

REORGANIZATION OF THE SURVEYING SYSTEM IN THE EASTERN PART OF GERMANY AFTER REUNIFICATION - EXAMPLES AND OUTLOOK -

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Summary:

After reunification the official surveying system in the new federal states of Germany had to be reorganized and rebuilt completely. Taking Saxony-Anhalt as an example for this process it will demonstrate how reconstruction in terms of professional, reorganization and staff components could introduce and assure a high quality of real estate cadastre and state surveying.

Key words: real estate cadastre, state survey, organization, training, further training

1. INTRODUCTION

According to the social-political situation in the GDR the official surveying was in a subordinate position. As a matter of fact the government was not interested in title registration of owners put down in the real estate cadastre and in the property register. The fundamental geodetic survey together with the official geodetic reference systems on one hand and the geotopography with the national topographic map series on the other hand were of no social and public significance because of their degree of secrecy. Therefore the quality assurance of official abstract of title was neglected in favour of other priorities. Another result was that the utilization of national topographic maps was not controlled consequently enough because of their lack of intensive public and private practice-orientated use. While engineering surveys and military surveying could develop well, real estate cadastre and state survey had to be totally reorganized and rebuilt after reunification. The enormous requirements of qualified personnel were not available for this task.

2. FIELDS OF REORGANIZATION

Official surveying includes the following fields of reorganization:

Real estate cadastre with

- real estate register,
- real estate map,
- cadastral surveying and
- cadastral measures and computations as well as

State survey with

- basic geodetic surveys / geodetic reference systems and
- authoritative topographic maps / topographical survey.

The **real estate cadastre** had to be completely renewed not only with regard to quality but in a similar manner it had to be changed into automated keeping. The register and records of basic minor control point were partly on a prewar level. Most parcels could not be found in plans indicating proposed sectional title boundaries and were not even registered in maps. Beside the regular tasks in the state Saxony-Anhalt with approximately 3 million parcels and about 2,5 million buildings there was a huge work of renewal due to be dealt with [Kummer 1996a and 1996b].

After reunification - first time for decades - the **authoritative topographic maps** could be opened for general usage. They had to be adjusted to new reference systems and adapted according to the West German mapping system. In addition to that the authoritative topographic maps had to be changed over to digital keeping. In the area of **basic geodetic surveys** the high point control network and the gravitational point control network were conceived anew in whole Germany. For control network there was made a conclusion about the new reference system "ETRS" on the basis of satellite-assisted surveys.

For the whole area of official surveying there had to be introduced a complete new professional law and all regulations needed to be adopted [Kummer, Möllering 1998]. Based on the new law a modern organization set-up had to be introduced as well [Kummer 1995a]. Only 30% of 3000 necessary qualified staff members (engineers and technicians) were at the state's disposal. Most of them were not prepared enough for these tasks. Because of this reason the official surveying started a **training and further training campaign** - never existed before to such an extend - and it still goes on until today.

The complete reorganization of state surveying included all professional and personnel fields and this way it resembles a great deal with an integrated quality assurance package.

3. COMPONENTS FOR PROFESSIONAL QUALITY ASSURANCE

3.1 Land tax register

In Saxony-Anhalt the keeping of descriptive data in real estate cadastre changed completely into digital „ALB-technique" already in 1993. Beside the cadastre data there is information about more professional data concerning each affected parcel. Today the land tax register is a relevant area-wide basic information system referring to parcels on a digital base [Kummer 1996b].

Cadastral map

The cadastral map as the illustrative element of real estate cadastre was close to decline in 1990. A number of about 14.000 old certified extracts from cadastral map series with nonstandard and far too small map scales could not be used for the new tasks. Therefore a state-wide major campaign for an extensive map renewal was initiated. This campaign will be completed in the year 2002 and will include the following elements:

- changeover from old certified extracts from cadastral map series to transparent films including a complete recording on microfilm (consolidation of product);
- area-wide photo flight over the region to a scale 1:3.500 and production of rectified aerial pictures to a scale 1:1.000 (information, purpose of planning);
- registration of the whole amount of new surveys since 1991 into 90.000 certified extracts from cadastral map series - that were empty before that - to a scale 1:1.000, analysis of aerial pictures and transfer of all buildings that were measured out in aerial pictures into new certified extracts from cadastral map series, at the same time changeover of new extracts from cadastral map series into digital keeping;
- scanning of parcel limits out of old map series, enlarge into scale 1:1.000 and fit into new digitally kept certified extracts from cadastral map series.

As a result there will be 90.000 cadastral maps - digitally kept in "ALK-technique" - at a standardized scale in the year 2002 in Saxony-Anhalt. They show the relevant, complete inventory of buildings in the region and will be worked upon furthermore. Within a period of only 10 years a map renewal 1:1.000 with the help of cadastral photogrammetry will be successfully completed, which is unique for an area-land. With conventional, terrestrial methods this renewal would have taken more than 100 years and were impossible to finance. The renewal of cadastre is described in detail in literature ([Kummer 1994a], [Grams, Loddeke-Thies 1998], [Kummer 1998a]).

3.3 Cadastral surveying and cadastral measure and computations

In Saxony-Anhalt cadastral surveying is carried out not by an official location reference system, but by a local map referred systems of coordinates that is seen in relation to station level. This way cadastral measures and computations with more than 20 million object point-coordinates exist independently from changes of geodetic based systems. Such a change is due to be dealt with soon when ETRS-System 89 will be introduced [Kummer 1995b]. Because of being resistant to reference system changes a genuine safety mechanism of basic data is reached this way. This mechanism is in detail described in literature ([Kummer 1994b, 1996b, 1998a], [Beul 1995]).

In addition to "survey coordinates" with an exactness of 0,02 m "map coordinates" for the cadastral map are kept as well. They are calculated from survey coordinates through transformation about identical control points and comply with the regulations of exactness 0,2 m because of cadastral map scales (1:1.000). That is the reason why changes of the relation system are not able to detract from map precision and can be controlled in spite of quantity. In Saxony-Anhalt there are kept 2 data files for cadastral measure and computations as emerges from the following figure 1.

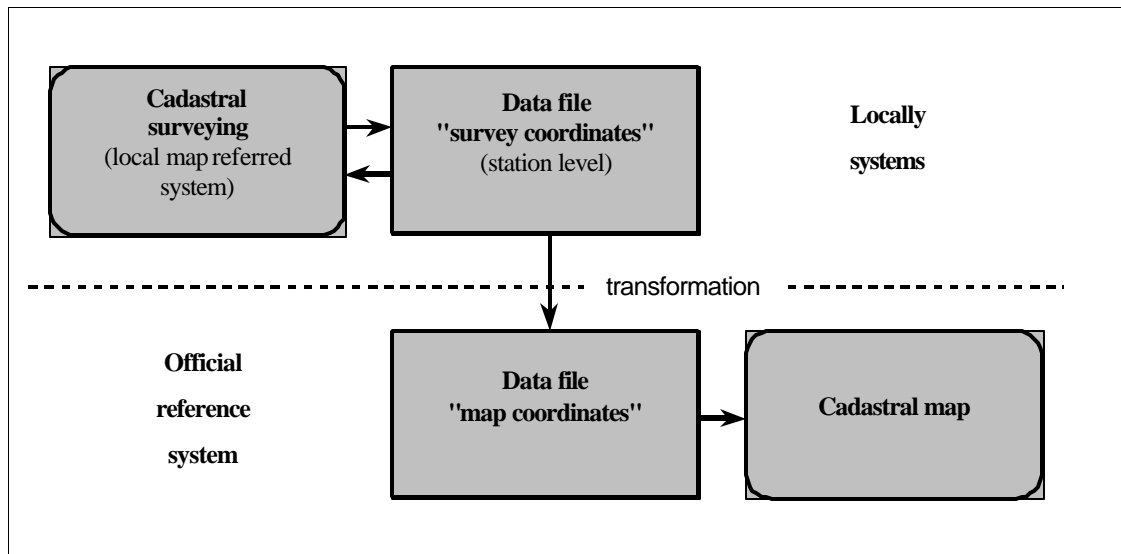


Figure 1: Principle of keeping cadastral measure and computations

Aside from digital keeping of data files for cadastral measure and computations the results of cadastral surveying in their geometric context are kept up to now in analog and graphical cadastral field sheets. Soon documents will be scanned and automatically administrated in a document management system.

3.4 Horizontal control network

Presently 40.000 control points of horizontal control network are getting determined anew by satellite-assisted procedures. The state Saxony-Anhalt has been covered area-wide by 18 permanent satellite reference units (distance 30 to 50 km). With the help of this units cadastral surveying and more detailed surveying, positioning and navigation can be carried out precisely and very economically. The permanent satellite reference units function as representatives of the official location reference system ([Beul 1995], [Patzschke, Leipholz 1996], [Kummer 1998a]). The area-wide construction of permanent units is shown in the following figure 2.

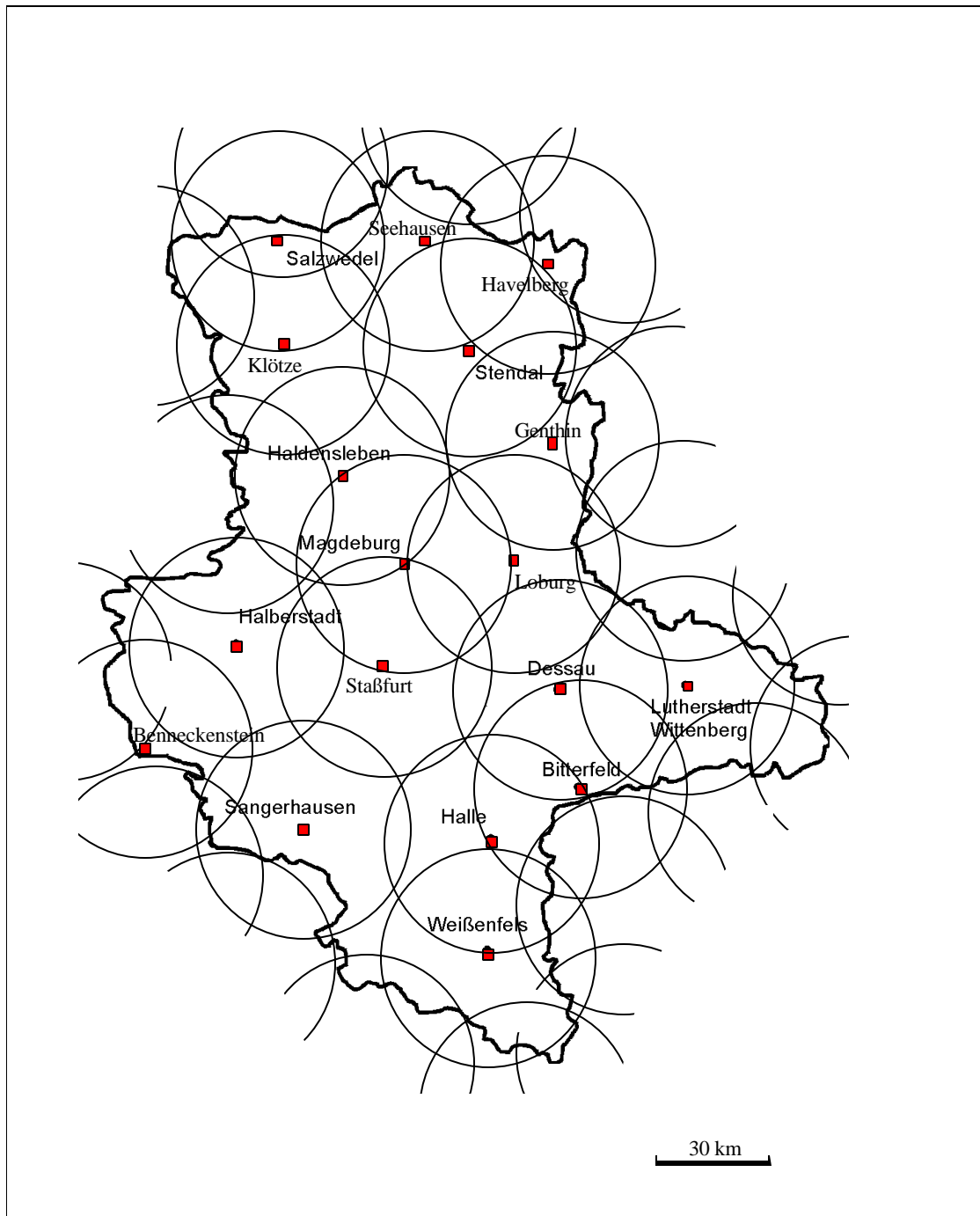


Figure 2: Permanent satellite units in Saxony-Anhalt

3.5 Authoritative topographic maps

Concerning authoritative topographic maps the state Saxony-Anhalt has area-wide analog map systems on file to the following scales: 1:10.000, 1:25.000, 1:50.000, 1:100.000, 1:200.000, 1:500.000 and 1:1 million. The changeover to digital keeping as authoritative topographic cartographic information system (Amtliches Topographisch-Kartographisches

Informationssystem "ATKIS") has been completed area-wide in the state to the topographic basic scale 1:10.000. In addition to that a digital plot model to a scale of 1:50.000 will be constructed soon. The Federal Bureau of Cartography and Geodesy (Bundesamt für Kartographie und Geodäsie "BKG") brings out digital plot models to a scale of 1:250.000 and 1:1 million. The changeover to digital keeping is of profound significance in terms of quality assurance measures. The conception for new digitally kept geotopographic information system plans to replace the conventional analog map system. From digital land models all interim scales can be derived as presentations.

4. COMPONENTS FOR REORGANIZATIONAL QUALITY ASSURANCE

4.1 Administration structure

First there was in Saxony-Anhalt a 3-step administration structure of professional administration:

- 39 offices of local authority (real estate cadastre),
- 4 offices of intermediate authority (regulatory authority and land survey office) and
- 2 departments in the Ministry of the Interior.

These 45 administration units have been reformed completely and reorganized extensively. Today professional administration in the state Saxony-Anhalt is organized as a slim two-stage administration structure with only 12 cadastral authorities, 1 land survey authority and 1 regulatory authority inside the Ministry of the Interior. This way the former 45 administration units are put together to 14 highly efficient units. Hereby methods like on-site competence and self-control are optimized in a way that the principle of quality assurance became even more effective. Because of a short-decision process the service is fast and user friendly. The administration structure is shown in the following figure 3.

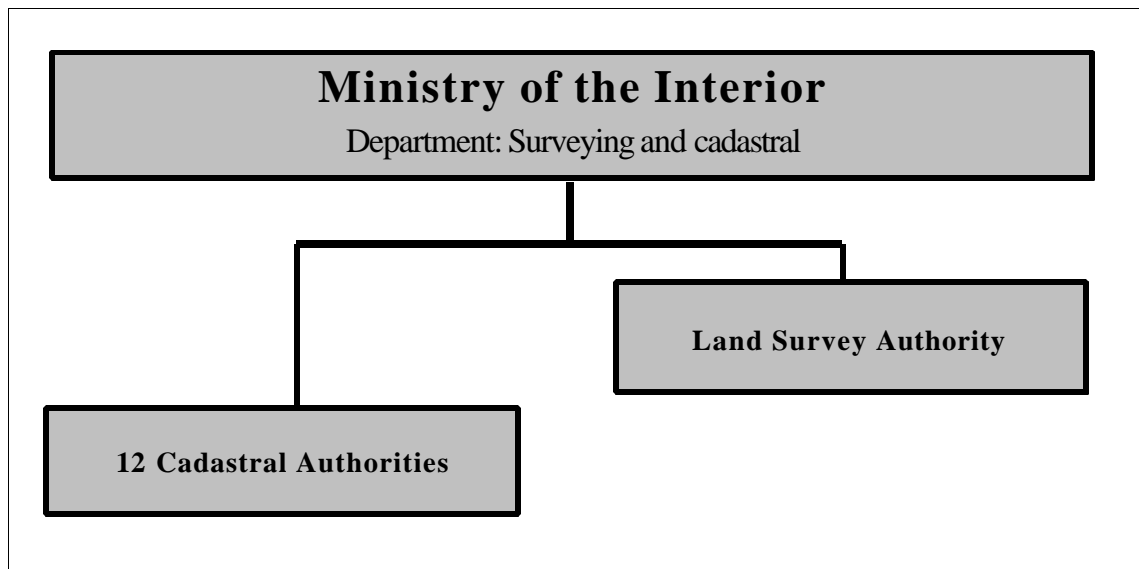


Figure 3: Administration structure of professional administration in the state Saxony-Anhalt

A cadastral authority employs on average 100 salaried staff members and it is responsible for an average area of 1.700 square km, for 230.000 inhabitants and 250.000 parcels. The land survey office is in charge of the entire state of Saxony-Anhalt ([Kummer 1999a, Dieckmann 1997]).

Together with the professional administration the Registered Land surveyors of the state belong to official surveying. They are authorized to do local cadastral surveying. In Saxony-Anhalt it is prescribed that cadastral surveying is carried out to 20% by cadastral authorities and to 80% by Registered Land surveyors [Kummer 1998b]. Altogether 65 Land surveyors received an additional qualification and passed a specific examination. After that they were able to get a registration as authorized Registered Land surveyors with a quality obligation relating to professional law.

4.2 Internal organization of authorities

The multi-step hierarchy structure of authorities was cut back for the benefit of only 1 organization level-departments. The departments are the only organizational units. For example the Land Survey authority is with 400 employees structured as follows [Kummer 1999a]:

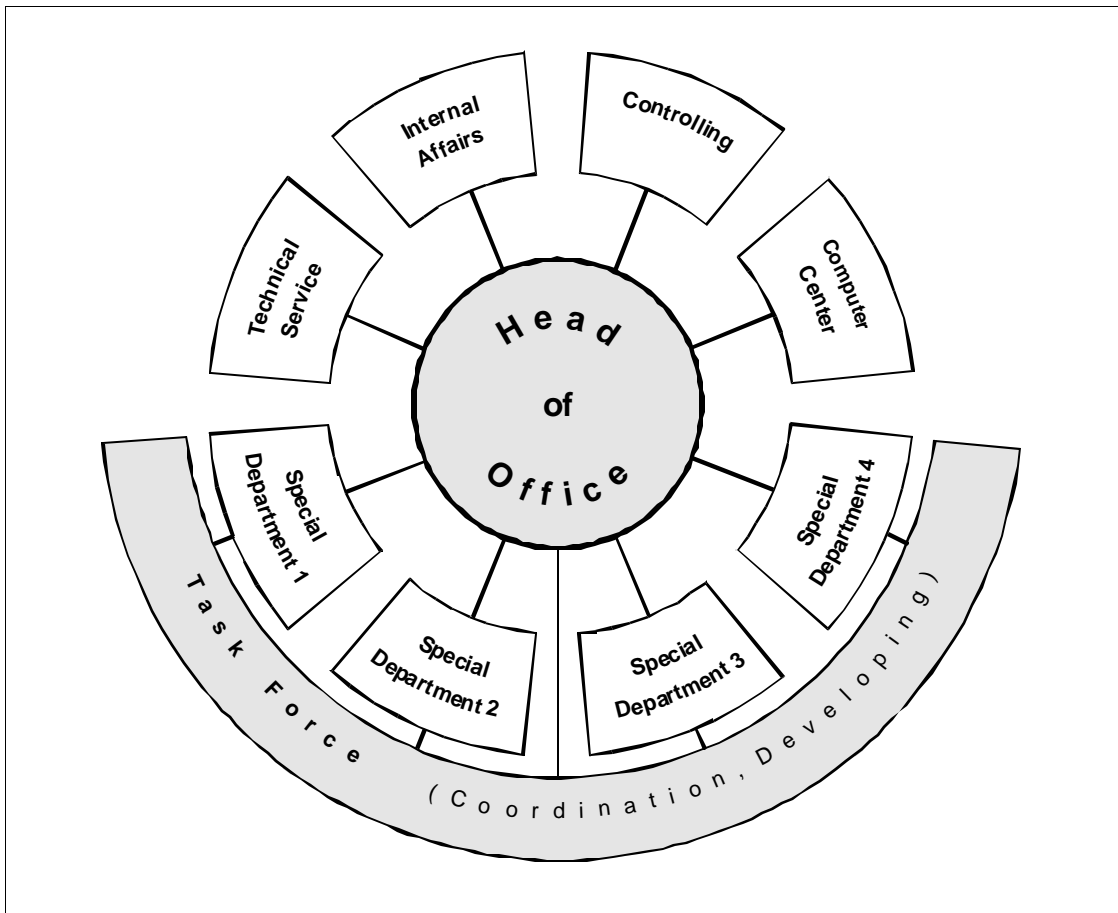


Figure 4: Internal organization of Land Survey authorities in Saxony-Anhalt

With support of this kind of slim hierarchy the authorities are guided by economically orientated principles of management. Apart from this they are obliged to fulfill only government duties [Kummer 1999b].

5. COMPONENTS FOR STAFF QUALITY ASSURANCE

5.1 Training

In order to remedy the deficiency of qualified personnel - a deficiency that never existed before to such an extent - the official surveying started a state-run training campaign after reunification. Within the last few years after reunification more than 1.700 land surveyors and surveying technicians received a special training in the state Saxony-Anhalt (a territory 25 to 30% of the Czech Republic). It was very helpful that the course of study "surveying" could be established at "Professional College Anhalt" in Dessau [Götz, Schallehn 1996]. The technical training is carried out by professional administration.

5.2 Professional further education

In order to meet the requirements of quality assurance the personnel of official surveying is further trained systematically in special courses at state's colleges. These courses are offered additionally to general available training opportunities in the scope of training programs - accompanying professional occupation like „Berufliche Weiterbildung, BWB“ (Continuing Professional Development, CPD) of "Deutscher Verein für Vermessungswesen, DVW" (The German Association of surveying). This exclusive program contains 10 different events per year, each goes on for several days. The achievement quote per year of further training (further training event ./ complete personnel) of the state's official surveying administration amounts today already more than 80% [Schultze 2000]. Further training for graduates who finished university is carried out at the University of Applied Sciences in Dresden [Augath 1999], engineers are educated at the "Professional College Anhalt" [Keller 1997] and survey technicians are qualified within departments of professional administration [Schultze 2000]. Each participant receives a confirmation (certificate) for the attendance at a training course. The certificate follows a standardized DVW-pattern and the participant collects her/his confirmation into a personal BWB-documentation book. Additionally staff members attend more courses that are listed in the DVW further training catalog. The certain structure of BWB system of "Deutscher Verein für Vermessungswesen" is detailed described in literature [Kölbel et al 1996], [Mehlhorn et al 1998].

6. CONCLUSION AND OUTLOOK

Today the official surveying in the Eastern states of Germany has reached West German standards and it offers a high level of quality assurance. Main focus of professional development referring to official surveying of every federal state in Germany is to merge all

registers of real estate cadastre with official geotopography in order to have an integrated, area-related, automated geobase information system of the country [Beul 1998], [Grote 1999]. The conception as a whole is shown in the following figure 5.

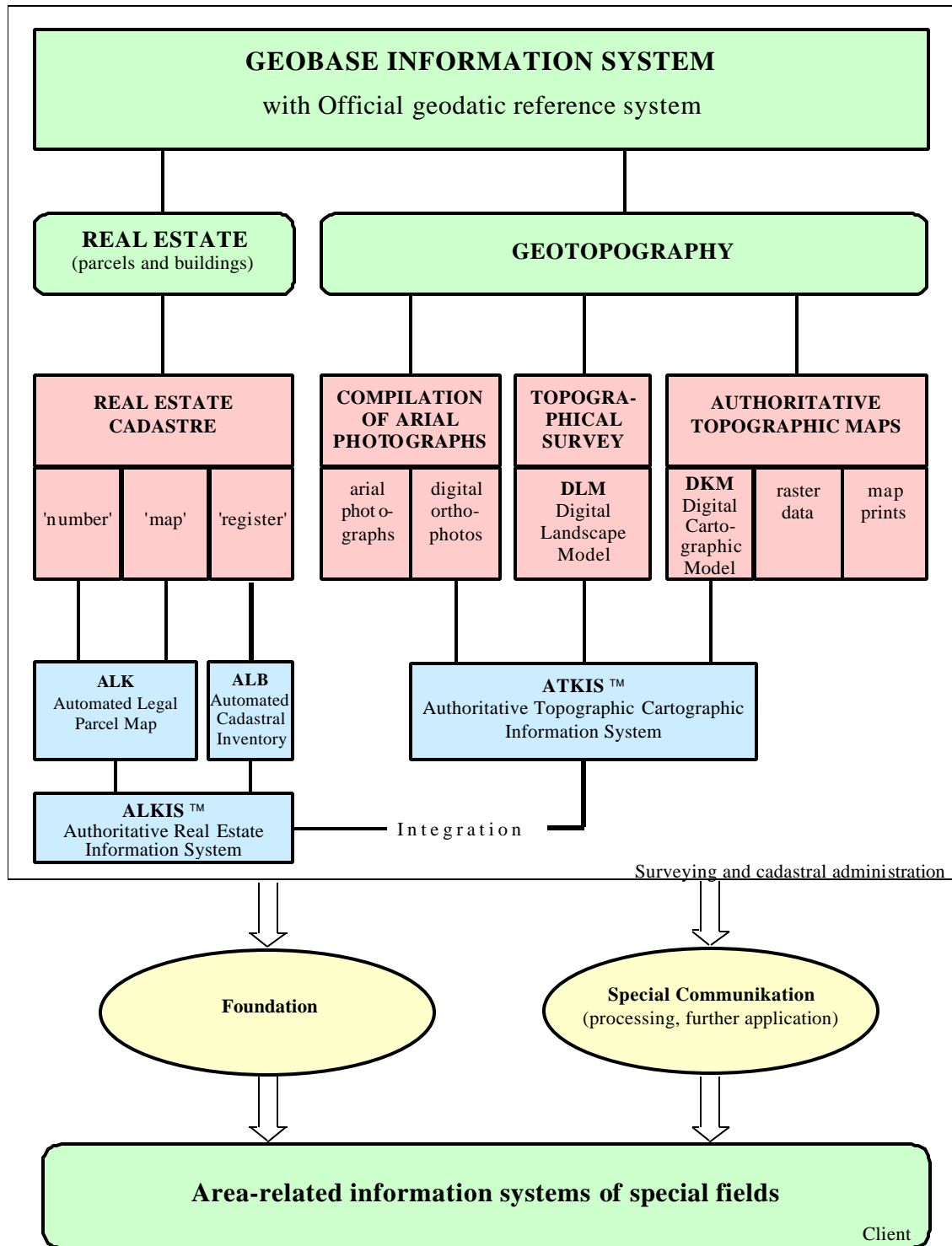


Figure 5: Area-related information system

Registers, maps and records are adjusted systematically and completely as a result of establishing an entire system. Redundant databases and previous covered discrepancies will be revealed and abolished. This is another module for the quality assurance system of German official surveying.

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