

AN ASSESSMENT OF THE LADM FROM THE CADASTRE 2014 PERSPECTIVE

# Long Live Modelling!

## Series on LADM

This article is the third of a series on Land Administration Domain Models (LADM) and its implementations. The upcoming issues of GIM International will cover worldwide developments related to LADM. For more information on this series, or if you would like to contribute, please contact the editorial manager: [wim.van.wegen@geomares.nl](mailto:wim.van.wegen@geomares.nl)

**The Land Administration Domain Model (LADM) makes a significant contribution to understanding the importance of data modelling in the domain of land, land administration and land management. The 'Cadastre 2014' vision of the International Federation of Surveyors (FIG) stated back in 1998: "Cadastral mapping will be dead! Long live modelling!". While one might think that this message was clear enough, few professional colleagues took it seriously. The editorial team of the LADM were the first to undertake action to get to the bottom of this important issue. Now that the LADM has become**

**an official ISO standard, that statement is strongly underpinned.**

'Cadastre 2014' is the result of a FIG Commission 7 working group examining trends and developments in the field of cadastre. The working group was active from 1994 to 1998 and pre-sented its results at the FIG Congress in Brighton in July 1998. It projected the trends and developed visions of how cadastral systems might look in 20 years' time. The 'Cadastre 2014' vision has received worldwide attention and has been translated into 27 languages.

LADM. Indeed, in the introduction of the International Standard, it is highlighted that the LADM will be based on the conceptual framework of 'Cadastre 2014'.

### MODELLING AND STANDARDS

Models are not eternal; they need improvements and amendments over time, on the one hand due to the inability to see the reality clear enough from the beginning, and on the other hand due to changes of real or legal conditions. The modelling process needs to investigate a problem to its very root, to have the courage to declare a certain view as fixed, and to make the model binding at least for a certain period of time. People are often not too keen on having to think hard, and it seems they may even be scared of compulsory standards.

### INTERNATIONAL STANDARD

In the meantime, the LADM has become an ISO International Standard. It should be remembered that the first normalisation conference of CEN/TC 287 took place in or around 1990. CEN insisted at that time on having a standard by

The idea of 'Statement 3 on Cadastre 2014' (Figure 1) is to model objects instead of thinking in graphical categories. Maps have no function as information repositories; their only purpose will be the visualisation of information. The consequence as mentioned in Statement 3 – that by 2014 draftsmen and cartographers will have disappeared from the cadastral field – was obviously slightly too inflated, but LADM efforts show that the general trend was correct. Cadastre 2014 has been a prominent departure point for the

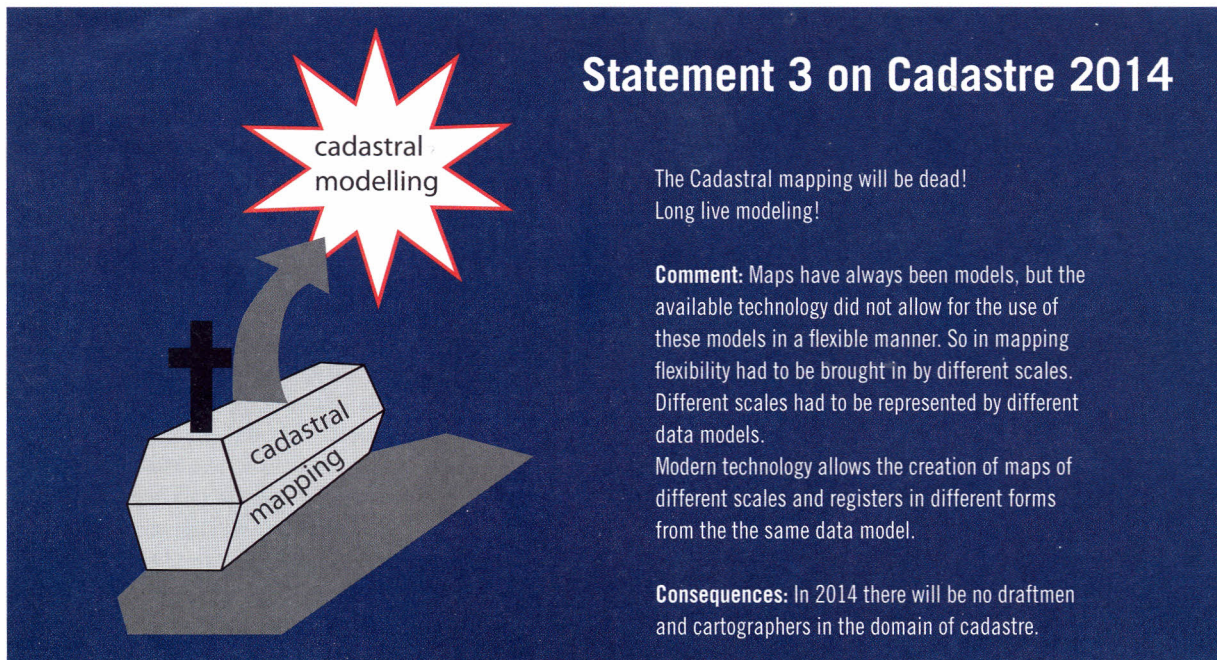


**Jürg Kaufmann** was born in 1942 and graduated from the Swiss Federal Institute of Technology. In 1988, he founded his own company, Kaufmann Consulting, working in the field of cadastre and geomatics at national and international level. Among many other involvements, he has sat on

the management board for the Swiss cadastral surveying system reform. Jürg Kaufmann was a member FIG Commission 7 and chaired the working group on 'Cadastre 2014'.

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◀ Figure 1,  
Statement 3 on  
Cadastre 2014.

1995 at the latest. The discussions were dominated by national data exchange formats and the major European countries tried to impose their own format. The Northern countries and Switzerland then brought conceptual modelling into the discussion. Later on, CEN left the leadership in this field to ISO. Unfortunately the Swiss authorities have not been very keen to contribute to the international standardisation even though data modelling started in Switzerland prior to 1990. More than 20 years later, a standardised model is now in place. Many would have wished for this much earlier, but again it has to be mentioned that people do not tend to like compulsory standards.

#### PEOPLE-TO-LAND RELATIONSHIP

The so-called 'property-based' approach does exist in different cadastral systems. To deal with this phenomenon, special units can be introduced as with what are known as the 'Basic Administrative Units' or 'Basic Property Units' (abbreviated to 'baunits') in the LADM. A baunit is in fact a group of spatial units with the same right(s) and right-

holder(s). This makes the model heavier and these special units have to be administered. The alternative would be to accept that the only clean solution is the triple Object-Right-Subject pattern, which respects the concept of database normalisation with minimal redundancy. This is the only approach that also respects that cadastral systems are to be "simple and efficient". A better solution would be to adapt the cadastral system accordingly. The database can be queried in order to obtain the information about a particular owner's property, and the baunit can be 'calculated' when needed. This solution does not produce additional administrative effort. This approach is one of the cases where the cadastral professionals make their own system more complicated than needed, punishing themselves and the clients by imposing procedures which are more expensive and time-consuming than necessary. This is one reason behind the problematic image our profession has.

#### USABILITY WITHIN SDI

According to proven experience, cadastral information about land

ownership is a prerequisite for any National Spatial Data Infrastructure (NSDI): no NSDI can be successful without such basic cadastral information. This is also illustrated in the INSPIRE Directive. The principle of legal independence in Cadastre 2014 (Figure 2) is the key for the cooperation of different authorities and stakeholders in an NSDI. In the Swiss Federal Act on Geoinformation, data modelling is a key issue. It is safe to say that there will be no NSDI without defined data models and the LADM is the only standardised one. But the LADM must be kept simple, otherwise it could fail due to complexity.

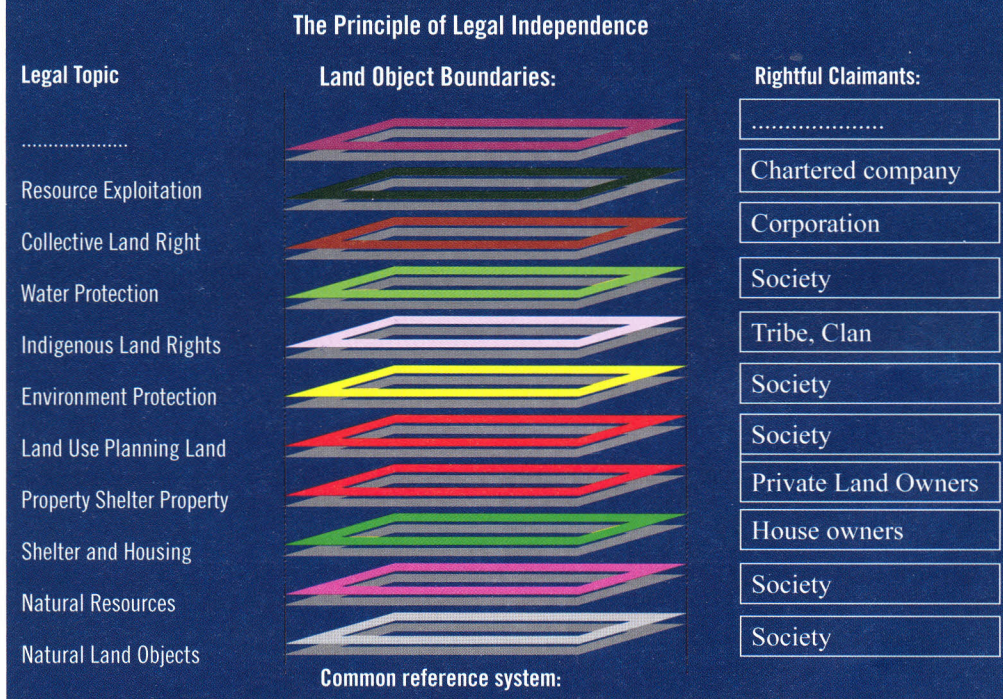
#### LOCAL SITUATIONS

Adaptability is only possible when there are clear definitions – and a data model is a clear and efficient definition. So the LADM will help to adapt the model to local situations efficiently. However, not every situation is worth adapting to, and preference should always be given to the simplest possible approach. The LADM can be applied successfully in many situations, but it should not be the aim of an application to ▶



## Cadastre 2014 - The Principle of Legal Independence

Cadastre 2014 received a lot of attention for the concept that future cadastre will show the complete legal situation of land, including public rights and restrictions – using the concept of legal land objects. The principle of legal independence is a key item in the realisation of Cadastre 2014. This means that legal land objects, being subject to the same law and underlying a unique adjudication procedure, have to be arranged in one individual data layer; and for every adjudicative process defined by a certain law. Besides a special data layer for the legal land objects underlying this process has to be created. This is illustrated in Figure 2.



▲ Figure 2, Cadastre 2014 - The Principle of Legal Independence.

complicate the model by inefficient procedures. It can sometimes be better to re-engineer existing systems.

### RRRS: RIGHTS, RESTRICTIONS AND RESPONSIBILITIES

Restrictions are based on laws. Scanning the Swiss legal framework in view of the Swiss Cadastre for Public Legal Restrictions on Landownership Rights (PLR-cadastre) showed that more than 180 federal laws are creating restrictions, with cantonal and municipal laws and regulations generating a similar number. All topics subject to the PLR cadastre and the NSDI are to be modelled with the help of the data definition language INTERLIS, the Swiss standard. The impact areas of all these restrictions are modelled as an

additional information layer with the basic Object-Right-Subject concept. In this model, the Objects normally have a geometric form, the Rights can have different types (ownership, possession, use, occupation, etc.) as defined by formal laws or informal rules and be temporal, and the Subjects can be any type of rightful claimants (natural persons, legal persons, tribes, societies, etc.).

### ACCEPTANCE

Despite the importance of data modelling, the level of professional acceptance is still far from overwhelming. Since governments will accept what the professionals are saying, additional efforts and contributions are needed from the industry, and FIG should do more as mentioned in Cadastre 2014: "FIG should promote and sponsor

a competence centre for modern cadastral systems; develop a common view of and recommendations for future national licensing policies and further use its contacts with governments and non-governmental organisations to launch an initiative for new, reliable, cost-effective cadastral services, provided by competent professionals."

### FUTURE DEVELOPMENTS

We will soon be able to handle 3D objects efficiently and the time aspect will be taken into consideration in the process models, because processes have an important time component. Our world is three dimensional and takes place in a 4D context. Concerning the 'Semantic Web Technology', data models such as the LADM are helpful for supporting a common terminology, which is essential for common understanding. Standardisation work must go on. Of course, as the only international domain model standard, the LADM has to be maintained and revised on a regular basis.

### ACCURACY

The growing impact of Cadastre 2014 can be seen in the LADM. There is still an obstacle remaining, making it difficult to fully understand the background of Cadastre 2014 and to draw the right conclusions. Furthermore, the introduction of the so-called 'RequiredRelationship' makes the LADM more complicated and less efficient. This is related to the fact that, within the LADM, it should be possible to include explicit relations between different themes, e.g. rights and restrictions. The reason behind this explicit linking is that overlays are not accurate enough in many cases, which causes unreliable results. This needs some explanation. Surveyors are often confronted by old and inaccurate maps, although the way many of them react to them is surprising. Despite being keen on always having the newest, most modern equipment and technology, they



attempt to 'make the best' of such old and inaccurate material – yet the best way to deal with old and inaccurate material is to replace it with new data. Nevertheless, complex procedures are developed instead and, in this case in the LADM, simple and straightforward models are destroyed. As a result, the surveyor's work is becoming more complex and expensive: identifying inaccurately represented facts, rectifying distorted map contents and managing unnecessary links in databases is inefficient, time-consuming and costly – plus it destroys the image of our profession. Why does this behaviour continue, why are old and inappropriate products being referred to when there is access to satellites, CORS systems, remote sensing, photogrammetry, highly efficient

terrestrial measuring technology, etc? Why?

In the Swiss cadastral reform, a lot of time was lost in discussing the use of existing map material. Ultimately, the resulting legal framework included a considerable amount of articles regulating the handling of old, existing map material. Only a few cantons applied the prescribed method, and obtained unsuitable results. After a short time, these results were replaced by new data acquired using modern survey methods.

#### CONCLUDING REMARKS

With their flexible structure, Cadastre 2014 and the LADM allow target-oriented and efficient working. One does not have to deal with traditional cadastral map content; instead, one can concentrate

on current needs. This is done practically by using orthophotos to support identification, determination and up-to-date documentation and registration of boundaries. And one can continue to acquire data as needed for the appropriate management of land, land rights, restrictions and the like without being forced to take care of the inaccurate content of the old cadastral maps that do not correspond to the needs of modern societies. It is necessary to overcome this insistence on traditional map content and instead create models that document reality and support sustainable development. This is the background of Cadastre 2014. The LADM is expected to have a positive impact on contemporary thinking about data management in modern land administration systems. ◀

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