Swiss Cadastre preparing for E-Government

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SUMMARY

Like in other countries, there are many E-Government activities and developments in Switzerland. The problems and issues that are encountered, however, are difficult.

The Swiss cadastre has gone through a reform process some 15 years ago and has been redefined in 1993. The crucial change at that time was the introduction of the digital format with many groundbreaking conceptual elements. These elements can nowadays be associated with terms such as SDI, NSDI, or NGDI, a terminology not in use at that time.

Over the last 12 years, the Swiss cadastre was mainly occupied to transfer and prepare the data in the digital format and to bring about territorial coverage. It is more concerned now with the preparation of data portals for uniform data access and more focused on customer needs. The inter-governmental impulse program "e-geo.ch" has been established to foster the coordination of geoinformation on all administrative levels.

1. INTRODUCTION

The influence of Napoleon is evident both in the design of the cadastres and their establishment in cantons rather than in the national sphere (Steudler and Williamson, 2005). Professional density in Switzerland is high with about 3,100 persons involved in cadastral surveying and approx. 2,000 lawyers and administrative staff in the land registry.

The long history of the cadastral system and the principle of subsidiarity have ensured wide social acceptance and understanding.

2. SWISS CADASTRAL SYSTEM

2.1 Structure and organization

The organizations involved in cadastre are situated on different administrative levels – federal and cantonal – and have different tasks and functions. For cadastral surveying, the Federal Directorate for Cadastral Surveying (FDCS) has the responsibility of supervising the cantonal surveying agencies (KVA). The KVA's have the responsibility to implement

cadastral surveying and have chosen different, although similar solutions in carrying it out: a few cantons carry out cadastral surveying by administrative units on their own, but most of them contract the field work as well as the maintenance of surveying data and cadastral maps to private land surveyor offices, which then are acting as public agents on behalf of the cantons. On the federal level, there are approx. 15 employees working for cadastral surveying, while there are approx. 300 on the cantonal level, and approx. 3,000 on the municipal level – most of them in the private surveying offices.

For land registration, the regulations, set-up of offices and districts, the appointment and the compensation of land registrars lie in the competence of the cantons. The federal level supervises the cantons through the "Federal Office of Land Registration and Land Law" with approx. 5 employees. Some of the smaller cantons maintain a single cantonal land registry office, while in 18 cantons, there are offices per one or several districts, or even per municipality resulting in a total of approx. 350 cantonal or regional land registry offices.

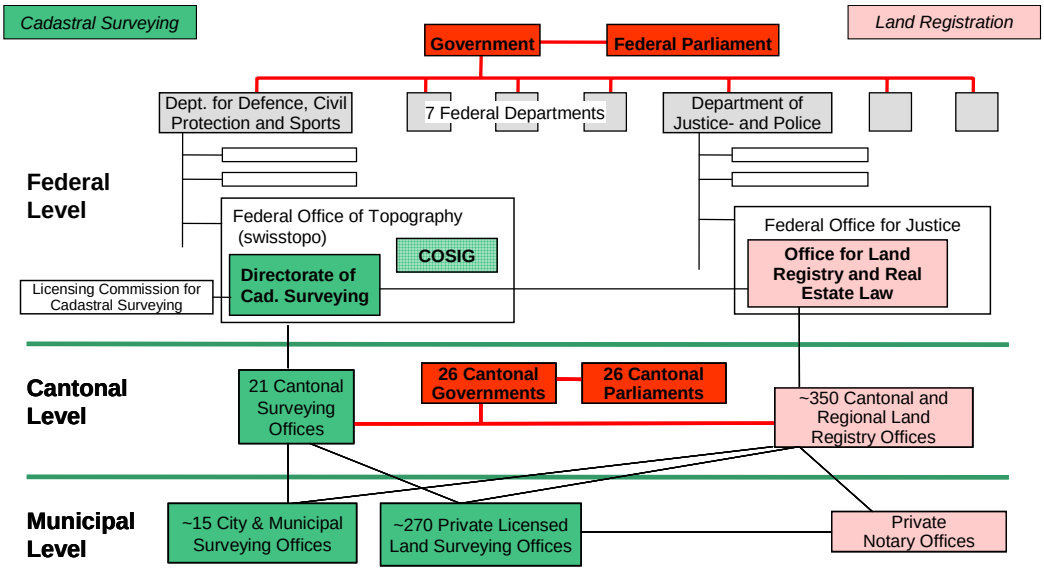

Figure 1: Organizations involved in the cadastral system.

2.2 Reform and digital format

The cadastral surveying system was reformed in 1993 to introduce a digital data format, allowing the surveying data – which mainly serve the land register – to also underpin land information systems of any kind. The development of the independent data description language INTERLIS was a crucial element in this flexibility.

Cadastral data is structured in eight information layers (compare Figure 2), each of which can be acquired independently from each other: control points, land cover, single objects, heights, local names, ownership, pipelines, and administrative subdivisions. The land cover

(including buildings) and ownership layers cover the whole territory without overlaps or gaps, while other layers have various definitions.

Each of the eight information layers is defined by an object-oriented entity-relationship diagram, providing a basis for translation of the data into an interoperable INTERLIS data exchange format. Land registry information is not available to the public and is restricted to those determined by information protection officers to "have an interest" in the information.

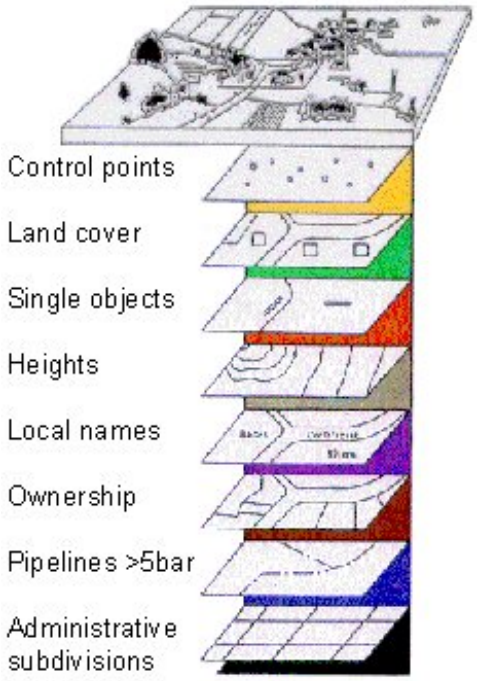

Figure 2: The 8 information layers of cadastral surveying.

Between 1912 and 1993, the cadastral system was mainly used for legal purposes to secure land ownership. Survey data was also used for utility mapping and municipal planning and management. Conversion of the data to digital form in 1993 has extended its use. By contrast, the land registries are variously digitized with some fully computerized and others remaining manual. The federal office is carrying out a project for a central data base for land registration data (eGRIS).

3. NATIONAL GEODATA INFRASTRUCTURE

The development of a national infrastructure for geographic information turns out to be a process of many steps that involves the participation of many. SDI started in Switzerland with the introduction of the new data-modelling concept for the description of cadastral surveying data in 1993. The basic building block is the data description language INTERLIS with which spatial data can be defined, modelled, and exchanged without information loss and independent from any system restrictions. The data model for

cadastral surveying has been named AV93, which is defined in the Federal TVAV Ordinance and legally binding for cadastral surveying in all Cantons. The data-modelling concept with INTERLIS has triggered the definition of more than 100 other spatial data domains over the last 8 years, enabling the use of the same data exchange mechanisms as cadastral surveying. With the introduction of the INTERLIS concept, cadastral surveying can be regarded as the forerunner for the SDI development in Switzerland.

In 2000, a new coordination group for geographic information (COSIG) has been established to foster the coordination, acquisition, and use of spatial data within the Federal administration. COSIG promotes the INTERLIS concept for the definition and handling of all spatial data.

This concept is also at the core of a new E-Government program (www.e-geo.ch), which attempts to bring digital spatial data closer to the users. In relation to the national infrastructure the federal government decided in June 2001 to prepare a concept for the establishment of a national strategy for geographic information; to develop – in collaboration with the "strategic information technology organ" – guidelines to introduce GIS within the federal administration; and to propose a concept for the development of a market for geoinformation based on a national framework (Amstein, 2006).

The main benefit of a future national geodata infrastructure (NGDI) is considered to be mainly socio-economic. It is expected that the still underused value of geoinformation will clearly be increased when administrations at all levels can base their decisions for planning on reliable and official data.

In order to achieve the potential benefits of an NGDI, a data network for geoinformation would need to be established and the access to data has to be simplified. For that purpose and to promote the NGDI idea, the label "e-geo.ch" has been established. The "e-geo.ch" project aims to encourage interlinked GIS activities.

The national and political dimension of such an infrastructure calls for controlled high-quality communication with all partners. Therefore all Federal administrations together with the cantons and municipalities, economic actors and research units that gather and use GI are part of the initiative and are invited to pursue these common objectives.

The NGDI initiative has nine topics, which are illustrated in Figure 3.

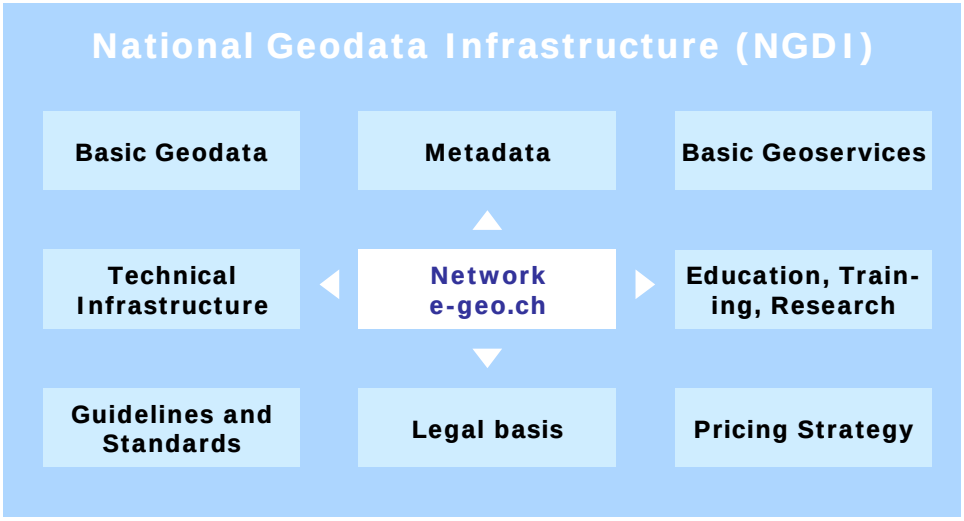

Figure 3: The nine topics of NGDI.

The steering committee of the e-geo.ch program is made up of delegates from four administrative levels: federal, cantonal, municipal, and associations. It is foreseen that each of these partners makes a financial contribution to the program, which is not the case yet, while solutions are being discussed.

4. CANTONAL AND MUNICIPAL INFRASTRUCTURES

While on the national level, the initiative has been taken by establishing COSIG and the e-geo.ch program, many municipalities were not able to cope with the technical developments. One reason is that the average size of municipalities is rather small – half of the approx. 3000 municipalities have a population of less than 1000 – and there are no financial or personal resources for maintaining a GIS infrastructure. Another reason is that many municipalities are not exactly aware of the possibilities of geoinformation and their own role in acquiring, maintaining and distributing that information. Many citizen and also private companies that are in need of geoinformation will firstly contact the municipality where they live in. The required geoinformation is often a cantonal or national data set and the municipality then either can provide the service itself or has to outsource it. Many municipalities also are looking for partnerships to deal with these issues.

A municipal administration has to deal with different issues that concern different information topics, such as for example person data, street and building data, land registry data, or environmental data. Efficiency in the sense of E-Government would be when data is shared and when the administrational units work with the same basic data sets; something, which is not always the case at present. It is therefore crucial that data, information and the processes have to be well defined and coordinated within the municipal administrations, not to forget the interactions with the cantonal and federal administrations.

Because of their limited resources, municipalities – and some of the smaller cantons – are looking for solutions that can provide the data and services to their administrative units and their clients. In Switzerland, there are mainly four models that have developed over the last 5-10 years (Graeff and Schneeberger, 2005).

Some of larger cities have enough resources to maintain a GIS service on their own (model A in Figure 4). They take the responsibility to acquire, maintain and update all the geoinformation by themselves.

In cantons with many municipalities, the municipalities are building municipal associations for the purpose of geoinformation. These associations are operating GIS systems to provide the service that the municipalities need. The associations are under the responsibilities of the municipalities, and sometime are being outsourced to the private sector (model B in Figure 4).

Some six cantons, mainly with few municipalities, the municipalities delegated their geoinformation responsibilities to the cantonal authorities. The canton then is responsible to provide the service (model C in Figure 4).

In other mainly smaller cantons, the responsibility to operate a GIS system has been assigned to a share holder company, where the canton, all the municipalities and related private companies are holding shares. The synergies in such a cooperative model are considerable and all share holders benefit from a holistic service (model D in Figure 4).

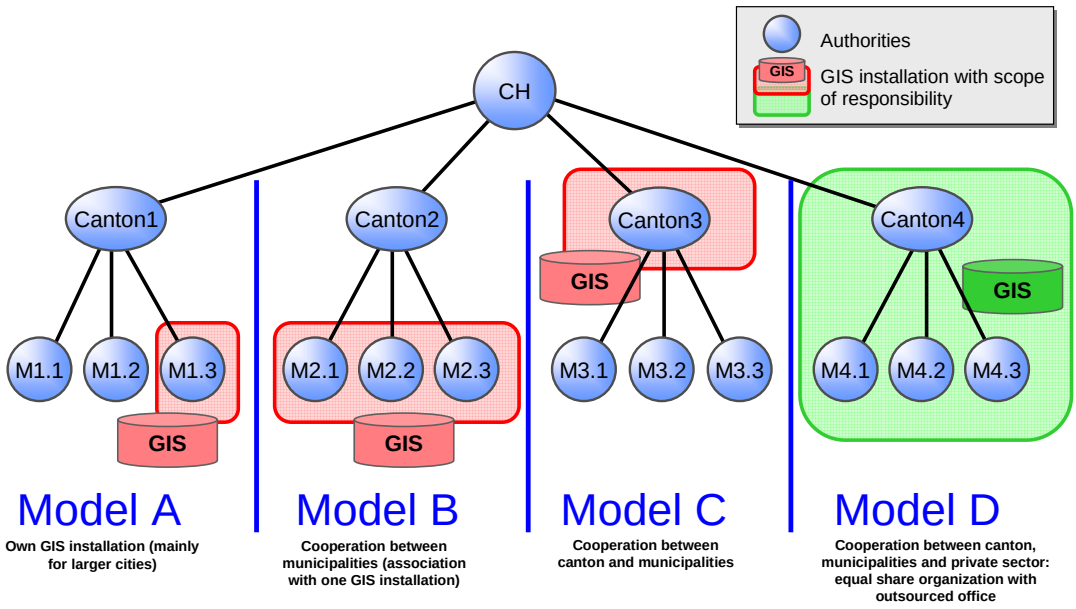

Figure 4: Models of cooperation (from Graeff and Schneeberger, 2005).

5. ENABLING PLATFORM AS AN INTERNATIONAL RESEARCH ISSUE

As Rajabifard et al. (2005) are showing, the issue of "enabling platforms" for dealing with geoinformation at different administrative levels is very much on the international research agenda. They illustrate that the development of an enabling platform for a country or a jurisdiction enhances the capability of government, private sector and the general community in engaging in systems based, integrated and holistic decision making in that jurisdiction. Applications, tools, and different information would be available through the platform to build a view of, query and allow decisions to be based on, both the built and natural environments. This platform must include the administration and institutional aspects of such features, enabling both technical and institutional aspects to be incorporated into decision-making. This is an aspect of research identified as more challenging than complex technical issues.

They also mention that the lack of effective interaction between the traditionally strong land and property information focus of spatial information with management of the natural resources, scientific information and socio-economic information is a crucial issue for geoinformation nowadays. State governments in particular are addressing these issues through the creation of whole-of-government spatial information initiatives which, when appropriate jurisdictional and institutional practices in place, contribute to an enabling platform. The development of national initiatives along with the development of state based land information systems have similar aims to that of the creation of an enabling platform – making information and applications widely available to users.

The technical basis for the delivery of whole-of-government on-line systems would also be the technical basis of an enabling platform. This basis is through an interoperability architecture based on distributed, custodial data management and open standards to meet the needs of producers, users and other stakeholders for information and services to be created once and used many times. Harmonization of data standards and specifications through the adoption of common data definitions, formats, models and exchange formats is crucial to the success of an enabling platform (Rajabifard et al., 2005).

In order to develop an effective geoinformation environment, it is important that it is developed with full cooperation of all involved administrative levels. In relation to the above mentioned activities and initiatives, Switzerland seems to be in line with these issues.

6. CONCLUSIONS

The development of an NGDI in Switzerland is in progress. In principle, the technical elements are all there and in use. What takes a lot of effort now, are the discussions and definitions of the institutional and coordinative elements. With the set up of the "e-geo.ch" program and the related activities, a first and crucial step towards holistic geoinformation services for the economic and social benefit of the country has been made.

The same can be said about the progress for E-Government activities. It is often stated that progress is slow due to the federative structure of Switzerland and because it always involves the agreement of all three political and administrative levels. However, the advantage is that once an agreement has been found, the solution is much more stable.

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BIOGRAPHICAL NOTES

Daniel Steudler graduated from the Swiss Federal Institute of Technology (ETH) in Zurich in 1983, earned the Swiss license for licensed land surveyor in 1985, and did his M.Sc.Eng. degree at the University of New Brunswick, Canada from 1989-91. Since 1991, he is working with the Swiss Federal Directorate of Cadastral Surveying with the responsibilities of supervising and consulting Swiss Cantons in organizational, financial, technical, and operational matters in cadastral surveying. Since 1994, he is involved in the activities of FIG-Commission 7 as a working group secretary until 2002 being involved in the publications of "Cadastre 2014" and "Benchmarking Cadastral Systems". He became the official Swiss delegate to Commission 7 in 2003. Between April 2000 and February 2004, Daniel completed a PhD at the University of Melbourne, Australia. The main research topic was to develop a framework and methodology for evaluating cadastral systems in the larger context of land administration. Since May 2004, Daniel is back at the Swiss Federal Directorate for Cadastral Surveying and is responsible for national address data and the development of international cooperation.

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