Government Re-engineering Approach to Sustainable Land Management

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1. Abstract

Re-engineering is an approach used by organizations to rationalize and improve their procedures to maximize surveying and mapping businesses that are associated with LIS, land management and land policy. Sustainable land management refers to comprehensive land related undertakings that are can be enriched by government re-engineering.

2. Introduction

The notion “land management” comprises activities aiming to fulfill established goals for the use of certain land resources. These activities may have the purpose of promoting efficient land use within an existing pattern. They may be mainly monitoring, administration and controlling natural resources. Alternatively, they may have the main aim of developing the land by making sustainable investment in the land and/or changing land usage. In all countries, land is a basic resource with unique characteristics. Many activities, related to human settlements which have been identified in the national policy statement on land management, are concerned with land (Henssen, 1988).

Moreover, the modern concepts of sustainable development, arising from the fears of over-exploitation of resources and pollution, also reflect the viewpoint that land is one natural resource that must be preserved for future generations. A balance between exploitation and conservation of land resources has generated social and political issues in order to respect the absolute level of sustainable land management in our present society.

Today, land management has been a dominant concern of governments and authorities that deal with land related records. However, the processes for land records management have not been consistent and not changed significantly (Mullin and Kittilsen, 1994). P.F Dale (1988) noted that land management entails decision making and the implementation of decisions about land. Land management may involve making fundamental policy decisions about the nature and extent of investments in the land. He also discerned different kinds of land management concerned with land policy, land administration arrangements, resources management, and land information management. Hence, land management may contains a broad spectrum of land related activities from physical planning, housing programs, building construction, cadastral surveying and mapping to land information management. These interacting processes of land management are often entangled between several government agencies which may lead to duplication and scatter of land related data. In order to achieve efficient and effective land management, governments have undertaken numerous improvement programs through organizational and exploitation of information technology.

The “Business Process Re-engineering” or “Re-engineering” methodology represents a new opportunity to address all aspects of (improving) land information management. Re-engineering is to streamline the process from property surveying through property registration. This paper is to examine the circumstance of government re-engineering and its potentialities for process engineering corresponding to information management and cadastral information processes.

3. Regeneration of the Role of the Cadastre

Many times, the UN has stressed the importance of a cadastre in their Regional Cartographic Conferences, and a multitude of reports about the cadastre is very useful for countries that strive to upgrade their cadastral system (Henssen, 1985). The primary reason in having a cadastre used to be the provision of a base for a fair and just taxation and ownership of land. However, it appears that these factors have gradually lost their importance and value. The cadastre is used for many purposes, which renders the tax and regal cadastre to a multipurpose cadastre.

The cadastre as a basic tool for different information systems must have a structure that allows its universal application. The cadastre has a service function. It provides data needed by other institutions. Hence, the cadastral information has to be reliable so that other institutions can use it without any doubt about its correctness. By the way, the cadastral data are constantly changing. The process of updating or maintenance is very a difficult one. The workflow to get new data has to be organized very carefully, especially where other institutions are involved.

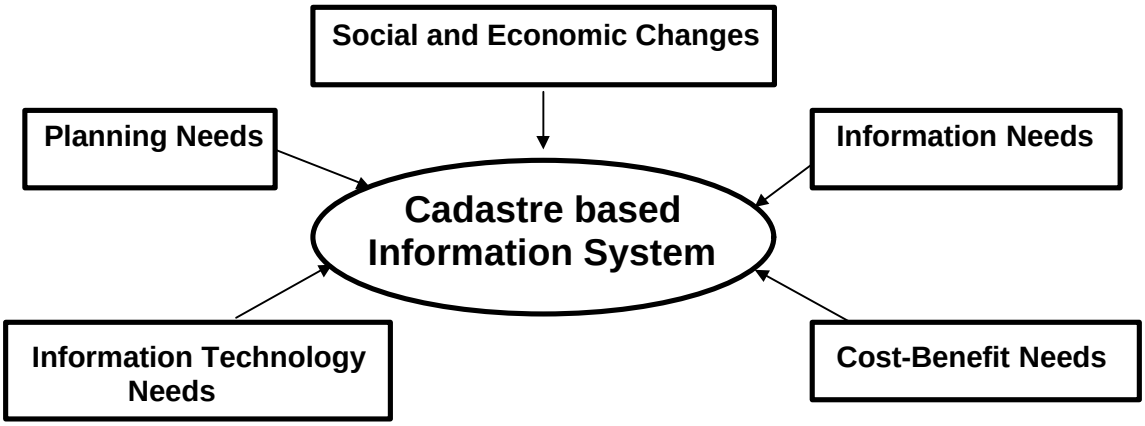

Figure 1. New Demands for the Cadastre.

To be able to keep the function of a multipurpose cadastre, several prerequisite needs have to be taken into consideration; these have a great impact on the fragmented and malfunctioned current cadastral system (Fig 1.).

4. Land Management and Land Policy

There was tacit consensus that the present-day world is becoming increasingly non-livable and non-sustainable. The achievements of science and technology have been peripheral to the development concerns of the people. No doubt, science and information technology have their share in contributions to the progress of societies. But scientists and technocrats have been arrogant towards traditional cadastral problems and indigenous knowledge of land policy, and always worked for their technological breakthrough. While it is true that science and information technology impact and affect the GIS/LIS community, it is equally important to structure the priorities of scientific research and development in accordance with the needs and demands of sustainable land management.

In principle, land policy should include the sitting of infra-structure balanced against relevant environmental conservation, and ensure that the cost of land is affordable to needs for private and public sectors, stemming from the facts that land property development for land management and land policy iterates highly volatile activities. This is why it may be viewed as a cyclical process in the context of the almost natural connotations of the concept of cycles in economics. With regard to the linkages between land policy and land management, we found that the whole issues of the role land related activities are considered as integral parts of cyclical mechanism in national land policy (Fig 2.).

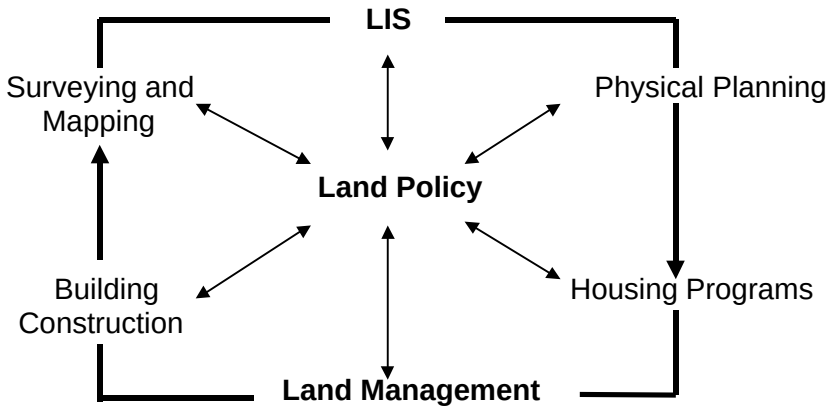

Figure 2. Cyclical Process towards Land Policy.

Land management includes the formulation of land policy, the preparation of land development and land use planning, and the administration of a variety of land related programs. In the face of the increasing complexity of the human settlements, land information system support the land policy and land management as well as land related planning and housing programs as an integrated tool. However, land policy has been significantly impacted by the historical land tenure system, and by economic, institutional, social and political forces. It has also been viewed as a starting point of national physical planning, and at the same time, as a concurrent node from housing programs, building construction, surveying and mapping, and land management.

5. Government Re-Engineering

Re-engineering and other process improvement efforts work best for the entire organization when managers and staff are knowledgeable about business process fundamentals, know exactly what re-engineering is, and how re-engineering is different from other process improvement efforts. Re-engineering starts with understanding what a business process is and what the mission-critical business processes are in the organization. All of the organizations have reshaped their organisms in response to the political and social changes they are trying to achieve, although many did not use the term “re-engineering”. Some started their major improvement efforts before the term re-engineering became popular. Others did not wish to adopt a buzzword that would be understood, and described their re-engineering effort in process improvement terms.

Michael Hammer gave birth to the idea of re-engineering in 1990. He had been frustrated with organizations applying technology to perform the same work force, rather than moving beyond the familiar manner of doing business. He also wrote that it is time to stop paving the cow paths. Instead of embodying outdated process, we should obliterate them and start over. We should “re-engineer” our business using the power of modern information technology to achieve dramatic improvements in performance.

Even the central government speaks of “Government Inventing”. Government re-engineering is a radical improvement approach that critically examines, rethinks, and redesigns mission-delivery processes and sub-processes under the current political characteristics of the public sector. The challenge to government re-engineering is a very difficult one and happens in a tumultuous political environment where is not wise to wipe a clean slate, as some may suggest, but to reshape current government organizations into something dramatically different for the purpose of streamlining land management mandates that are dispersed in government agencies.

However, this can lead to serious political and social uproar because different policy agendas and expectations permeate decision-making of land policy across all levels and branches of government (Fig 3.). As top level officials come and go, new policy agendas may negate or delay process improvement plans. Furthermore, legislative, executive, and court decisions impose restrictions on staffing and other operational assets.

5.1 Framework for Process Enhancement

The Ministry of Housing and other Ministries, associated with land policy, are striving to streamline the processes of land management benefiting from re-engineering. In particular, surveying and mapping processes have been spread thinly among governments and concerned authorities. These multi-level steps have carefully controlled map-making processes and checked mapping accuracy. With the benefits of information technology, map-making processes will be formalized and standardized, by implication.

A great number of national mapping centers is, today, striving to streamline these processes benefiting from re-engineering. Process improvement (or re-engineering) is a complex undertaking that demands inputs from the highest levels in the government and participation of virtually all executives, managers, and professional employees.

Fig 3.1 shows the major phases in process improvement. These activities lead to a re-engineered process and the necessary changes in the organizational and technological infrastructure needed. The current environment (A) is external to processes under consideration and represents all factors outside the direct control of processes that can influence or constrain process improvement efforts. The current organizational infrastructure (B) supports the existing process. The relationship of the process to the existing organizational structure must be well-understood so that appropriate organizational changes can be made in the light of planned process improvements.

The current technological infrastructure (C) provides a platform of information management and communications services for existing processes. The relationship of processes to platforms must be well-understood so that appropriate technological changes can be made in the light of planned process improvements without unduly affecting existing information systems (DoD, 1994).

6. Technical Change Management

While many useful and rewarding process improvements can be achieved without any consideration of technology or information system improvement, true or radical re-engineering efforts invariably depend on exploitation of available or emerging information technology capabilities. The effective use of advanced technology can dramatically enhance an organization’s ability to achieve major improvements or even breakthroughs. There are issues of technology integration, migration or transitional systems, interconnectivity, and interoperability that are best handled during the enterprise engineering phase of the framework of process improvement (Fig 3.).

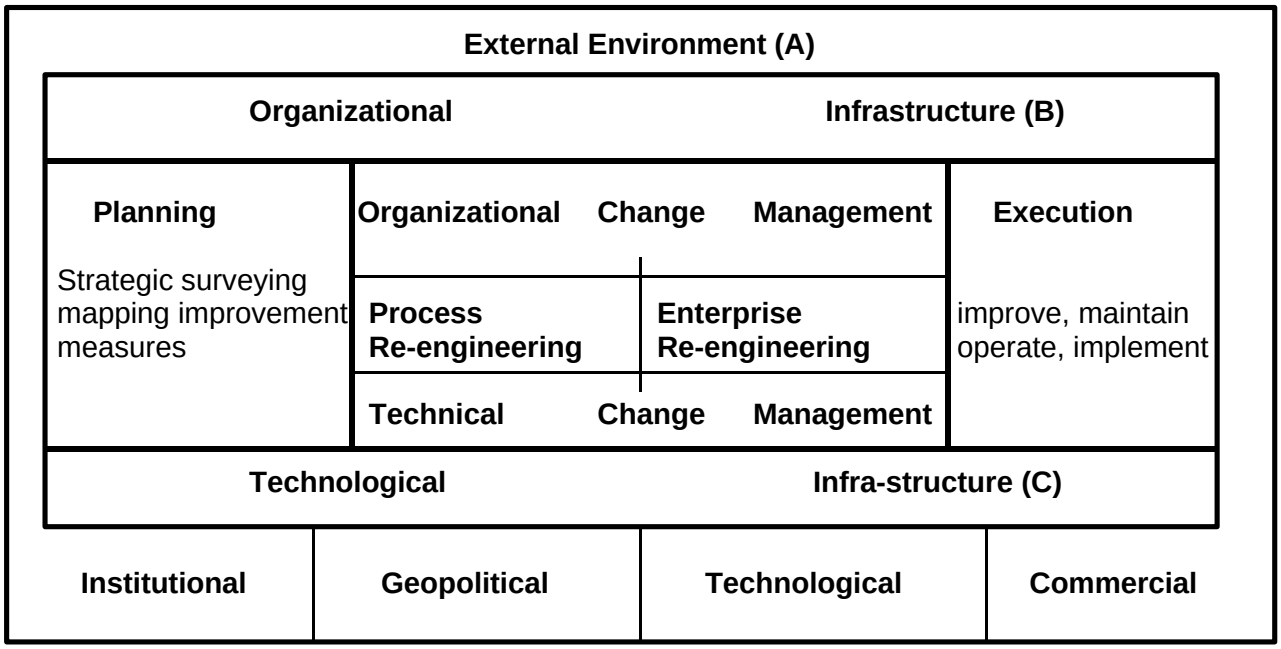

Figure 3. Framework for Process Improvement.

From the perspective of the technical requirements of GIS/LIS, we can consider the strategy of using a simple relation between information system and information technology. Most organizations want state of heart technology pertaining to information policies, information system policies, activities and organization of information management, etc. The delineation in Fig 4. between ends and means or between applications and delivery is intended to clarify the concepts and practices in strategy formations. The major issues are about what we should do with the GIS/LIS technology in information system management, whereas the real question is how we can define the role of GIS/LIS in the information technology strategy. The IS strategy is concerned primarily with aligning IS development with mapping business needs and with seeking competitive advantages from IT.

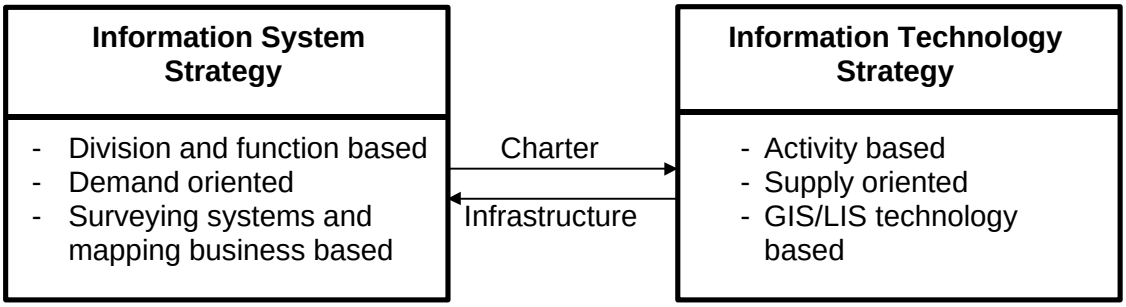

Figure 4. Relationship between IS and IT.

The IT strategy is concerned with technology policies and with procedures for “putting the management into IT”. This strategy becomes the charter, guidelines and modus operandi for the IT function (Earl, 1988). There are likely to be fewer IT strategies than IS strategies in large and complex organizations, perhaps only one in a centralized national mapping

center that is responsible for distributing land related data in land management and decisions of land policy.

The levels of IS and IT together become the activity for GIS/LIS functions and views. In addition, organizational, financial, and geopolitical strategy must be taken into consideration when planning surveying and mapping, land information systems, and land management, if one is to benefit from the close cooperation between governments and a wide spectrum of enterprises. To be able to elaborate process management in GIS/LIS, the organization needs to have a clear and consistent technological framework for incorporating re-engineering.

Judging from Fig 3. and Fig 4., we are able to consider technical change requirements that can be applied to land information management from five prints of view. Each view incorporates several principles which when taken together provide a complete framework for re-engineering efforts in land management.

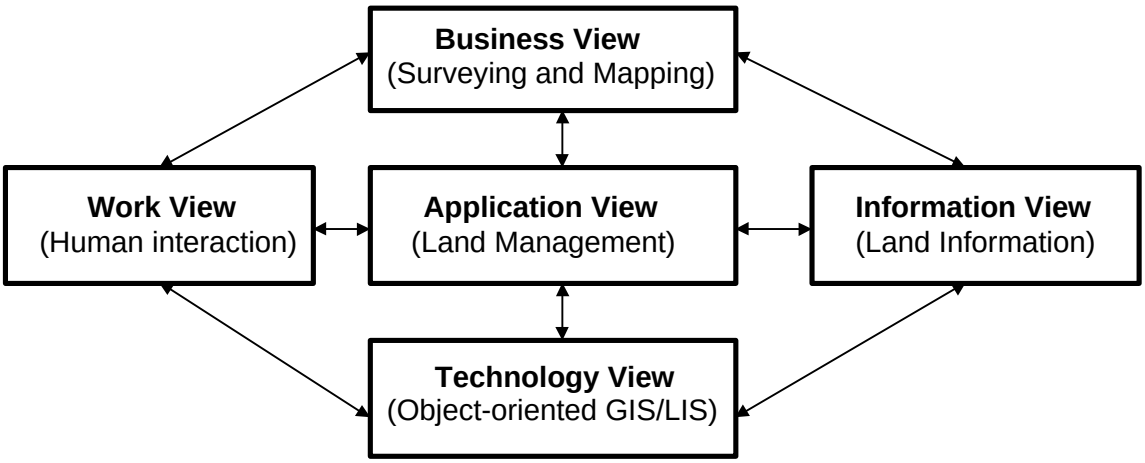

Figure 6. Technical Change Requirements for Re-Engineering.

7. The Process of Cadastral Surveying for Modern LIS

Historically, cadastral surveying has applied surveying technology to provide written property descriptions of land parcels and boundaries. In many countries, the urgency of land development usually led cadastral surveying practice to use accepted routines. There was little time for trying to understand the rationale of these routines or whether they might be improved. Consequently, cadastral surveying and mapping became pragmatic in character and failed to develop an intellectual status, compared with other parts of the industry or other professions. There is, today, increasing evidence that cadastral studies have turned around in some aspects.

Economic development and economic depression can be of fundamental importance for evolving institutional and organizational infrastructures in accordance with national strategies of cutting government inefficiency and duplicated tasks. Obviously, development cadastral organization is essential to establish law and order in the use of land resources as well as to form real estate markets. Technical infrastructure stemming based on computers and telecommunication is able to observe, record, store, retrieve and analyze cadastral data. However, converting these opportunities into reality depends on detailed analysis of cognitive processes to achieve higher levels of automation. This need for automation led the economy to develop and maintain large data sets in modern cadastral systems.

The primary design goal of the Cadastral Electronic Field Book (CEFB) is to provide surveyors with a tool with which they can more easily analyze and automate cadastral field surveying and computational processes (Parker et al., 1994). CEFB is not intended to be a collection package for all types of surveying, but is designed for cadastral surveys where large amounts of traverse data, evidentiary information, and geodetic computations are involved.

Different survey requirements dictate that different data collection practices and procedures should be used. A good example of this is the case of engineering design surveys. The Florida Department of Transportation has recently developed a highly automated survey data collection and manipulation software system (Paker et al., 1994). They argue that this system provides excellent data collection capabilities which include concepts such as chaining, feature coding, instrument calibration, time tagging, etc. Data that has been collected with this system can be transferred directly into a computer aided design format digitally, including line work, attribute information, and surface model definition. This CEFB enables the surveyor to integrate computer aided design (CAD) for surveying and mapping (CSM) applications.

7.1 Surveying for Sustainable Land Management

The activities in cadastral surveying and mapping are important parts of the cadastral information system. The main task has been the measurement of boundaries and parcels, and updating of the cadastral map. With the advent of information technology, any cadastral agency strives to modernize the cadastral maps which aim at: connecting all cadastral maps to the national reference system using the large scale map, improving the quality of the map by comparing the cadastral boundaries with the topographic features on the large scale base map and bringing the maps into digital form (Polman, 1990).

The process analysis deals with the information and knowledge flows that relate to surveying and mapping processes. It has thus a restricted value for other fields of interest because the processes depend heavily on institutional and organizational circumstances as well as all levels of surveying techniques.

To be able to build up the integrated surveying and mapping process, all cadastral map sheets should be converted to digital format and connected to the national reference network. If these maps are of good quality, they can be digitized and transferred directly to the database. The best ways to keep the whole process consistent is to ad here to CSM procedures and standards.

Land parcel mapping is a continuous process that should evolve toward increasing reliability and accuracy. These maps are never finished, and require constant updating to keep pace with cadastral transactions. Parcels are complex features. Even the definition of what constitutes a parcel often varies widely. It is important, however, to stress the importance of a parcel in the CSM environment because many of the principles of LIS are data-driven, similar to processes of CAD/CAM for architecture and mechanics.

High-level communication in a format that is computer-interpretable minimizes the need for human interpretation and enables integration of applications as one of the technical requirements of re-engineering. Computer-interpretable communication requires standardization agreements. The surveying and mapping industry is too fragmented to make such agreements at the project level because survey teams use surveying techniques in accordance with the requirements of their map scale and survey project. They change too often to make standardization agreements economically feasible. The other major problem is that they use many different data formats and specifications in

CSM. Therefore, an agreement at the industry level is required that is supported by all participants, in all applications, and preferably on a national and international scale. However, an industry-wide agreement for the surveying and mapping industry is very difficult to realize. This is why re-engineering based upon object technology will be required to enhance the efficiency and effectiveness of CSM for better land management.

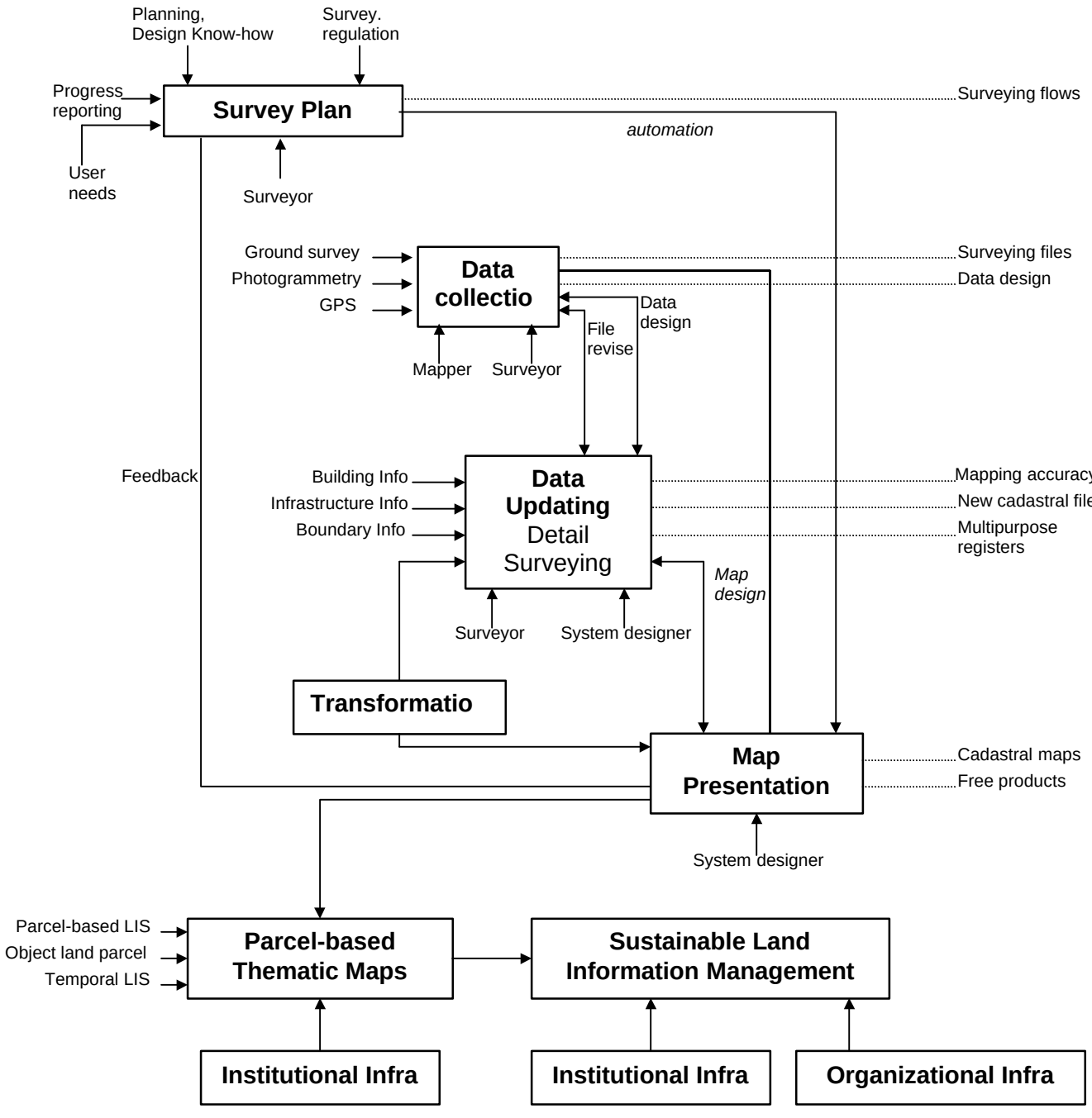

Figure 7. Surveying for Sustainable Land Management.

8. Conclusion

Re-engineering is a holistic, and dramatic development that occurs when an enterprise radically redesigns work for quantum improvement in performance. Michael Hammer and Champy (1993) defined this concept to imply fundamental rethinking and radical redesign of business systems to achieve dramatic improvements in critical measures of performance such as cost service, and speed. In this paper, we examined the notions and principles of re-engineering aimed at recreating business process and strategies.

With regard to the regeneration of the cadastre, we also highlighted the current cadastral status quo in view of the socio-economic requirements, IT and IS, planning and cost-benefits of cadastral systems. A cadastral information system contains a number of phases and processes associated with map-making, property surveying, property assessment, and property land title registration, etc. The cadastre is a very strong factor in LIS. Nonetheless, the cadastre should be updated.

New surveying techniques necessitate re-engineering of the cadastre on the grounds of new developments in technical, institutional and organizational infrastructures. With the rapid spread of Internet and data modeling, cadastral data collection and upgrading can cope much easier with current public and private needs. Especially, the CAD for surveying and mapping (CSM) is not only coming to research object, but also emerging controversies in GIS communities. One of methods, today, is the CEFB that enables surveyors to register cadastral data very rapidly. But there are needed to be much considerations of softwares and hardware platforms in accordance with enhancements of CSM processes and standardization of data formats. The CSM may be new approach to surveying and mapping arena as a powerful reengineering methodology to integrate different parts of workflows toward modern LIS.

Thus, reengineering is one of good ways to streamline duplicated and complicated workflows from property surveying through property registration among government agencies. To be able to accomplish reengineering for sustainable land management, organizational, institutional and technical change management should be taken into considerations.

In conclusion, reengineering is that the reshape of government is entering new territory. Traditional government structures, characterized by appropriated funds, stovepiped functions, and hierarchical bureaucracies, are migrating to new forms of governance, not only for surveying and mapping business and land information management, but also for sustainable land management land policy.

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