The Egyptian Unified Cadastral Data Model

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SUMMARY

The Necessity to share data is being realized during last decades due to the high costs of collecting geographic information. In most countries all over the world, the national land survey authority is providing the Information Society with the core data, which is the cadastral data in digital format to enable every authority/ organization (private or public) building up its own GIS application. In Egypt, Egyptian Survey Authority, ESA, is the authority which responsible to establish and maintain the cadastral data, and it have to be able to provide the Information society with the cadastral data in the format that it can be easily used. That could increase ESA's revenues and reduce the duplicated efforts collecting the same data, and reduce the conflicts that may results between different GIS application, and enable data accessibility and communicability among these applications.

In the 80's of last century most of Egyptian authorities and organizations started building up their own GIS applications, some of them asked ESA to have cadastral data in digital format, but unfortunately ESA was unable to provide them with the data because it was analogue form.

Through international technical cooperation ESA succeeded to digitize most of its cadastral data, but, in the middle of 90th, ESA found that these data is not up to date, in different formats (paradox, oracle, Informix) and still some analogue data. On the same time, ESA have been demanded more and more to provide the society with the digital cadastral data because most authorities and organizations want to enter the electronic government "EG" world.

ESA started to tackle the problems that rises due to the different approaches from different technical cooperation and succeeded to unify its efforts and experiences and investigate the most user needs, using market orientation strategy, within the frames and limitations of the Governmental rules and regulations to implement a proper object oriented database model that could fulfill user current needs and expected near future needs, and enable sustainability of updating of the cadastral data, that will ensure more security of land tenure and improve land administration system in Egypt.

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1. INTRODUCTION

The Egyptian Survey Authority under ministry of Irrigation and public works “ESA” is the Egyptian organization which according to the Egyptian law, is responsible to produce, maintain and distribute current and accurate geographic data that describing the Egyptian landmass (Topographic, Geodetic and Cadastral data), the cultural features thereon and its ownership, and provide these data to the public and private sector end-users. The cadastral data is the most strongly demanded from ESA in the last few decads to support the program of national land registration, and development programs,one of the bigest roles of ESA is to provide cadastral data (maps and survey books) to Real Estate Publicity Department "REPD", under ministry of Justice and to Real Estate Taxation Department "RETD" under ministry of Finance, the first to apply Title Regestration law, and the second to modify the tax books . For about one century ESA was a governemental organization and most of its demands were fully subsidized (financied) by the State.

The first cadastral survey in Egypt, started in 1892 and finshed about 1905, the second one started at 1927 and upgraded in 1989 by doing the cadastral activities using computers insted of manual works, the first cadastral survey was for Tax Purposes and was sufficient according to its purposes, but ignored updating compenet, the second one was legal cadastre considered and set procedures for updating and the updating was done regualary till about 1980, at that time Egypt started applying Title regestration to replace gradualy the Deed regestration. In the deed system the REPD was regulary informing ESA about new registered contracts through special form (Form 15), but in title system, the REPD was sending another form (Form 39) for the same purpose of updating, but not regulary, and this form sometimes was insufficient to update the cadastral data at ESA. That resulted in having the cadastral data at ESA became not fully up to date.

In the middle of 80’s of last century ESA found that only about 50% of rural areas are covered by cadastre (at that time the urban cadastre was not yet started, and only urban maps were either avilable in analouge form or no maps at all) . At the same time the pressure increased on ESA to finalize cadastral survey for rural areas, and to start urban cadastre. At the same time, most of Egyptian authorities and organizations start implementing their GIS system and some of them asked ESA to have the basic cadastral data to build up their systems, unfortunately ESA had had the cadastral data either in analouge format or not having the data at all because the cadastre coverage was not yet completed. And that were enough reasons made ESA upgrading the second cadastre, by assistance of International technical cooperation.

In 1989 ESA received technical assistance (TA) from US-AID and German GTZ. The USAID project undertook the cadastral activities digitaly using the (AutoCad and Paradox), and

update only the spatial data, the GTZ project aimed at devloping a multi purpose cadastral system as a model in upper Egypt, to be extended to all Egyptian provinces, but the extention had not done. Both projects had achieved its objectives, but there was a lack of harmonization between them. In 1998, ESA recieved a TA from ITC, the Netherlands, the Training Managers and Supervisors project (TMS/ESA), the project aimed at increasing the cabapilities of ESA by conducting a training program for the aim of upgrading the skills and more qualifying the managers and supervisors for the national cadastre, providing institutional support and strengthens technical management at ESA. The project is implemented through a comprehensive set of training courses.

On 1st of July 2001, ESA gained a sort of autonomy and became an economic authority in the public sector instead of service authority that means it will operate as cost recovery organisation, but the mandates still as it is, just to be self-financed. So, ESA found that it have to be organized as a large public enterprise, using the instruments of marketing and financial accounting, workflow management, quality control, business process reengineering, ...etc, as an appropriate management tools to increase its revenues and to be a cost-recovery organization.

Since 2002, ESA has TA from the ministry of forrign affairs of Finland "MFA" to develop a system to convert the still existing part of the manual cadastre into digital one, and some other objectives in the provinse of Damanhour as pilot area, the orientation of the project has been modified to be: developing the Egyptian Cadastral Information Management system "ECIM", the project is consulted by the National Land Survey of Sweden, "SWEDESURVEY". The cadastral data is not up to date, and partialy digital, in different formats (Paradox, Oracle), and partialy in Analouge (manaul) form. The project aimed to unify all former efforts and experinces to develop an unified system that can contain all these data formats and is able to fulfill ESA's, and user's current and near future needs.

1.1 Egyptian Cadastral Information Management (ECIM) project

The expected outputs of ECIM project as described in the work plan adopted by the Supervisory Board in June 2002 may be summerized as:

- Development of a functioning pilot cadastral system for ESA needs in Damanhour district, as a pilot area.
- Proposal of a framework for future co-operation between ESA, REPD and RETD, this proposal shall be based on the experiences of the development and running of the cadastral system for Damanhour. A co-operation group should be established in Beheira to elaborate this proposal.
- Development of a plan for the implementation of the new cadastral system (which is developed in Damanhour in Phase 1) at all ESA offices in the rest of the country including central and regional levels (including organisational aspects, communication between organisational levels, and conversion/migration of data stored in the system which is established by the GTZ project in Aswan province).
- Proposals concerning necessary needed legislation and instructions for ESA in order to give the new cadastral system a legal value. The proposals shall be based on the

experiences gained from the development, test and running of the Cadastral System in Damanhour and on the expected future organisation of land administration in Egypt.
- Development of an IT support for the Sigil Aini process in rural and in urban areas.
- Develop a plan for renewal of damaged maps

The project works in two parallel lines to develop the system
- Doing conversion for analouge and paradox data to MS-ACCESS & AutoCad Map, which is to know the current data and its specifications, and revise it.
- Developing the system using A systematic approach.

1.2 Strategies to create the Data Model

In the beginning of the project, the existed infrastructure at ESA, in terms of Information Technology (IT), was basically established within USAID & GTZ projects. The cadastral data was stored in different software platforms. For example, in the American –TA- project, graphical data is stored in AutoCAD application program whereas the textual data is stored in Paradox. In the German -TA- project in Aswan both graphical and textual data was stored in Intergraph and Oracle/Informix software application programs. Communication networks established in both projects according to the status of technology in that time were very local driven and very modest. Graphical and textual data is not linked at all in the American project and the textual data is not being digitally updated in that project. On the other hand, the numbering system adopted by the German project in Aswan is different from the numbering system of ESA.

ECIM has designed an IT-system, which is supposed to be a part of the new cadastral system necessary to achieve the goals of the project. An information data model for the Unified Cadastral Database, UCD, has been developed. Existing data in different formats is being converted into digital form and is temporarily stored in Access and AutoCAD Map databases, and it is migrated to the UCD using Feature manipulating Engine "FME". The data model is shown in Appendix 1.

The selection of cadastral software system for ESA has very strategic importance for Egyptian Information Society "EIS", specially, the potential stakeholders (REPD & RETD) . The system is supposed to be used by the whole ESA cadastral officies. And to be used in the technical co-operation with other stakeholders in land administration . In order to select the best solution, ECIM has conducted a very thorough strategies.considering the following issues, and that is considered as a starting point , the project will focus on Land Administration Information , later should move to Multi Purposes Cadastral System "MPC" .

1.3 Methodology

The ECIM and SWEDESURVEY, for the above strategies for Rural Areas had cearfuly analized the current procedures and regulations, avilable data structures and formats, data content, laws, REPD instructions and rules, and possible enhancements, as follows

1.3.1 Rural Areas

- Reviewing and restructuring of the proposed cadastral D.B. (case study).
- Contact REPD and RETD to confirm their approval about :
  - Content of DB
  - Data format
  - Data exchange procedure
  - updating system
- Preliminary conversion of analogue maps and registers into Digital (Auto CAD , paradox)
- Conversion of digital maps (Auto CAD), textual (paradox) into the final data base (using New Egyptian Coordinate System).
- Analyzing the results of the above four points as concerning:
  - Types of problems
  - Sources of problems
  - How to solve problems
  - Required issues
    - Adjudication
    - Hard ware and Soft ware
- Final design of Data Base.
- Developing transaction procedures; regarding New Regulations and relations between the ESA provincial office and district offices.
- Training Plans for ESA staff, in different levels.
- Organizational Improvements in the province / district level as needed.

1.3.2 Urban Areas

For Urban Areas, and because there was till this moment, no urban cadastre at all in Egypt, the ECIM collected and analized all avilable related data forms , such as mutation forms, deeds, urban maps, urban sketchs, and ESA instruction for implementing urban maps. Also ECIM collected and anaized the related laws, and studies done in ESA. To select a suitable approaches to start urban cadastre. Two tests in two provinces had been done to test and study the results

- Propose the concept of including urban areas into cadastral information system
  - Date capturing
  - Date format
  - Adjudication
  - Required data
  - Survey forms (reports) register of urban .

1.3.3 Main Issues

All studies, analysis, stakeholders discussions, observations, the ECIM worked side by side with the consultants, the National Land Survey of Sweden "SWEDESURVEY" and local

Egyptian company Quality Standards Information Technology "QSIT", and find out the following main issues that the Data Model have to fulfill.

1.3.3.1 Data Management

- Data loading into Oracle database (textual and spatial) must be efficient. Performance regarding processing time (how fast the model supporting processing of data).
- Creating new columns to the database and recording values for them should be efficient.

1.3.3.2 Monitoring

- The model should allow keeping track of all activities done in the system, which user is connected? Doing what? At which time? Which methodolgy used?
- The model should allow retriving all the predifined historical data
- The model should allow keeping track of all REPD transaction requests, which request is in status 1? Why it didn't move to next status? ....etc

1.3.3.3 General issues

- The model should affact the whole system stability positivly.
- The model should allow fast replecation between different officies.
- The model should allow crash recovery of the system, these recovery should be smooth and fast.
- The model should allow system security in different levels and different user groups on the same level.
- The model should allow easy database accessibility and security.
- The model should easily accept any near future extend (urban data)
- The model should suuport completely the workflows.
- The model should contain proper validation of inputs.
- The model should have a "Job Status" component.
- The model allow correspondence management
- ESA numbering system should be consedered
- The model should facilitate getting
  - Standard reports
  - Required reports

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