

Geoinformation Technologies in Land Management and Beyond: Case of Georgia

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SUMMARY

Introduction of geoinformation technologies for building up a modern land management system in Georgia goes back to mid-1990s. This has been stimulated by start of land reform resulting in privatization of over 3 million agricultural land plots in whole in the entire country. These new properties were to be properly surveyed, registered and recorded in a newly established cadastral system with the aim of launching free market transactions.

During following five years (1996-2001) very different approaches, methods and technologies have been tested in various pilot areas by multiple donor projects, financed and conducted by the World Bank, UNDP, USAID, GTZ, etc. Such activities resulted in creation of large amount of parcel-based information, quite distinct in quality and not always compatible with each other. In such circumstances, launch of a new *Cadastre and Land Register* project (in 2000), co-financed by the German government through KfW, designated for creation of unified cadastral and land register system for the whole country, was a turning point in implementation of a modern land management system in Georgia. The project has brought in advanced technologies and modern methods in obtaining, processing, storing and presenting land-related data. It has used aerial photography (or satellite imagery) and orthophoto maps as a base for cadastre, applied high accuracy field measurements by mass usage (over 30 sets) of digital plain tables (DPT) and total-stations and designed geo-databases, assuring integration of all data collected previously by other donor-funded projects. At present almost 80% of territory of Georgia is covered by precise and highly reliable parcel-based information, organized in geo-databases, embracing over 5 million land plots in rural and urban places. These achievements make land reform held in Georgia quite successful and advanced case not only among other countries of the South Caucasus region, but also former-Soviet states (excluding Baltic countries).

Other advantage of implementation and use of land information is multipurpose use of [cadastral] data, allowing broader and efficient application for land-related (e.g. land consolidation, land taxation) and adjacent (e.g. urban planning, environmental zoning, infrastructure development) fields of activities. Relatively newly emerged and fast developing IT-oriented private sector (GIS, RS, surveying companies and consultants) is a guarantee for sustainability of a system, technological advance and effective public-private partnership.

Georgian case shows that modern geoinformation technologies promote introduction of advanced land management and land administration system and stimulate development of the land market.

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1. PREFACE

Development of nations in the world could be assessed by different - economic and non-economic - measures. Among them availability and reliability of different sorts of information, frequency and speed of data flow, provision and usage of modern information and communication technologies (ICT) play very important role. According to these measures some scholars and experts divide modern societies into "the Fast World" and "the Slow World". The purpose behind such division is to emphasize that in the modern global competitive socio-economic system the enterprises, states and entire regions *'find themselves in an endless race to seek out new markets and reduce what is known as the "turnover time" of capital: the amount of time it takes for money invested to fund the costs of new production to be returned with a profit through the sale of goods and services. In the global capitalist system, time costs money, and the inevitable result is a steady acceleration in the pace of life.'* (Knox & Marston 2004, p.74).

Not surprisingly, geographically the fast world coincides with the core, developed economies, while the slow world embrace the rest of (mostly developing) countries. Many of the so-called transitional economies, including Georgia, belong to the slow world more than to the fast one.

Among various information trafficking through Internet, which is definitely the leading edge of the fast world, and all other communication channels, **spatial data** is one of the most valuable and highly demanded. Spatial data or, as it is often called, **geographic information** is essential for fast and efficient operation of competitive free markets. This is especially true for land and real property markets where almost all transactions need precise and reliable information on land plots, buildings, utilities, etc., i.e. objects with geographical features. Provision of this kind of information always depends on existence and application of appropriate tools, techniques and technologies for capturing, processing, analyzing and presenting spatial data.

It is easily explainable that during last decade or so the countries in transition to the market economy, especially East European and former Soviet states, have concentrated much efforts on design and implementation of modern information systems and advanced technologies to guarantee efficient land management and assure rapid growth and effective performance of land markets, as compulsory preconditions of the overall economic growth. Obviously, some of the outcomes of such efforts (e.g. in Baltic states) proved to be very positive and successful.

Among other post-Communist countries Georgia has never been a leader or even a "success story" in transition to market economy. Despite not pretending for the leadership either in the field of land management and land market development its case still could be quite interesting for observation of how the geoinformation technologies help progress in land management, land market development and other land-related fields. The purpose of this paper is to reflect "Georgian progress" in above-mentioned fields and to assess the extent to which the modern geoinformation technologies really help the country's development and reduction of the gap with the fast world.

2. SOVIET LEGACY AND LAND REFORMS

Soviet power brought to Georgia some universal conditions of development, or rather rigid frameworks, which applied all over the USSR and are well described in the writings of several authors (see Gachechiladze 1995, Jeffries 1993, Kornai 1992, Lerman, Csaki & Feder 2004).

Management system in general and land management in particular was one of the most important universal conditions. *It was characterized by extreme centralization. An administrative (political) centre became the major seat of decision-making on practically every issue concerning the territory under its jurisdiction... At first sight this situation might have had some advantages for effective management and, theoretically, might have been equally pertinent to the whole area. However, in practice the very centralization stimulated territorial disparities in social justice, which were manifested in the creation of favourable opportunities for the development of the centre itself, not infrequently to the detriment of the rest of the territory.*

Another universal condition was the State ownership of land, the only form of land ownership since the 1920s... It seemed to be an advantageous condition, since a collective managing body lacks a personal interest in land distribution and, in theory, the optimal form of land use could be found. But if such a situation might in part prevent large-scale speculation, it could not escape the problem of the misuse of land'. (Gachechiladze 1995, p. 156). Indeed, this condition gave rise to a disgraceful attitude towards land. In other words, the most valuable and expensive resource in Western societies was practically free in the Soviet Union and land-use depended on bureaucratic decisions, with corruption sometimes "playing the role" of the market mechanism.

Above-mentioned and some other conditions didn't assist in establishment of transparent and effective land management system: access to land for individuals was extremely complicated, and the quality of environment and human life often did not meet people's needs. Land-related data was also hardly accessible and often inaccurate, unless it was produced for military purposes. Technologies applied in civil land administration were mostly primitive and obsolete.

The break-up of the Soviet Union caused the necessity of establishment of a new land management system. Since early 1990s Georgia, like many other former Soviet republics, started the transition to the market economy. As a result of changes of the political and economic framework of the country, the land policy also changed dramatically. The most radical changes have been introduced through **land reforms**.

Three following aspects of land reforms in Georgia could be named as leading among many others:

- **Privatization** of state land;
- Introduction of a modern **land administration** system;
- Emergence and development of a free **real estate market**.

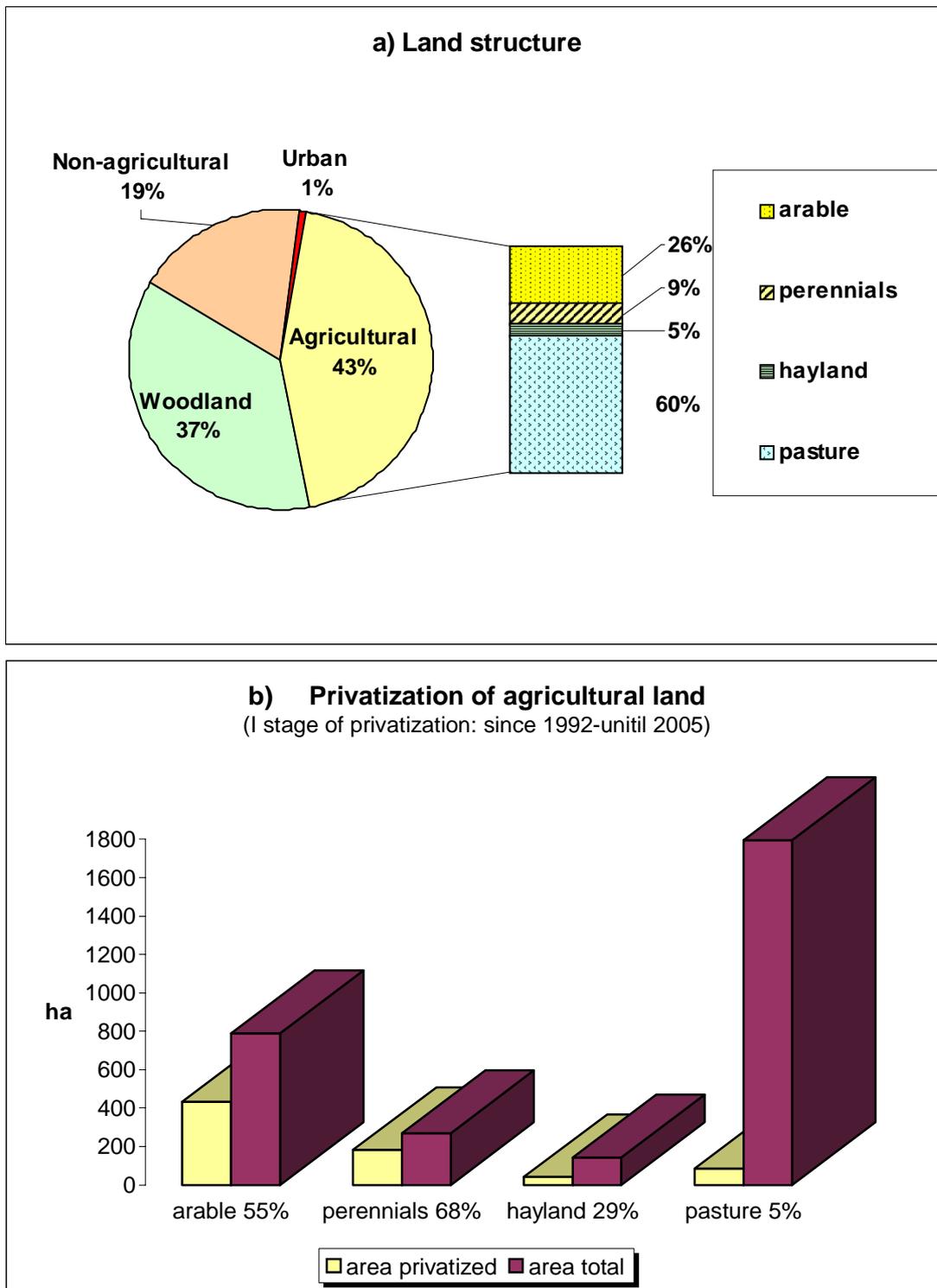
3. LAND PRIVATIZATION

The foundation for land reforms and respectively for the land market development in Georgia was laid after privatization of the state-owned agricultural and non-agricultural. By the end of 1980s in Soviet Georgia more than a thousand of large state and collective (*Sovkhoz and Kolkhoz*) farms possessed over 1,2 million hectares of agricultural land. In frames of the **agricultural land reform**, which began in 1992 and lasted till 1999 (first phase of privatisation), these farms were abolished and a “privatization fund” of 0,8 million ha of land was established. It embraced over 25 percent of all agricultural area. Out of this fund the land was distributed to rural households free of charge according to pre-defined norms: up to 1,25 ha - to the farming households in villages and up to 5 ha of pastureland - to the farmers engaged in cattle breeding in the highlands.

By 1999 over 750 thousand ha agricultural land has been privatised and approximately 1 million people became landowners. (*Geography of Georgia 2003, p.111*). Large number of agricultural land parcels (over 3 million), distributed through the reform, helped landowners in creating small subsistence farms with limited economic potential. At the same time, substantial number of farms enlarged their area through short-term leases of state-owned land (see fig. 1). *'Thus, in 1998, about 4% of Georgian farms (42,900 entities) were leasing nearly 1 million hectares from the state, i.e., 22 hectares per lease contract on average'*. (*Lerman, Csaki & Feder 2004, p.83*). As a result, over 80% of production is produced in big and medium farms, which make up only 6% of all farms but occupy over 60% of total farming area.

As fig. 1 shows despite nearly 75 percent of agricultural land remaining in the state ownership after the first phase of privatization, over half of the most valuable agricultural land – arable and perennial plots – has been already privatized.

Fig.1 Land structure and privatisation of agricultural land



Sources: *Geography of Georgia 2003, p.111; Statistic Data...1999*

In 2005 a new (second) phase of agricultural land privatization started. It envisages privatization of almost all remaining agricultural plots except of the most of pastures. It will increase the amount of privatized land in Georgia by 360.000 hectares. In cases of actual lease the existing lessee enjoys advantage of buying the land. The minimum size of land parcel is limited to 3 hectares to avoid further fragmentation of land, which was definitely undesirable and negative consequence of the first privatization.

Private ownership of *non-agricultural land*, including urban sites, did not exist prior to November 1997. Land parcels possessed by private persons were deemed to be state property. In the course of the first stage of privatization of urban land, housing privatization was carried out neither privatizing the land on which the property stood, nor the land adjacent to the property. The Civil Code, adopted in 1997, declared that non-agricultural land parcels under individual houses and apartment buildings were under private ownership.

The second phase of privatization embraced industrial lands through one-off symbolic payment equal to the annual land tax to obtain ownership rights. As a result of these processes, over half of urban land has already been privatised, which gave a very strong push to establishment and relatively quick development of urban land markets.

Assessing and ranking privatization land policies of 22 transition countries of Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS) according to the ideal model of agriculture in market economies with full transferability of land ownership rights, Lerman, Csaki and Feder place Georgia by 9,2 points of land-policy index out of possible 10, '*clearly closer to the group of CEE countries than to the rest of the CIS by their land-policy scores*'. (Lerman, Csaki & Feder 2004, p.99).

4. LAND ADMINISTRATION: ASSISTANCE OF DONOR PROJECTS

Privatization of land and emergence of a stratum of private landowners caused an acute necessity of introducing a modern land administration¹, which is of a high importance for legal security of ownership, land market development and overall economic progress. As Dale correctly mentions: '*Until recent times the primary aim of land administration was seen as the provision of secure title to land... Without effective access to secure property rights, national economies cannot progress and sustainable development cannot be achieved. Today, the prime objective of a land administration system is seen as facilitating the operations of the land market*'. (Dale 2000, p.32).

Realization of the theoretical advantages of the private ownership of land occurring after land privatization – to conduct a transaction in the free land market with real property – completely depends on a capability of a country to implement effective cadastre and land ownership/title

¹ UN Economic Commission for Europe has adopted the term "Land Administration" to describe the process of recording and disseminating information about the ownership, value and use of land and its associated resources. Land administration includes cadastre, land registers, land consolidation, valuation and land information systems.

registration systems. Implementation of these systems, as essential components of land administration, needs viable concepts, much time, funds and corresponding skills. In 1990s Georgian government and institution in charge – State department of land management-SDLM (replaced by the National agency of public register-NAPR in 2004) - was unable to finance cadastral and land survey activities and prepare legal documents necessary for registration of ownership to the land. They also didn't possess sufficient know-how and skilled personnel for fulfilling this task. Therefore, the initial registration process of land ownership was implemented with the help of a number of international organizations operating in Georgia².

Participation of multiple donors gave a strong initial impulse to the introduction of cadastre and title registration in Georgia. At the same time, during the first stage of implementation (1996-2002) co-ordination between the donor projects was insufficient, with some portion of noticeable rivalry. These circumstances were caused by absence of a common concept of system design and shared vision on final results and products. In such situation each particular project followed divergent aims, implementing own approaches and methods, covered areas and operation segments of its own interest (see table 1 and fig. 2).

Technical approaches and facilities applied by different projects were also quite distinct. A good example of this statement is survey of land parcels done in the same villages and communities-*sakrebulo*s by USAID and KfW projects. In 1999-2002 USAID project prepared over 2 million ownership certificates on privatised land parcels (so called "reform fund") using traditional survey instruments (old theodolites, tapes, etc.) fixing parcel boundaries in local/relative coordinates, thus, leaving them non-georeferenced, while after 2-3 years KfW project measured remaining neighbouring parcels – households, leased and state owned land (almost 1,5 million in total) – using high-accuracy orthophoto background in combination with GPS based modern digital plane tables (DPT) and fixing boundaries in UTM co-ordinate system. Significant differences occurred also in implementation of GIS and other software (e.g. World Bank project used MapInfo, KfW and UNDP – ArcView, GTZ – EZSInter), content of captured data sets and processed data structures, etc. Such uncoordinated activities of the projects resulted in creation of a big amount of parcel-based information, quite distinct in quality and not always compatible with each other.

² During last 10 years the World Bank, UN, EU, also German (GTZ, KfW), American (USAID), and Swedish (SIDA) governments have been financing the projects on implementing cadastre and land registration systems in Georgia.

Fig. 2 Areas of operation of the donor projects

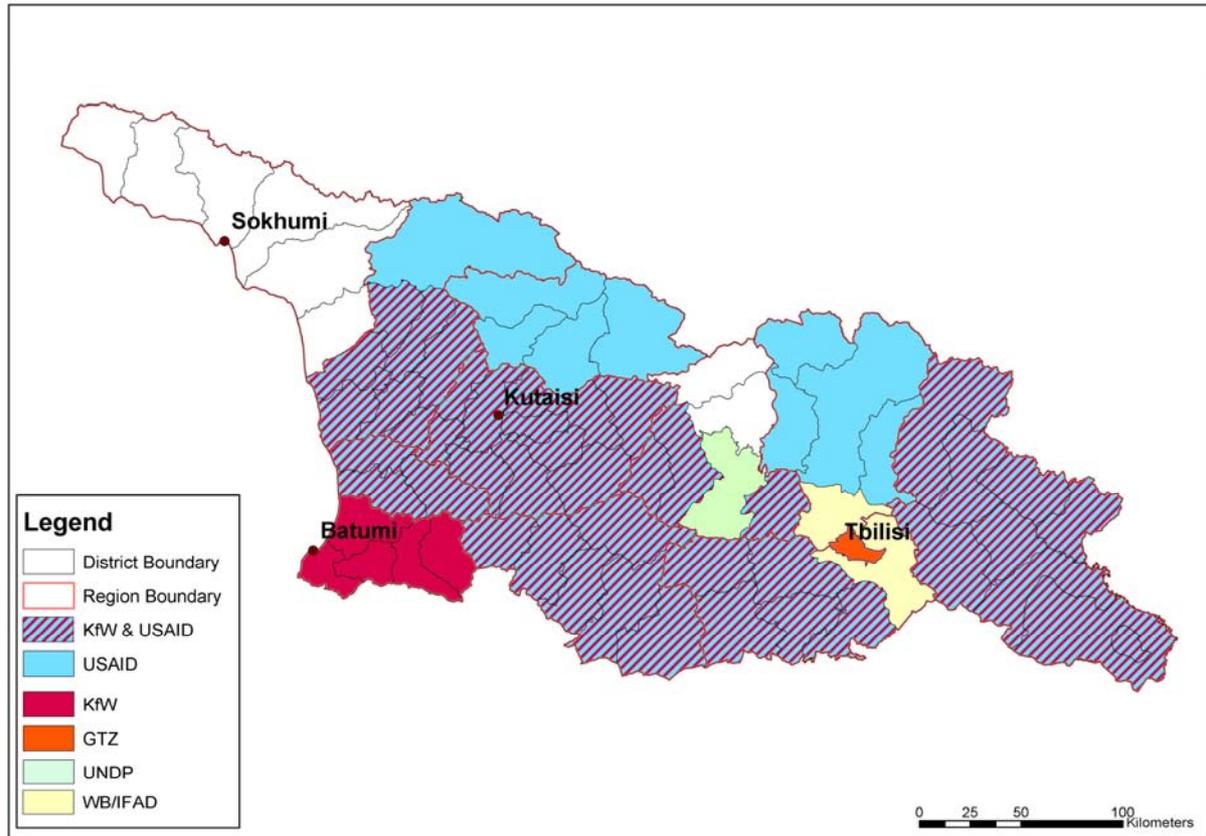


Table 1 and fig. 2 show ranges of topical involvement of particular projects and geographical areas of their pilot-projects, cadastral fieldwork and registration activities.

Necessity of implementation and application of results of particular projects in a real nationwide land administration, particularly in registration of real property transactions, very highly demanded by the market, obliged the acting donors, on the one hand, and the state body-National Agency of Public Register (NAPR), on the other hand, to deepen co-ordination in order to achieve the main purpose - creation of a **unified national cadastral and registration system**.

Formation of a permanent working group in 2003, consisting of selected representatives of all acting projects and the state agency, as well as some invited local and foreign experts could be seen as a turning point in collaborative relations and beginning of the second stage of implementation of land administration. The new incentive allowed elaboration of a guideline - "Concept and Business Plan for Real Property Registration and Cadastre in Georgia" (2004), agreed upon by all participants. The main objectives and directives set by the named document could be briefly generalized into the following points:

- Enhancement of institutional organization and financial strength of the state body for land administration;

- Application of relevant (geo)information technologies and technical facilities in cadastral and registration activities;
- Combination and integration of different sorts of data captured and processed by donor projects into standardized and unified database(s);
- Guaranteeing effective data maintenance and efficiency of system management after ceasing external assistance, i.e. system sustainability.

Table 1. The donor projects in the field of land management

Donor-project title Field of activity	World Bank/IFAD- Land Registration: (1996-2003) two administrative districts	KfW- Cadastre and Land Register: (2000- up today) 51 admin. districts and 5 cities	GTZ- Land Management: (1996-up today) Tbilisi	USAID- Land Market Development: (1998-2002) agricult. "reform land" in 50 districts	UNDP- Land Management: (1999-2003) one district	SIDA- Training of land technicians and managers (1998-2002)
<i>Aerial survey</i>	Y Jointly with KfW, nation-wide	Y Jointly with WB, nation-wide	Y Tbilisi only	N	N Used KfW/WB aerial photos	N
<i>Production of orthophotos (OP) and vector/line maps (VM)</i>	Y VM for two districts	Y OP for over 35.000 km ² and VM for 20 cities	Y VM and OP for Tbilisi	N	Y OP for one district	N
<i>Systematic cadastral field survey</i>	Y Geo-referenced (in UTM)	Y Geo-referenced (in UTM)	Y Geo-referenced (in UTM)	N Non geo-referenced	Y Geo-referenced (in UTM)	N
<i>Title registration</i>	Y Systematic+ Sporadic in 2 districts	Y Data provision + update	Y Data provision + Sporadic	Y Agricultural 'reform land' in more than 50 districts	Y Data provision + Sporadic	N
<i>Geographic data processing and integration</i>	Y MapInfo + own registration software	Y ArcGIS + RegLand++ GeoDB; Integration of all donor data	Y EZSInter	N	Y ArcView+ Regland	N

Training	Y Short term: Registrars	Y Short term: Surveyors, Registrars	Y Short term + long term (university)	N	N	Y Mid- term: various
Public awareness	Y Occasional	Y Mostly at local level	Y Occasional	Y Mostly at central level	Y occasional	N
Equipment of NAPR offices	Y Regional centres	Y Central and district levels	Y Tbilisi office	N	Y District level	Y Training centre

Y= yes; N= no.

Note: The table is a modified version of Salukvadze 2002, p.101.

5. LAND ADMINISTRATION: TECHNICAL AND INSTITUTIONAL ASPECTS

Approaches, methods and techniques applied during cadastral survey and mapping, registration and data management procedures introduced by different donor projects, through implementation of the reform of land administration system, differed significantly. This applies especially to the first stage of reform. Although it is still possible to define very generalized "Georgian model" of land information management (see fig. 3). It's obvious that the concept of land administration, particularly in the part of cadastre and registration, is based on:

- a. effective management and maintenance of land related data, assuring its **multipurpose** use, and
- b. use of **modern technologies** and employment of well-trained personnel in land operations.

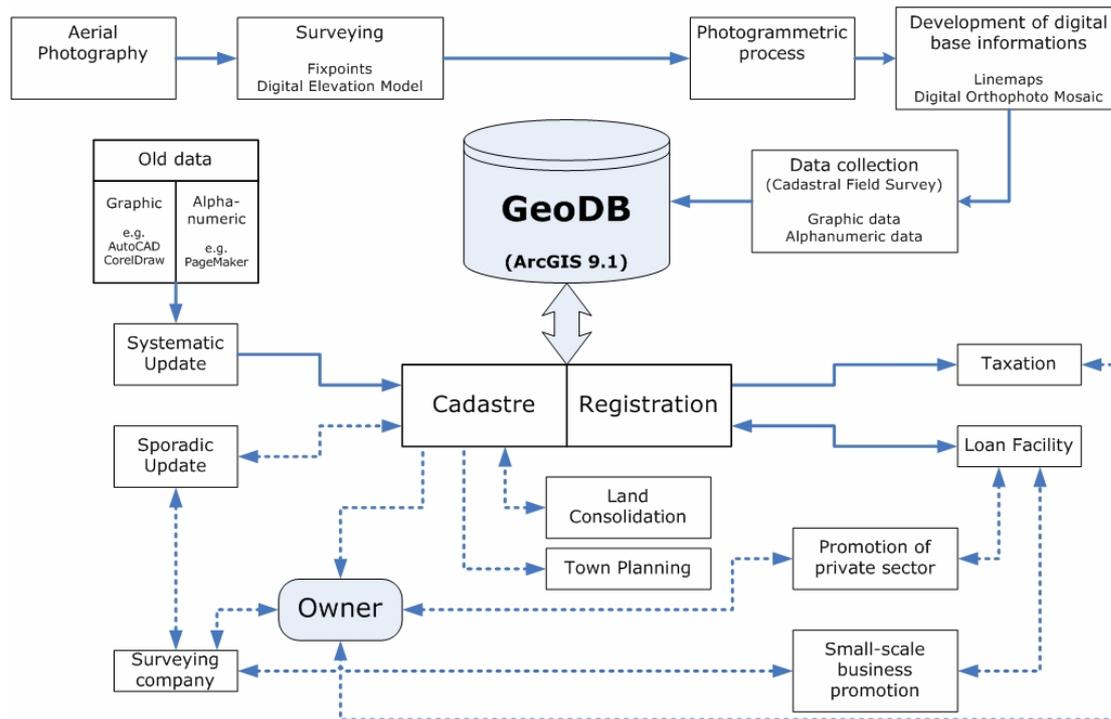
The "technological chain" for creation of a land information system, including cadastre and registration as the most essential components, mainly is determined by approaches and experiences of German government funded (through KfW and GTZ) projects, which are technologically advanced in comparison with others. It could be described as follows:

1. **Aerial survey** - covered over 35.000 km² of economically active territory (out of 69,700 km² - total area of Georgia). The following flight scales are applied: 1:5.000 for cities, 1:12.000 for rural settlements and agricultural land, and 1:35.000 for mountainous and forest (thinly populated) areas. For the rest of territory (mostly unpopulated) satellite imagery is used.
2. **Orthophoto- and vector/line mapping** is based on further processing of aerial photos and satellite images. Production of orthophoto mosaics and line-maps includes the measurement of geodetic fixed points in UTM co-ordinate system using projection WGS 84. Maps are produced in scales: 1:500 and/or 1:1.000 for cities, 1:2.000 for towns and rural settlements, 1:5.000 for agricultural land. In total the orthophotos are produced for nearly 30.000 km²
3. Field **cadastral survey and owner investigation** aims at defining and fixing property boundaries on the ground, as well as collecting documents proving owner's rights. Survey is usually done using GPS-based equipment (digital plane tables- DPT, total stations)

with high accuracy and high speed of measurement. Simultaneously, legal documents on ownership rights are digitally copied and filed in a digital database. It is noteworthy that only in Georgia among other former Soviet republics mass operations – cadastral survey with DPT sets - took place: in years 2001-2006 over 30 DPT sets are used in the field.

4. Processing and organizing field data into interlinked alphanumeric and graphical databases implies the use of both standard (e.g. MS Office, ESRI ArcGIS) and specially developed (RegLand++ - for registration, Edit/search engine - for object identification and update) software. Finally all data is converted and stored in a ***unified geoinformation database (GeoDB)***³ organized by administrative districts and big cities.

Fig. 3
Data Management of the Cadastre and Land Registration Project co-financed by KfW



Information collected and designed in such way is used by NAPR offices for registration of property transactions in the public register. Thus, the primary goal of organizing land information in form of GeoDB is to serve the property/title registration that is crucial for market operations.

Simultaneously with certain technical progress achieved in land administration, remarkable institutional enhancements have been accomplished in the sphere of reorganization of NAPR.

³ Main benefit of using the GeoDB is integration of the different features in one database, which can be implemented for cadastral and registration purposes simultaneously. At the same time, existence of the additional features (layers) allows to use the same information in different universal applications, such as soil cadastre, physical planning, environmental monitoring, statistical and spatial analysis, i.e. guaranteeing multipurpose use of data.

As it was already mentioned, in 2004 NAPR substituted SDLM as the only state body responsible for title registration and cadastre in the country. Together with liquidation of couple of other agencies (e.g. Bureau of technical inventory-BTI) formerly involved in registration and transferring its resources (e.g. archives) to NAPR, the reorganization simplified registration procedures and the whole process itself, making it "one stop", thus benefiting the customers.

The organizational changes were twinned with important improvements in legislation, which allowed the country to lead a list of top reformers in property registration. World Bank and International Finance Corporation assessed reform held in Georgia in their joint publication: *'Georgia – the top reformer in 2004 – made the most progress. The newly created Agency of Public Registry offers expedited registration and combines other procedures to allow entrepreneurs to obtain a registry extract, certificate of property boundaries and proof of no other claims all at the same time. Before, this took visits to 3 agencies. The time required fell from 39 days to 9, and the procedures from 8 to 6... Georgia also cut fees and eliminated the transfer tax, reducing the costs of registration by 75%.'* (*Doing business in 2006, p.28*).

Award of certain financial autonomy to NAPR was very important amendment to its statute. It allowed the agency to keep part of revenue generated through registration of transactions and to use it to raise salaries of staff, purchase equipment for the offices, develop necessary software, etc. Traditionally being financially poor institution (in the times of SDLM it was insufficiently financed from the state budget), NAPR generated 7,7 million Lari (~ 4,3 million US\$) in 2005 (*The National Agency of Public Registry 2006, p.8*). It demonstrates that the costs paid for implementation of the cadastral and registration systems (approximately 35 million US\$) could be covered in less than 10 years time, especially if the market activities will continue to grow with the same speed.

Above-mentioned progress shouldn't be perceived as absolute success, because there are still many shortcomings in land administration. One of the major problems is a lack of skilled and highly motivated personnel, able to run and maintain rather complicated, modern technology-based land administration system. It is especially true in case of NAPR branch offices in rural district where know-how of local human resources is not always enough for automated management of digital data. Some other problems of the existing system will also be considered below.

6. IMPACT ON THE DEVELOPMENT OF LAND MARKET

It is difficult to judge extent to which land market development was influenced by the progress in land administration. Nevertheless, high correlation is evident. Application of modern geoinformation technologies also played significant role.

During last few years Georgia achieved relative progress in land market development. As of April 2004, the number of transactions carried out and recorded in the Public Register (cases of purchase and sale, hypothecation, succession, donation, lease, servitude, usufruct and the right to build in total) exceeds sixteen-fold the number of transactions handled in 1999

(82.497 versus 5.213) (*Analysis of Real Estate Market Development in Georgia 2004*). In the beginning of 2006 NAPR reported on 358.430 cases of registration and delivered services in previous year. The permanent growing trend is characteristic of the period from 1998 (when registration became compulsory) up to today. It is also remarkable that in the first quarter of 2004, operations with real estate made up 6% of GDP (*Georgian Economic Trends, 2004, p.12*).

What does this trend indicate? Several explanations could be suggested:

- The necessity of property registration becomes generally recognized and accepted;
- The offered registration procedures and services are not very cumbersome, time-consuming and expensive to avoid them. The number of informal transactions minimizes steadily and rapidly;
- Banking sector recognizes validity and safety of the information and documents issued by the Public Registry and accepts registered property as a collateral when giving loans. Credits are becoming more available;
- Disposable personal income relatively grows and so does an interest of investing in real property;
- As market value of real estate grows fast, buyers are willing to make further purchases of property more rapidly.

This incomplete list of possible correct answers does show only range of positive aspects of *state of the art*. Besides the general growing trends in land market development, one can easily sort out huge disparities between the growth of urban and agricultural land markets, as well as geographical/regional differences. The capital city - Tbilisi could be deemed to be a "land market growth pole". The fast growing number of all market transactions and high percentage of land and real estate mortgages (despite unfavorable conditions, e.g. high interest rates) could be used as a good indicator to prove it. Out of almost 40.000 mortgages registered in Georgia during last 5 years (1999-2004) 55% have been registered in the capital city, 32% in other cities and only 13% in rural places (agricultural land). It means that the land and real estate in Tbilisi is not only highly demanded, but it also becomes commonly recognized as a collateral.

Meanwhile, the banking sector accepts agricultural land as a collateral only in rural regions with high-yield agricultural production (e.g. productive vine, fruit and citrus growing areas). Despite a relative breakthrough during last two years, heavily fragmented agricultural land parcels are still rarely accepted. It shows that the level of the agricultural land market development is developing slowly.

Another proof of growing land market is raising **market values** on land and real estate. This general trend is also expressed very differently in distinct parts of the country: the value of 1 km² land in the central districts of Tbilisi exceeds 1.000 US\$, showing dramatic increase (4-5 times) in comparison with late 1990s, while in many rural areas one can still buy 1 hectare of agricultural land for less than 50 US\$. Such variations between property values in different markets are common, but the fact that quite big part (over 60% due to my observations) of properties doesn't enjoy considerable if any growth through years, reflects continuing economic stagnation and even depression in some regions

of the country. It must be closely linked with problems of uneven distribution and unequal availability of resources, funds and wealth, including land and information about it.

7. BEYOND LAND MANAGEMENT

Land information is widely used also in the fields other than land management. There is significant demand from different users and clients, e.g. tax authorities, town planners, property developers, environment inspectors, banks, insurance and many other state institutions, public agencies and private companies. Currently hundreds of different users, especially from the private sector, are procuring data in forms of digital orthophotos, cadastral maps, databases, etc. using it further as the most accurate and reliable base for their own projects. This proves *multipurpose* character of the produced land information.

The process of implementation of modern land administration had strongly involved private sector in project activities. Cadastral fieldwork, owner's investigation, digital data preparation, etc. usually has been subcontracted to the private sector. On top of this, KfW project trained over 400 persons on job for using DPT equipment and processing geo-data by GIS software, later supported the trainees to establish over 30 private companies and invited them for participation in their tenders. Demand for much work in the fields of cadastral survey, orthophoto production, digital data processing and possibility of getting contracts through tenders strongly promoted development of *IT-oriented private sector* (GIS, RS, surveying companies and consultants).

Today several companies from this sector are successfully acting not only in the local market but also attracting contracts from abroad. For example, the leading company in this field in Georgia - "LKN – Earth Research and Consulting" (see www.lkn.ge) is a corporate member of FIG and official partner of many prominent international companies. Together with them it conducts operations in almost 20 counties. It is noteworthy that in July 2006 the representatives of private sector founded the Society of Professionals of Land Information Technologies (SPLIT), which applied for full membership of FIG. It obviously shows growing potential of Georgian IT professionals and their desire to join international family of the colleagues. Presence of strong private sector could be seen as a guarantee for sustainability of several fields using geoinformation, technological advance and effective public-private partnership in the country.

Another effective measure for assuring sustainability in land management and urban development is opening of two specialized Masters programs in two Georgian universities due to assistance of GTZ project: the program in Town Planning is running at Georgian Technical University (since 2003) and the program in Land Management and Land Tenure– at Tbilisi State University.

8. END NOTES

Based on the above-presented story one could agree that Georgia has made significant progress towards better land management by introducing and developing modern land administration system with strong cadastre and registration components. The role of international donor-funded projects was decisive for successful accomplishment of this.

Implementation and effective use of modern information technologies, especially for capturing and processing of spatial, i.e. geographic data significantly contributed the progress. Construction and further maintenance of unified GeoDB, containing multi-user information on land parcels, is one of the main priorities for the time being. It will ease access of state bodies, legal and physical entities to land-related data, accelerating registrations of ownership and other market demanded activities. The fact that almost 80% of the territory of the country is already covered by cadastral survey and partly loaded in GeoDB, strengthens previous suggestion.

The progress is also evident in building up the professionals and private companies, skilled in information high technologies, management, etc. It gives guarantee to the sustainability of the land management system after cease of foreign financial and technical assistance to this sector.

At the same time, the land management system still suffers from serious shortcomings and deficiencies:

- Despite above-mentioned progress in capturing and processing of land information (mainly parcel-based cadastral data), its dissemination through interested state institutions and utilization in particular activities, planning and decision-making remains insufficient. It devaluates and hinders efficiency of produced data;
- Like most of other state institutions NAPR, in spite of internationally recognized progress, is still not strong and effective enough to perform relevant operations and deliver quality services to the clients. Thus, there is obvious "capability gap" between the projects capturing and producing high quality data, and state bodies using and maintaining it. Transfer of know-how and flow of skilled personnel from the donor projects to NAPR seems to be necessary and unavoidable for the system sustainability;
- "Capability gap" also grows between fast developing private sector and relatively weak and poor (fortunately this doesn't relate anymore to NAPR) state institutions. It causes big imbalance between private sector's demands on timely and high-quality services and their inadequate delivery from the state sector;
- Only part of modern (geo)information technologies are used in land management in Georgia. Huge possibilities of Internet and other electronic communication and technical facilities for data acquisition and distribution, learning, advertising, planning, monitoring, participation in decision-making, etc. are still very slightly explored and utilized.

Above-presented points show that capacity building of state institutions in general and NAPR in particular, must become a priority of the state policy and international donor assistance in

the nearest future, as it is crucial for developing effective and sustainable land management in Georgia.

It is *naïve* to think that application of modern geoinformation technologies will solve the problems of overall development alone but it definitely helps a progress in many ways. As Georgian case shows, involvement of advanced technologies doesn't eliminate gap between fast world and slow world. Nonetheless, it makes this gap smaller. All the rest largely depends on the good governance, of which land management and land administration are essential parts.

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1974-1979	Studies in Human Geography at Tbilisi State University
1988-2000	Associate Professor, Department of Human Geography, Tbilisi State University
1991-1992	The Swedish Institute visiting scholar- Department of Human Geography, University of Stockholm; Department of Social and Economic Geography, Lund University.
1993-1995	Head of Department, Department of Land Resources and Cadastre, Mayoralty of Tbilisi
1996-2000	National co-ordinator, GTZ - financed <i>Land Management project</i> for Tbilisi, together with the Municipality of the city of Saarbruecken
1998-1999	Visiting Fulbright Scholar; <i>Special Program for Urban and Regional Studies (SPURS)</i> , Department of Urban and Regional Studies (DUSP), Massachusetts Institute of Technology (MIT)
2000-2005	Head of Department, Department of Human Geography, Tbilisi State University
2000-up today	Co-team leader, GFA-Terra Systems; <i>Cadastre and Land Register project for Georgia</i> , co-financed by KfW
2002-up today	Visiting lecturer, Postgraduate International MSc Program " <i>Land Management and Land Tenure</i> "; Technical University of Munich
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