representative for this strategy is the Netherlands.

Dutch Kadaster started on this process in 1996. The final strategy was developed in 2002. The steps involved include renewal of the existing core system, designing the necessary steps to result in a technically and functionally renewed system in support of all primary business processes, their sequence and all further relevant aspects. This means that a new system will be built up in parts in a new environment while the old system must be synchronised until it can be phased out.

2.4 Big-bang approach

The big-bang approach is easier to implement. Of course, the new system has to undergo a longer customer and employee introductory period and an extensive test phase, for it has from the first moment to run without serious errors. But the big-bang represents a well defined date at which the old system will be replaced by the new. Parallel data capture and long-term dual maintenance of data and system is not necessary. So it may be a faster and less costly strategy. The risks may be found in the period shortly following on implementation of the new system. Even with perfect planning things will not run as smoothly as they should, but problems should not be so big that data becomes inaccessible for weeks at a time. Careful planning and preparation is highly recommended for the ‘big bang’ strategy.

Finland used this strategy very successfully for the introduction of their integrated cadastral system JAKO. After some years of planning they implemented the system in spring 1998. The cadastral database covering the area, for which National Land Survey of Finland is responsible, is available for users via an adaptable map user interface. The integrated new workflow had to be designed and training of staff had to undertaken which required more effort than anticipated. After a time of training and learning about the new system now the Finish organisation achieved an increase in productivity of 30%.

3. E-LAND ADMINISTRATION

3.1 Standards and interoperability

E-Land Administration is an internet service from the cadastral and the land registration authorities often embedded in larger E-Government programs on an international national or local level. The key word in these programs is standards, interoperability of data, software and information.

To properly ensure access to information society services, interoperability between services and devices must be ensured, preferably through open standards. Data interoperability can be guaranteed only by using common standards. These standards are defined by international standardization bodies like ISO and the OpenGIS Consortium OGC. UML, GML and XML may be three examples for data formats which are world wide recognized standards in the GIS environment.

To operate mapping services on the internet OGC established the Web Map Service (WMS) for raster and the Web Feature Service (WFS) for vector data. Using these services users are able to combine mapping data from different sources online. These different sources that can be combined need to fulfill some strict regulations. The basic and common geometry of all data on all layers available has to be used by any of these components. This is the point where Land Administration data come into the play. These data become most relevant basic data sets in most SDI-projects. Each partner in SDI-projects has to follow these basic regulations, software and data based on international standards and to use the same basic geometry.

3.2 Optimizing the workflow in land administration

The traditional workflow for updating the cadastre or for producing extracts was a mixture of digital and analogue operations with a lot of breaks in data flow, manual copy and paste work etc. on different levels with different partners inside the cadastral organization and with partners of the private sector.

E-Land Administration allows new opportunities on both the public and the private sector along the cadastral workflow. Private licensed surveyors are or will be able to extract data from the cadastre online for their specific work for example a subdivision of land. They will be even online with the cadastre during the field work, getting coordinates for boundary points, restore these points in the field by using RTK (Real time kinematic) equipment and modern total stations, survey and calculate new boundary points according to the wishes of the customers and sending them back to the home office.

After checking and electronically signing these new data they will be transferred to the cadastral office, cross checked there whether they are conform to the system and then being used for updating the records and electronically archived without any media break online.

From the technical point of view the hard- and software solutions are already available, but very often the legal background has to be created.

3.3 E-Land administration and SDI

Marketing of public geodata up to now is focused on analog distribution channels, but online-availability of geodata is increasingly gaining importance. The provision of geodata via internet has become a key segment of E-government.

Cadastral maps and textual information about parcels are a key element of SDI projects on international and national level. In Europe INSPIRE is on the way. It will go through the conciliation procedure in the second half of 2006 and it seems that it will come out as an EU directive in 2007.

INSPIRE is a legal framework being developed by the European Commission services with officials and experts in Member States and accession countries from the national, regional and local levels. It is to be implemented throughout the European Union (EU) from 2006/7 onwards with different types of geographical information gradually harmonised and integrated, resulting in a European Spatial Data Infrastructure. A key objective of INSPIRE is to make spatial data available for Community policy-making and implementation in a wide range of sectors, starting with environmental policy and later extended to other sectors such as agriculture, transport etc. (from the web page of INSPIRE http://inspire.jrc.it).

Cadastral parcels and property identifiers are listed in the INSPIRE papers as important parts of the system. Member states shall create the necessary metadata no later than 3 years and the data itself no later than 5 years after the date of entry into force of this Directive.

Not only are the information on parcels recognized as very important elements in national SDI projects, the majority of cadastral data are, like buildings, land use, rights and restrictions etc. The provision of customers with cadastral data in E-Government environments is an important step forward to make these data accessible easy and customer friendly. These data can be combined with other information about land related issues.

A lot of things have to be decided besides the more technical oriented problems, e.g. pricing policy (an issue in INSPIRE), ownership of data, guarantee of the correctness of the information etc. E-land administration is more a political and organizational task than a technical challenge.

4. CONCLUSION

Cadastral data become a key element in SDI projects. This can only be realized when the IT environment in the Land administration sector is state of the art. FIG Commission 7 organized two seminars regarding the strategies for an IT renewal in the land administration organizations and the experiences and good practices on E-land administration.

The FIG paper Cadastre 2014 (Kaufmann, Steudler, 1998) is still up to date. Some of the statements can be realized only as parts of larger SDI projects. What became most relevant is the issue of standards. Without the acceptance and agreements on using international standards in SDI projects the majority of these projects will not run successfully. Maybe Cadastre 2014 should therefore be added by a new vision statement: "Cadastre 2014 will be highly standardized."

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BIOGRAPHICAL NOTES

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