Integration of Public-Right Restrictions into Cadastre
Case Study From the Practice

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Key words: CADASTRE 2014, Private Sector, land administration system, regulating or restricting laws for the use of land

ABSTRACT

At the 2002 Washington congress, the author presented "Cadastre 2014 in Practice – Activities of the Swiss Private Sector ", where the activities of the Swiss private sector were presented. It was recognized that the visions – as formulated in the publication "Cadastre 2014" – should be moved forward; they not only pose challenges, but offer huge opportunities for the profession itself. Cadastral surveyors can take the lead in becoming information service providers and even information brokers. Information technology, data modeling, as well as a political and a client-oriented way of thinking play a crucial role.

Since the Washington congress the private sector in Switzerland invested a lot of energy to bring down the visions of Cadastre 2014 into practice. To continue and professionalize the results of the working group private surveyors founded in 2003 the cooperative CADASTRE 2014. More than 1,000 Swiss laws on the Federal, cantonal and communal level were inspected for articles regulating or restricting the use of land or other particulars with spatial reference. The data model and its implementation in the leading GIS software are completed, the training of the members is in progress and the online shop to distribute the reports per plot is ready. The article will also inform about the data collection campaign which will start in 2006 to get a good data coverage as soon as possible, the next challenge to make it ready for the market.

ZUSAMMENFASSUNG

Am FIG Kongress 2002 in Washington stellte der Autor „Cadastre 2014 in der Praxis - Tätigkeiten der Ingenieur Geometer Schweiz“ vor, wo die Tätigkeiten der privaten Geometer dargestellt wurden. Die Chancen für den Berufsstand wie in der Publikation „Cadastre 2014“ formuliert, wurden erkannt. In der Zwischenzeit wurde die Genossenschaft Cadastre 2014 auf Initiative des Verbandes der freiberuflichen Geometer der Schweiz (IGS) gegründet. Mit der Entwicklung von modernen Lösungen für die vollständige, zuverlässige, rasche und kostengünstige Information über die Rechte an Grund und Boden will die Genossenschaft eine Vorreiterrolle bei der Realisierung der Vision Cadastre 2014 in der Schweiz übernehmen. Das Hauptprodukt der Genossenschaft ist der Katasterauszug SIGIS, welcher erstmals die öffentlich-rechtlichen Eigentumsbeschränkungen einer beliebigen Parzelle vollständig darstellt.

Mehr als 1.000 Gesetze auf Bundes-, Kantons- und Gemeindestufe wurden bis heute auf raumrelevante Artikel überprüft, die den Gebrauch des Grundstückes regulieren oder einschränken. Die technische Lösung und deren Implementierung in den führenden Vermessungsprogrammen wurde realisiert. Die Schulung der Mitglieder ist im Gange und das online-Portal für den Bezug des Katasterauszuges SIGIS ist aufgeschaltet. Der vorliegende Artikel beschreibt auch die Datenerfassungskampagne welche gestartet wurde, um möglichst rasch flächendeckend Daten zur Verfügung zu haben, eine der grössten Herausforderungen um auf den Markt zu bestehen.

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1 INTRODUCTION

At the 2002 Washington congress, the author presented "Cadastre 2014 in Practice – Activities of the Swiss Private Sector ", where the activities of the Swiss private sector were presented. It was recognized that the visions – as formulated in the publication "Cadastre 2014" – should be moved forward; as they not only pose challenges, but offer huge opportunities for the profession itself. Cadastral surveyors can take the lead in becoming information service providers and even information brokers. Information technology, data modelling, as well as a political and a client-oriented way of thinking play a crucial role.

Since the Washington congress the private sector in Switzerland invested a lot of energy to apply the visions of Cadastre 2014 into practice. To continue and professionalize the results of the working group, private surveyors founded the cooperative CADASTRE 2014 in 2003.

2 LEGAL FRAMEWORK

At the moment, there are no legal bases regulating the listing of restrictions of title relevant to the public law in a cadastre. Nevertheless, this situation is about to change. Various propositions regarding the introduction of a new „geo-information“ law are being discussed on a federal level. The resulting project of this new federal law has now been submitted for a first consultative procedure and the resulting constitutional amendment should come into effect in 2008.

The above-mentioned draft of the planned amendment stipulates that the Federal Council should issue regulations regarding the minimal requirements of a cadastre, especially within the aspects of its organization, its supervision, the harmonization and the quality of its data as well as the applied methods used to establish it. The data thus put in a prescribed form shall be registered in the owners name and legally binding. In analogy to the actual law regarding the official land survey, the cantons would be liable for the whole and warrant for any damages resulting from an insufficientnes of the cadastre.

Various reports have been commissioned in order to define certain notions, but also the requirements and advantages of such restrictions of title within the public law. The preliminary work of c2014 has been incorporated.

At the moment the rough estimate of the costs involved in establishing and initially developing the 6 most important domains (zones, lines of construction, lines defining the minimal distance to forests, cadastre of refuse dump locations, water protection zones, maps of hazard zones) varies between 90 and 345 Mio euro. Considering the complexity of the project and the expected costs, only a step by step procedure can probably lead to a successful implementation. Already existing projects and solutions should, if possible, be incorporated. Thanks to its readiness to stay in dialogue with the various involved parties, the association c2014 increases the probability that it will, in due time, finally be rewarded for assuming the role of a technical pioneer.

3 ASSOCIATION C2014

The association c2014 (a co-operative society) was founded in 2003 on initiative of IGS (Ingenieur Geometer Schweiz – Association of the private licensed surveyors of Switzerland). Through the development of modern methods for the complete, reliable, fast and cheap gaining of information on land related rights, c2014 intends to assume a leading role in the implementation of the Cadastre 2014 project in Switzerland.

The association is supported by 87 private rural engineering and surveying offices in Switzerland. The fact that every third surveying office in Switzerland has joined c2014 represents a remarkable success for its initiators.

Geographical repartition of the members of c2014

The main product of c2014 is the cadastre extract SIGIS SIGIS, which represents a list and/or extract of a plan indicating all the restrictions of public law for any given lot. SIGIS is standardized throughout Switzerland and is presented in a uniform text format with logo. Its major advantage lies in the fact that, by the simple pressing of a button, SIGIS will give the essence of the legal boundaries related to a plot, thus automatically filtering the necessary data out of the flood of federal, cantonal or communal laws regarding construction, environment and spatial planning.

The name SIGIS is not an abbreviation of terms but a fantasy name originally created by a marketing agency. The key objective was to have a name which would be noticed and remembered by the clients. The facts that SIGIS also can be interpreted as the French and German abbreviation of "Geoinformationssystem" and that the name sounds the same when read for- or backwards are pure coincidences.

4 ORGANISATION

The association c2014 is managed by a board of 5 administrators, all members of the cooperative society. Each linguistic region is represented by at least one administrator. The secretarial and administrative tasks have been assigned to an acting manager. Furthermore, a technical delegate is responsible for the compliance with the basic technical concept and the elaboration of the specimen documentation for every canton. He or she is also responsible for the instruction of the surveyors and of their project manager. The coordination, the marketing and the technical framework lay within the responsibility of the association. The implementation of the project represents the main task of the members, the necessary instruction and documentation being provided by the association. As the value and individual profit of such an information platform only increases with the availability of a maximum of data, it is essential to move swiftly towards a large geographical coverage.

5 TECHNICAL CONCEPT

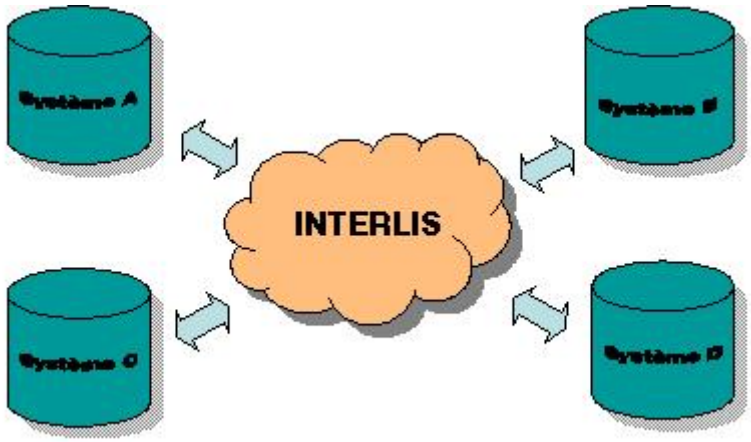
5.1 Necessary components

In order to make an informative statement regarding the public law restrictions on a given lot, one needs the following components:

- Geometrical data gained by official land survey
- Geometrical data regarding the public law restrictions
- Laws and their relation to each other in a standardized form

5.1.1 Official land survey

The data gained by official land survey is, for the most part, already available in a digital form. Thanks to the introduction of INTERLIS by the federal authorities, all the regional spatially related data (geodata) can now be stored, processed and made available in a widely compatible transfer format. The most important part of this data is represented by land boundaries, which superposed on the public law restrictions give the essential raw geodata (sectional area object).



5.1.2 Public law restrictions

Every law related to and representing a given space must be based on geometrical data. According to the specific subject, this data can be retrieved at the commune (local district), the canton or the federal authorities. Often the public law restrictions are not yet available in a digitalized form and must first be brought into the according format.

5.1.3 Laws

The entrepreneur assigned by the association c2014 has analyzed, adapted and registered all the federal or cantonal laws and decrees - especially their articles related to spatial topics - for every canton. Within this procedure, over a 1000 texts with spatially relevant issues have been processed. In a second step, the relevant laws and decrees were then integrated in the INTERLIS geodata system.

This model and the corresponding data for every canton are available to the members for further applications in their commune. Based on the relevant federal and cantonal laws which were thus recorded, a model community with its according laws has also been established in every canton.

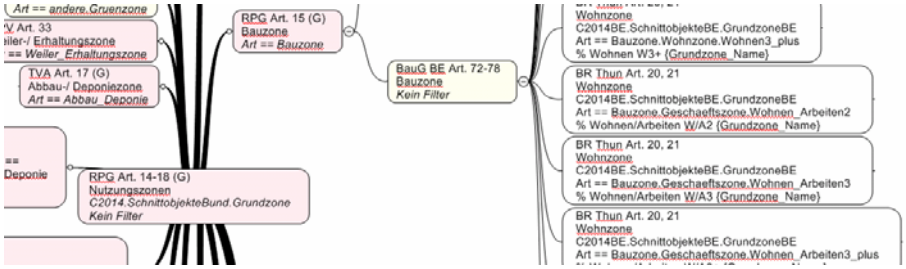
5.2 Procedure in the communities

For every community (commune, local authority), the procedure implies the following tasks:

- Adaptation of the relevant laws
- Collection and registration of the geodata related to public law restrictions
- Production of the raw data material for the SIGIS extract (XML Files)
- Publication

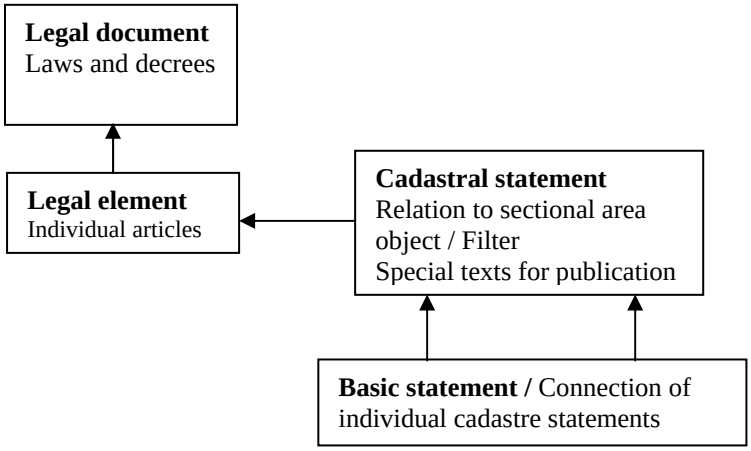
5.2.1 Adaptation of the relevant laws

The adapting of the relevant laws implies the studying and analyzing of the communal laws for each commune. After having gained a detailed overview, all sub-regulations (articles, clauses, paragraphs etc.) of the communal law related to spatial topics must be sorted out to complete the data already made available by the federal and cantonal authorities. The method of „mind mapping“ (MindMAP) has proved itself as being a useful tool fort his type of task:



As a fundamental principle, with some exceptions, every communal law is based on a cantonal law which again is based on the federal law. In general, only the relevant laws and orders are registered, as well as the sub-regulations with a specific spatial topic.

The cadastre extracts represent the core of the legal records. A cadastral statement can basically be defined as the intersection between the legal and the spatial aspects (sectional area object). The addition of the individual cadastre statements then gives an overview of the overall relation to communal, cantonal and federal laws and decrees:



This step of the procedure is not only important for the accuracy of the geometrical data in relation to public law restrictions but is also essential for the later quality and accuracy of the SIGIS extracts.

5.2.2 Collection and registration of the geodata relevant to public law restrictions

The federal authorities have established an INTERLIS model for the administration of public law restrictions. In accordance with the relevant recommendations, this model can be adapted to local specifications in each community.

The geodata relevant to public law restrictions is generally found in various formats (from digital in INTERLIS to paper plans). All this data must first be collected and then in a second step be integrated in the C2014 model. The degree of detailed information depends on the later use of the data.

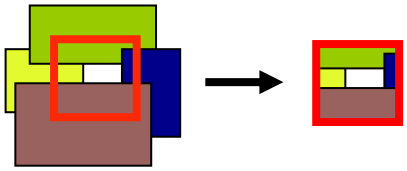
5.2.3 Production of the raw data material for the SIGIS extract

The following data is basically available for the production of raw data (XML-File „E**x**tensible **M**arkup **L**anguage“) later to be used in the SIGIS extract:

Data provided by official survey

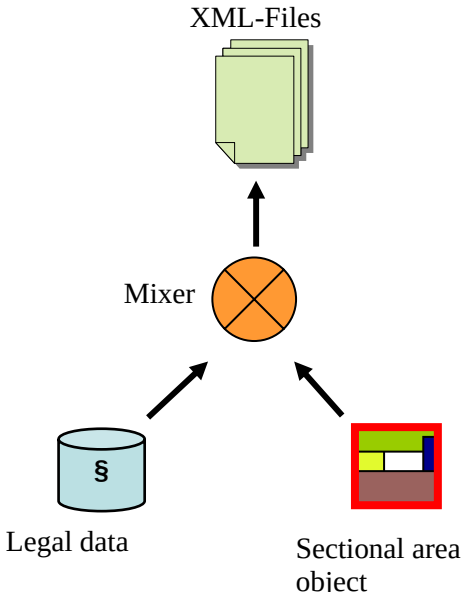
Geometries of the public law restrictions

The cross-section of both gives the sectional area object



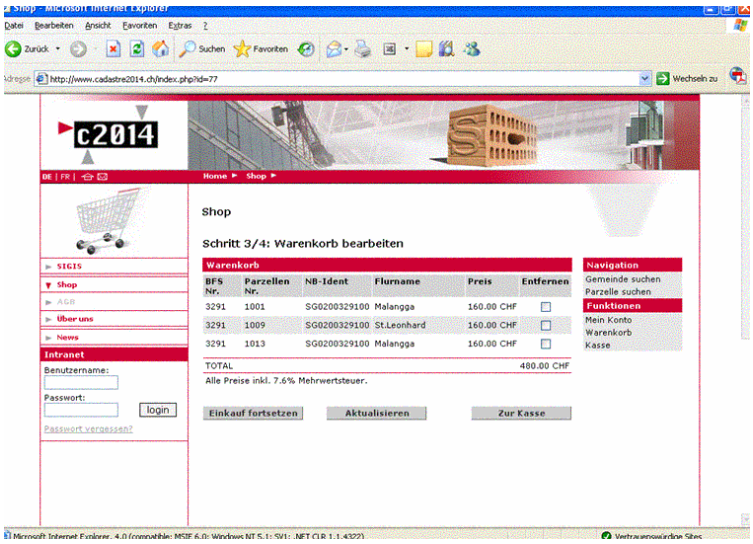
Legal data, including cadastre statements

The legal data and the sectional area objects are now ready to be processed ("mixer" method) in order to result in the relevant XML files specific to each plot. For this step of the procedure, all the cadastral statements and their relation to the context must first be analyzed. Any sectional area objects resulting from this cross-analysis are then registered in an XML-File. One such file, containing all the relevant information, is established for every individual plot:



5.2.4 Publication and sale

In a second step, the thus produced XML files can be stored on the portal server of the association. From then on, clients can retrieve the desired SIGIS extract through the on-line shop which was specially installed for this purpose.



6 MARKETING

The major advantage of the product SIGIS lies within the wide range of its possible uses in various aspects of real estate business. The goal of any marketing projects must therefore be to present those possibilities to future clients.

In order to acquire a reliable client feedback, the SIGIS project and sample extracts have been presented personally to various banks, real-estate associations, landlord associations and other big customers. This procedure not only enabled the gaining of useful contacts but also of important feedback regarding the content and the pricing of the SIGIS extract. Although it has been clearly established that there is a definitive market for a digital extract, the successful launch of the project as such will finally depend on the interval needed to establish a maximum geographical coverage and on the pricing of the final product.

In the real-estate portfolios of banks, the SIGIS extract can be considered as a given asset. Nevertheless, the interest for any prefinancing is only marginal. Nowadays, the assembling of all relevant documents for a given plot mainly remains in the responsibility of the client. Yet, if the SIGIS extract can acquire the position of an essential or even indispensable element of any real-estate dossier, the demand will without doubt be increasing. In this case, the price would only play a minor role for the banks, as the costs are generally endorsed by the applicant. Of course, the scenario would be different if the banks request an SIGIS extract for all their real-estate transactions. Nevertheless, the operational margin for the pricing in such a case is quite narrow. At the moment, various models of financing are being discussed.

In order to attract the attention of potential users on this new service, the first step must consist in enabling an on-line access to the relevant laws in every community. The user should thereby be able to gain access to all restrictions of public law on any given lot of a community. This exclusive offer will represent a useful tool for the start-up of marketing activities

and will certainly help in initially creating a steady traffic on the internet portal, even before all the geometrical laws have been registered.

Furthermore, the actual discussions regarding the new geo-information legislation and various reports which have been assigned in this context represent another valuable marketing tool. Independently of the results of the before-mentioned reports, the ongoing discussions and analyses will increase the awareness regarding the necessity of clear and standardized information on ownership restrictions through public laws and of solutions providing this type of data. At the moment, the SIGIS extract developed by c2014 seems to be the only available and lasting alternative.

7 EXPERIENCE REPORT

7.1 Model community

In order to test the general concept, the association established one model community in every canton which was later to serve as a pattern for further communes but also to reveal any potential difficulties occurring in the process of data modelling and processing. The experience thus made clearly demonstrated the feasibility of a data extract which also gives information on any public law restrictions for a given plot. But the testing phase with the model communities also exposed deficiencies in the modelling process which have in the long run lead to various extensions and adaptations of the original model.

7.2 Fundamental decision Thun

Another application which has been operational in the city of Thun since 2004 has clearly demonstrated that a compressed form of information on restrictions of public law is in demand. The project „Fundamental decision Thun“ shall therefore be described in more detail.

In November 2003, the city of Thun (Berner Oberland) introduced a new building regulation. Amongst other things, the building regulation establishes the fact that the fundamental decision regarding construction projects is to be issued by the building inspectorate. Through this clause, the city mainly aims to obtain an increased security during the construction, but also a better service and a better partnership between the authorities and private persons (eg. the owner of a house in construction).

Thanks to the close collaboration between the local cadastral surveyor (Düschler & Naegeli) and the cities responsible person for the geographical information system (GIS), the concept of C2014 was introduced at an early point. As a result, the local authorities decided to base the project „Fundamental decision Thun“ on the essential guidelines of C2014.

One of the major differences between C2014 and the „Fundamental decision Thun“ consists in the publication of plans. In order to assure the readability of the plans, the according document is divided according to different themes. The publication of plans as a completion of the relevant articles regarding the public law restrictions has distinct advantages. The central

facts can be represented graphically. A spatial exactitude can only be described with the help of a plan. It is the combination of plan and text which results in an extract containing a maximum of information.

In 2004, a first version of the „Fundamental decision Thun“ was put into operation by the building inspectorate. This version is based on Word documents specific to every plot. The according maps had to be manually copied into those documents. Through the further development of C2014, a second extension phase was initiated in 2005/2006. The main goal of this phase is to convert the information registered in the Word documents in to XML files and to make those automatically available. Furthermore, this phase also aims to increase the level of information. It is planned to conclude this second phase of extension by the end of August 2006.

7.2.1 Conclusion

The C2014 technology has in practice shown its distinct advantages and has definitively proved its worth. The proposed model based solution enables a modern form of data administration. Through the use of XML files, the definitive publication format can be freely chosen (eg. PDF).

8 CHALLENGES

8.1 Modeling of the laws

The main challenge of the C2014 project lies in the complexity of the subject itself. The client shall be given a correct and complete documentation on a certain property. Nevertheless, to define the notion of "completeness" is quite a problem. For this reason, the association has come to an agreement on a selection of distinct themes of interest. The selection criteria were set to guarantee that all the important subjects will be taken in to consideration. The already implemented laws are listed on every output.

8.2 Themes of interest

During the preparatory phase, the aspect of legislative modeling had been clearly underestimated. Once the project initialized, it rapidly became clear that more laws had to be closely examined than first assumed. This fact has lead to a significant delay in the implementation of the project. Meanwhile, the collection of data has been concluded in a majority of cantons. The modeling of the communal laws represents a new challenge for the surveying staff. The research work for relevant laws but also the process of modeling requires a certain professional experience. By the use of standardized methods, the personnel must therefore be accordingly instructed in order to achieve a uniform use of specimen forms and a uniform publication on all federal levels.

8.3 Survey of the geometries related to public law restrictions

The collecting of all the necessary geodata for each commune poses another important challenge. One must find the correct source for the relevant data. Nevertheless, in general the geometer is only responsible for a small part of this data, especially when data of the construction zone plan is involved. Further data has to be collected from the planners, engineers, the cantonal and federal authorities. As the cantons and the Confederation often administer data going over the boundaries of particular communes, it makes sense to retrieve this data regionally. A SIGIS extract can only be considered as valuable if the basic data is up to date. Therefore, the responsibility regarding supervision and administration must be clearly defined.

Another problem lies in the exactitude of the data. A large part of the regional data is gained from overview-plans and is not suitable for an exact intersection plan of different plots of land. Here again, new methods and solutions must be found with the responsible data administrators. Nevertheless, the insufficient exactitude of the data not only represents a problem but might also be considered as a unique chance to improve the existing data for the means of C2014. The restrictions by public law can be defined as restrictions of ownership and have direct consequences on the value of a given plot. Therefore, there must be some interest in finding out the effects of such restrictions.

8.4 Technical procedure

Through the creation of model communities, a lot of useful experience has been gained which subsequently was implemented in the technical procedure, thus allowing its refining and optimization.

At the moment, four major systems are used in Switzerland for official surveying and GIS. Practically all systems are in use amongst the members of c2014. The final solution must therefore be supported by the producers of those systems.

The basic technical principle has been chosen in order to give a free choice to the software producers regarding the integration of the „mixer“ function. The minimal requirements stipulate the integration of the cantonal model with the possibility of registering and administrating geometries and laws. In systems with incorporated “mixer”, the step of storing sectional area objects is not necessary. In cases where the “mixer” has not been integrated, the system must be able to create sectional area objects and store them. In order to ensure the transfer of data, all systems should support INTERLIS import and export functions.

9 SUMMARY

The Integration of public-right restrictions into cadastre in Switzerland is technically realized. The private sector of surveyors has invested done its homework so long and can demonstrate with the cadastre extract SIGIS SIGIS an impressive solution. The next step will be the acquisition of the legal and geometrical data, therefore the local surveyors has to be instructed. The Know How of the pioneers has to be transferred to the “doers”. As the value and individual profit of extract SIGIS only increases with the availability of a maximum of data, it is essential to move swiftly towards a large geographical coverage. The ongoing discussions and analyses will increase the awareness regarding the necessity of clear and standardized information on ownership restrictions through public laws and of solutions providing this type of data. At the moment, the SIGIS extract developed by c2014 seems to be the only available and lasting alternative.

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BIOGRAPHICAL NOTES

Peter Dütschler: graduated from the Swiss Federal Institute of Technology (ETH) in Zurich in 1991 and earned the Swiss license for licensed land surveyor in 1997. Since then, he has been running his own surveying office, Dütschler & Naegeli in Thun, together with his partner Christoph Naegeli. The office with 18 employees is specialized in cadastral and engineer-surveying, GIS, online-map-systems and consulting. Since 2001, he is the technical deputy of the organization of the private licensed Surveyors of Switzerland IGS.

Mathias Bigler: works as a GIS and INTERLIS specialist for Dütschler&Naegeli. He is the project manager of "Fundamental decision Thun". As a developer, he has significantly contributed to building up and organizing a data platform in the canton of Bern (www.be-geo.ch) as well as to the implementation of the SIGIS extract.

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