The Rebuilding of the Cadastre in Kosovo

**Tor VALSTAD and Ole-Jørgen HAUGHOLT, Norway/Kosovo and
Hyzri LLABJANI, Kosovo**

Key words: Kosovo Cadastral Agency, KCA, Cadastre, Property Rights Register.

ABSTRACT

This paper deals with the present process of reconstructing a cadastre that has been left with big holes after a long ethnic conflict, which ended in a war in 1999. UN and three donor countries agreed upon a three-year programme to rebuild the cadastre. The build up of capacity, competence, organisation, technology, equipment, reference network and communication is a huge and exciting task necessary to suit the cadastre to a market economy.

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JS 19 Solutions in a Challenging Environment: Kosovo   1/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

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1. BACKGROUND ON KOSOVO

Kosovo has been a province in former Yugoslavia until it erupted in an ethnic conflict between the Albanians and the Serbians in the spring of 1999. NATO entered the war and after 77 days Serbia surrendered. On 10 June 1999, the United Nations Security Council passed Resolution 1244 authorizing the United Nations Interim Administration Mission in Kosovo (UNMIK) to begin the long process of building peace, democracy, stability and self-government in the shattered province.

To achieve this goal, UNMIK has been acting as the transitional administration for the region. UNMIK performs the whole spectrum of essential administrative functions and services covering such areas as health and education, banking and finance, post and telecommunications and law and order.

KFOR is a NATO-lead international force responsible for establishing a security presence in Kosovo. This peace-enforcement force entered Kosovo on 12 June 1999 under a UN mandate, two days after the adoption of UN Security Council Resolution 1244.

KFOR has reached its full strength of 50,000 men and women. Nearly 42,500 troops from 37 countries are deployed in Kosovo and another 7,500 provide rear support through contingents based in the Former Yugoslav Republic of Macedonia, in Albania and in Greece.

The war destroyed much of Kosovos infrastructure, for example was more than 300.000 buildings destroyed. When the Serbians withdrew from Kosovo they destroyed or took with them almost everything of value. Archives, maps, instruments, computers etc. are still in Serbia.

2. BACKGROUND TO THE PROGRAMME

At the request of the United Nations Interim Administration Mission in Kosovo (UNMIK), UNCHS (Habitat) carried out a rapid assessment of the situation regarding housing and property rights and property registration in Kosovo in 1999.

The rapid assessment highlighted the following major areas of concern:

- Property certificates and registries were partially removed.
- Property boundary markers, survey control points and associated documentation were destroyed or defaced.
- Geodetic surveying equipment and computers had been removed.

JS 19 Solutions in a Challenging Environment: Kosovo   2/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

- Discriminatory legislation applied over more than a decade and lack of effective control over property registration and taxation had deterred people from recording property transfers.
- Restrictions in the recruitment of personnel for public sector positions and the displacement of people after the conflict left many municipal cadastral offices without qualified staff.

The Government of Sweden (Sida) commissioned a consultant, Blom International, to carry out a more in-depth study of the situation and develop a strategy to support the re-establishment of a cadastre system and the improved operation of the municipal cadastral offices. In parallel, the Government of Switzerland had committed support for the preparation of aerial photography for Kosovo. Equally, UNMIK allocated resources from the Kosovo Consolidated Budget to develop the cadastral system. These resources were targeted to the payment of local wages and other expenses.

The "Blom Report" outlined a three-year action programme to support the re-establishment of the cadastre system in Kosovo. The report made also proposals on funding arrangements and indicated the need for the mobilization of contributions from several donor sources. Sida organized a Logical Framework Analysis (LFA) Seminar in Sweden in February 2000 with the participation of a team of Kosovar professionals, international experts, representatives of UNMIK and the Governments of Sweden, Switzerland and Norway, Blom International and UNCHS (Habitat). The LFA reviewed the Blom report and made recommendations for improvement.

2.1 Terms of Reference

The terms of reference for the implementation of the Kosovo Cadastre Support Programme (the Programme), is the result of the above process and the specific negotiations for the implementation and financing of a three-year programme involving the Governments of Sweden, Switzerland and Norway, UNMIK and UNCHS (Habitat).

The main objective of the programme is to develop a well functioning real property and land market, supporting democratic and sustainable development and economic growth in Kosovo.

A central principle underlying efforts has been the need for a strong and effective coordination mechanism to ensure that duplication of efforts is avoided and resources are properly integrated into a coherent and sustainable strategy. These aims shall be achieved by the establishment of a strong and efficient **Kosovo Cadastral Agency (KCA)**.

3. KOSOVO CADASTRAL AGENCY (KCA)

KCA was established in November 2000 as a result of an UNMIK Administrative Direction no. 2000/14 of 7 June 2000. This Direction gives KCA the necessary authority in:

- Formulation of the strategy for the re-establishment of the cadastral information system, including the land information management and the land administration system.

JS 19 Solutions in a Challenging Environment: Kosovo   3/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

- Formulation of a program for the re-establishment of the cadastral information system.
- Development of a regulatory framework for the re-establishment of the cadastral information system, including the setting of standards.
- Provide technical support in matters relating to the cadastre.
- Manage the program for the re-establishment of the cadastre.
- Monitor technical standards for data capture, including field survey, data processing and data exchange related to the cadastre.
- Develop a database for land and real property information at the municipal level and administer and archive such information at the central level, consistent with given data protection requirements.
- In co-ordination with the Local Administration, develop, introduce and oversee measures for harmonizing the practices and procedures by the municipal cadastral offices, including the levying of fees or charges for cadastral services.
- Make necessary arrangements to provide the municipal cadastral offices with required basic surveying equipment.
- Train the municipal cadastral officers to adopt new technologies and use of surveying equipment and software related to the cadastre in the most sustainable and efficient manner, including the appropriate management of the cadastral data base.

There are a lot of activities and responsibilities mentioned in the terms of reference and the UNMIK direction. These will always be our first priorities, but as the only agency dealing with these issues in Kosovo there are additional issues to be considered:
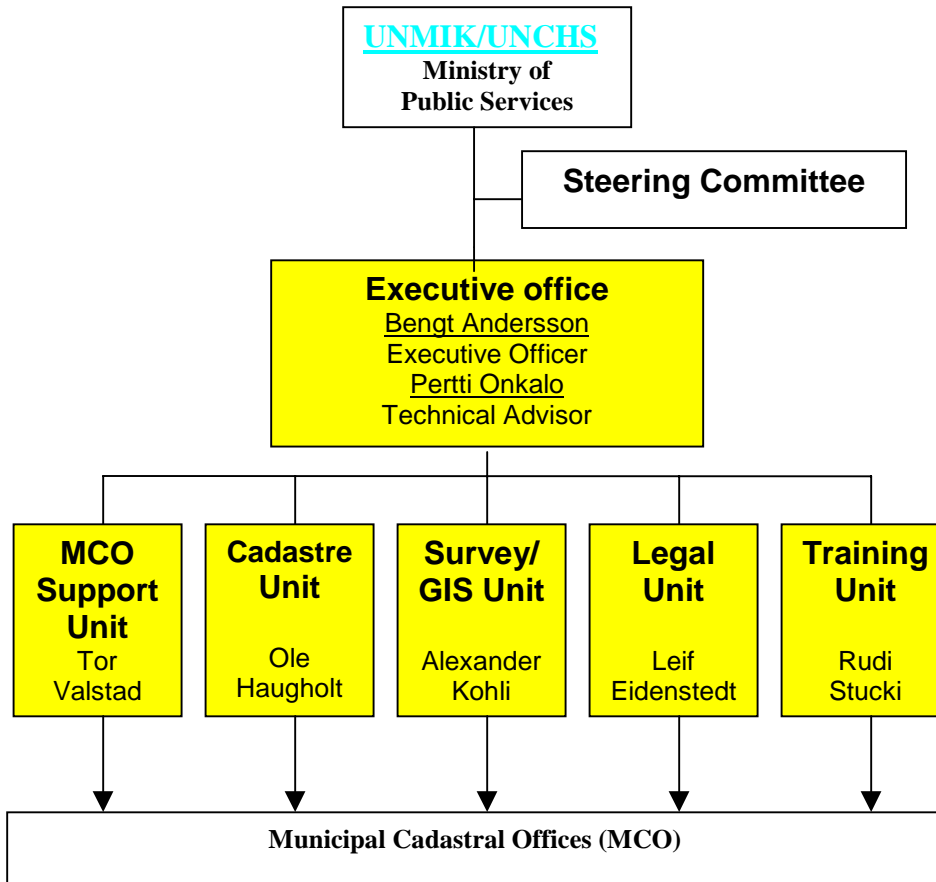
- Information technology and communication
- Geographic (spatial) information management
- Utility mapping
- Photogrammetric mapping
- Building and construction services
- Building and apartment register.

Depending on demand and finances the Kosovo Cadastral Agency might evolve into a Mapping and Cadastral Agency by the end of the three-year Programme.

4. ORGANISATION

The organisation of KCA is established with international co-heads of each unit and with both local and international staff within the units. Since KCA is a sustainable agency, local co-heads will be trained to take over within the Programme period.

At present (August 2001) there are 13 international and 25 local experts at KCA and a total of 56 employees.

JS 19 Solutions in a Challenging Environment: Kosovo   4/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

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                    │   Bengt Andersson    │
                    │   Executive Officer  │
                    │    Pertti Onkalo     │
                    │   Technical Advisor  │
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MCO Support Unit Tor Valstad	Cadastre Unit Ole Haugholt	Survey/ GIS Unit Alexander Kohli	Legal Unit Leif Eidenstedt	Training Unit Rudi Stucki

Municipal Cadastral Offices (MCO)

5.   THE RECONSTRUCTION OF THE CADASTRE

The entire area of Kosovo (10,908 sq.km) was divided into 1298 cadastral zones and the cadastral system is parcel based. The cadastre books have detailed descriptions of the possessor(s) and of land use classes including quality classifications. This information was integrated into a graphical mapping system based on surveying and aerial photogrammetry from 1931 – 1935 and 1951 – 1985. Luckily the data was processed using punch card equipment and it was possible to build a digital cadastre based on the backup of the cadastral records.

5.1 The Textual Database

One of the main priorities of the Programme was to restore the cadastral information and make it available in digital form. The aim was also, to some extent, to integrate textual and geographical data. Major parts of the operational database and original graphical cadastral plans were removed from Kosovo during the conflict.

JS 19 Solutions in a Challenging Environment: Kosovo   5/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

The main objective for preparation of the textual database is to give the MCOs reconstructed data about parcels and owners as soon as possible. This will give the MCO the possibility to discover mistakes and prepare the staff for new administrative procedures.

The Interim Database version 1.0 was a simple read-only database in MS-Access, reconstructed from textual data on magnetic tape obtained from the Electronic Data Processing Facility of Kosovo (EDPK). This centre in Pristina possessed backups on magnetic tape for all cadastral records for all territory of Kosovo until 1989. The data was organised into databases for each municipality and delivered together with a computer and printer.

Totally for Kosovo there was 29 databases containing 1,853,090 parcels and 331,324 possessors (users).

These "read only" data was delivered in March 2001. Initially two days training with all employees assigned to work with the database was carried out, where two persons from each MCO participated. Subsequently all MCOs have been visited three times as a minimum. This training started from the very basic level, since most of the MCOs employees were lacking basic computer knowledge. A manual was prepared and disseminated to all MCOs as a guideline on how to use the database. This first cadastral database had several shortcomings and KCA started immediately the compilation of a new version.

The Interim Database version 2.0 was a read-write database developed in Visual Basic and MS-Access. In this version the MCOs will gradually be able to improve the quality of the data by introducing new information. Old information is archived in a separate database. Updating will be based on information found in MCOs up to 1997, where this information is available, and information provided by the public. This information will be connected to vectorized cadastral maps when they are available.

Three MCOs were selected as pilot municipalities to start with testing of the new version KCID2.0. These MCOs possessed different kind of data. For instance Pristina had one copy of the data in a DOS-based system with the situation from 1997, the other two had books. KCA made an agreement with Pristina MCO to build up the new database from their DOS-data. This updating was finalised by the end of August 2001.

Two days training for the rest of the MCOs was carried out and the database was installed in 27 MCOs of Kosovo. A user manual was prepared to facilitate some degree of self-learning. KCA experts are following up the work of the MCOs and are providing additional training to those in need (during the period July – December 2001, 119 visits have been carried out.

There are many problems that are slowing down the reconstruction process in Kosovo:
- Missing data (removed in Serbia during the conflict).
- A ten-years gap of the cadastral workers expelled from their jobs and who therefore have difficulties to cope with new technology.
- Unreliable electric power.
- Huge number of customers, unsuitable office-space etc.

JS 19 Solutions in a Challenging Environment: Kosovo   6/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

Based on the monitoring of the existing DB of Kosovo done so far, currently there are three categories of the cadastral data:

- MCOs with complete database
- MCOs with database lacking several years of data (1997-2000)
- MCOs possessing only the books from 2000 and upwards.

All MCOs of Kosovo today have books for registration of the changes since 2000, and all necessary changes initially are registered in the books, a method very familiar for the most of employees, then they are entering these changes into the database prepared by KCA. At the end of the week they make a backup on CD and save it in the office and by the end of month they bring a copy to KCA.

An improved version called KCID2.1 was installed in January/February 2002. This version has some additional possession list data and features not included in the previous versions. This version is prepared in three languages (Albanian, English and Serbian).

Below is a table describing the update and type of data possessed by Kosovo MCOs.

OVERVIEW OF DATA AND UPDATING STATISTICS IN KOSOVO KCID V2.0, DECEMBER 2001					
Name of municipality	Total number of changes	Updates in database	Type of data	Actual beginning	No. of trained employees
DEÇANI	757	757	Books	31.05.2001	2
DRAGASH	130	0	30% of books, PC Bormen 70%	19.09.2001	2
FERIZAJ	420	65	Books form 2000-2001	23.08.2001	2
FUSHË KOSOVA	120	90	Books from 2000-2001	07.09.2001	1
GJAKOVA	7200	0	Books and PC Bormen 1996	02.11.2001	2
GJILANI	1651	150	Incomplete books	10.09.2001	1
GLLOGOVC	160	60	Books 2000-2001	20.08.2001	1
ISTOG	5991	137	Books	13.09.2001	2
KAÇANIK	5470	270	Books and PC Bormen 1996	20.08.2001	1
KAMENICA	161	160	Incomplete books	16.08.2001	2
KLINA	920	525	Books and PC Bormen 1997	13.09.2001	1
LEPOSAVIQ					
LIPJAN	1550	180	Books and PC Bormen 1996	07.09.2001	2
MALISHEVA	272	230	Books	12.09.2001	2
MITROVICA	152	127	Books 2001-	17.08.2001	2
NOVO BERDO	250	250	PC Bormen 1997		
OBILIQ	631	631	PC Bormen 1997	07.08.2001	1
PEJA	7700	3500	Books	10.10.2001	2
PODUJEVA	815	31	Books from 2000-2001	13.08.2001	2
PRISHTINA	5776	5776	Books from 2000-2001, PC Bormen 1997	29.05.2001	2

JS 19 Solutions in a Challenging Environment: Kosovo   7/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

OVERVIEW OF DATA AND UPDATING STATISTICS IN KOSOVO KCID V2.0, DECEMBER 2001					
Name of municipality	Total number of changes	Updates in database	Type of data	Actual beginning	No. of trained employees
PRIZREN	5500	420	Books from 2000-2001, PC Bormen 1994	04.09.2001	2
RAHOVEC	3800	18	Books and PC Bormen 1997	12.09.2001	2
SHTERPCË					
SHTIME	32	32	Books from 2000-2001	31.05.2001	1
SKENDERAJ	403	185	Books from 2000-2001	23.08.2001	2
SUHA REKA	4000	250	Books from 2000-2001	14.08.2001	2
VITIA	?	0	Books until 1985	11.09.2001	1
VUSHTRRI	470	120	Books 2001-	17.09.2001	2
ZUBIN POTOK					
Total:	54331	13964			42

- Books means that the municipality have books of changes without interruption.
- Books and PC Bormen means that the municipalities have books and a DOS-based copy of the database.
- Books from 2000-2001 means that they have only new books from 2000 and on. These MCOs updates only changes based on the new contracts from the year 2000.

After a test and error correction period in April a pilot period started in May 2001. Pristina MCO had an older DOS-based system, which had been updated to 1997, therefore KCA made an agreement with Pristina MCO to reconstruct the database from 1987 to 1997. The updating was finalised by the end of August.

The training and installation of KCID2.0 is now finalised in 25 municipalities.

Our experience up to now, regarding the reconstruction, is that each MCO have different challenges regarding administration, localities, data sources and level of computer skilled personnel. KCA will make a plan for each MCO where action is taken based on the actual situation in the MCO.

5.2 The Cadastral Plans

Property registration and cadastral mapping were integrated into a unified system. No digital maps existed and most of the updated and original cadastral maps had been removed. The cadastral maps also had Kosovo-wide coverage and consisted of more than 10,000 sheets in scales 1:500, 1:1000, 1:2500 and 1:5000. The most recent maps was from 1989 and the oldest from 1931.

JS 19 Solutions in a Challenging Environment: Kosovo   8/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

5.2.1 Scanning

Already in July 2000 KCA started the scanning of cadastral plans (maps in scale > 5000 are called plans) received from the Archives of Pristina and the various Municipal Cadastral Offices. The scanning of 10,000 plans was finalised in April 2001. About 500 plans have not been found. The content of the plans vary from plans with only boundaries and parcel number to complete topographical maps with contours.

5.2.2 Vectorization

The next step is to geo-reference and rectify these scanned cadastral plans so that they can be imported to selected GIS software and delivered to the MCOs together with computers and software. The linkage between the cadastral plans and the textual database will be based on the parcel number.

Linking the cadastral database to the cadastral plan will be an important measure of success regarding the reconstruction of the cadastre and will greatly enhance the user friendliness of the system.

The vectorization process includes the introduction of new software (GeoMedia from Intergraph and GeosPro), a data model and the screen vectorization using snap functions in the software.

A pilot project has been finalised with the vectorization of 20 cadastral plans containing 2500 parcels. The results were acceptable, but it is time-consuming and with the limited computer skills and resources in the municipalities it is difficult to estimate when all the plans are vectorized.

6. DELIVERY OF SURVEYING AND COMPUTER EQUIPMENT

27 municipalities got one computer with printer and UPS together with Microsoft Office 2000 and the first textual database in March 2001. 2 additional computers will be delivered to each municipality together with GIS and surveying software later this year.

Reflectorless total stations TCR303 from Leica with accessories was delivered to 23 municipalities in May 2001. Additional total stations and levels will be distributed in 2002. Switzerland was also donor for several Leica GPS instruments that are used by KCA.

7. REFERENCE NETWORK

The Gauss-Krüger conformal transverse cylindrical projection of three-degree meridian zones was adopted as the official map projection for Yugoslavia in 1924. The Bessel (1841) reference spheroid was chosen and Hermanskogel (Austria) was used as a datum. The network has never been adjusted as a whole and it was believed to have irregularities due to scale differences and azimuth changes. In addition many of the points had been partially

JS 19 Solutions in a Challenging Environment: Kosovo   9/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

destroyed or not within reach because of land mines. There was also little documentation available about the quality of the network and no inventory of its present condition.

It was decided to establish a new network based on the existing Gauss-Krüger projection (7th zone) included the scale reduction at the central meridian by 0.0001 (scale factor 0.9999). But this time the system should be based on the International Union of Geodesy and Geophysics (IUGG) spheroid GRS80 (Geodetic Reference System of 1980) as used in the European Terrestrial Reference System ETRS89 and connected to the EUREF Permanent Network (EPN).

32 stations was established and measured with Leica GPS receivers SR520 and SR530 in static mode with duration of up to 9 hours. 23 of the new GPS stations was linked to the existing levelling network of Kosovo.

The computations were done by SFOT and the quality of the measurement is very good.

For the second order network there are altogether 137 stations established and measured and another 44 stations has been prepared for measurement. All the former second order network stations (1500 points) will be transformed using the 7 transformation parameters found between the old and the new coordinate system.

8. AERIAL PHOTOGRAPHY AND ORTHOPHOTO PRODUCTION

Kosovo is absolutely in need of new digital technical and economic maps. But mapping the whole territory of Kosovo is a slow and expensive process, so it was decided to produce digital colour orthophotos as soon as possible. Due to the weather conditions only 40% of Kosovo was covered in 2000. The rest of Kosovo was photographed in May/June 2001 with the exception of the buffer zone to Serbia and Montenegro.

The aerial photography is completed and films have been developed and scanned by the Swiss Federal Office of Topography (SFOT). Orthophotos for 10 urban areas are produced and quality control is ongoing in Norway. Orthophotos from the 2000 images was delivered in October 2001. Local staff of KCA has done most of the GPS surveying of ground control points and points for the digital elevation model.

KCA has now the capacity to print orthophoto hardcopies. Two high quality plotters, a laminator machine and plotter media has been delivered to KCA from Norway.

9. TRAINING AND SUPPORT

Training and support both to the local employees at KCA and to the MCOs is of course an essential part of our activities. If we do not succeed here, the utilisation of the given tools will be limited and it will be easy to revert to old routines.

So far more than 300 has participated in our training courses and 200 has received on the job training.

JS 19 Solutions in a Challenging Environment: Kosovo   10/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

9.1 MCO capabilities

Co-ordinates for traverse points are missing in some areas. Most points are expected to exist also in the field, but the employees have limited knowledge about their condition.

The organisation of the Cadastre differs from one municipality the other. Some places the Cadastres are stand alone units. Elsewhere its function is organised together with other municipal tasks. Usually the director is a surveyor (approximately half the cases) or a lawyer by education. Generally the number of surveyors and other staff employed seems not to correlate very well with the tasks in each municipality. Only a few have had possibilities to practice their profession during the last decade of the past century. The salaries are small in most municipalities – in some less than 200 DM pr month. It is argued that the low income is reflecting the working intensity for cadastre work.

The highest potential for increasing the effective use of new instruments and methods in each municipality are in raising the knowledge in use of computers. Lack of basic knowledge about Windows, Word and Excel is a barrier for transferring data between total station and computer and saving data in a structured way in the computer. This problem will be a barrier when special software for computing, documentation and presentation of measurements and plans are taken into use. Training is necessary for most of the municipality staff!

It is not only technical skills that is lacking. Training in management, planning, budgeting and organisation will be a challenge for our future support to the municipalities.
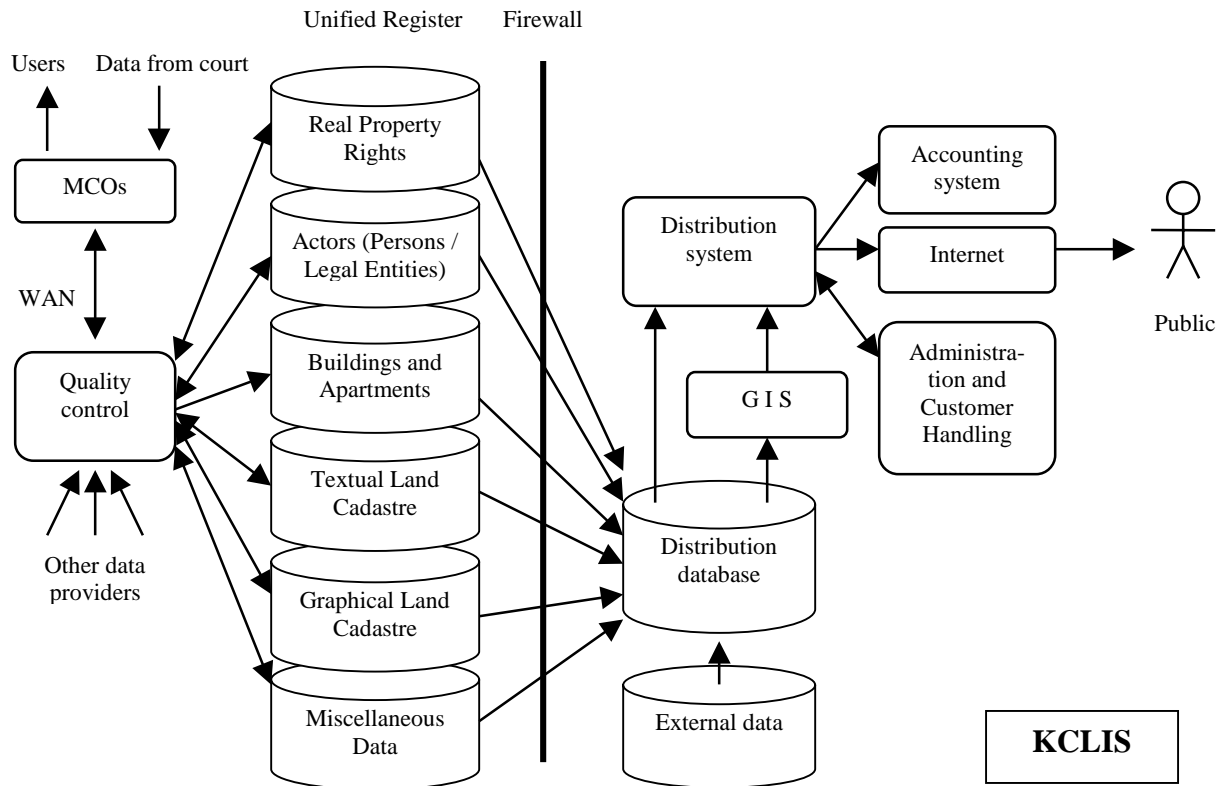
10. KOSOVO CADASTRE AND LAND INFORMATION SYSTEM (KCLIS)

At KCA we are now collecting updated textual land cadastre information from each MCO. The textual land cadastre contains information about parcels and possessors. This register is developed in Visual Basic/Access and updates are delivered to KCA on CDs.

KCA is also involved in a pilot project for Property Taxation, where information about buildings and apartments are connected to the textual land cadastre. This register is developed in Access.

In the Unified Register, which will be based on SQL-servers, the information about land, buildings, apartments and actors are connected through the Real Property Rights Register including following rights; ownership, mortgage, servitudes and rights of use of socially owned property.

From the sketch we can see that the MCOs will do the updates and receive data through a closed Wide Area Network. Data from other providers can also be controlled and stored in the Unified Register. Both textual and graphical cadastre information is stored in this database. This information is protected by a firewall and replicated to a separate distribution database. Information from the distribution database and other external databases will be accessible to public on Internet trough the distribution system.

JS 19 Solutions in a Challenging Environment: Kosovo   11/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

The distribution system will accept different type of users, asking for different type of products, trough a password system. For example a full package including sketches or maps with textual description produced by the GIS, summary information like different types of statistics or tailored products created on demand. There will also be a customer handling system including accounting and administration connected to the distribution system.

Documents printed from the distribution system are not legally valid without the data provider's seal and signature. For example a possession list, or other certificates, is only valid when it is printed, signed and stamped by the actual MCO.

10.1 The Model for the Unified Register

The model in the sketch is the first draft of KCLIS. This system is the final goal, which will be created step by step. The first step was development of KCID (the textual land cadastre), where information delivered by court is updated by MCO. The next step was the Property Tax Register linked to KCID and updated by fiscal authority in the municipality. From this register, and other available registers, we will extract data about actors, buildings and apartments. We are now entering the third step, design and development of the Unified Register, which is the base for KCLIS. The unified register will consist of following registers:

-   Real Property Rights, which keep records on ownership, mortgages and servitudes on land, buildings and apartments. This is a legal register.

JS 19 Solutions in a Challenging Environment: Kosovo
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

12/14

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

- Actors, which keep records on private persons and legal entities (Id number, name, address, type of actor (owner, possessor etc)). These actors will be connected to land, buildings or apartments in the Real Property Rights Register.
- Buildings and apartments, which keep records on buildings (Id number, Address, type of building, construction year, number of floors, area, etc.) and apartments (Id number location in building, number of rooms, area, etc.)
- Textual land cadastre, which keep records on land parcels (Id number, type of land, area, etc.)
- Graphical land Cadastre, which keep records on vector data (cadastre plans with parcel borders, roads, rivers, etc) and raster data (orthophoto, digital terrain models etc.
- Miscellaneous registers, which keep records on data delivered by different data providers. The model for these registers will be determined in cooperation with the provider when the data is included in the unified register.

10.2 Development Plan for the Unified Register

The Real Property Rights Register (RPRR) will be prioritised in the development of KCLIS. As soon as the legal framework for this register is signed, funding established and software developer selected, development phase A, estimated to 7 months, will start. The phase will include: System analysis, Design, Program development, Program implementation, Training, Acceptance test and Pilot operation. At least 5 MCOs can now register Real Property Rights and print the necessary Certificates, depending on the network capacity in Kosovo.

Development Phase B, the distribution system, is estimated to 4 months. Then selectable information about Real Property Rights will be available for public and customers at Internet, regulated by the legal framework for the register.

The total cost for phase A and B, including standard software and hardware, is estimated to 2.1 mills EUR.

BIOGRAPHICAL NOTES

Tor Valstad is at present Cadastral Programme Manager at the Kosovo Cadastral Agency in Pristina. On two years leave from the Municipality of Oslo, Norway from the position of Manager of Cadastral Surveying. Earlier experience in engineering surveying, land, geodetic, hydrographical and quantity surveying. Chair in the Norwegian FIG Committee and Secretary of FIG Commission 3 since 1996.

Ole-Jørgen Haugholt is at present co-head of the Cadastral Unit in Kosovo Cadastral Agency in Pristina. Earlier experience in management of cadastral database development projects in Macedonia and Latvia for Norway Register Development. Researcher at Telemark Research Foundation, Norway and Assistant Professor at Telemark College, Norway in Database development, GIS and Project management.

JS 19 Solutions in a Challenging Environment: Kosovo   13/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002

Hyzri Llabjani is at present co-head of the Cadastral Unit in Kosovo Cadastral Agency in Pristina. Earlier experience was in Agricultural Company "Milan Zeqar"in Ferizaj-Kosovo from 1982 – 1991. The function in this Company as surveyor was to maintain cadastre and property rights. Participated as cadastral expert for court needs during the years from 1991 until 1999. Working as cadastral expert in Kosovo Cadastral Agency from July 2000.

JS 19 Solutions in a Challenging Environment: Kosovo   14/14
Tor Valstad, Ole-Jørgen Haugholt and Hyzri Llabjani
The Rebuilding of the Cadastre in Kosovo

FIG XXII International Congress
Washington, D.C. USA, April 19-26 2002