Functional system for cadastral plans

Vlatko Dimovski, Vladimir Gjorgjiev and Aleksandra Dimitrovska, Republic of Macedonia

Key words: Cadastre, Digital plans, Data, System

SUMMARY

The analysis shows that the real estate market in Republic of Macedonia grows daily. With the expansion of this market increases the need for better planning and management of the real estates. The real estate cadastre, which represents a land information system, is the one that monitors and enrolls the rights of all those changes.
In order to achieve higher efficiency and speed in monitoring of those changes, it is necessary gradually but certainly, to leave the old methods of processing the data and to establish new and modern solutions.
One of the most important components of the real estate cadastre is the cadastre plans.
The spatial data and their credibility, accuracy, form, actuality, access, dissemination and protection, represent the basis that corresponds to the real situation of the estates.
The system that was fundamental on analog cadastral maps and land registers gradually becomes inefficient and useless.

In this paper we would like to emphasize the need for production and the need of spatial data in digital form.
The project for digitalization of cadastre plans of all cadastral municipalities, on the territory of Republic of Macedonia represent the basis by which we want to approach closer to establishing a modern and efficient land information system.
By obtaining products such as digital cadastral plans we are initiating a step to the integration of all systems that have already been implemented in the Agency for Real Estate Cadastre and of all systems that are still in phase of construction.
The need of establishing a functional system for cadastral plans is more than necessary. This solution offers performance, reliability, responsiveness, accuracy, presentation, manipulation etc… but above all it offers a valid and accurate spatial data which will play an important role in the real estate market progress.

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The essence of digitalization as process is to obtain data that are open, accurate and precise, unique, manipulative and easy to control, easy for processing, presentation, etc ... The benefit of the digitalization process and of course as the product itself (the digital data) is huge.

In a time when the developing of highly intelligent software solutions is conceivable, the digital data is the basis for to their operation. Today, without the existence of the digital data we cannot imagine the progress not only in cadastre systems but also in everything else.
According to this, we can conclude that the paper plans are past, this is the time of the modern technologies and therefore this is the time of digital data.

In the same direction, as all that was mentioned above, goes the thinking of AREC. AREC is an institution that is open towards implementation of new ideas and modern technologies. Therefore a strategy is designed upon which moves the entire idea for implementation and establishment of modern cadastral information system that would be supported by a highly efficient electronic system which purpose is to simplify the managing of the cadastre system in every possible aspect.

GCIS (Geodetic Cadastral Information System) represents a system that by its nature is a complex system. When it's viewed from different aspects we can see that it manages a variety of issues. All these solutions need to be well composed so they can close the cycle which represents the system.

As part of this strategy and a part of the system it fits the establishment and the implementation of a functional system for cadastral plans.
The aim of the system is an adequate reason to exist by itself and to obtain digital cadastral plans which as a format are more attractive, easier for maintenance, long lasting and accurate, precise, unique ... but of course this is not the final goal. The aim is all the systems to be connected, where all data shall above all be harmonized (one record in graph match to one record in the alphanumeric base) and easily available for processing, issuing and publishing.

THE PROJECT

The project for establishing a functioning system for cadastral plans is divided into several parts. It is implemented step by step. The aim is all cadastral municipalities in the territory of Republic of Macedonia to be digitalized and to continue to be maintained digitally.
The area that covers the territory of R. Macedonia is 25.713 square kilometers. AREC has established 29 cadastral departments with 1692 cadastral municipalities that cover the territory of R. Macedonia.

In 99.87% of the number of cadastral municipalities is established the Real Estate Cadastre while in the remaining 0.13% is still in force the cadastre of land but is in progress the procedure for the establishment of the Real Estate Cadastre on these cadastral municipalities.

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With this would be establish the Real Estate Cadastre throughout the whole territory of Republic of Macedonia.

The aim is the same with all the other systems including the system for cadastral plans, e-cadastre, map production etc…all of these systems to be fully established on the whole territory of Republic of Macedonia.

LEGISLATION

In order to begin the project it was necessary to review and to carefully elaborate all the legislation which is related to the Cadastre in Republic of Macedonia and refer to this process leading to the production of the digital plans as well and their update and maintenance.

For that purpose was prepared the Rulebook for Cadastral Plans (Official gazette of RM 18/12) and in progress is the adoption of the amendments of the Law on Real Estate Cadastre, in the article 173, aimed for overcoming the identified problems and ambiguities regarding the process for digitalization of cadastral plans.

ANALYSIS AND WORK PLAN

At the beginning to the process for establishment of a system for cadastral plans was made analysis of the percentage of the already established digital cadastral municipalities, and were detected the number of changes in the cadastral municipalities and based on this was made the work plan.
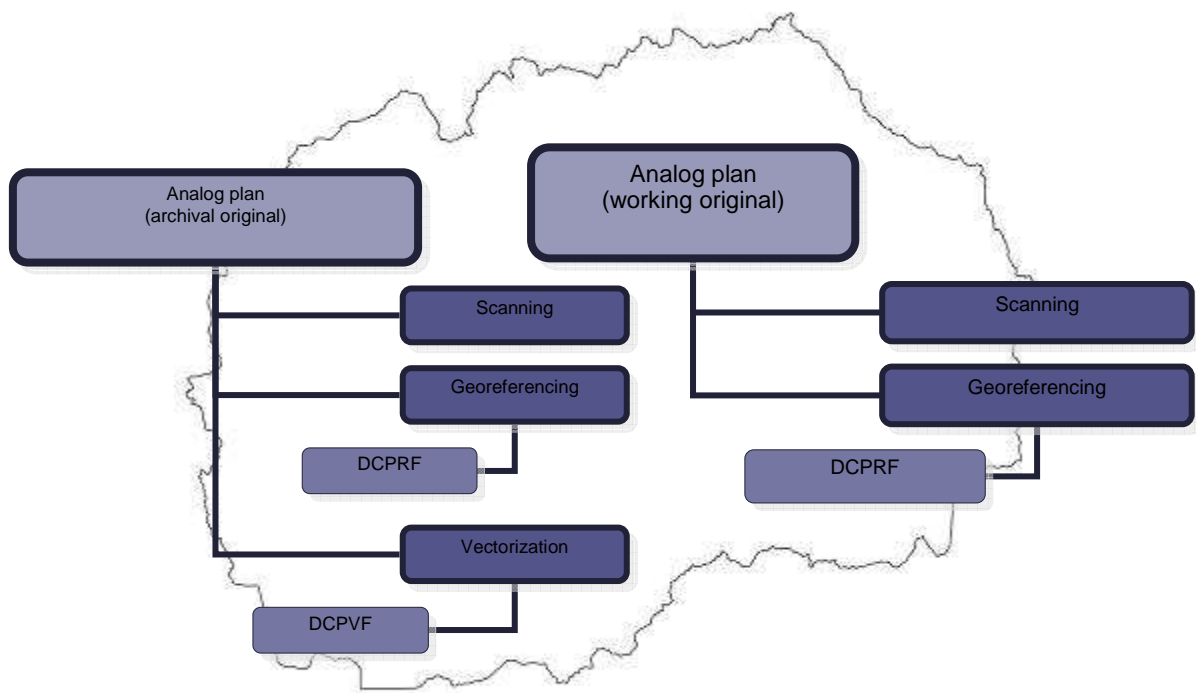
Also precisely was defined the methodology, the data format, the process of vectorization and control, the homogenization of data, update, maintenance and integration with e-cadastre and the other AREC systems.

The work plan was divided into lots that included the existing digital cadastral municipalities, The Pilot Project 79 CM, Project 585 CM (Lot 1, Lot 2, Lot 3, Lot 4) – four lots, Project digitalization of Skopje department and digitalization of other cadastral municipalities.

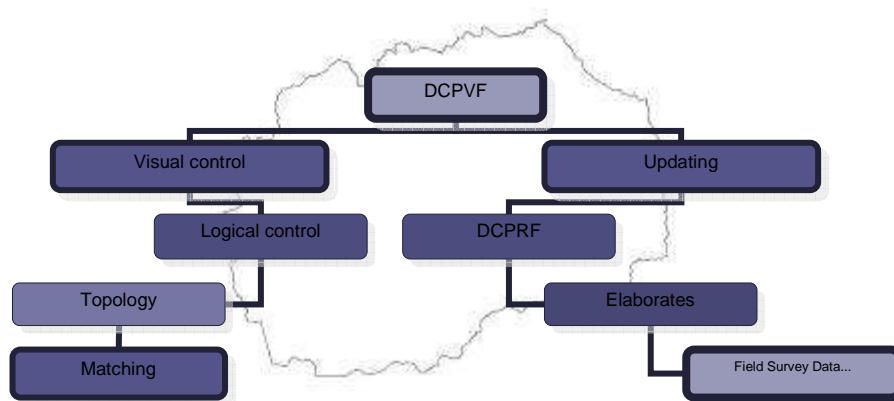## PROCESS OF DIGITALIZATION OF CADASTRAL PLANS

The production process of digital cadastral plans is composed of several processes. First the Arrchive plan that represent the archive original is scanned and georeferenced. With this process we get a digital cadastral map in raster format so called Archive Digital Cadastral Plan (ADCP). This is followed by proces of vectorization of this plan, we get a Digital Cadastral Plan in Vector Format (DCPVF). This is the process of conversion of plans from analogue (paper) into a digital vector format.
The same occurs in the process of conversion of cadastral plans - working originals (in which are maintained the changes) from analogue (paper) in a digital raster format since they are needed only for the process of updating the ACP- DCPVF.

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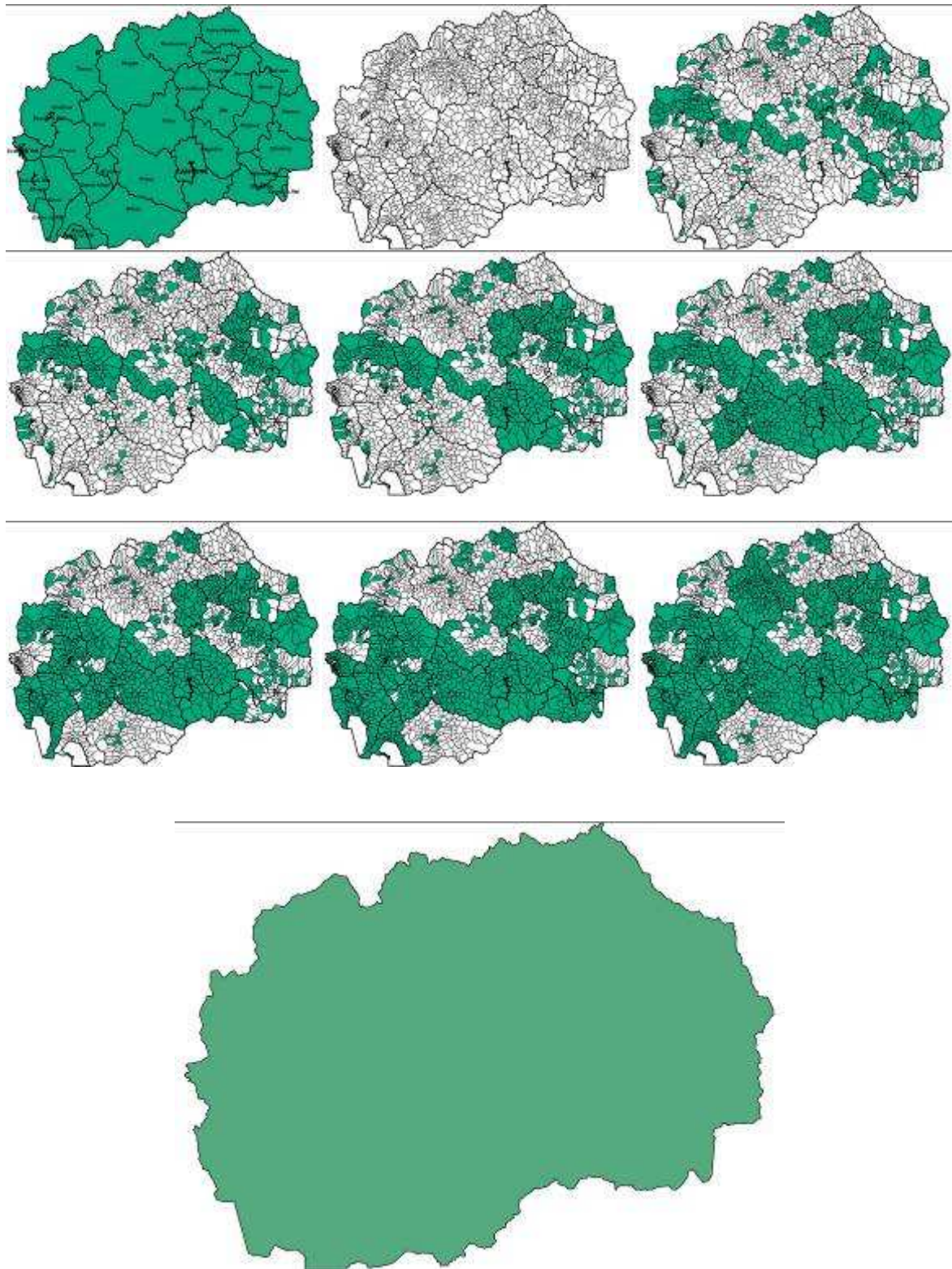Rome, Italy, 4-5 May 2012

PROCESS OF UPDATE OF ARCHAIVE DIGITAL CADASTRAL PLANS

The process of updating of digital cadastral plans is in fact is the most lengthy procedure because with it these digital plans are brought to the actual situation. The procedure is – all that came out as a change in the enrolment in GCIS to be applied according to the same legal basis for the resulting change. As a data used for updating of DCP, may be taken any data that above all is accurate and correct and backed by legal basis.

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WORK PLAN – CURRENT AND PLANNED SITUATION

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HOMOGENIZATION OF DATA

During the process of updating of the cadastral plans also has been carried out the process of homogenization of data from the graphics and the alphanumerical base where are enrolled the attributes for the real estates.

The system for registration and maintenance of the occurred changes in the alphanumerical database is called e-Cadastre (electronic cadastre) that was already implemented and that is constantly upgraded.

The process of homogenization refers to unification of the data that would lead to link a single record on the cadastral plan to match only one record in alphanumerical database of e-cadastre for which will be harmonized all the attributes.

This process is an important step because it is needed to be completed for the purpose of integration of data into a single base. This procedure will be working with the editor for maintenance of digital cadastral maps which would be explained later.

MAINTENANCE OF DCPVF

The current maintenance of DCPVF requires a lot of technical resources. Continuously must be hired more professionals to work on the maintenance of same DCPVF because the data always must be up to date. Therefore is needed a system that is above all functional and open in every aspect.

INTEGRATION OF THE SYSTEMS IN AREC

In order to clarify this vision of AREC we will clarify the systems that are in test phase or are developing and some of them have already been putted in use.
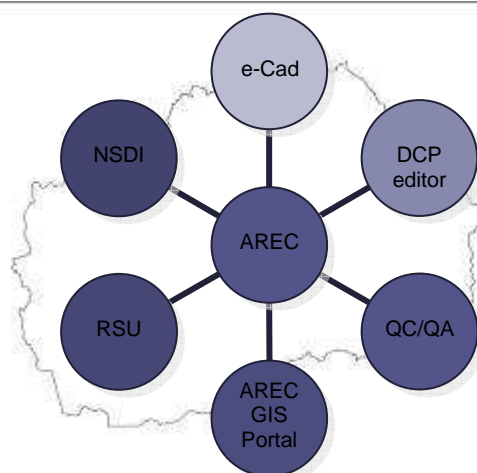
The system that is defining the infrastructure, the process of sorting and control of data before they are imported into the system of AREC has three technical approaches – intranet, extranet and internet. Here are defined the processes for processing graphic data as well as their process throughout the system for quality control and confirmation of the data as well as the technical solutions related to the flow of information and data and their processing, issuing and publication.

In addition here must be noted the project for establishing a NSDI in Republic of Macedonian by which are taken the recommendations in consideration for the development of these systems.
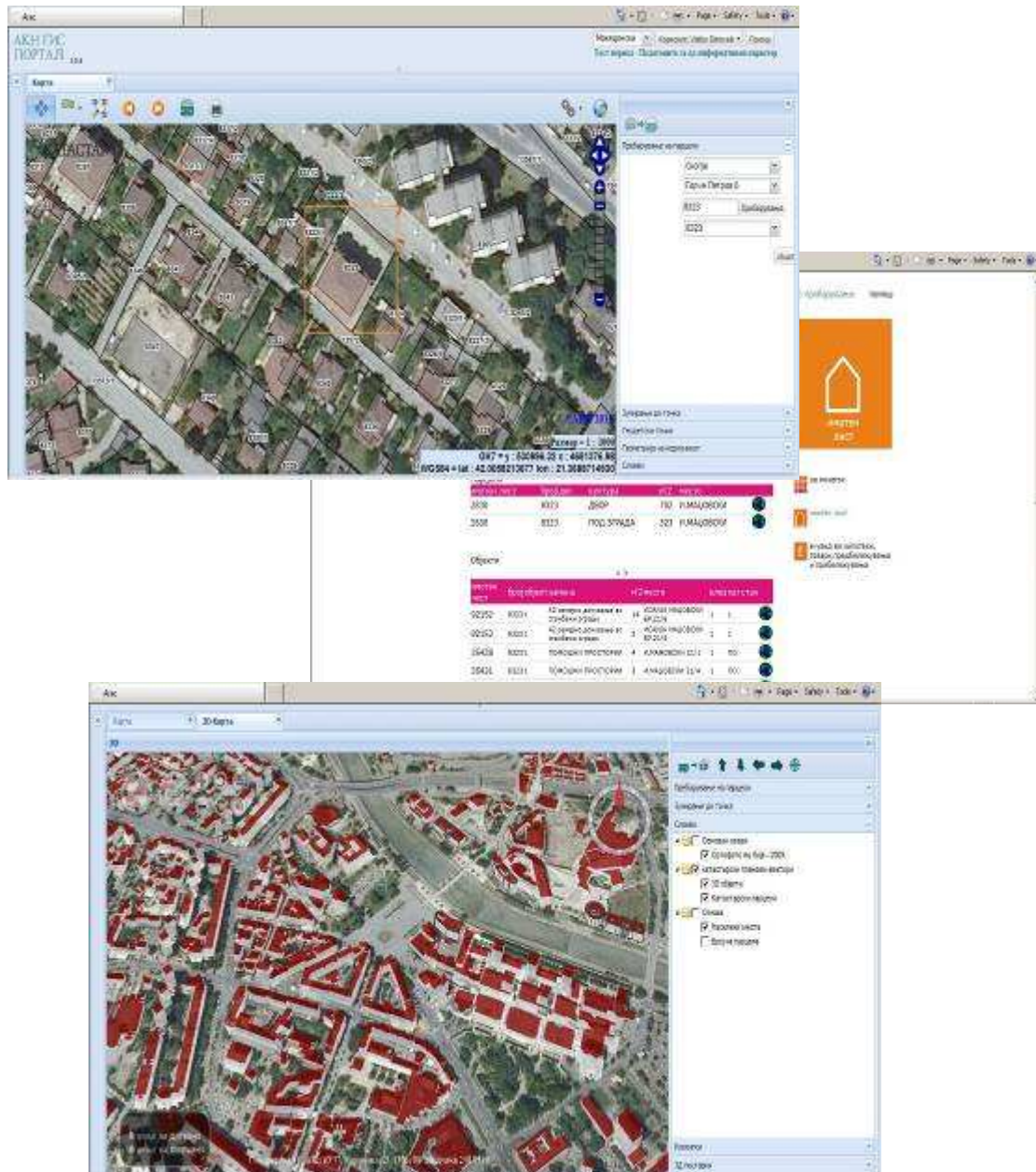
The system for QC/QA is taking into consideration the quality control as well as the confirmation of the same before they are entered into the integration base that represents only and unique base where are inserted all the graphical and alphanumerical data. This is a step for integration with the other systems of AREC – System for QC/QA. After the confirmation of all the procedures, the records from this database are set in the e-Cadastre.

As it was mentioned above that before the process of integration of digital cadastral plans in a vector formats should be converted to shape format and entered in the editor database. This editor is necessary for the process of maintenance of digital cadastral plans. The editor is actually a software platform with integrated GIS and CAD working environment that is connected to the database that is integrated into this closed system. This editor is used for processing the graphic changes in the cadastral system. This editor together with the e-Cadastre and the other systems rounds off the process of maintaining the changes in GCIS.
The maintenance process of the changes using this editor has precisely defined procedures, processes and workflow concerning the communications and the exchange of the data between AREC and the private surveying companies.

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A system whose purpose is presentation of spatial data is already implemented and functions as the AREC GIS PORTAL –that represents a WEBGIS integrated online service that allows review to geospatial data. This system provides 2D and 3D functionalities by which we can get to the various information about the real estate, and it also has a broader function that exceeds the cadastral requirements and may be used as for the purpose of investment information, spatial planning and etc.

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CONCLUSION

As it has already been noted in the summary, the project for digitalization of cadastre plans represents the basis by which we want to get closer to establishing a modern and efficient land information system.

By obtaining products such as digital cadastral plans we initiate a step to the integration of all systems that have already been implemented in the Agency for Real Estate Cadastre and also integration of all systems that are still in phase of construction.

The need of establishing a functional system for cadastral plans is more than necessary. This solution offers performance, reliability, responsiveness, accuracy, presentation, manipulation etc… but above all it offers a valid and accurate spatial data which will play an important role in the real estate market progress.

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Internal documents, regulations and laws which apply in the Agency for Real Estate Cadastre.

BIOGRAPHICAL NOTES

Vlatko Dimovski is employed in the Agency for Real Estate Cadastre of Republic of Macedonia as head of digitalization department. In 2002/03 he completed secondary school and recieved the title surveying technician. He graduated in 2009 at the Faculty for civil engineering in Skopje – Republic of Macedonia, and received a bachelor degree in geodesy. From 2011 he is enrolled on the master studies on geodesy at the Faculty for civil engineering in Skopje – Republic of Macedonia. Over the past four years of working experience he worked on many projects related to Cadastre, Engineering Geodesy and GIS. His main field of interest includes GIS, Digitalization and Cartography.

Vladimir Gjorgjiev is employed in the Agency for Real Estate Cadastre of Republic of Macedonia as Advisor for Digitalization. He graduated in 2008 at the Faculty for civil engineering in Skopje – Republic of Macedonia, and received a bachelor degree in geodesy. From 2008 he is enrolled on the master studies on geodesy at the Faculty for civil engineering in Skopje – Republic of Macedonia. Engaged in Faculty of civil engineering and Faculty of architecture – Skopje like external expert associate in the fields of GIS. Also he took a part of some research projects and engagements in the fields of Land Governance and GIS.

Aleksandra Dimitrovska is employed in the State Authority for Geodetic Works as Advisor for Digitalization; Involved in the project for the Macedonia's NSDI; Engaged in Faculty of civil engineering – Skopje like external expert associate in the fields of remote sensing and photogrammetry; She is particularly focusing on GIS information systems software, data analysis and modeling, evaluation (or application) in the field of cadastre.

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CONTACTS

Vlatko Dimovski
Agency for Real Estate Cadastre
Trifun HadziJanev # 4
1000, Skopje
REPUBLIC OF MACEDONIA
Tel. +389 71 384 752
Fax +389 2 3171 668
Email: vlatko.dimovski@katastar.gov.mk
Web site: www.katastar.gov.mk

Vladimir Gjorgjiev
Agency for Real Estate Cadastre
Trifun HadziJanev # 4
1000, Skopje
REPUBLIC OF MACEDONIA
Fax +389 2 3171 668
Email: vlgorgiev@gmail.com
Web site: www.katastar.gov.mk

Aleksandra Dimitrovska
Agency for Real Estate Cadastre
Trifun HadziJanev # 4
1000, Skopje
REPUBLIC OF MACEDONIA
Fax +389 2 3171 668
Email: aleksandra.dimitrovska@katastar.gov.mk
Web site: www.katastar.gov.mk