

# 10 Years of "Law on Geoinformation" in Switzerland - Current Situation and Outlook

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## SUMMARY

The law on geoinformation has proved its worth over the last 10 years. The awareness of geoinformation in society has improved significantly. The clear focus on the use of geodata has triggered a number of important changes. The associated mental change of the experts concerned was underestimated. With the cadastre of public law restrictions (PLR-cadastre), a new cadastral system was established all over Switzerland within a relatively short period of time.

For the documentation of the underground, a first step is being taken with the establishment of a cadastre of underground utilities. This is certainly not the end of the story. The importance of using the underground will continue to increase, as will the need for reliable documentation.

The available technologies will continue to develop rapidly over the next few years. Legislation must recognize current trends and initiate the necessary regulations. With the new law on geoinformation, Switzerland has taken a major step towards the Spatially Enabled Society. Further courageous steps will be necessary.

## SUMMARY (in German)

Das Geoinformationsgesetz hat sich in den letzten 10 Jahre sehr bewährt. Die Wahrnehmung der Geoinformation in der Gesellschaft konnte deutlich verbessert werden. Der klare Fokus auf die Nutzung der Geodaten hat einige wichtige Entwicklungen ausgelöst. Der damit verbundene mentale Wandel der betroffenen Experten wurde unterschätzt. Mit dem cadastre of public law restrictions (PLR-cadastre) konnte innert relativ kurzer Zeit über die ganze Schweiz ein neues Katastersystem etabliert werden.

Für die Dokumentation des Untergrundes wird mit dem Aufbau eines Leitungskatasters ein erster Schritt in Angriff genommen. Damit ist dieses Thema aber sicher nicht abgeschlossen. Die Bedeutung der Nutzung des Untergrundes wird weiter zunehmen und damit verbunden auch der Bedarf an zuverlässiger Dokumentation.

Die verfügbaren Technologien werden sich in den nächsten Jahren rasant weiter entwickeln. Die Gesetzgebung muss die aktuellen Trends erkennen und die notwendigen Regulierungen veranlassen.

Die Schweiz hat mit dem neuen Geoinformationsgesetz einen grossen Schritt in Richtung Spatially Enabled Society gemacht. Weitere mutige Schritte werden notwendig sein.

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## 1. FINDINGS OF THE LAST 10 YEARS

### 1.1. Awareness of geoinformation

Before work could begin on the new law on geoinformation, the general awareness of geodata had to be actively promoted. This was tackled with the programme "e-geo.ch" as a broad-based information offensive. The confederation, cantons, municipalities, science and industry worked together on various basic topics. As a commitment, 148 organisations signed a joint charter for geoinformation. (Charter for Geoinformation, 2003)

The drafting of the new law was successfully used to further raise awareness of geoinformation. The law was adopted in parliament without questions and without dissenting votes.

Findings: The new law has given geoinformation an official status and made it visible and concrete.

### 1.2. Clear focus on the broad use of geodata

The law consistently focuses on the use of geodata. The purpose of the law is formulated as follows: "The purpose of this law is to ensure that geodata ... is available for broad use, sustainable, up-to-date, rapid, simple, in the required quality and at reasonable cost."

This meant a radical reversal of the way of thinking and practice geoinformation in Switzerland. The historically grown structures of geoinformation were focused on the data owners and thus traditionally sender-oriented. The new law, on the other hand, is clearly designed to be receiver-oriented and thus focused on the users. Geodata is no longer an end in itself for the data owner, but must be available for broad use. The law regulates the requirements and conditions so that this can happen successfully.

This new focus has set in motion a fundamental transformation process in the entire geoinformation industry that has not yet been completed. With the trend toward Open Government Data, this process has been radicalized and accelerated in recent years (Lüthy et al. 2018).

Findings: The new law has triggered a transformation of the entire geoinformation in the direction of user orientation, thus making a major contribution to the positive perception of geoinformation.

### 1.3. Standards for all spatial information

For the first time, the law established clear rules for conceptual modelling, documentation with metadata, collection, maintenance, presentation, harmonisation, provision as services and data, historicalisation and archiving for all geodata. These standards did not have to be newly created in Switzerland. They had been established in cadastral surveying for more than 10 years and only needed to be generalised for broad application.

What was already familiar to the licensed surveyors through a painful learning process was a completely new challenge for the data owners of the GIS data. With the standards and the associated processes and documentation, their work now became transparent and comprehensible. This uncovered various shortcomings in previous practice and the quality of the geodata could be improved. Much more significant was the fact that the GIS experts lost their exclusive status as "daring pioneers without control". Suddenly, for example, conceptual data models were developed in working groups, which then only had to be implemented by the experts in the systems. Or automatic check services for geodata were established, which continuously check the formal integrity of the data. These developments, coupled with rapid technical progress, finally led to the insight "spatial is no longer special".

Findings: This radical transformation process was seriously underestimated. The implementation of the new law brought more internal resistance on the part of those involved than was generally expected. However, it is also becoming apparent that the new generation of GIS specialists, who have grown up with the new law, are much more familiar with the regulations and standards.

#### **1.4. New PLR-cadastré**

Inspired by the FIG publication "Cadastré 2014", the law on geoinformation introduced a new cadastral system, the cadastré of public law restrictions (PLR-cadastré). As a complement to the land register, which documents the private-law relationships of a property, the PLR-cadastré administrates public law restrictions systematically and with high quality. For the build-up and operation of the cadastré, the same division of tasks was chosen as for the official cadastral survey. The federal government is responsible for strategic planning and supervision. The implementation is carried out by the cantons in cooperation with many competent authorities, such as groundwater, spatial planning, noise protection, etc. As a consequence, 26 different conceptual, organisational and technical implementations have been created - in small Switzerland! With interface standards, the confederation is attempting to facilitate use throughout Switzerland. By the end of 2019, the cadastré should have been introduced all over Switzerland. This goal will not be achieved completely, but to a large extent.

The Canton of Zurich will have implemented the PLR-cadastré across the board by the end of November 2019.

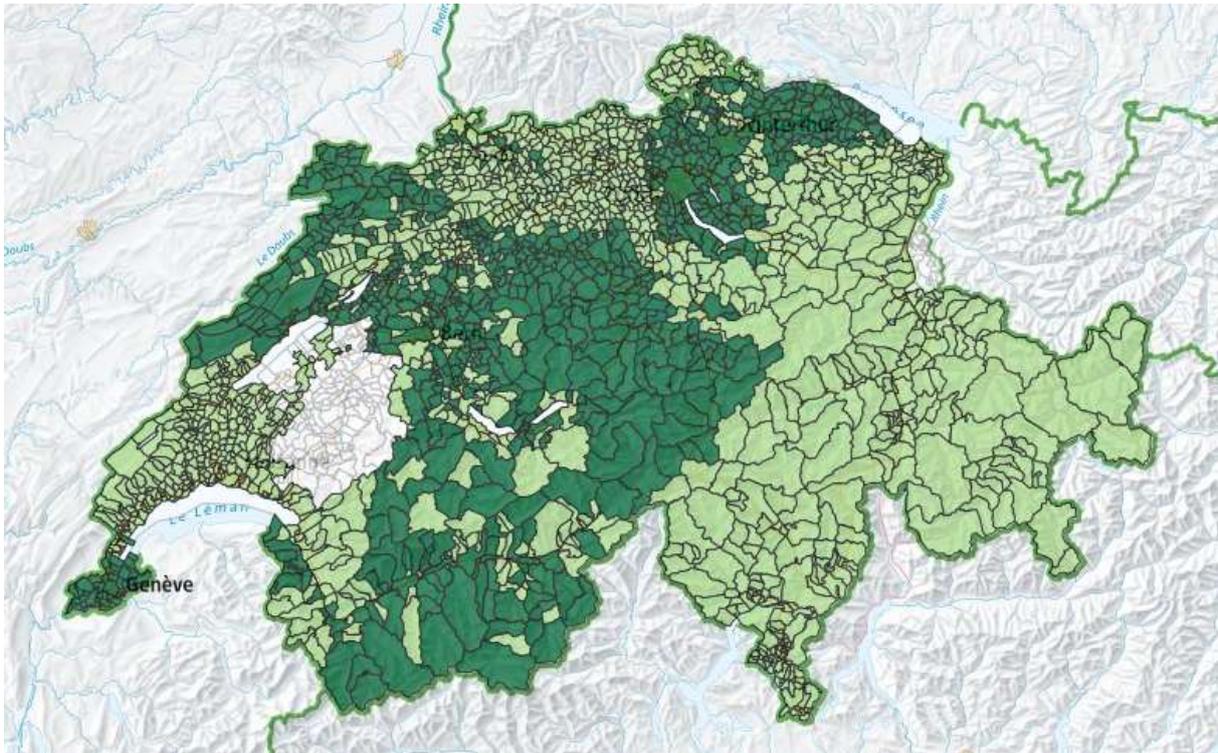


Figure 1: Availability of PLR-cadastral in Switzerland on January 2019

Legend: dark green: established / green: in progress / white: not yet planned

Findings: The implementation of the PLR-cadastral was a courageous step in the new law. Many assumptions had to be made, which were later verified in pilot projects. Some minor adjustments also had to be made. Even if the build-up did not go smoothly everywhere, it is still an amazing achievement to set up a new cadastral system in 10 years. Polls show that the benefits of the PLR-cadastrals are undisputed. The heterogeneous implementation with 26 different systems is from today's point of view too complex, but probably owed to the federal structure of Switzerland. The legal positioning and differentiation from the land register is not quite simple and will have to be further sharpened in the future.

## 2. CURRENT DEVELOPMENTS

### 2.1. Cadastre of underground utilities

In recent years, various cantons have begun to establish a cadastre of underground utilities as an information system for the space occupied by pipes. In 2019, the Canton of Zurich will set up a centrally managed platform for pipe cadastral data and provide a portal for viewing and reporting as well as data and service usage. All owners of the pipes are obliged by law to supply the information on all pipes and utilities as a copy to the platform. The canton only makes the data usable, but does not change or update it. The issues of data protection and information security must be carefully examined in this project and weighed against optimal use by interested parties.

In addition, the question arises as central regulations are necessary at federal level. Studies have shown a clear need for a country-wide regulated cadastral system. The focus of the confederation will be on a common legal framework and the definition of standards. The implementation will again be carried out by the cantons. In contrast to the PLR-cadastre a central information access for the whole of Switzerland is planned right from the start. When this is ready, the system of canton Zurich will be linked to the national portal.

## 2.2. Next dimension - 3D

The practical applications of the third dimension have increased considerably in recent years. BIM is a major development, particularly in construction planning and implementation, which will have a major impact on geoinformation. In addition to the adaptation of standards, data models and systems, mental change is once again the major challenge. In the past, the big challenge was to represent and read complex 3D structures on 2D plans. In the future, such 3D structures must be understood, modelled, collected and analyzed in three-dimensional object parts. 2D plans are only one of many possible interpretations of them. With the publication "Best Practices 3D Cadastres" the FIG has created a valuable foundation. Switzerland is currently examining the possibility of 3D documentation of condominium ownership (Åström 2017). A practical pilot work was successfully completed at the end of 2018. A division plan can be automatically generated from a 3D vector model of the building. In 2019, the ideas are now to be concretized.

## 3. CHALLENGES AHEAD

### 3.1. Underground

Starting from the cadastre of underground utilities, the documentation of the entire underground will in future also extend to other objects. Tunnels and underground buildings are obvious. However, for example poorly documented geothermal probes for heating systems cause major problems.

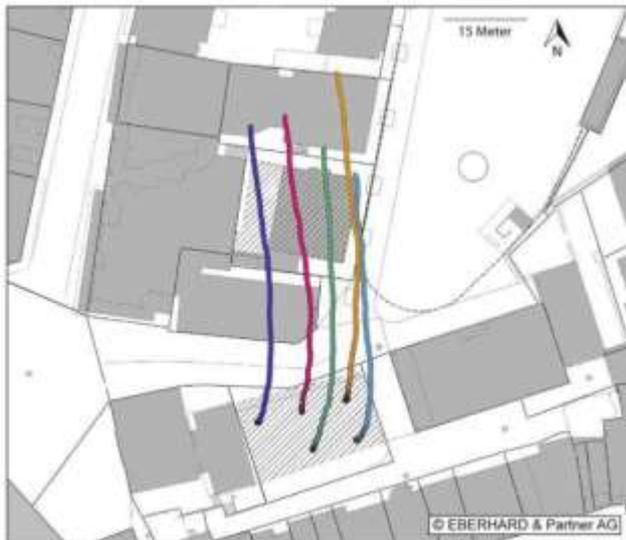


Figure 2: Probe course in the depth shows drift over neighbouring plots of land

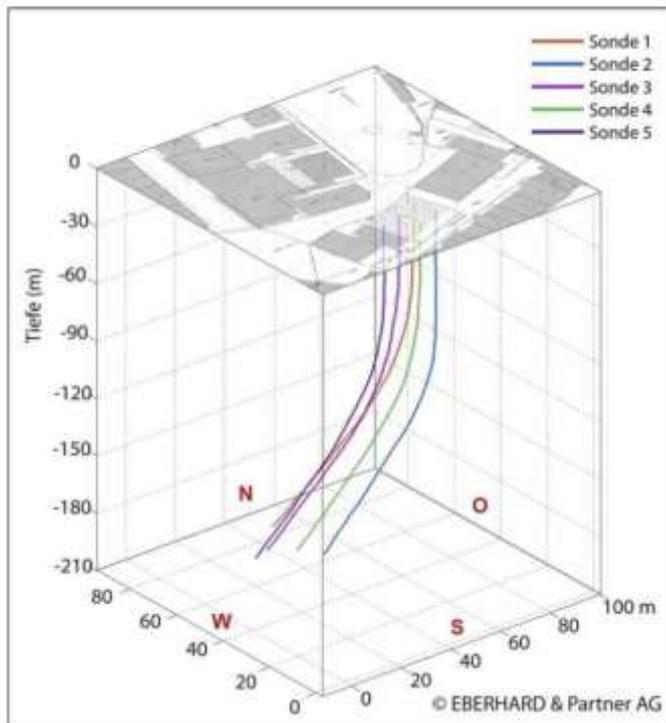


Figure 3: Spatial probe course in the depth

In such situations, future conflicts of use are inevitable. Reliable underground documentation can be of great use here.

With the increasingly dense use of the underground, more and more legal questions arise regarding planning and the delimitation of use in the underground. Politicians are increasingly addressing these. Various studies, reports and expert opinions are currently being prepared in Switzerland. However, an overall view of the legal issues is not yet available.

### 3.2. New technologies

Since the law on geoinformation came into force, the technological possibilities have developed rapidly. Today, with 5G mobiles, Internet of Things, new sensors and almost unlimited storage space, new development possibilities are available that were unthinkable just a few years ago. Geoinformation must further develop the legal framework in order to be able to make optimum use of these technologies and at the same time keep their misuse to a minimum. Even after 10 years, the current law is still surprisingly modern and offers a certain framework for new technologies. However, the above-mentioned new possibilities will probably go beyond this framework in the next few years, so that there will be a need for adaptation.

### 3.3. Organisation

After more than 10 years of experience, there are certain shortcomings in cooperation across the different levels of government. In some cases, there are questions about jurisdiction that nobody could have imagined 10 years ago. Who is responsible for a data set at federal level if it consists of a collection of cantonal data? There is simply no statement on this in the current

law. Such questions must be clarified jointly and then regulated by law. At present, the necessary suffering pressure is still lacking.

#### **4. CONCLUSION AND OUTLOOK**

Although the law was designed on a greenfield site at the time, the regulations have proved very successful. The law triggered many innovations and thus made geoinformation known, comprehensible and above all usable. Switzerland has thus taken a major step in the direction of a Spatially Enabled Society (Steudler et. al. 2012)

Now it is time to recognise the new signs of the times and to embark on the necessary further developments.

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## **BIOGRAPHICAL NOTES**

**Christian Kaul** is head of Department for Geoinformation at the Office for Spatial Development in Canton of Zurich (Switzerland). He obtained a master's degree in 1992 from Federal Institute of Technology Zurich (Switzerland) in Rural Engineering and Survey. After ten years of experience in different domains like communal infrastructure, land management and SDI-Projects he worked a consultant in cadastral issues and procurement processes. Back in an engineering company he completed his experience in land use planning and spatial development. Since 2013 he focuses as head for Department on building modern cadastre systems and holistic spatial information infrastructure.

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