Country Report 2003

(Based on the PCGIAP-Cadastral Template 2003)

Switzerland

Country/state for which the indications are valid:	Switzerland
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I. Country Report

A. Country Context

Geographical Context

Switzerland is situated in the centre of Western Europe, bordering with Germany, Austria, Liechtenstein, Italy and France. Its territory covers an area of 41,290 sq km and is dominated by mountain ranges (Alps in the South, Jura in the Northwest) with a central plateau of plains, rolling hills and large lakes. The highest point is Dufourspitze with 4,634m, while the lowest point is Lago Maggiore at 193m above sea level.

The total population is 7,261,000 (end of 2001). The five largest urban areas are Zurich (943,400), Geneva (457,500), Basle (401,600), Berne (319,100), and Lausanne (288,100). There are four languages in Switzerland that are used and recognized as official administrative languages. About 65% of the population speak German, 19% French, 8% Italian, and 1% Romansch; a remaining 7% speak other languages.

Historical Context

After the last civil war of 1847, the loose confederation of states was replaced by a soundly structured federal state, in which, however, the autonomy of the Cantons and communities was largely maintained. Many parts of the present Swiss Federal Constitution still correspond to the first modern version of 1848. Subsequent Swiss history led not to a unitary state but to a nation by will in which small communities of varying size, economic strength and cultural traditions (language, religion etc.) live alongside in mutual respect.

Switzerland's independence and neutrality have long been respected by the major European powers and it was not involved in either of the two World Wars. The political and economic integration of Europe over the past few decades, as well as Switzerland's role in many UN and international organizations has strengthened Switzerland's international role. Switzerland is active in many UN and international organizations, but retains a strong commitment to neutrality. This neutrality has long prevented Switzerland from becoming member in the UN itself, which it finally joined in 2002. Although there is a very close cooperation with the European Union, Switzerland is not a member so far.

Switzerland in recent years has brought its economic practices largely into conformity with the EU to enhance its international competitiveness. Although Switzerland is not pursuing full EU

membership in the near future, agreements have been signed in 1999 to further liberalize trade ties. Further areas for cooperation are in discussion.

Current Political and Administrative Structures

The Federal Constitution defines Switzerland as a "league of the peoples of 23 sovereign Cantons" (three Cantons are subdivided into half-cantons) making it a federative, democratic and constitutional nation. The Constitution also defines the separation of the three powers – legislative, executive, and judiciary.

The Federal Parliament is the legislative body consisting of two chambers that have equal rights: the National Council (Nationalrat) with 200 representatives and the Council of States (Ständerat) with 46 representatives, 2 from each of the Cantons. The Federal Council (Bundesrat) is the Swiss Government and the supreme executive body. Each year, the Federal Parliament elects 1 of the 7 Federal Councilors to be the President of the Confederation. The Federal Court is the highest judicial authority and acts as a supreme civil law court to judge offences against the state.

The Confederation, however, has only limited power. The 26 Cantons and the approx. 3,000 municipalities exercise a large degree of autonomy according to the subsidiarity principle. The Cantons are autonomous and have their own constitutions, parliaments, governments and courts. Also the municipalities enjoy certain autonomy with their own constitutions and communal statutes, although being under the supervision of their respective Cantons.

Historical Outline of Cadastre

During the early 19th century under Napoleonic influence, cadastres were established in many of the 26 Cantons; however, mainly for fiscal purposes. With the putting in force of the Federal Constitution in 1847, a modern state with a stable rule of the law developed, and with the industrial developments, the need for a legal cadastre emerged, securing land ownership rights and enabling land transactions.

The Civil Law from 1912 constitutes the basis of the "Federal Land Registry System". It was detailed with the "Instruction for the Monumentation and Cadastral Surveying" in 1919 and with the "Ordinance for Land Registry" from 1910. When the cadastral system has been established in the early 1900s, several principles have been defined that are still valid today:

- the land register has five main parts and is based on a cadastral map;
- the cadastral map has to be based on cadastral surveying;
- according to the political and administrative structure of the country, the operational control of cadastral surveying and land registration is with the Cantons;
- the Confederation is supervising and subsidizing the Cantons;
- cadastral surveying can be contracted to private sector land surveyors;
- surveyors carrying out cadastral surveying need to hold a Federal licence.

In 1993, two new ordinances – VAV and TVAV – replaced the old instruction from 1919. The aim was to renovate the cadastral surveying system and to introduce the digital data format. Due to the versatility of data in digital form, the purpose of the cadastral surveying data has been extended from purely serving the land register to serving land information systems of any kind. The establishment of the system independent data description language INTERLIS was a crucial element in this concept.

The data of cadastral surveying has been structured in 8 information layers, which had the advantage that they can be acquired independently from each other, which in fact was a prerequisite for the newly introduced tendering system for surveying projects.

B. Institutional Framework

Government Organizations

The organizations involved in the cadastre are situated on the different administrative levels – federal and cantonal – and have different tasks and functions. For **cadastral surveying**, the Federal Directorate for Cadastral Surveying (V+D) has mainly the responsibility of supervising the cantonal surveying agencies (KVA). Those 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 Confederation 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.

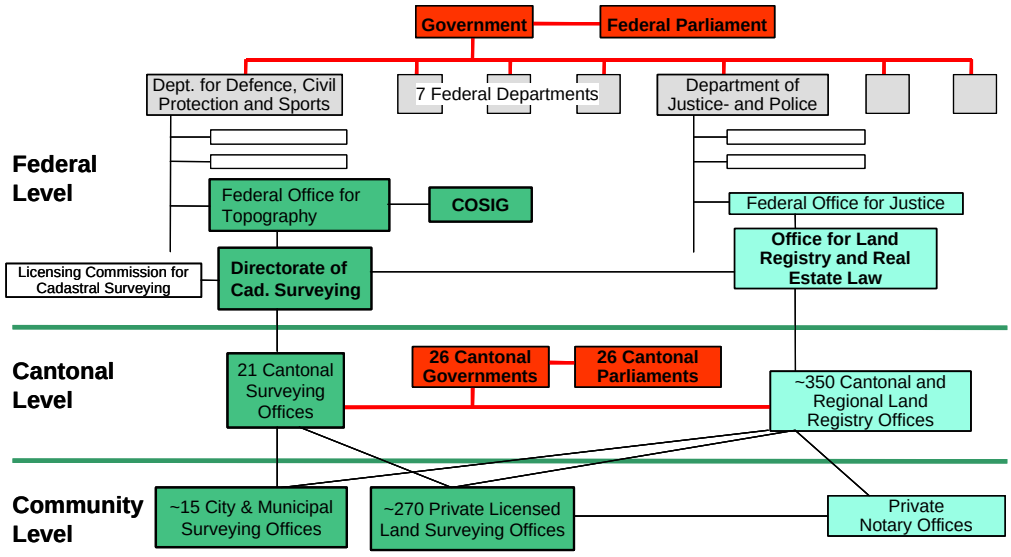


Figure 1: Organizations involved in the cadastral system.

Private Sector Involvement

The private sector carries out 80-90% of the total work within cadastral surveying. The involvement of the private sector is a normal practice since the establishment of the cadastral system in the early 1900's. This proved to be beneficial over the past decades and has further been confirmed over the last few years with the general trend of new public management demanding higher cost awareness and flexible market deregulations.

The private sector is commissioned with projects – through a tendering process – for data acquisition, upgrading, and updating. There is a long established and accepted system, through which the private sector is mandated with data updating and maintenance procedures. As such, the private surveyors are acting as public agents providing a decentralized service close to customers. With the availability of digital data, Cantons and municipalities are introducing their own land information systems and private surveying offices quite often support such projects either by contract or by consulting.

With the many technological developments over the last few years, the involvement of the private sector proved to be very useful for the development of the whole cadastral system. Being forced – through the market situation – the private sector had to adapt processes and technologies, and picked up new possibilities, applications, and methods that helped to improve the system. The innovation potential of this private-public cooperation has benefited the whole cadastral system.

Professional Organization or Association

Most of the cadastral surveyors are member in the "Swiss Association for Surveying and Rural Engineering" (Schweizer Verein für Vermessung und Kulturtechnik, SVVK), which has some 830 members. SVVK is member in FIG and is committed to the advancement of professional interests. The private sector cadastral surveyors are maintaining their own section within SVVK: the "Swiss Cadastral Surveying Association" (Ingenieur-Geometer Schweiz, IGS), which is representing the interests of the private sector.

The cantonal agencies for cadastral surveying are cooperating with each other and meet at least twice a year in the "Conference of the Cantonal Cadastral Surveying Agencies" (Konferenz der Kantonalen Vermessungsämter, KKVA), where structural and strategic matters are being discussed in close cooperation with the Federal Directorate for Cadastral Surveying (V+D).

Licensing

With the introduction of the land registration system in 1910, the Confederation also introduced a regulation for the licensing of cadastral surveyors. Only licensed land surveyors can carry out cadastral surveying. The practical examinations are being carried out under the responsibility of the Federal Directorate of Cadastral Surveying (V+D). The first examination has been held in 1913 and there are some 10-15 candidates on average that pass the licensing exams annually.

The licensed land surveyor can carry out cadastral surveying in any of the 26 Cantons. Although they are mostly operating in the private sector, they are public agents, bound by regulations and contracts.

Education

On the university level, there are education programs in surveying on both campuses of the Federal Institute of Technology (ETH), one in Zurich and the other in Lausanne. Both offer programs equivalent to Masters degrees, which focus more on rural and environmental engineering with mostly optional courses in geomatics. The tendency towards environmental engineering over the last few years is actually a big challenge for geomatics. Around 50-60 students graduate from both ETH's combined each year.

In Switzerland, there are also two technicums that offer bachelor degrees in surveying (in Muttenz and Yverdon). Both technicums combined have 20-30 graduates annually.

C. Cadastral System

Purpose of Cadastral System

From 1912 until 1993, the cadastral system had purely a legal purpose and was mainly geared for securing land ownership rights. The cadastral surveying data have always widely been used as basis for utility mapping and many sorts of municipal planning and management purposes.

Since 1993, in addition to the legal purpose, cadastral surveying data (in digital form) are also to serve as basis for any land information systems.

Since around 2002, there is a growing need to document public law restrictions and responsibilities; working groups have been established to investigate their integration into the cadastral system (compare Figure 2).

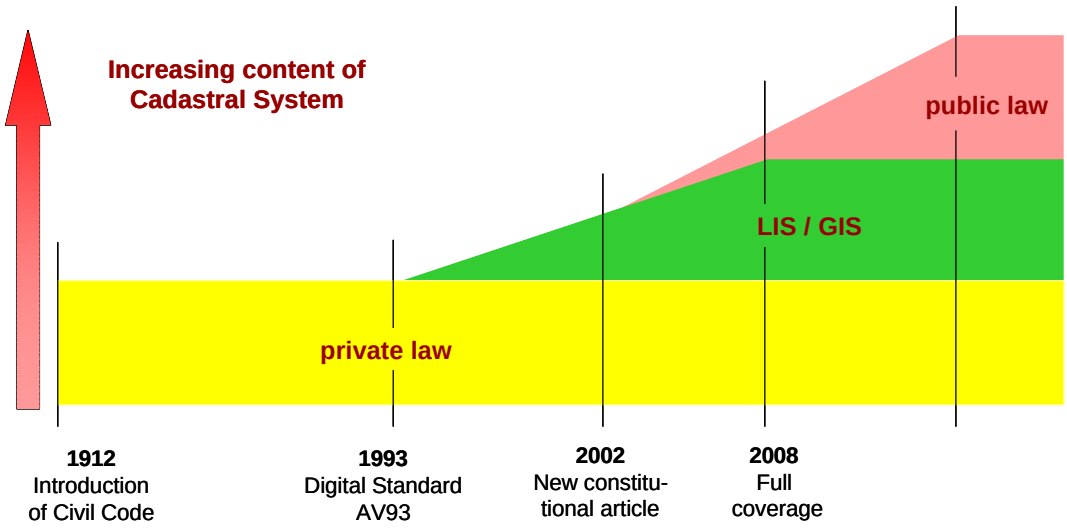


Figure 2: Increasing content of cadastral system serving more purposes.

Types of Cadastral Systems

There is only one comprehensive cadastral system, which by definition of land parcels covers the whole territory in a complete way. Every piece of land is a parcel with an assigned owner. Roads or public areas can for example be in the ownership of municipalities, Cantons, or Federal organizations. Also private companies or cooperations can be owners of land parcels.

Cadastral Concept

The cadastral system is based on a folio principle, i.e. each "land parcel" on the ground is related to exactly one ownership title registered in the land registry. Every land parcel has a unique parcel identifier number, to which all parcel-relevant information is linked. Buildings are by definition integral parts of "land parcels" and by default cannot cross parcel boundaries. In the case of a building sitting on top of a parcel boundary, the boundary would need to be rectified accordingly or the two parcels would need to be merged. Land parcels can be sold only as complete entities. If only a part of a parcel is to be sold, it has to go through a subdivision process by first creating a new parcel, where the new boundary is delimited by a predefined cadastral survey process.

Content of Cadastral System

The cadastral system can be described consisting of the two main elements "land registration" and "cadastral surveying". The **content of cadastral surveying** is defined by a data model with 8 information layers (compare Figure 3).

The **content of the land registry** is mainly the registration of properties, which can be: real estates (land parcels including buildings on them), servitudes and easements, mines, and condominiums.

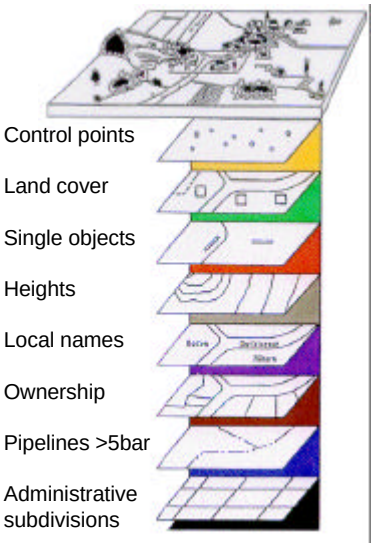


Figure 3: The 8 information layers of cadastral surveying.

D. Cadastral Mapping

Cadastral Map

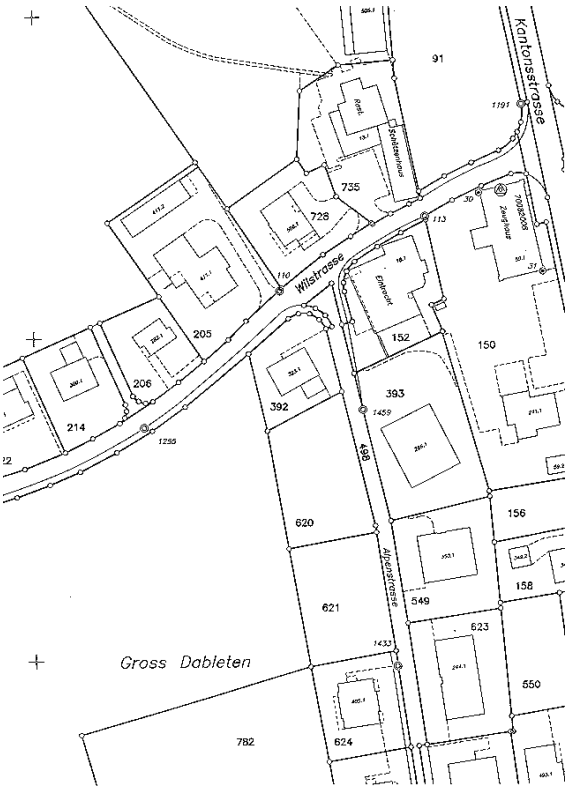
The "digital" cadastral map consists of 8 information layers illustrated in Figure 3. By definition, the two layers "land cover" and "ownership" cover the whole territory in a complete way, i.e. without overlaps and without gaps, while other layers have different structural definitions. Buildings are part of the "land cover" layer.

Each of the 8 information layers is object-oriented and defined by an entity-relationship diagram, which is the data model and also the basis for the translation of the data into an interoperable INTERLIS data exchange format.

The precision of cadastral surveying and the degree of detail are prescribed in 5 different levels according to the economic value of the areas: city centres, settlement areas, intensively used agricultural areas, extensively used agriculture areas, and mountain areas.

Cadastral surveying data are based on a national control system, organized in a hierarchy of 3 orders. Like the majority of geographic data in Switzerland, they are based on a specific geodetic reference framework (oblique Mercator projection), which is in the process of being adapted to modern GPS requirements.

Example of a Cadastral Map



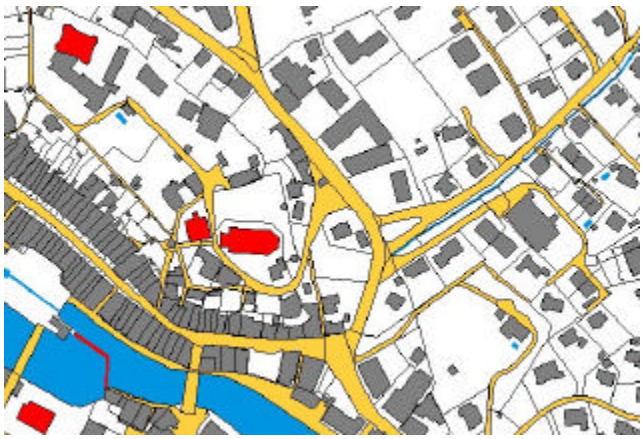


Figure 5 (above): Example of new digital cadastral map with object-oriented approach.

Figure 4 (left): Example of a traditional cadastral map.

Role of Cadastral Layer in SDI

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 1998, a new agency (COSIG) has been established to foster the coordination, acquisition, and use of spatial data within the Federal administration. COSIG promotes the INTERLIS concept as well for the definition and handling of all spatial data. This concept is also at the core of a new e-government project (www.e-geo.ch), which attempts to bring digital spatial data closer to the users.

E. Reform Issues

Cadastral Issues

Although the new legislation for the digital data format has been passed and put into force in 1993, cadastral surveying is still in the process of transforming old data formats into the new digital AV93 format. In this context, it is facing some challenges:

1. In contrast to land registry, which did not necessarily require a complete coverage for spatial data, land information systems now need complete data coverage over the whole territory in order to be operational and useful. Complete data coverage is needed as soon as possible as the real benefits of digital spatial data cannot take effect without that.
2. The system change in the payment of Federal agricultural subsidies has led to a need for more precise and more up-to-date information about the size of agricultural areas. The problem manifested itself mainly in the transition zones between forest and agricultural areas.
3. There are more and more public restrictions and responsibilities interfering with private land ownership rights. They are documented in different registries and documentations – if at all – and therefore difficult to be aware of. A transparent and fair land market is increasingly in need of a comprehensive cadastral system, which also includes and documents public restrictions and responsibilities.

Current Initiatives

In response to the above challenges, the Federal Directorate for Cadastral Surveying (V+D) is undertaking the following initiatives:

1. **Complete data coverage:** V+D adopted a strategy in 2001 for a complete AV93 coverage of all Cantons until the end of 2007.
2. **"Land cover" layer in agricultural areas:** V+D started a project for the acceleration of the AV93 information layer "land cover" in the transition zones between forest and agricultural areas. Data acquisition is being done mainly through the use of digital orthophoto maps.
3. **Integration of public restrictions and responsibilities:** V+D and the private sector surveyors have established working groups for the discussion of the technical and organizational inclusion of public restrictions and responsibilities in the cadastral system according to proposals of "Cadastre 2014".
   At the same time, a motion to amend the Federal constitution with a new "surveying" article has been put forward. The aim is an improved legal and constitutional basis for the extension of the cadastral system with public restrictions and responsibilities.

References

- Federal Department of Foreign Affairs: Switzerland – The Essentials (www.eda.admin.ch/washington_emb/e/home/legaff/essent.html).
- Federal Directorate for Cadastral Surveying, V+D (www.swisstopo.ch/en/vd/)
- Federal Office for Land Registry and Real Estate Law (www.ofj.admin.ch/themen/gba/intro-e.htm)
- INTERLIS – The Geo Language (www.interlis.ch)
- COSIG: interdepartmental GIS Coordination Group (www.cogis.ch)
- Initiative "e-geo.ch" for a National GeoData Infrastructure, NGDI (e-geo.ch)

II. Questionnaire

1. Cadastral Principles

Deed or title registration

1.1 Is your cadastral system based on deeds registration or on title registration ?

- ☐ deeds registration
- × title registration
- ☐ other: …….

Registration of land ownership

1.2 By law, is registration of land ownership compulsory or optional ?

- × compulsory
- ☐ optional
- ☐ other: …….

1.3 If felt necessary, please, comment on the actual practice and the legal consequences.

Approach for the establishment of the cadastral records

1.4 Are landowners required to register their properties systematically during the initial establishment of the cadastre or is registration sporadic, i.e. triggered only by specific actions (such as for example sale) ?

- × systematic
- ☐ sporadic
- ☐ both
- ☐ all properties are already registered
- ☐ other: …….

2. Cadastral Statistics

Population

2.1 What is the **population** of your country ?

7,261,000 (end of 2001)

2.2 Please, estimate the **population distribution** between urban and rural areas.

urban:	…68… %
rural:	…32… %
total:	…100… %

Number and distribution of land parcels

2.3 Please, estimate the approximate **total number of the smallest uniquely identified land units**, often called "land parcels" in your country, including urban and rural areas ?

The total number would include all freehold and state owned land, regardless of registered, non-registered or informal holding.

4.000.000

2.4 What is the approximate **total number of registered strata or condominium units** ? This number would be in addition to the number of land parcels indicated in 2.3 ?

200.000

2.5 For **URBAN areas**, please, estimate the **distribution between the smallest uniquely identified land units, often called "land parcels"** (i) that are legally registered and surveyed, (ii) that are legally occupied but not registered or surveyed, and (iii) that are informally occupied without any legal title (this may include illegal occupation or squatting).

If the estimation is too difficult or complex using land parcels, you may base your estimation alternatively on the number of people occupying these forms of land parcels.

legally registered and surveyed:	…100… %
legally occupied, but not registered or surveyed:	…0… %
informally occupied without legal title:	…0… %
total:	…100… %

2.6 For **RURAL areas**, please, estimate the **distribution between the smallest uniquely identified land units, often called "land parcels"** (i) that are legally registered and surveyed, (ii) that are legally occupied but not registered or surveyed, and (iii) that are informally occupied without any legal title (this may include illegal occupation or squatting).

If the estimation is too difficult or complex using land parcels, you may base your estimation alternatively on the number of people occupying these forms of land parcels.

legally registered and surveyed:	…100… %
legally occupied, but not registered or surveyed:	…0… %
informally occupied without legal title:	…0… %
total:	…100… %

Number of professionals

Please estimate the total number of *academic professionals* that are active within the cadastral system and the proportion of the time that they actually commit for cadastral matters (as opposed to work outside of the cadastral system) ?

2.7	Total number of **professional land surveyors**, such as licensed surveyors active within the cadastral system:	500
2.8	Proportion of the time that these land surveyors commit for cadastral matters:	80%

2.9	Total number of **lawyers/solicitors** or equivalent active within the cadastral system or land market:	700
2.10	Proportion of time that these lawyers/solicitors commit for cadastral matters or land market:	70%

Remarks and Comments

Please, identify the best aspect of this questionnaire ?

Please, suggest the area in the questionnaire that could be improved ?
