

# A Vision on the Development of the Urban Cadastre in Egypt

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**Key words:** Urban Cadastre, Egypt

## SUMMARY

The need for information, development of appropriate databases and exchange of information as condition for creating the basis of sustainable development in all regions of the world is addressed in the UN Agenda 21 and The Habitat II Global Plan of Action. One reason for this is that the global society faces great problems with urbanisation and the influence of urbanisation on coastal zones and environmental conditions overall. Spatial information in general, and cadastral information more specifically, is an indispensable part of the basic infrastructure of a country.

In Egypt administrators and politicians are recognising spatial information as a national resource as well as a part of the basic infrastructure that needs to be efficiently co-ordinated and managed in the interest of the nation. The Egyptian eGovernment initiative is an example here. Further, the Egyptian government is encouraging the development of a Real Estate Industry and foreign investments. One step in this development is the completion of the urban cadastre, including both spatial data and legal administrative attributes. The efforts to realise this will be substantial. A main condition for implementation of an urban Cadastre is the co-ordination and co-operation between the governmental agencies like the Egyptian Survey Authority (ESA), the Real Estate Publicity and Notarization Department (REPND) and the Real Estate Taxation Department (RETD).

In the vision as presented in this paper a low profile approach is proposed to establish an urban cadastre. A high geometric accuracy is often unnecessary for users of the data. Low-cost surveying and mapping techniques are proposed to be used. Existing administrative and spatial data sources are proposed to be upgraded: *upgrading of the taxation cadastre to a legal cadastre in a step by step approach combined with geometric data collection and linking or integrating geometric data with legal/administrative data*. Public inspections are required; the tax payers are not owners in all cases.

# **A Vision on the Development of the Urban Cadastre in Egypt**

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## **1. INTRODUCTION**

The need for information, development of appropriate databases and exchange of information as condition for creating the basis of sustainable development in all regions of the world is addressed in the UN Agenda 21 and The Habitat II Global Plan of Action. One reason for this is that the global society faces great problems with urbanisation and the influence of urbanisation on coastal zones and environmental conditions overall.

Spatial information in general, and cadastral information more specifically, is an indispensable part of the basic infrastructure of a country. Cadastral information has to be consistently with legal/administrative data on ownership.

In Egypt administrators and politicians are recognising spatial information as a national resource as well as a part of the basic infrastructure that needs to be efficiently co-ordinated and managed in the interest of the nation. The Egyptian eGovernment initiative is an example here. An e-government portal has been launched at 25 January 2004. This portal is a new citizen-oriented gateway that aims at enhancing the level of services offered to citizens and create a favourable environment for investors and members of the business sector. The portal integrates multiple back ends and gives the user a citizen centric friendly interface and provides people with all government services through a convenient one-stop shopping technique that has been developed with a strategic alliance between the Government of Egypt and Microsoft while the government is committed to provide most of its services by 2007 online.

In this respect it is important to develop policies for standardisation, legal aspects, pricing, distribution, etc. in the environment of a National Spatial Data Infrastructure. It can be expected that (cadastral) spatial data will be integrated in all kind of information systems. Data from different sources and with different geometric accuracy will be used in all kind of new combinations. As society is changing the demands on data provider organisations as the Egyptian Survey Authority are changing when products and services are concerned. It can be expected that customers expect (all) data in digital formats, availability of data 'just in time', customised and quickly delivered products, more actual data, integrated administrative and geometric data, improved data quality and, finally, one front-office instead of many.

## **2. DEVELOPMENT OF THE URBAN CADASTRE**

One step in this development is the completion of the urban cadastre, including both spatial data and legal administrative attributes.

In general it can be stated that in this moment the cadastral map of Egypt is not available nationwide in a homogeneous way. Especially the 1800 km<sup>2</sup> urban areas require data acquisition for uncovered areas, data updating for covered areas, and a better accessibility of cadastral and the related legal/administrative data on the ownership situation.

The efforts to realise this will be substantial. A main condition for implementation of an urban cadastre is the co-ordination and co-operation between the governmental agencies like the Egyptian Survey Authority (ESA), the Real Estate Publicity and Notarization Department (REPND) and the Real Estate Taxation Department (RETD). Experiences learn that there is no tradition of solid co-operation in Egypt. The same is even valid for co-operation with users/customers, e.g. utility companies. The development of digital (Spatial) Data Infrastructures is only possible in an institutional environment based on close co-operation at all levels with clear and well defined responsibilities.

Further experiences in Egypt learn that there is a serious risk that, after 'upgrading' cadastral and linked ownership data for urban area's, the data will out-dated again after a few years. This results in disinvestments and waste of resources. Many ownership transactions and transactions on other real rights are not properly registered at all; there is no legal mechanism to guarantee that the consequences of an ownership transaction are registered, this should start at least for new buildings and apartments. It is important to stress that the development of related legislation, the improvement of organisational structures, the development of financial mechanisms, and the technical (e.g. Information and Communication Technology) issues are closely interconnected. Issues related to legislation, organisation and funding are frequently more complex to solve than technical issues.

Resources like a management structure, technical expertise, skills, tools, facilities and budgets for the development of an urban cadastre are not yet completely available.

An approach for the development of an urban cadastre in Egypt is proposed here. A high geometric accuracy is often unnecessary for users of the data. Low-cost surveying and mapping techniques are proposed to be used, with the remark that low cost is of importance but fast data collection even more. Existing administrative and spatial data sources are proposed to be upgraded: *upgrading of the taxation cadastre to a legal cadastre in a step by step approach combined with geometric data collection and linking or integrating geometric data with legal/administrative data. The private sector should have an apparent role in the development of the urban cadastre.* Involvement of the private sector requires legislation to support the participation of the private sector. The private sector could also play a role in data administration under the responsibility of the public sector.

This approach requires as a prerequisite the co-operation between governmental agencies to avoid data duplication and to join efforts in the development of a Spatial Data Infrastructure where cadastral geometric data are considered as framework data. geometric data, e.g. address co-ordinates, can be related to object identifiers, which can, at their turn, be combined with real rights and persons. Note: a system for identification of persons is under implementation in this moment in Egypt; this is a basic condition for eGovernance. The next

step could be object (parcel/apartment) identification and the identification of the rights between persons and objects.

The motivation for the development of an urban cadastre is being worked out now, this is partly based on the UN/ECE Land Administration guidelines.

### 3. GOVERNANCE

For good governance a complete, up to date, reliable and accessible urban cadastre is a condition in the support of:

- **Foreign investments.** Foreign investments can be stimulated if the investor can rely on the object-, subject- (persons, companies, governments, etc) and ownership data in the registrations. This is not really the case in this moment in Egypt, this is a lacking condition for foreign investments.
- **Guarantee of ownership and security of tenure.** The compilation of land records and the judicial processes that must be gone through in order to bring land information onto the registers should provide formal identification and, in some systems, legal proof of ownership. The real estate registration in Egypt does not provide legal proof of ownership. The real estate registers contain essential juridical information allowing anyone viewing the system to identify third-party rights as well as the name of the owner; this information is not available for all objects. Concerning legal security it can be stated that in this moment titles related to cadastral maps are available in 25% of urban area's, 50% of the area's require updating and 25% of the urban area's can be considered as informal. In case of initial cadastral data collection (establishment of a cadastre) the co-operation between the Real Estate Publicity and Notarization Department and the Egyptian Survey Authority not yet optimal. In cases of updating existing information based on ownership transactions the (operational) co-operation is better. The responsibilities of the Real Estate Publicity and Notarization Department are production and registration of ownership titles. The responsibility of the Egyptian Survey Agency is the production and maintenance of the cadastral map. The Egyptian Survey Authority has the responsibility for object identification.
- **Support for fair land and property taxation.** *Good* land records will improve efficiency and effectiveness in collecting land and property taxes by identifying landowners. Those taxes are relatively easy to collect in contrast for example to personal income taxes where earnings can be hidden. It is not possible to hide a piece of land or building although it is possible to conceal the records of such a property. In this moment there is no common approach in the implementation of land and property tax collection. Taxation is in its execution not based on a general concept with common principles. The Ministry of Finance maintains a Taxation Cadastre and is even implementing a Geographical Information System to computerise this system, this implies duplications in data sets.
- **Provide security for credit.** *Certainty* of ownership and knowledge of all the rights that exist in the land should provide confidence for banks and financial organizations to provide funds so that landowners can invest in their land. Mortgaging land is one way to

acquire capital for investing in improvements. Landowners can then construct or improve buildings and infrastructure or improve their methods and management of the land, for example by introducing new farming techniques and technologies.

- **Develop and monitor land markets.** The introduction of a cheap and secure way of transferring land rights means that those who wish to deal in land can do so with speed and certainty. Those who do not wish to sell their land can be protected-no persons need be dispossessed of land unless they so wish since their rights should be guaranteed. The registers should be public so that at any time a landowner can confirm his or her rights. Those who wish to buy land can do so with confidence, knowing that the person who is trying to sell the land is the legally guaranteed owner.
- **Expropriation.** Those whose properties are subject to compulsory purchase-for instance where a new highway is to be built across their land-can be treated with fairness since the registers should provide information on current land prices, thus allowing better estimates of the market value of land to be made.
- **Protect State lands.** In Egypt the land that is held by the State for the benefit of the community is poorly documented. The State is a major landowner and its property must be protected for example from encroachment by farmers onto land beside roads or from attempts by squatters to settle on vacant land that is being held for future use.
- **Reduce land disputes.** Disputes over land and its boundaries give rise to expensive litigation. Much time is taken up by the courts in resolving these matters, leading to delays in other parts of the judicial system. Land often cannot be put onto the market or put to better use without resolution of the disputes, since no *potential investor* is likely to wish to be committed to developing land where a lawsuit may be pending. Land disputes could be considered as a 'business' for the courts, but definitively not as a motor for economic development. The question is what is more relevant for society.
- **Facilitate in urban planning and infrastructure development.** Urban centres need redevelopment and effective land-use planning and control. A good land administration system should permit the integration of records of land ownership, land value and land use with sociological, economic and environmental data in support of physical planning. The availability of up-to-date large-scale cadastral plans of urban areas provides the basic framework within which development schemes can be planned and assessed and acceptable designs implemented. From the growing informal areas and the limited use of developed cities in the desert it can be observed that the approach in urban and regional planning is not really successful until now in Egypt. The same is valid for the management of governmental lands and protection of rural resources.
- **Support environmental management.** Multi-purpose cadastral records can be used to record conservation areas and give details of archaeological sites and other areas of scientific or cultural interest that may need to be protected. The cadastre can be used in the preparation of environmental impact assessments and in monitoring the consequences of development and construction projects. In the Netherlands, for example, there is a register of presently polluted sites and of formerly polluted sites that have been decontaminated.
- **Produce statistical data.** Both long-term strategic planning and short-term operational management require data in support of decision-making.

- **E-Governance.** e-Governance can only be established if the authentic registrations like population register, land data, land use data, planning data, topographic data and cadastral data are combined with guaranteed unique identifiers, are computerised and up to date. Experiences in other countries learn that digital distribution of governmental data is related to high quality demands where up-to-dateness is concerned. Inconsistencies, e.g. different spelled names for the same person in different registers are not accepted by customers. Completeness is another matter and can be achieved step by step: e.g. complete object identification combines with a co-ordinate, a complete set of parcel boundaries which could have better and better accuracy over time (different versions in accuracy).
- **Utilities management.** Utilities management is more or less successfully implemented in Egypt. Utility companies have a good overview of owners of buildings and apartments (as the Real Estate Taxation Department has).
- **Better quality of housing.** Good registration of apartments and condominiums is a condition for maintenance of the 'common parts' (roofs, stairs, corridors, entrance, elevator, etc) of these buildings.
- **Urban management.** A pre-condition for urban management is knowledge on the location and status of those area's for maintenance and development purposes, especially in 'informal' suburbs.

#### 4. MAIN PRINCIPLE IN THE DEVELOPMENT OF URBAN CADASTRE

**The main principle in the development of an Urban Cadastre is that not all parcel boundaries have to be represented with high accurate co-ordinates. The object identification linked with one co-ordinate is relevant input for many applications, also in eGovernment.**

The development of an urban Cadastre in Egypt is proposed to be organised as follows:

1. Identification of the buildings: building identifier linked with one reference co-ordinate. Available data sources: satellite images and the 1:5000 scale cadastral map of Cairo. For apartment buildings one reference co-ordinate is sufficient. Individual apartments get an index to the building identifier. As soon as this product is available the ownership data can be upgraded and linked.
2. Link with object address.
3. Rough estimation of parcel boundaries (contours, based on the existing spatial information sets, including satellite images)
4. Systematic accurate definition of its boundaries based on terrestrial observations. There are (sporadic) cases where accurate boundary definitions are required immediately, e.g. in case of foreign investments, development of real estate projects. As soon as accurate data are available a development of a multipurpose cadastre in the framework of a Spatial Data Infrastructure can start.

Note 1:

To support this catalogue has to be built based on an inventory of existing spatial data sets. This catalogue should be standardised according to OpenGIS standards (19117 GI) for proper future use in relation to a Spatial Data Infrastructure. Furthermore there should be attention to existing spatial data sets available in other organisations. Existing registration which could be of importance for the development of urban cadastre could be included. Attempts can be made to visualise the coverage of those data in relation to the catalogue. The catalogue provides information on availability (where to find the information), location (in relation to map index), accuracy, contents and status information on registrations. Many data with different quality are available within Egyptian Survey Authority in relation to formal urban areas. This concerns existing cadastral maps, topographic maps in scale 1:5000, etc. For informal areas only limited data are available. In many cases cadastral maps are available but not the link to the ownership data. The Real Estate Taxation Department has a more or less complete Taxation Cadastre, including the names of owners. A Geographic Information System is under development. Spatial data from the Ministry of Finance should be included in this inventory (catalogue).

Note 2:

There are population registers where names of persons can be checked.

## 5. USER REQUIREMENTS

It has to be clarified which land policies exist and which ministries are responsible for which registrations (UN ECE Land Administration guidelines). Which information do planners require? What is the basic data in value assessment for land and property tax? Is there any tax imposed in case of purchase of land? Who in the central government will acquire for land and/or building data? What private institutions (banks, etc) will acquire for land data? Other private parties, e.g. in case of development of building clusters? How much are they willing to pay? From analyses of this it should be possible to set priorities where to start. All the time it should be realised that each single data item is expensive to collect and to store. Extra data can lead to delay, e.g. in case of complex valuations. No data should be collected which *might* be needed in the future.

In a feasibility study the following could be clarified in detail:

- How much tax revenues could be generated based on reliable information, if available
- How many costs can be saved compared to the existing situation where extra costs are made because of not having an urban cadastre (e.g. costs of courts, lawyers, costs of maintaining taxation cadastre, costs of managing complaints for taxation because of incorrect information, etc)
- The costs of reduction of governmental rural lands with high quality soil (production loss per year)
- Pro memory costs are in the non-optimal image of the government by the citizens

Such clarification could support decision making of the development of urban cadastre: how much of the revenues and savings is available for the development and maintenance of an urban cadastre.

An Urban cadastre (as part of a Spatial Data Infrastructure or *Virtual Land Agency*) is an asset in general. It should be considered as a key part of a wide infrastructure. Establishment of the urban cadastre demands for co-operation between public sectors and between the public and private sector (e.g. in cases of ICT developments and digitising). Mission critical activities should not be outsourced (e.g. data modelling, data base administration). Conflicts can be expected when seeking co-operation. Knowledge on inter-organisational processes is required. A policy could be formulated in parallel to operationalise, but an urban cadastre should be based on user requirements and rapid changing needs of its users and must adapt to changing technologies in the future. Approaches in data collection can be variable. Potential benefits have to be demonstrated in pilots to encourage further investments.

A pricing policy has to be developed. Many data from different sources will be combined, which is typical for a digital approach. Copyrights and quality labels will finally be available on record level. Some questions in relation to pricing cannot yet be answered; but it has to be remembered that the same is valid for the extra costs to the society of Egypt when duplications and double efforts are concerned.

## 6. PRODUCTS

Given this approach new products could be the following combinations of administrative and spatial data, to be provided in a standardised way, e.g. based on the Geography Markup Language, GML, standard:

1. Object identifier per building, index per apartment + co-ordinate reference
2. Object identifier per building, index per apartment + co-ordinate reference + subject identifier (expected owner) per apartment
3. Object identifier per building, index per apartment + co-ordinate reference + subject identifier (expected owner) per apartment + address
4. Object identifier per building, index per apartment + co-ordinate reference + subject identifier (expected owner) per apartment + address + parcel identifier + estimated boundaries + estimation of area
5. Object identifier per building, index per apartment + co-ordinate reference + subject identifier (expected owner) per apartment + address + parcel identifier + accurate boundaries + accurate area
6. Same as 1 to 5 + taxation object identifier + subject name and subject id as known in taxation department (in co-operation with Real Estate Taxation Department)
7. Same as 1 to 5 + preliminary title (in co-operation with the Real Estate Publicity and Notarization Department)
8. Same as 1 to 6 + preliminary title (in co-operation with the Real Estate Publicity and Notarization Department and the Real Estate Taxation Department)

9. Same as 1 to 5 + title (in co-operation with the Real Estate Publicity and Notarization Department)
10. Same as 1 to 6 + title (in co-operation with the Real Estate Publicity and Notarization Department and the Real Estate Taxation Department )
11. Same as 1 to 11, bulk delivery
12. Same as 1 to 11, other attributes

## **7. APPROACH IN DETAIL**

The following approach can only be successful if there is agreement on it between Real Estate Publicity and Notarization Department, Real Estate Taxation Department and the Egyptian Survey Authority. There is a need for a common vision in those three departments on the way of handling cadastral data, the design of databases (and associate modelling) should not be done in isolation. Further there is a need for harmonisation of existing data models to allow sharing and integration of archived data in all departments.

To guarantee that governmental departments and other customers get what is requested and invested for, there should be continuous communication at governmental level and at top level of the organizations involved. A task force composed out of top-representatives from the involved organizations should be given the responsibility to fulfil the task of developing urban cadastre including ownership data.

Geodesy and cadastral survey technology allows for accurate, less accurate and low accurate approaches: accuracy is considered to be just a quality label, high accuracy as such is definitely not a condition or prerequisite. Identification from less accurate aerial photographs or satellite images is a well-known approach and is understood by the citizens. Also the usage of classical tapes are in line with peoples understanding. In case studies the potential of satellite images in identifying various cadastral entities, different types, different architecture, different living standards could be analysed.

Paper based linking between spatial and administrative data is very possible but expensive and errors can easily be made. For this reason experts from Real Estate Department and Real Estate Taxation Department should be involved in the design of data exchange formats between databases.

Steps in the approach are:

Develop a management vision with a balance between central control and de-central responsibilities and availability of budgets for development and maintenance of urban cadastre.

- Recruit new staff with appropriate skills (and use available experience within the organisation, which is limited available, experiences from ‘older staff’ can be used for a self-learning organisation approach)
- Co-operation has to be organised.

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- Communication to higher management, political levels, staff, departments and users. Ongoing political support is a requirement.
- Definition of responsibilities of involved employees in implementation.
- Definition of measurement of performance of managers. It is important here to distinct in performance aspects which are under control by the manager and external factors which can not be controlled by the manager.
- Definition of expected output results.
- Develop an investment plan related to the feasibility study as introduced above
- Define Qualifications of employees.
- Budgets. Investments are based on future savings in costs in other governmental departments and inside the Egyptian Survey Authority. Furthermore a part of the tax revenues should be available for registration. There should be agreement in forehand on this based on a feasibility study.
- Develop a resource planning approach supported by automated systems.
- Develop a Data model (re-use but simplify the existing model as much as possible by checking which data can really be marketed).
- Process model (re-engineer, but re-use existing software as much as possible). Quality control (and quality labels, based on area's). Value adding chains in data processing based on responsibilities. Software development based on re-use of existing software.
- Development of forms for initial data acquisition of legal/administrative data. Same for transactions. Examples of such transaction forms could be provided from other countries. Existing forms could be redesigned here based on the principle that interpretations should be avoided as much as possible. Attention to identifiers of the forms and related identifiers used in the forms.
- Documentation management.
- Work-processes for public inspections (to guarantee performance).

## **8. IMPLEMENTATION, GENERAL**

In relation to implementation the following steps are proposed:

- Definition of urban cadastre implementation area's, e.g. to existing administrative urban subdivisions or just a group of streets
- Appointment of implementation manager.
- Appointment of responsible judge.
- Appointment of work force.
- Decide on the approach per administrative area, depending on available spatial data sets and administrative data. If no spatial data available Ikonos or Quickbird images could be bought. Produce enlargements. Identify objects (one point). If 1:5000 maps available: make enlargements to identify objects and to include an estimation of new boundaries.

Processes are (alternative examples are presented here depending on available data):

- Identify buildings from satellite images. Link one co-ordinate to one building

- Identify apartments within the building in the field (if possible: ask for subject id per apartment), give index per apartment
- Link available data from Real Estate Taxation Department per apartment using subject id
- Organise a Public Inspection, collect complaints on published data (remember: not all tax payers are owners)
- Improve the data
- Organise a Public Inspection for 2<sup>nd</sup> verification
- Complaints to be decided by special judgement (judge available for this process)
- Produce the titles on ownership of apartments
- Maintenance based on compulsory registration for the transaction in the area

Or:

- Digitise existing paper cadastral maps
- Compare with satellite images by super imposition
- Identify buildings not included on the map
- Identify and classify new (expected) boundaries (from the image)
- Link with data from Real Estate Publicity and Notarization Department (if available)
- Link with data from Real Estate Taxation Department (if available) using subject id (remember: the Real Estate Taxation Department used its own object id!!)
- 1<sup>st</sup> Public inspections, partly based on available data in Real Estate Taxation Department and Real Estate Publicity and Notarization Department combined with the preliminary updated cadastral map
- Handling of complaints because of incorrect ownership data or incorrect interpreted boundaries (image available during inspection)
- Decisions on complaints. In case of complaints because of incorrect boundaries a new indication should be given on the photos on site, neighbours should be there (no surveying).
- 2<sup>nd</sup> public inspection (verification)
- Complaints: to be decided by special judgement
- Title production for all the owners in the area
- Maintenance based on compulsory registration for the transaction in the area

Later: quality improvement in a digital environment where a second, more accurate, representation of a parcel be generated. This will have impact on the area of the parcel. There should not be all kind of discussions on this approach, most important for the people is the value of the parcel, not the area of the ground parcel.

A similar approach has to be worked out for areas with already existing digital cadastral maps but no titles.

- Within the triangle Egyptian Survey Authority - Real Estate Publicity and Notarization Department – Real Estate Taxation Department it should be very clear who is responsible for which data (attributes). For this purpose a *final* data model and process model has to be developed as soon as possible. The identification of objects is a point of crucial

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importance here, in this moment the Real Estate Taxation Department is using its own object identification systems. This requires accepted standards; the relation to existing registers should be included.

- The amount of attributes in the data model should be minimal because each attribute requires maintenance. The number of attributes has to be multiplied with the number of objects (parcels/apartments). This gives an overview of the amount of data to be maintained by the 3 organisations. Better to have less optimal quality data than more bad quality data.
- Technologies like: Lidar, Cyclomedia, Radar, GPS Infrastructure, etc.: to be investigated. Lidar is an alternative for Satellite images. Buildings can be identified. This information could be combined with tape measurements for boundary identification: via Lidar the fronts of buildings can be available with geo-reference. Completion with tape measurements means the identification of boundaries perpendicular to these fronts; tape surveys are well understood by the citizens. A similar approach could be used at the backside of buildings.

The following institutional/legal aspects deserve attention:

- Development of a cadastral act (object identification, responsibilities in registration, use of the cadastral data, data protection, organisation of efficient surveys, procedures for initial creation of data, procedures for resolving disputes in registration, avoidance of duplications, compulsory use of other datasets, etc., etc.). What is the legal meaning of digital data, signatures? This is important for the introduction of electronic conveyancing for maintenance purposes.
- Compulsory Registration and state guarantee of title? If there is no compulsory registration of land transactions the data in urban cadastre will be outdated soon and will lose its value. This implies a miss-investment in urban cadastre and no reliable support in governance.
- Acceptance of '90% quality in accuracy'. This means that the geometric data are not 100% quality but lower in the first approach. This should be explainable and acceptable to courts. 90% is better than nothing...
- Acceptance of the existing tax cadastre as a basis for the legal urban cadastre.
- Acquisition by prescription: how many years can a piece of land be occupied without governmental measures before there is legal ownership? This means illegal occupations have to be detected and monitored. If people should move to another area: should the government give support in this?
- Privacy, clearness on meaning of signatures. Finger prints.
- Integrated data collection (for legal purposes, tax purposes, etc.)
- Digital signatures, not only in convincing also for approval of digital spatial plans and spatial related decisions, e.g. restrictions to allow something or not.

The following social aspect deserves attention:

- For Informal areas an approach based on building identification based on images, followed by apartment identification and 2 public inspections should be tested as soon as possible. Security in tenure could motivate people in developing economic activities. This

approach is based on the idea that the government is really there for its people, and not the other way around.

Communication aspects are:

- Inform the citizens by TV, radio etc. The provided information should be understandable and reliable. No information should be provided on the basis of speculations, non-planned expectations or non-agreed commitments. This means all provided information is based on realistic resource management and planning and agreement. E.g. if a public inspection is organized it should be known when the data are available, which is the location, who will be available to discuss with the citizens, who will be available to make decisions in case of complaints, which capacity is available to produce the titles.
- Part of the communication is that registration is compulsory. This can be communicated only after agreement with the ministry of Justice.
- Transparency in the process.
- Monitoring marketing and customer satisfaction.

Resource management implies for giving attention to:

- Software for resource planning. Activities for development of urban cadastre should be related to human resources, budgets, time planning, etc. Results should be compared with planning. Knowledge should be built (norms) to improve future planning's.
- Inventory of existing resources.
- Employees. Of course a well-motivated workforce is a critical factor for success. The employees should agree with the approach which is a non conventional approach compared with the existing organization of work at the Egyptian Survey Authority. The employees should agree with expected output results.
- Instruments. Image interpretation software. Evt. renewal of Photogrammetric equipment, some GPS instruments for ground control surveys in relation to photogrammetry.
- Facilities. Offices with furniture, etc. Cars. Places for public inspection. Papers. Post facilities. This could imply a reorganization of existing Egyptian Survey Authority offices in urban areas.
- Internal registration of ICT devices and tools. Hardware, databases and supporting software like Microsoft Office. Networks. Back up facilities. ICT department with system managers, database administrators and network managers. There should be a policy to avoid that employees of this department leave the Egyptian Survey Authority because of better job perspectives outside the Egyptian Survey Authority.
- Management of external parties based on standardised agreements
- Tenders.
- Pilots will support in generating realistic figures of production time: per building/parcel time has to be estimated per process step to conclude in a total budget and time.

A basis for detailed financial calculations is as follows:

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- There are about 1800 sq km of urban areas. 212 old towns, 17 new towns and 42 building clusters. Approximately 2000 parcels per sq km. High accurate geometric data will cost about 12.5 USD per parcel. But a lot of cadastral data are already available. In average there are about 20 apartments per parcel.
- In this moment titles related to cadastral maps are available in 25% of urban area's, 50% of the area's require updating and 25% of the urban area's can be considered as informal.
- Costs for high accurate data per apartment: USD 15, those are only costs for the Egyptian Survey Authority, not the costs made by the Real Estate Publicity and Notarization Department
- Parcels:  $1800 * 2000 * \text{USD } 12.5 = \text{USD } 45 \text{ mln}$  (only costs for the Egyptian Survey Authority)
- Apartments:  $1800 * 2000 * 20 * \text{USD } 15 = \dots\dots$

Such amount of money is expected not to be available, even when citizens contribute. This means the process of development should start with collection of less accurate data.

A proposal is to start in informal area's, the co-ordinate approach is estimated to cost no more than 20 USD per building with 10 apartments: those are costs for building identification, apartment identification and collection of subject ids, including public inspections, without surveying. In informal areas the number of apartments per parcel is about 10.

Costs of human resources and required facilities for ICT.

Costs of scanning existing 1:5000 Topographic maps.

## 9. CONCLUSION

The Urban Cadastre in Egypt is far from complete. Alternatives are developed in this document to complete the Urban Cadastre in phases starting from less accurate geometry with fast data collection methods and usage of existing data in the Real Estate Publicity and Notarization Department and the Real Estate Taxation Department. In a second phase further completion could be achieved in the direction of a multi purpose cadastre.

## REFERENCES

- UN Agenda 21,  
<http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm>
- UN ECE, Land Administration Guidelines,  
<http://www.unece.org/env/hs/wpla/docs/lguidelines.html>
- UN Habitat II Global Plan of Action

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