

Cadastre 2014: The Practical Realization of a Comprehensive Documentation of the Complex Legal Situation of Land Using a Simple Data Model and Sophisticated Information Technology

Jürg KAUFMANN, Urs FLÜCKIGER and Peter BÄNNINGER, Switzerland

Key words: Cadastre 2014, complex legal situation of land, simple data models, documentation, information technology

SUMMARY

The Cadastre 2014 [Kaufmann, Steudler, 1998] approach allows it, to resolve the problem of the documentation, administration and management of the complex legal situation of land, which has emerged from the legislation impacting the private land rights. To secure a sustainable cohabitation of humankind, to omit the destruction of the environment and to make a sustainable use of the natural resources possible, most of the existing societies have created a big number of laws. The legislation work was and is often tackled under time-pressure and has an emergency characteristic.

Therefore the impacts of these laws on the private property rights:

- have often not been taken into consideration during the legislation process, because this issue had no priority;
- exist all over the world, because in most cases existing laws are copied and adapted to the local conditions;
- create an increasing uncertainty for land owners and investors;
- threaten the functioning of the land markets, which are important drivers for economical and social development.

These negative effects can be corrected, when a reliable documentation of the legal situation of land can be implemented, which is the basis for a proper land administration and for successful, effective and sustainable land management.

Based on the ideas of Cadastre 2014, solutions for these problems are emerging all over the world. In Switzerland this FIG publication has initiated activities and developments which can be considered as exemplary. The straight forward and comprehensive, easy to conceptual data and law modeling technology and the functionalities of the modern information technology have proven to be feasible and efficient. Comprehensive practical solutions support the efficient and effective land administration and land management on all political levels.

ZUSAMMENFASSUNG

Der Ansatz Cadastre 2014 erlaubt es, das Problem der Dokumentation, Administration und des Managements der komplexen rechtlichen Situation von Grund und Boden, die aufgrund der, die Eigentumsrechte tangierenden, Gesetzgebungen des öffentlichen Rechts entstanden ist, zu lösen. Um ein nachhaltiges Zusammenleben der Menschheit sicherzustellen, die Umwelt vor Zerstörung zu schützen und eine nachhaltige Verwendung der natürlichen Ressourcen zu ermöglichen, haben die meisten der existierenden Gesellschaften eine grosse Anzahl Gesetze geschaffen. Die Gesetzgebungsarbeiten wurden oft unter Zeitdruck angegangen und sie weisen in vielen Fällen die Charakteristik von Not-Gesetzgebungen auf.

Daher gilt für die Auswirkungen dieser Gesetze auf die Eigentumsrechte Folgendes:

- sie sind meist im Gesetzgebungsprozess gar nicht berücksichtigt worden, weil sie keine Priorität hatten;
- sie existieren überall auf der Welt, weil Gesetze in den meisten Fällen kopiert und an die örtlichen Verhältnisse angepasst werden;
- sie verursachen eine zunehmende Unsicherheit bei den Inhabern der Rechte und bei den Investoren;
- sie bedrohen das Funktionieren der Landmärkte, die eine entscheidende Rolle für die wirtschaftliche und soziale Entwicklung spielen.

Diese negativen Effekte können korrigiert werden, wenn eine zuverlässige Dokumentation der rechtlichen Situation von Land eingerichtet werden kann, welche die Basis für eine saubere Landadministration und für ein erfolgreiches, effektives und nachhaltiges Landmanagement ist.

Basierend auf den Ideen von Cadastre 2014, entstehen auf der ganzen Welt Lösungsansätze für diese Probleme. In der Schweiz hat diese FIG-Publikation Aktivitäten und Entwicklungen ausgelöst, die als beispielhaft gelten können. Die geradlinige, umfassende und einfach zu handhabende Daten- und Gesetzesmodellierungstechnologie und die Anwendung der Funktionalitäten moderner Informationstechnologie haben sich als tauglich und effizient erwiesen. Umfassende technische Lösungen unterstützen effiziente und effektive Landadministration und Landmanagement auf allen politischen Ebenen.

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1. INTRODUCTION

This paper intends to summarize the impacts of the ideas of Cadastre 2014 on the development of comprehensive documentations of the complex legal situation of land, which has emerged from the legislation impacting the private land rights. To secure a sustainable cohabitation of humankind, to omit the destruction of the environment and make a sustainable use of the natural resources possible, most of the existing societies have created a big number of laws. The legislation work was and is often tackled under time-pressure and has an emergency characteristic.

Therefore the impacts of these laws on the private property rights:

- have often not been taken into consideration during the legislation process, because this issue had no priority;
- exist all over the world, because in most cases existing laws are copied and adapted to the local conditions;
- create an increasing uncertainty for land owners and investors;
- threaten the functioning of the land markets, which are important drivers for economical and social development.

These negative effects can be corrected when the legal situation of land is reliably documented.

Switzerland is on the way to implement this type of documentation, which serves the land administration and the land management, following the ideas and recommendations of cadastre 2014. These initiatives and developments are commented in this paper.

Simple data models are necessary to make the documentation efficient and sustainable,. The type of data models used in the projects is explained.

In addition the methods and technologies used to implement a comprehensive documentation are discussed.

A practical solution will complete the presentation.

2. IMPACTS OF CADASTRE 2014 ON COMPREHENSIVE LAND RIGHT DOCUMENTATION

2.1 Cadastre 2014 an approach to master the complex legal situation of land

The vision created by Cadastre 2014 consist of 6 statements as follows:

TS12 – Cadastre 2014 and Cadastral Modeling

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Shaping the Change

XXIII FIG Congress

Munich, Germany, October 8-13, 2006

Statement 1:

- Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions!

Statement 2:

- The separation between 'maps' and 'registers' will be abolished!

Statement 3:

- 'Cadastral mapping' will be dead! Long live modeling!

Statement 4:

- 'Paper and pencil cadastre' will be gone!

Statement 5:

- Cadastre 2014 will be highly privatized! Public and private sector are working closely together!

Statement 6:

- Cadastre 2014 will be cost recovering!

These statements show which measures are to be taken to implement a comprehensive cadastre system in the future.

In the context of this paper, statement 1 is the most important one. The necessity to have a comprehensive documentation of all existing legal arrangements concerning land is prerequisite to maintain functioning land markets and to solve the existing complex problems in a sustainable way.

But the other 5 statements are relevant as well. Cadastre 2014 needs an efficient organizational environment, makes use of modern data modeling and information technologies, takes advantage of public private partnership and supports cost recovery.

2.2 Activities and Developments in Switzerland

The ideas of Cadastre 2014 have initiated several developments in Switzerland.

2.2.1 Law on Geoinformation

A new law on Geoinformation has been drafted. One major part of this law is the regulation for a Cadastre on Restrictions by Public Law. This new institute shall be a common task of the confederation and the cantons, where the confederation has responsibility for the strategy and supervision and the cantons for the execution with the help of private partners. It is a

complement to the property cadastre which documents the property rights according to the civil law.

This new cadastre shall be organized according to the principles stated by Cadastre 2014, in particular on the principle of legal independence, and it will serve all authorities, organizations and individual persons interested in land matters and land development to obtain comprehensive information on the legal conditions existing on land parcels.

Banks, insurance companies, real estate agencies, land owners, investors but authorities as well are highly interested in better information about the important resource land.

The draft of the new law has passed the consultation phase and will be discussed in the parliament during the winter 2006/2007.

It is expected, that the realization of the new cadastre will start officially by beginning of 2008.

2.2.2 c2014

In parallel to the legislation work the Society of the Swiss Publicly Appointed Surveyors has established an internet-based service providing information on land rights and restrictions run by the cooperative society c2014, which has investigated all federal and cantonal laws in respect of the existence of spatial objects which can have an impact on land property rights. All the laws have undergone a formal modeling process. The individual surveyors have taken the task to investigate and model the laws of the municipalities, they are responsible for. In addition all the relevant spatial data, describing the spatial objects with impacts on land, have been acquired and stored in respective formal data models.

A server with information on: 'Which parcel is affected in which degree by which law?' was installed by the cooperative society. Interested customers can get the permanently updated information from the society's internet portal for a fee.

As long as the Law on Geoinformation is not in force, the society has to take full responsibility for the good quality of the information. As they are licensed surveyors, they know this business, but they would be happy, when the state takes his part of responsibility as well.

The technical solution is reality and the community of interested clients is growing. Improvements will be implemented according to lessons learned.

2.2.3 GeoBER

A further initiative is focused on the municipalities. They have to deal with all the conditions imposed by construction permits. Due to intensive construction activities the number of this type of restrictions is growing fast and it is often impossible for the responsible officers to

keep the overview. In addition, there is no feasible filing system available. The most reasonable identifier is the location, where the condition or restriction is effective.

GeoBER is a tool based on the Cadastre 2014 approach, which allows the responsible officers of the municipalities to keep the files and to use the tool to administrate and manage the construction affairs.

Since many years, this matter was pending. Now there is a great interest in this new possibilities.

GeoBER is used on a pilot basis and experience must be collected in the future.

3. PRINCIPLE OF SIMPLE MODELING

The legal situation of land has become complex and will be even more complex in the future. To be able to handle this complexity, it is important to keep the data models as simple and as easy to maintain as possible. Cadastre 2014 makes use of the method of polygon overlaying to keep the models simple. This method can only function, when the spatial objects are located in a common reference system.

Many professionals argue, that the old deformed and distorted map material makes it impossible to work with this method. In reality old map material is renewed and actualized whenever the digitizing and vectorization processes take place in a certain jurisdiction. All over the world we see this type of cadastre renovation and reconstruction. New technologies like orthophotos, sophisticated transformation procedures, GPS, etc. allow efficient work. Real professionals know, that only actual and reasonably accurate data can be the basis for the services required by modern and globalized societies.

The unique, straight-forward and simple model stipulated by Cadastre 2014 reduces the complexity, prevents from implementing, keeping and maintaining artificial links between objects, is maintenance-friendly because only the object affected by a change have to deal with, is therefore efficient and cost-effective, answers new requirements created by new laws by simply adding topics to the existing ones, or, what happens unfortunately not often, removes a topic from the model without additional work when an existing law is cancelled, omits expensive and exhausting data conversion and migration efforts, and can answer unexpected questions.

Traditional models are parcel centric and can give answers like: 'Is a certain land parcel affected by a land use planning zone?' It is nearly impossible to answer the opposite question: 'Which land parcels are situated within or affected by a certain land use planning zone?'

Only simple modeling has a future. All the other approaches will fail, because they add complexity to an already complex problem.

4. SOPHISTICATED INFORMATION TECHNOLOGY FOR SOLUTIONS

The practical Cadastre 2014-based solutions make use of different possibilities of modern information technology.

4.1.1 Conceptual Data Modeling Technology

All spatial object are defined with the data definition languages INTERLIS and INTERLIS 2, the only really consolidated and successfully operating data modeling standard. This tool allows clear and unambiguous understanding of the meaning of objects and data, can be used for data and representation models, includes domain definitions and consistency conditions, can be automatically interpreted and checked by compilers, and can create data exchange formats automatically. Based on the model description automatic data checking can be carried out.

Unless other standards are fully operational and offer the same performance, INTERLIS is the reasonable approach for successful solutions.

4.1.2 Polygon Overlay Technology

This technology makes simple modeling possible. Geometry is used to create the relation between spatial objects in the moment when this is needed. For the surveyor as the specialist for geometry, this technology is fundamental. He should be proud to enable straightforward and efficient procedures by preparing reliable data and to make competent use of this tool.

4.1.3 Law Modeling Technology

Based on INTERLIS, the conceptual model of all Swiss legal documents was executed. Special software to support investigation and modeling of laws has been developed. A special part of this software is capable to relate the detailed legal description of land rights and restrictions to the parts of the spatial objects affected by a certain law. These advanced technological solutions support efficiency significantly.

4.1.4 Internet technology

Internet technology is increasingly used for data management tasks as maintenance of data sets, data exploitation, and creation and execution of general services based on available data and accessible on the web. This tool applied consequently makes information technology more user friendly, efficient and less expensive.

5. PRACTICAL EXAMPLE

A practical example of GeoBER can be found on www.aris-geoservices.ch and www.esri-suisse.ch.

c2014 has demonstration data on www.c2014.ch.

Information on INTERLIS can be found on www.interlis.ch.

REFERENCES

Kaufmann J., Steudler D. [1998] with Working Group 7.1 FIG Commission 7 (1998) Cadastre 2014, A Vision for A Future Cadastral System

BIOGRAPHICAL NOTES

Date of birth: 22. August 1942

Nationality: Swiss

Education

- Federal Institute of Technology Zürich, Rural Engineering and Surveying, Diploma 1967
- Diploma Mössinger Business-School, 1965
- Licence as Swiss Federal Licensed Surveyor, 1981

Languages: German, English, French, Italian

Consulting Experience

- Project Management Board of 'Reform of the Swiss Official Cadastral Surveying'
- Consultant GIS/Cadastre/Land Administration to authorities in Switzerland and the Principality of Liechtenstein
- Member of Board for the preparation of the Swiss Law on Geoinformation
- Consultant for Cadastre Projects in Belarus, Ukraine, Georgia, Kosovo, Serbia, Macedonia

Professional Experience

- since 1988: Independent Consulting Engineer, KAUFMANN CONSULTING
- CEO Keller Survey Ltd. and CEO Digital Ltd., Geomatics Services

Professional activities

- President of geosuisse, Swiss Association for Geomatics and Landmanagement
- Lecturer TUM, Master Program Land Management: Modern cadastral systems
- Lecturer ETHZ, Cadastre 2014

FIG activities

- Delegate of Switzerland FIG, Commission 7, Cadastre and Land Management
- Member of working group 'Statement on the Cadastre'
- Chair of working group 'Cadastral reform and procedures; Cadastre 2014', 1994-1998
- Chair of working group 'Benchmarking Cadastral Systems', 1998-2002

CONTACTS

Jürg Kaufmann
KAUFMANN CONSULTING
Hauffeld 109
CH-8455 Rüdlingen
SWITZERLAND
Tel. + 41 44 867 14 36
Fax + 41 44 867 34 89
Email: juerg.kaufmann@geosuisse.ch
Web site: <http://homepage.hispeed.ch/jkcons>

Urs Flückiger
ESRI Geoinformatik AG
Beckenhofstrasse 72
CH-8006 Zürich
SWITZERLAND
Tel.: + 41 44 360 19 00
Fax: + 41 44 360 19 11
<http://ESRI-Suisse.ch>

Peter Bänninger
Wagistrasse 6
8952 Schlieren
SWITZERLAND
Tel. + 41 44 745 16 16
Fax: + 41 44 733 85 21
E-Mail schlieren@swr.ch