

# Ten Years of "Law on Geoinformation" in Switzerland – The International Context

Daniel STEUDLER, Switzerland

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## SUMMARY

This paper is one article in a series of three that have been submitted to the FIG-WW 2019 in Hanoi. The background is the 10-year anniversary of the "Swiss Federal Law on Geoinformation", which came into force on 1 July 2008.

Switzerland enacted the Federal Law on Geoinformation (GeoIG) in 2008 mainly with the aim to harmonize and unify the provision of and access to geodata for the benefit of all society. The development of the digital format of geoinformation and its standardization has been initiated and championed by cadastral surveying since the late 1980s. With the clear definition of a data model and thus a change of paradigm, it set the scene for upcoming developments in the geoinformation field in many ways.

International studies and publications such as "Cadastre 2014" and "Spatially-Enabled Societies" had a strong impact on the design of the GeoIG in Switzerland, which did include the establishing of the new "Cadastre on Public-Law Restrictions". The data modelling and data exchange standards are the basis for establishing spatial data infrastructures.

This paper investigates the Swiss developments defined in the GeoIG and attempts to put them in context with international visions. They will be benchmarked against the Cadastre 2014 statements and the requirements of a spatially-enabled society.

# **Ten Years of "Law on Geoinformation" in Switzerland – The International Context**

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## **INTRODUCTION**

Switzerland has a reliable and survey accurate cadastre since its introduction by the Civil Code in 1912. It is a title registration system, where the state provides the guarantee to the bona fide land and property owners.

The digital format for cadastral surveying has been introduced in 1993. Two new ordinances – VAV and TVAV – replaced the old instruction from 1919 and defined the digital data format in cadastral surveying and mapping. Due to the versatility of data in digital form, the purpose of cadastral surveying data was extended from purely serving the land register to serving land information systems in general and of any kind, which – in a federal country as Switzerland is – is a challenge in itself.

Two basic elements introduced for the digital format of cadastral surveying, i.e. the definition of a data model and the application of the topical layer principle set the scene for broader information system, later called SDI. GIS and web-based portals then led to the management and publication of many other geodata topics. The exchange and sharing of geodata in general further developed, and the need for harmonization and standardization of geodata handling increased in the early 2000s, culminating in the definition of the new Law on Geoinformation (GeoIG) in 2008.

## **ENACTMENT OF NEW LAW ON GEOINFORMATION**

### **Political Context**

In its message on the Federal Act on Geoinformation, the Swiss Government (2006) commented on the context of the new law. It mainly made the hint that changes towards an information and knowledge society are progressing and that the political and economic importance of geodata and geoinformation is growing accordingly. Geodata are labelled as spatial data that describe the attributes of the land – be it coordinates, place names, postal addresses or other criteria, and that they form the basis for planning, measures and decisions of all kinds, in administration as well as in politics, business and science or in the private sector. A direct democracy would be unthinkable without geoinformation.

More than a hundred different geodata sets were available at that time in the Federal Administration. And, about one hundred IT applications are in use for the collection, processing, updating, analysis, visualization and distribution of those geodata. Geodata inventories at the cantonal and municipal levels are even larger. All this information was collected at considera-

ble cost and, according to estimates, represents a total value of more than CHF 5 billion. By far the most important users of geodata from the public sector are the public administration departments themselves or third parties acting on behalf of the public sector.

For efficient and sustainable use of geodata, there is a lack of a common policy and of uniform standards and technologies at federal, cantonal and municipal level. The Federal Government recognized this development in 2001 and adopted the Federal Strategy for Geoinformation. The implementation concept then proposed the establishment of a National Spatial Data Infrastructure (NSDI), in order to meet the needs of modern society.

### **Aim and Content**

The new Law on Geoinformation (GeoIG) then was put in force in 2008 mainly to ensure that such an NSDI is incorporated into the legal framework and that it corresponds to the political and administrative conditions in Switzerland. The aim of the GeoIG is to "make geodata on the territory of the Swiss Confederation available to the federal, cantonal and municipal authorities, as well as to the business community, society and science, for broad use, in a sustainable, up-to-date, rapid and simple manner, in the required quality and at reasonable cost." (Swiss Federal Assembly, 2007)

The law describes that "qualitative and technical requirements for spatial and geometrical data shall be defined in such a way as to allow easy exchange and wide use, and that internationally or nationally recognized standards for geodata and geometadata shall be taken into account in the implementing provisions of geoinformation law to the extent possible and technically reasonable".

The GeoIG and its associated ordinances are defining the content in the "catalogue of official geodata" with some 216 different topics and geodata sets. Those topics are mainly concerned with national survey (topographic mapping, national borders), national geology, and cadastral surveying. In addition, the law also includes the possibility to establish a "Cadastre of Public Law Landownership Restrictions". Based on that, a new project then started in 2012 to add another 17 topical layers documenting public-law restrictions such as e.g. zoning for land-use planning.

### **Common Data Integration Concept**

The integration of cadastral surveying data and other geodata is based on the underlying common data integration concept, which is at the core of how the cantonal and national SDIs are being set-up. This concept respects four simple principles to ensure a clear, simple, flexible, and modular structure for the spatial data infrastructure (compare Figure 1):

- respect the institutional and legal independence of the different institutions;
- use of topical information layers, allowing a clear definition of stakeholders, responsibilities, and data flow;
- no logic relations between objects of different information layers; the only connection between objects is the geographic location;
- use of a common geodetic reference framework.

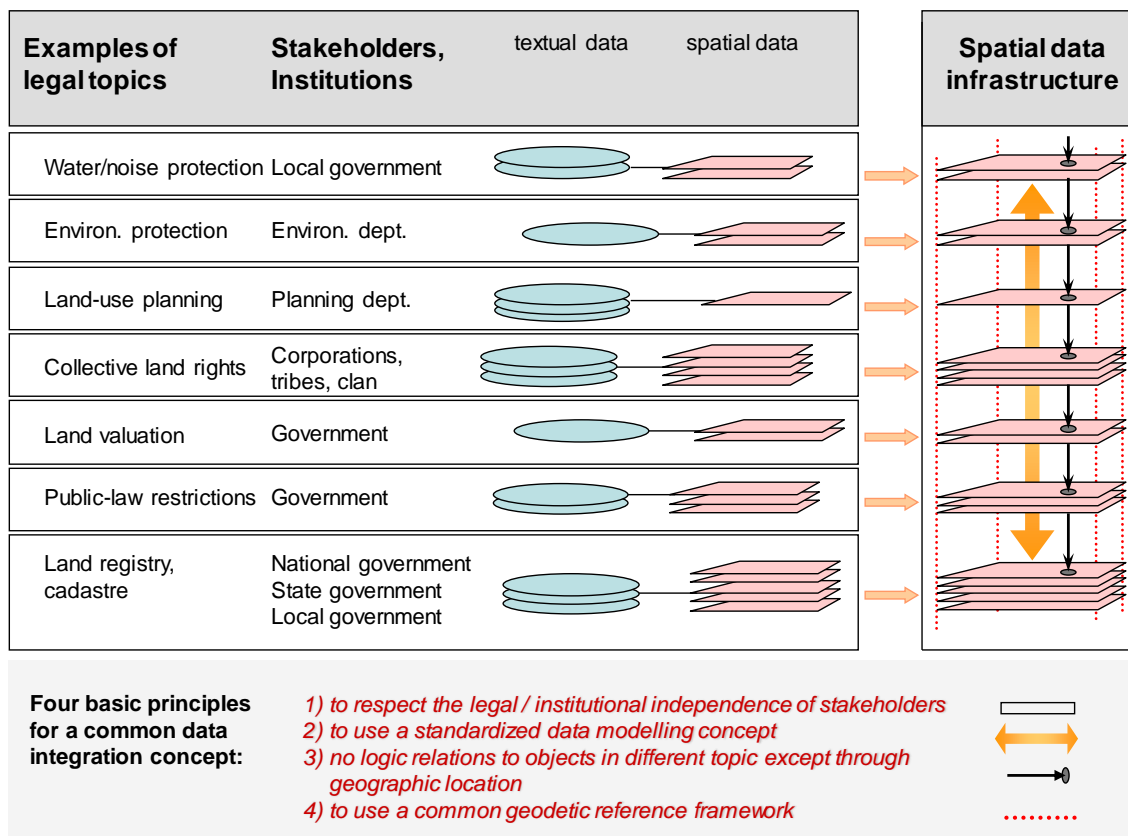


Figure 1: The four basic principles for a common data integration concept.

When the above four principles are respected, an SDI – or even multiple SDIs – can be operated in either a centralized or decentralized federated environment. It is beneficial for a national SDI to adopt a common data integration concept at an early stage. This allows for the early introduction of future interoperability and linkage between data sets. It is crucial to overcome isolated data silos, but requires a strong commitment and communication among the potential players within an SDI.

The four principles seem to be rather technical in nature. They need, however, to be discussed on a conceptual level, mainly because the common data integration concept is generic enough to be tailored and adapted to a ‘fit-for-purpose’ land administration system and because it leaves full flexibility to develop and extend the system at a later stage.

This data integration concept provides a clear definition of responsibilities among partner organizations, and the flow of data. It is being applied now for the extension of the cadastre with the PLR topics and will be used for further extensions later.

## INTERNATIONAL CONTEXT

Looking at the international context, there are two publications, which were setting standards in terms of cadastral and more general geodata developments. They were «Cadastre 2014» (Kaufmann and Steudler, 1998) and «Spatially Enabled Society» (Steudler and Rajabifard, 2012).

### Six Cadastre 2014 statements

The «Cadastre 2014» publication in the 1990s was looking at the trends of the cadastral field and where the cadastral systems might look like in the future. Based on questionnaires and working group results, the publication came up with a list of six statements:

- 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 modelling!
- Statement 4: 'Paper and pencil - cadastre' will have 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!

The publication has been translated into more than 25 languages and is still today being used as a benchmark for the development of cadastral systems in many countries.

### Six SES elements

The publication «Spatially Enabled Society» (SES) observed in 2012 that the needs of societies are increasingly of global scale and require spatial data and information about their land, water and other resources – on, above, and underground – in order to monitor, plan, and manage them in sustainable ways.

Spatial enablement was defined as a concept that adds location to existing information, thereby unlocking the wealth of existing knowledge about land and water, its legal and economic situation, its resources, access, and potential use and hazards. Societies and their governments need to become spatially enabled in order to have the right tools and information at hand to take the right decisions. Spatially enabled societies – including their governments – make use and benefit from a wide array of spatial data, information, and services as a means to organize its land and water related activities.

The SES publication focused essentially on six fundamental elements, which are required to realize the vision of a SES:

1. a **legal framework** to provide the institutional structure for data sharing, discovery, and access;
2. a sound **data integration concept** to ensure multi-sourced data integration and interoperability;
3. a **positioning infrastructure** to enable and benefit from precise positioning possibilities;
4. a **spatial data infrastructure** to facilitate data sharing, to reduce duplication and to link data producers, providers and value adders to data users based on a common goal of data sharing;

5. **land ownership information**, as the dominant issue in the interactions between government, businesses and citizens relating to land and water resources; and
6. **data and information** to respect certain basic principles and to increase the availability and interoperability of free to re-use spatial data from different actors and sectors.

## **BENCHMARKING THE SWISS SITUATION**

The 10 years of GeoIG in Switzerland is now the occasion to look at the achievements since its introduction. This chapter aims to benchmark the Swiss cadastral system against the six statements of Cadastre 2014 and the six fundamental elements for an SES.

### **Benchmarking against the six Cadastre 2014 statements**

#### **Statement 1: Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions!**

Situation in 2019: With the introduction of the new cadastre on Public-Law Restrictions with 17 data topics, the Swiss cadastral system evolves in the direction of Cadastre 2014.

Opportunities: Potentially, there are many more data topics to be included in the future; at the moment, it is considered to include another approx. 20 topics. Also the introduction of underground facilities is in preparation and might be introduced in the coming years.

#### **Statement 2: The separation between 'maps' and 'registers' will be abolished!**

Situation in 2019: Land registration and cadastral surveying are still two separate organizations. The cooperation, however, works well on a technical level, i.e. data are being exchanged back and forth without any major problems.

Opportunities: The cooperation could be improved, although this would need a common understanding of both organizations in providing a common service to the clients.

#### **Statement 3: Cadastral mapping will be dead! Long live modelling!**

Situation in 2019: Data modelling and with it data exchange has been adopted in the digital format of cadastral surveying from very early on in 1993. The change of paradigm away from paper maps to digital data sets took a few years, but is now very solid within the profession.

Opportunities: To further develop and promote the common data integration concept.

#### **Statement 4: 'Paper and pencil - cadastre' will have gone!**

Situation in 2019: With the introduction of the digital data format in 1993, this has been achieved very early on.

Opportunities: To support the development of SDIs on national and cantonal levels and to integrate and participate in 3D developments.

#### **Statement 5: Cadastre 2014 will be highly privatized! Public and private sector are working closely together!**

Situation in 2019: The private sector is heavily involved in the operation of the cadastral system in Switzerland; approx. 87% of the work force is in the private sector. The overall responsibility, however, is in the public sector.

Opportunities: To keep the private sector involved in future developments, mainly because innovation comes into the system through the private sector.

### **Statement 6: Cadastre 2014 will be cost recovering!**

Situation in 2019: The Swiss cadastral system is not directly cost recovering in direct terms. However, when considering the contribution of it towards the reliability, stability, and trustworthiness of the land market as a whole, it is probably safe to say that the cadastral system is an essential pillar in the economic stability of the country.

Opportunities: To keep the stability and to keep developing and promoting the economic contributions.

### **Benchmarking against the six fundamental elements for an SES**

#### **Element 1 A legal framework to provide the institutional structure for data sharing, discovery, and access.**

Situation in 2019: The legal framework has been established with the introduction of the GeoIG in 2008.

Opportunities: To continue and carefully observe future developments within the geodata context.

#### **Element 2 A sound data integration concept to ensure multi-sourced data integration and interoperability.**

Situation in 2019: Data exchange and data integration in a federal, rather decentralized context had to be dealt with from early on and is a central element for future developments

Opportunities: To recognize and further promote this concept.

#### **Element 3 A positioning infrastructure to enable and benefit from precise positioning possibilities.**

Situation in 2019: A stable and sound positioning infrastructure has been in place in Switzerland since the 19<sup>th</sup> century and has always been updated and upgraded. In the age of GNSS, it still is in the forefront of international developments and plays a central role as the fundamental element for national geodata.

Opportunities: To continue the positive developments and contributions.

#### **Element 4 A spatial data infrastructure to facilitate data sharing, to reduce duplication and to link data producers, providers and value adders to data users based on a common goal of data sharing.**

Situation in 2019: With the adoption of the Federal Strategy for Geoinformation in 2001 and the implementation of the National Spatial Data Infrastructure (NSDI) in the

following years, Switzerland got a very good basis early on. The continued extension of the SDI with more partners and more data topics is a good sign for the development in the right direction.

Opportunities: To continue the positive developments and contributions.

**Element 5 Land ownership information, as the dominant issue in the interactions between government, businesses and citizens relating to land and water resources.**

Situation in 2019: The Swiss cadastral system is working properly in a well maintained organizational and technical context. It provides the required information, stability and trustworthiness to the land market and – with the clear definition of landownership – to the general organization of the country.

Opportunities: To continue the positive developments and contributions.

**Element 6 Data and information to respect certain basic principles and to increase the availability and interoperability of free to re-use spatial data from different actors and sectors.**

Situation in 2019: Cadastral surveying took a long period of time to achieve full data coverage. It thus took a rather long time until the benefits of a fully digital basis took hold. Nowadays, the concept of Open Government Data has been adopted on the federal level and in approx. half the cantons; this development will help a lot for easier data exchange.

Opportunities: The cooperation among the different administrative levels can further be improved.

## CONCLUSIONS

The definition and introduction of the digital format for cadastral surveying in 1993 brought mainly two changes of paradigms: holistic way of digital thinking, away from paper-map approach and the definition of the final product rather than method. These changes of paradigms required several technical and conceptual elements, such as data modelling, standardized data exchange, thematic and semantic independent data layers, which then also became the basic elements for the national spatial data infrastructure.

The Law on Geoinformation GeoIG then established the uniform legal basis for all geoinformation, where the cadastre is the central element among many other datasets. The federal context in Switzerland required that data exchange of geoinformation had to be ensured from the very beginning. The efforts in the early stages were big, but the advantages now can be reaped in the age of shared information portals and SDIs. There are no data silos any longer, but comprehensive information systems.



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## BIOGRAPHICAL NOTES

Daniel Steudler holds a PhD degree from the University of Melbourne, Australia and is a scientific associate with the Swiss Federal Office of Topography swisstopo, working for the Federal Directorate for Cadastral Surveying. He has been active in FIG-Commission 7 for many years and was chair of the FIG-Task Force on «Spatially Enabled Society». He published widely in the cadastral field and consulted internationally in land administration and cadastral issues. Since March 2015, he is chair of the EuroGeographics "Cadastral and Land Registry" Knowledge Exchange Network.

## CONTACT

Dr. Daniel Steudler  
Swiss Federal Office of Topography swisstopo  
Seftigenstrasse 264, CH-3084 Wabern  
SWITZERLAND  
Daniel.Steudler@swisstopo.ch  
[www.swisstopo.ch](http://www.swisstopo.ch) and [www.cadastre.ch](http://www.cadastre.ch)