

BASIC MODEL OF THE GEO-DATABASE OF THE REPUBLIC OF MACEDONIA

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Abstract - In this paper is presented the basic model of geo-database of the Republic of Macedonia. The model is based on the latest information technologies using GIS and integrated database, allowing further development and upgrading of the geo-database. I present a list of digital data and maps that will be included in the geo-database. Logical structure is shown for entering data into the database and the service architecture of applications and data redundancy.

Key words: geo-database, national data repository, GIS, vector map, digitalization

INTRODUCTION

Based on the experience from the developed countries (Canada, USA, Dutch) Republic of Macedonia has the need to develop its own geo-database. Centralized geo-database will allow efficient management of mineral resources, urban planning, ecology and many other sectors.

Macedonian geo-database will be central point where ministries, private companies, faculty and others will search for geosciences data and information. Geo-database will enable government institutions to be more efficient in the control and managing geo-resources. Data from the geo-database should be available to citizens and companies. This data will be foundation for further investigations and investments that will bring economic benefit for the country.

Payoff of the geo-database is more than obvious. Dutch experience shows that the annual government investment in geo-scientific information is 0.1% of the value of the managed data & information resources. In present situation every government institution (ministry, university, government agencies) are doing their own geo-data processing. Without centralized state geo-data repository access of the data is difficult for institutions and users.

Digitalization of the paper data is necessary. For paper data acquisition are spent enormous resources in funds, time and people. Archiving paper data in digital form should be priority for the government.

This paper is part of the Master work "Model of geo-database of the Republic of Macedonia" from Blagoj Delipetrov. In this paper presents the basic of the geo-database while in the is Master work its implementation.

MOTIVATION AND RELATED WORK

In the past years a team from the Faculty of Mining, Geology and Polytechnic worked on digitalization of paper maps and data. The goal is to include digital data into the geo-data repository system. Parallel with the digitalization, strategy was building which data and maps should be processed. Digitalization of the maps is done with its scanning and their vectorization. Data is digitalized with scanning, OCR and manual processing. Digital data is stored so latter can be included in the geo-database.

In the past period the team worked on vectorization of the basic geological map 1:200 000, hydro-geological map 1:200 000, other maps and data.

MODEL OF THE GEO-DATABASE OF THE REPUBLIC OF MACEDONIA

Model of the geo-database of the Republic of Macedonia is built from the experience of similar models from developed countries. This model is based on the latest information technologies using GIS and integrated database allowing further development and upgrading of the geo-database.

First task is to determine the data to be included into geo-database. For this reason several experiments and investigations were done. Goal of the investigations was to select what scale of the map should be taken as a basic for the geo-database. Scale 1:200 000 was selected because it holds most relevant data for the territory. In the maps with higher scale relevant data is absent, on the other hand smaller scale maps are overloaded with data.

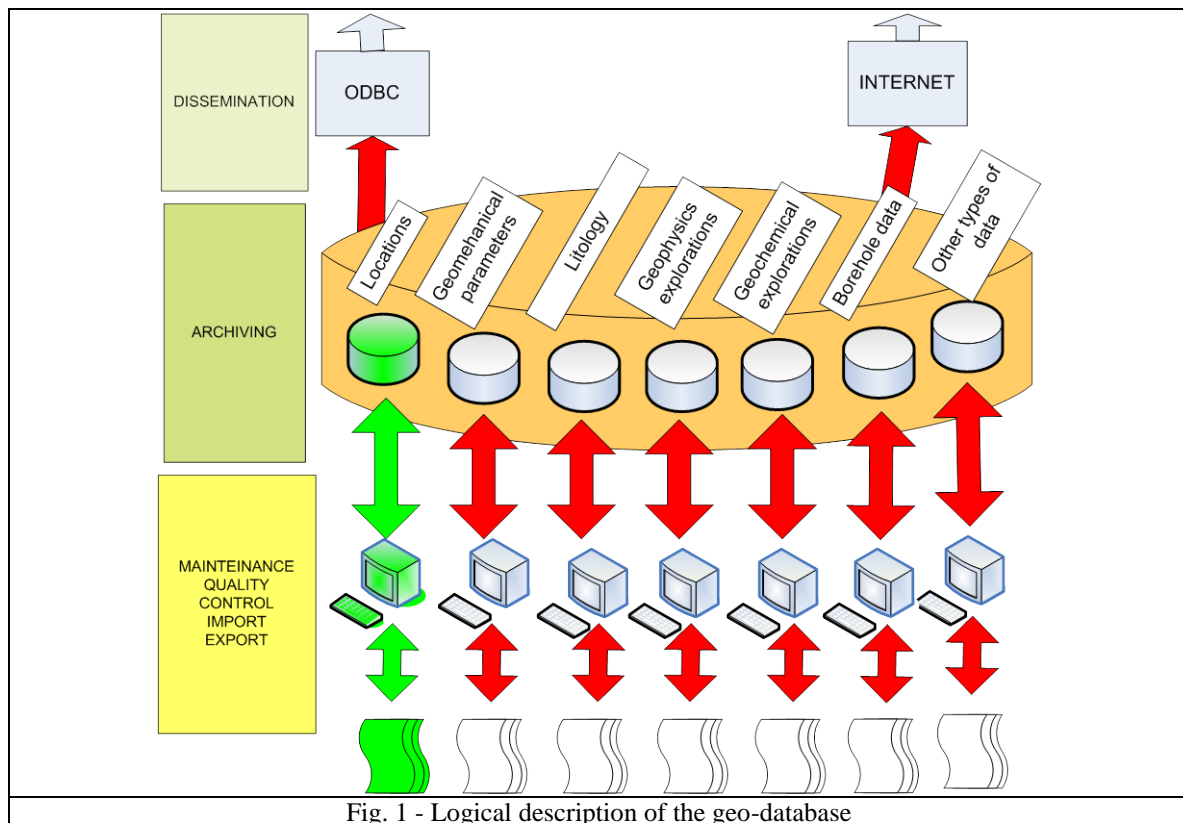
Basic geological map 1:200 000 is selected as foundation of the geo-database. This map holds relevant data for the territory of the Republic of Macedonia and can be included in many applications in the field of geology. Time needed to vectorize this map is less than maps with smaller scale. In the master is work these maps are vectorized:

1. Location data (roads, rivers, springs, lakes, etc),
2. Basic geological map 1:200 000,
3. Tectonic map 1:200 000,
4. Hydrogeology map 1:200 000,
5. Scan of the basic geological map 1:100 000 together with paper data

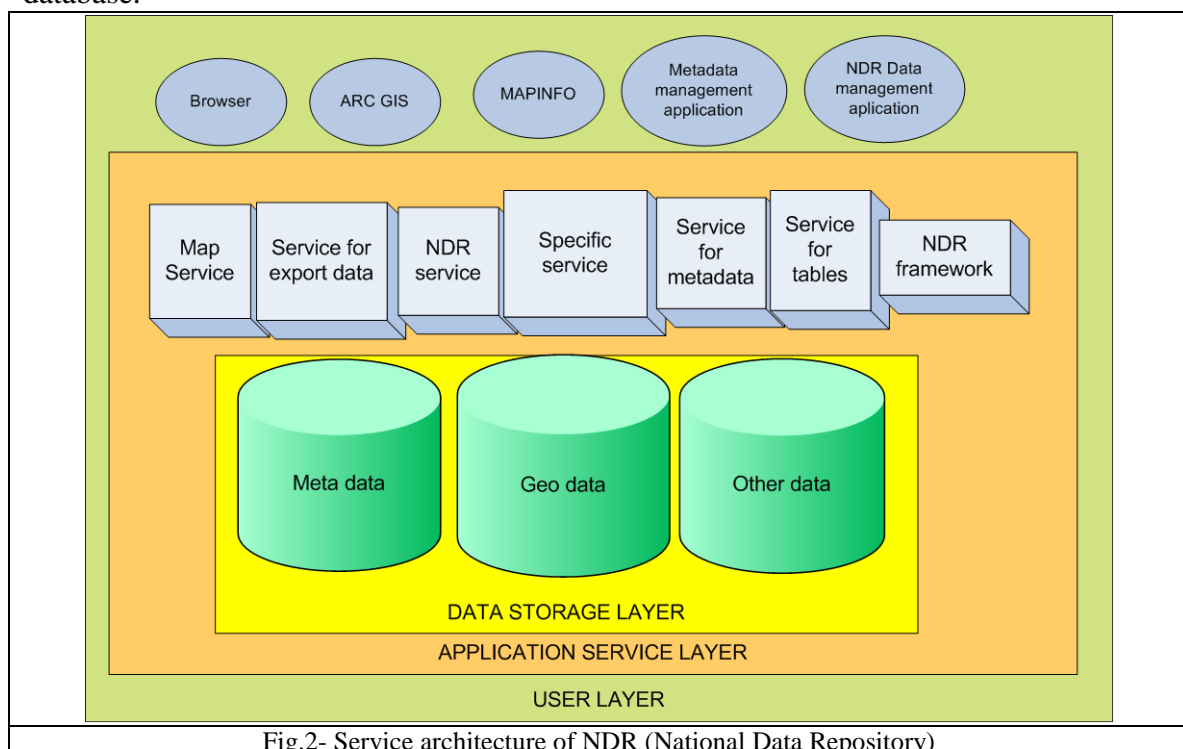
These maps are covering all Macedonian territory and can be used for starting new investigations. For completing the geo-database this maps should include:

6. Geophysics,
 - a) Map of geomagnetic anomalies 1:500 000,
 - b) Map of geomagnetic field 1:100 000,
 - c) Map of seismogenic zones,
 - d) Map of thermal field,
 - e) Map of gravimetric anomalies 1:500 000,
7. Geochemical map,
8. Physical-mechanical and chemical laboratory data,
9. Map of boreholes of the Republic of Macedonia,
10. Engineering-geological map,
11. Metal genetic map 1:200 000,
12. Map of mining deposits,
13. Data of geological explorations of the Republic of Macedonia,
14. Map of concessions,
 - a) Map of concession for exploration,
 - b) Map of concession for exploitation,
15. Database of raster map,
16. Database of reports,
17. Other type of data.

All the maps/data have their attributes that should be considered before including in the geo-database. That's why there is a need to form a team of experts from geology, geophysics, geodesy, IT that will define data and attributes. Maps and data will be grouped in databases that together will form central geo-database repository.



On Fig.1 is shown logical scheme of the geo-database of the Republic of Macedonia. We can see dataflow of information. First step is to digitalize paper data. These phase start with scanning paper maps, vectorizaion of scanned images, entering data, ect. After digitalization of data, processing must be done to get appropriate form. Next is exam of quality of the processed data. If processed data pass quality control is included into the geo-database.



Data entered into geo-database is archived and grouped by type. Model foresees presentation of data over internet and direct access to geo-database. All users can access internet data and direct access will be given to government institutions.

On Fig.2 is we can see service architecture of the model. Geo-database has three layers. The first layer is data storage layer that stores data into relational database. There are also defined metadata for efficiency searching of the database. The second layer is a service application which enables communication between users and geo-database. Here services and their capabilities are defined. User layer holds applications that access the geo-database. This model provides access try browser, GIS programs ARC Gis and MapInfo and others.

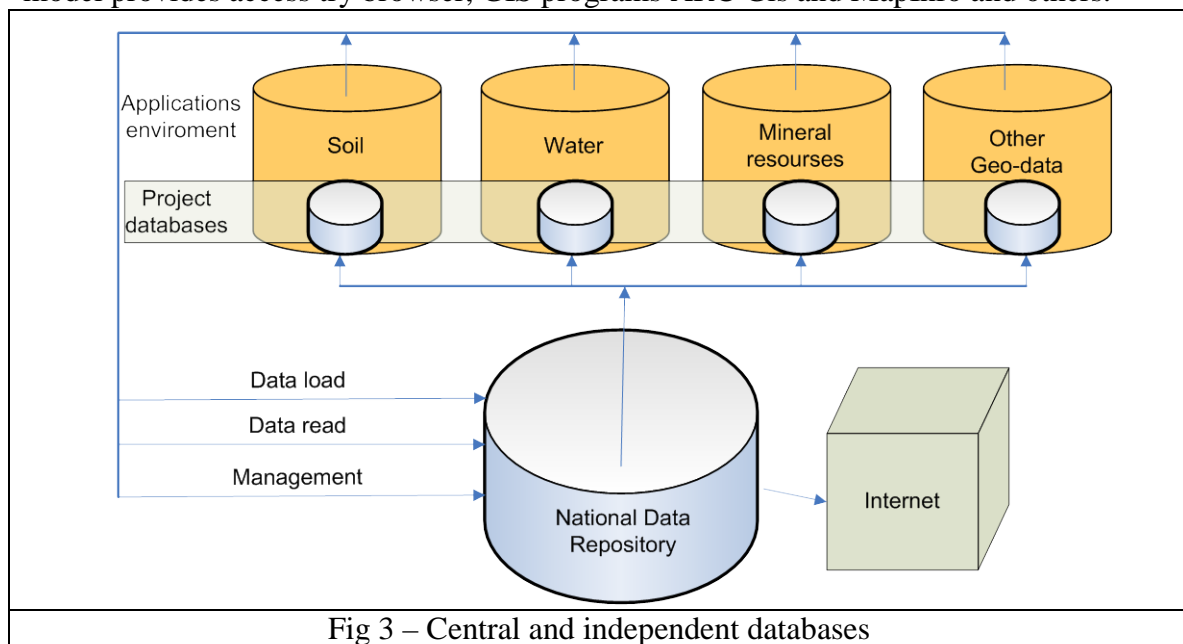


Fig 3 – Central and independent databases

Model of geo-database predicts forming of several geo-databases for different type of data (Fig.3). This will split centralized geo-database into more independent databases that could be easily management. Independent databases will be redundant with central geo-database. This architecture will provide higher protection of the geo-database data.

CONCLUSION

In this paper basic model of the geo-database of the Republic of Macedonia is shown. Presented model is original and it's based on experiences of developed countries having in mind existing Macedonian maps & data. Implementation of the model is presented in the master's work "Model of the geo-database of the Republic of Macedonia". For completion and building the geo-database government support is necessary.

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Резиме

ОСНОВЕН МОДЕЛ НА ГЕО-БАЗА НА РЕПУБЛИКА МАКЕДОНИЈА

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Абстракт - Во трудот е поставен основниот модел на геобазата на Република Македонија. Моделот се базира на современите информатички технологии користејќи ГИС и интегрирана база на податоци, овозможувајќи понатамошен развој на геобазата и нејзина лесна надградливост. Определена е листата на дигитални податоци и карти кои ќе се вклучат во геобазата. Графички е прикажана на логичката структура на внесување на податоци во геобазата како и сервисната архитектура со апликациите за пристапот и редундацијата на податоците.

Клучни зборови: гео-база, национална база на податоци, векторизација на мапи, дигитализација