Mapping the Business Processes before Mapping the Ground: Building the e-Land Administration Infrastructure

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Key words: Cadastre, ICT,Business Process, Land Administration.

ABSTRACT

The point of departure for this paper is the 1999 UN-FIG Bathurst Declaration which called for the re-engineering of the land administration systems, through the proper use of information and telecommunication technologies (ICT). This paper argues that to implement the Bathurst Declaration is essentially moving to provide e-Land Administration (electronic-Land Administration). e-Land Administration involves a fundamental shift in the way the land registration and cadastre agencies build and develop their information systems, i.e., a genuine and results-oriented move to enterprise systems (ES). The ES imply a distinct focus on the core mission of agency and thus its business processes—i.e., moving from existing processes to e-Processes. e-Processes involve identifying, targeting, and improving an agency's process base and tightly integrating an ES with it to increase process efficiency and effectiveness. Implementing e-Processes requires a distinct knowledge-base and toolbox of techniques/approaches which are: (1) business process-oriented and (2) land administration-specific. This paper will present a set of useful guidelines for cadastre and land registration decision-makers as regards the latter by answering the following questions when moving towards an e-Land Administration environment: (a) what type of e-Process investments are available to choose from? (b) how can you identify the core (non-core) business processes?; (c) how you should start the e-Process implementation? Finally, the above framework and underlying principles are illustrated through the lessons from the case of automating the Lebanon's land registries and cadastre departments—a case of building the UN-FIG e-Land Administration Infrastructure.

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1. INTRODUCTION

According to the FIG-UN Bathurst Declaration[1]:

> "Many land administration systems need to be <u>re-engineered</u>. Efficient and effective <u>land information infrastructures</u> are required… It is recommended that governments be encouraged to re-engineer their land administration systems…Land administration systems need to be more <u>service-oriented</u> ... In <u>re-engineering systems</u>, attention needs to be paid to an increasing complexity of legal rights, restrictions and responsibilities …Land administration systems are increasingly required to handle vast amounts of data as a consequence of which, the <u>understanding and use of information and communication technology (ICT)</u> is becoming a necessity. However, there is a considerable <u>risk that ICT may become the driver rather than a tool</u> serving user needs. The installation of hardware and software systems should be based upon a <u>careful analysis of current and future information flows</u> and the need to maintain land and property records. When <u>information systems are conceptually well designed</u> they will become a critically important component of spatial data infrastructures." [underline emphasis added by author]

In particular, ICT-intensive land administration projects usually cover some aspects of titling and registering of real property and typically incorporate the provision of aerial photos, ground surveys, Global Positioning System, improving the national geodetic grids, computers, graphic software, etc. The implication is that through application of ICT, there will be improvements to the business processes through which land is surveyed, registered, valued, adjudicated, etc. and thus in the delivery of the intended products, be they titles, title abstracts, fiscal cadastre, etc. However, to deliver typical land administration improvements through ICT projects means more than this. Because, although "careful analysis of current and future information flows," can lead to "information systems are conceptually well designed," this is easier said than done. And as is always the case, the devil is in the details. In other words, although the Bathurst Declaration calls for service-orientation, in practice the matter involves highly differentiated specialized functions and overlapping responsibilities within and outside land administration organizations. Unless the associated business processes of land administration are targeted as the core issue, the practical effectiveness of ICT investments will remain sub-optimal.

In fact, it is argued by this paper that the core business processes of land registration and cadastre have not received the attention they deserve in ICT-based land administration projects. There may be numerous reasons for this state of affairs. On the one hand, it is relatively easier to prescribe and specify bundles of ICT (hardware and software) to be used for land administration. On the other hand, it is much harder to target and specify precise improvements in the business processes of land administration, which are organizationally

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and institutionally difficult problems involving both human and technical issues. Nevertheless, just because a problem is difficult, it should not prevent us from tackling it and developing methods for its solution. This paper argues that an Enterprise System (ES) approach to ICT investments in land administration will provide some elements of the latter solution.

We have identified the inadequate emphasis on business processes as an obstacle to effective implementation of ICT in land administration. Even if we agree with this premise, we still face two challenges to be able to put the right level of emphasis on the processes. First, how do we find out which particular process is the right one ("core")to invest in or improve? Second, having identified a core process, the next problem is, how can we improve it and what are the typical issues we are expected to resolve? Addressing these two questions is taken up by the remainder of the paper.

2. DEFINING & TARGETING PROCESSES FOR ICT INVESTMENTS

2.1 The Process Paradigm

The low/no emphasis on business process syndrome is easy to observe through anecdotal evidence. Many land administration organizations have found that even dramatic levels of investment in the ICT often don't translate into better overall performance—e.g., number of secure titles issued. In fact, they may work against the stated goal. A major and populous middle eastern country tried and did not succeed. After a few years of work, preparing approximately half million mapped parcels, the project architects are back to the drawing board. The second try, if it comes to that, will include a clear target of the existing business processes and how improve them.

The implication of the above argument is that ICT though essential in improving land administration, should be regarded as enabler of improvements to the land registration and cadastre business processes. This is consistent with the caution by the UN-FIG Bathurst Declaration that there is a "…risk that ICT may become the driver rather than a tool…" So a framework is needed that is both simple and elegant but illustrates the inherent necessity of business process approach. One that is put forward by Steven Alter of University of San Francisco is called the Work-Centered Analysis framework.[2] Alter's contention is that since almost all work in organizations is carried out within or around business processes, we need to give these the attention they deserve in all projects that target organizational improvements (particularly those involving large information technology investments). According to the framework, the primary role of the business processes are to produce products for customers. They are supported or involve: stakeholders, participants, information, and technology. This framework or other similar ones[3], help to create a clarity of focus on business processes that is needed in implementing improvements to land administration.

Let's illustrate the relevance of the business process approach with another case which is perhaps opposite of the middle eastern country. A large county government in the western U.S.A found itself dealing with a deluge of land subdivision applications in early 1990s'. By targeting its core business process, i.e., for processing plats, for improvement it managed to

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raise productivity and also achieve greater citizen satisfaction. The investments appeared rudimentary technologically but in terms of real impact they were precisely what was needed. Often, this very simple focus on reducing cycle time for plats and what it takes to do so in terms of related business process improvements is overlooked with disastrous consequences.

The moral of above stories is not that ICT investments in land administration projects should not include the needed hardware and software. Rather, the objective is to point out that to produce the proper impact and substantially affect the capabilities that most influence a land administration agency's performance—its *core business processes* need to be directly targeted for improvement. These ICT investments which are process-based are usually known as ES. The ICT-based land administration projects which do not target ES or core business processes, are not only unlikely to achieve their intended improvements and they may also waste financial and human resources on disruptive and disappointing initiatives.

2.2 What are Core Business Processes? Processes with Salience and Worth

How can land registration and cadastre organizations improve their core business processes? As a first step, a framework is needed to determine what a "core process" is. Such a framework can aid in deciding which business processes are worth improving and thus require investments. To distinguish core versus non-core business processes two aspects of processes should be assessed: the *salience* of a process, or its relative importance to a land administration organization, and the *worth* of a process, or the relative value added.[4]

This framework can be used to guide the land administration project ICT investments by focusing attention, money, and human resources on a small number of major business process improvement opportunities within the land registration and cadastre sphere. In other words, the organization can marshal its scarce ICT investment resources towards the business processes that make a difference to its mission. The salience and worth are described in more details below.

SALIENCE. The word *salience* suggests standing out from the general surface, being prominent; salient processes are the most prominent ones. They are the processes that relate most directly to the basics of land administration—those that visibly relate to the core business of land registration and cadastre—and the priority activities that keep the engine of everyday work running. It is not difficult to come up with various examples in multitude of land administration projects where resources were invested without a clear focus on process approach or in processes that were not critical to their success. Some things are improved, sometimes dramatically, i.e., producing accurate aerial maps of the land parcel boundaries. However, in many land administration projects, the major bottleneck is usually not the map itself. Rather, it is the processing of map and the associated activities that consumes effort, financial resources and significant amount of time.

For example, in one cadastre organization post-processing of private surveyors' work by the government surveyors and the quality control of the latter surveys consumed up to two-thirds of the total time it takes for them to get checked and approved. Thus, in terms of importance or salience any improvement to this portion of the survey work processing can have a far

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reaching impact on the overall performance of cadastral map preparation.

For a process to be salient it should be a long-term activity in the value chain of the organization. The value chain is usually defined as a series of activities according to which functioning of the organization can be understood in basic terms. According to Porter (1985)[5] value chain activities fall under two generic broad categories: primary and support. Primary activities constitute the physical production of a product or service, delivery, and service: inbound logistics, outbound logistics, operations, delivery, and service. The support activities bolster the primary activities and each other by providing purchased inputs, human resources, and some form of technology to perform a given function. Porter divides support activities into four areas: procurement, technology, human resource management, and organization's infrastructure. The first three can be associated with specific primary activities, or they support the entire value chain. The infrastructure usually supports the entire chain as the name implies.

To determine a salience of a process the following questions should be answered regarding the process:

- Can the process be accounted or included in the value chain of the organization? (if yes, then others should be answered, if not, it is candidate for elimination or outsourcing)
- Is it a customer facing process (key to the identity and service delivery of the agency)?
- Is it critical to the mission accomplishment of the organization?
- Is it a key support process (an overhead activity required to accomplish the mission)?
- Is it a mandated process required by law/regulation/etc.?
- Is it another type of process (candidate for elimination or outsourcing)?

If the answers to all above questions (except for last one) is positive, then the process is candidate for being salient. However, the degree of salience requires more situation-specific information and also awareness of mission-criticality which can only be assessed on a case-by-case basis. In general, customer-facing, mission-critical, support and mandated processes are regarded as highly salient.

In a land administration project some activities can be assessed in the following manner. Mass systematic ground surveys conducted one-time to initiate demarcation and field adjudication are clear examples of non-salient activity—they can be outsourced. The quality assurance/quality control and audit function of these surveys, however, is clearly a salient process which is in the value chain, because without such a compliance check and enforcement there is little trust in the work of the surveyors and thus its value. The proper record keeping and the associated infrastructure is also a salient support process, which directly contributes to accomplishing the mission of the land administration as the custodian of land records.

WORTH. The worth of a process is the relative customer and organizational value it adds for a land administration project. For example, GPS-based surveys may be implemented,

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providing impressive, measurable benefits (a very fast and quick boundary survey), but benefits are not value. Consider the project in the large Middle East country versus the Nevada county government both of which included the provision of sizable land administration investments. The former made productivity gains in technical map production with little visible improvements in title production and delivery processes. The latter, however, streamlined and accelerated a business process that in terms worth produced significant gains.

The basic principle of process worth is simple: any process ties up resources of the organization and also returns some value (some return negative value which is quite possible). A process that ties up resources but is value-neutral, is candidate for outsourcing or elimination. To determine a business process's worth two questions should be answered:

- Approximately does the process tie up significant (financial and other) resources of the organization? (usually a threshold should be established based on the particular organization, say, 5% of the budget of a function, etc.).
- Does the process generate a positive or negative value after an approximate accounting?

If the answer to the first question is "not much", then the process is probably not worth considering for improvement or it should be outsourced or may be eliminated. Although a process's costs and generated value are basic economic considerations, it is realistic that in most land administration organizations, the managers will not be able to supply such information. Thus, the reader may question the utility of a framework based on information that is almost impossible to track. However, readers can be reassured that: (a) there is no need to collect massive cost data, because the underlying logic is more important (it is better to be approximately correct than to be precisely wrong!); (b) the notion of value being negative or positive speaks to processes being assets or liabilities for the organizations which is a reasonable assumption and quite easy to estimate rather than accurately calculate.

Let's illustrate this through an example. A national land registration and cadastral agency is undergoing automation. The managers are being asked to come up with a list of processes and functions that should be automated. A long list of processes was produced including the automation of the actual title register, the map sheets, inheritance transfers, inter-family transfers, foreign-owner transfers, etc. Upon careful examination by the project team, it was discovered that the production and delivery of title abstracts contributes to less than 20% of the total revenue (a far cry from most of the latter transfers) generated through real estate fees, but it consumes more than 80% of staff time (primarily due to manual hand-copying of the information onto the title abstract form). (This is a classic application of 80/20 Rule!) Answering the above questions, the process ties up substantial amount of total staff resources of the agency and it is on the negative side of value added (i.e., although it is a liability in terms of value added, it is an integral function of land registry required by law). Therefore, it is a candidate for both improvement and automation.

Having determined the salience and worth of business processes within land administration it becomes relatively more straightforward to label the respective processes as either core or

non-core, and a perhaps a third category, semi-core. The core business processes are those which have both high salience and high worth to the organization. Conversely, the business processes that are labeled as low-salience and low-worth are non-core. Furthermore, after performing such an assessment of business processes, some processes may end up being high-salience, low-worth and high-worth, low-salience. The latter may still be targeted for improvement for obvious reasons—labeled as "semi-core". Figure 1 is a pictorial illustration of processes which are labeled core, semi-core and non-core (plotting salience versus worth with low-high categorization yields a conceptual 2 x 2 matrix with the upper-right-hand containing the core processes).

The rationale and approach to identifying core business processes are summarized below:

− Land administration business processes are "core and non-core" ("semi-core").
− Importance of a business process is determined by whether it is: a value chain activity; customer facing; mission-critical; support; or mandated.
− The worth of a process depends on how much organizational resources it ties up and what level of value added it produces (either negative or positive).
− Sustainable projects prudently invest in core (& semi-core) land administration business processes.
− The salience/worth framework and its proposed application do not depend on "hard" numbers but on high-level but realistic estimates of resource use/value added.

Bearing the above approach in mind, it is commonsensical that land administration business processes differ from one another in their importance to a land registration and cadastre organization's survival, and that investing in core processes is more likely to help the organization's success in delivering on its mission than investing in lesser ones. So far we have proposed a method to identify which processes should be targeted for investment and improvement. However, a different and perhaps a more vexing problem still exists: how to improve the processes that are targeted for investment? That is the topic of the next section.

3. USING PROCESS MAPPING AS A TOOL TO IMPROVE BUSINESS PROCESSES

In this section, we will describe "process mapping," an essential analytic tool that offers a clear graphic representation of the workings of an organization's processes. This is usually the precursor to understanding and improving the targeted business processes. It is through these land administration processes that the real work of land registration and cadastre gets accomplished. These business processes often embed tacit and explicit knowledge of land registration and cadastral business practices which are often accumulated over many years and distilled into unconscious business rules that are applied automatically. Thus, not all business processes can be or should be improved in the same way. Many business processes offer opportunities for greater effectiveness and efficiency, but only if they are analyzed individually. Below, we will discuss practical ways to "dissect" business processes for improvement.

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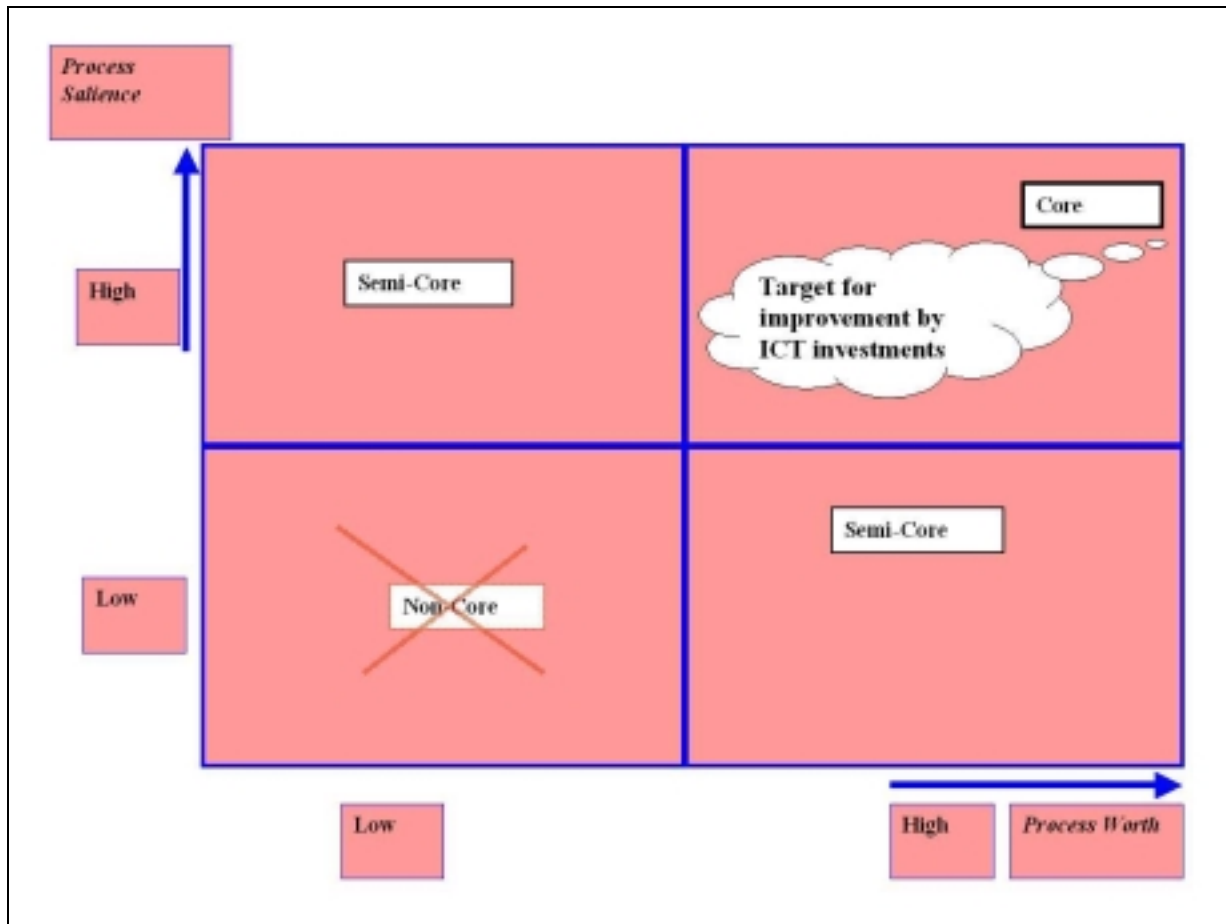FIG XXII International Congress
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Figure 1—Determining the Core Business Processes of the Organization

We propose process mapping as a tool to be used to describe, in workflow diagrams and supporting text, every vital step of land administration business processes. Too often we believe that we know business processes, but in reality most managers who want land administration investments badly do not really understand what the underlying processes are composed of or how they can be improved, simplified, or eliminated. Process mapping is a proven analytical and communication tool intended to help us improve our existing processes or to implement a new process-driven structure enabled by land administration investments.

According to Davcnport,6 "A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs/outputs: a structure for action". Often processes are rolling along (or, frequently, fumbling) in organizations, whether they are attended to or not. We have two choices—we can ignore processes and hope that they do what we wish, or we can understand them and improve them.

A business process is a series of steps designed to produce a product or service. Some cadastral/land registry processes (such as the map drafting) may be contained wholly within a function. However, most processes (such as survey/title subdivision processing/production) are cross-functional, spanning the "white space" between the boxes on the organization chart. What are some of the ways that, aided by land administration investments, business processes

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can be re-designed and improved:

- – Eliminate duplicate activities
- – Combine related activities
- – Eliminate multiple reviews and approvals
- – Eliminate inspections
- – Minimize hand-off and re-do's
- – Simplify processes
- – Process in parallel
- – Eliminate movement of work.

In order to improve business processes, first they need to be mapped and then they need to be linked to three organizational performance variables: (1) process goals, (2) process design and process management. Each of these process-based variables is described below.

3.1 Process Goals

Each process should make a contribution to one or more enterprise land administration goals. Therefore, each process should also be measured against process goals that reflect the contribution that the process is expected to make to one or more enterprise goals. In practice most processes do not have goals. While functions (departments) usually have goals, most key processes cross functional boundaries. If we are working in a cadastre/land registry organization in which surveying is a key process, and if we ask for the goals of the cadastre (survey) process, the response usually is, "Oh, you mean the goals of the Cadastre Department." When we reply that we really do mean the cadastre process—including those steps accomplished outside the Cadastre Department—we frequently get blank stares.
Performance measurement is most effective if it is done in relation to strategic or tactical organizational/enterprise targets, or goals. Process goals are derived from three sources: (1) enterprise goals, (2) customers' requirements, and (3) benchmarking information. Process benchmarking—comparing a process to the same process in an exemplary organization—is very useful.

Process goals are usually linked both to enterprise goals and to customers' requirements. Note that, in our examples, they are not merely goals for the cadastre department. These process goals also reflect the performance expected of focal process' partners (land registry) in the process of say the subdivision plat processing and field survey operations. By meeting these goals, this process will make a significant contribution to the realization of the enterprise's strategic vision: more efficient land registration and increased tenure security in the land market.

A cadastre department's business goal may be to reduce the subdivision application cycle-time response to an average of "5-days by the end of next year." The goals for this process might include:

Error rate in Quality Check/Audit of Subdivision Surveys will be less than 1%.
We will meet our 5-day cycle-time goal without increasing the staff complement by using

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geo-technology.

We will provide our customers with a single point of contact for questions regarding their subdivision application processing.

To meet these business goals we should also establish process goals for the "subdivision plat" process. In all cases, the key "process mapping" goal is for the core processes to be linked to customer and organization requirements.

3.2 Process Design & Management

After we have established goals for the core land administration processes, we need to ensure that the processes are designed to achieve those goals efficiently. To determine whether each process and sub-process is appropriately structured, we should create a cross-functional approach to build our process map. This shows input-output relationships among process-dependent operations and departments, and documents in a step-by-step process the sequence of activities that are required to convert inputs to outputs for the specific process. Too often, one finds that there isn't an established process; the work just somehow gets done.

Figure 2 illustrates an "As-Is" (current state) process map of a subdivision plat process, as developed in a typical cadastre automation project. The team traces the process of converting the input (subdivision application) through all the intervening steps until the final required output (payment) is produced. The process map shows how all functions are involved as the application is processed. This process mapping structure allows you to identify all the critical interfaces, overlay the time to complete various sub-processes on the process map, start to define the opportunities for improvement, and identify "disconnects" (illogical, missing, or extraneous steps) in the processes.

As we document and analyze the current "As-Is" process for processing a subdivision application, we may identify a number of disconnects, such as:

– Secretariat takes too long to assign a work order number.
– Individual surveyors slows down the process by batch-handling applications.
– Quality checking of the plat and field survey check are done for all applications rather on an audit of a random sample for each.
– Quality checking of plats holds up the process because it is done in series with field verifications.

Reduction of cycle-time is usually a very deserving target in most process improvement efforts. In particular, outdated land administration business processes are excellent candidates. Experience of the author is consistent with the general findings of white collar business processes, where value added time (the time in which a product or service has value added to it, as opposed to waiting in a queue or being reworked to fix problems caused earlier) is typically less than 5 percent of the total processing time.7

We then can create a "To-Be" Process Map, which reflects a "disconnect-free" subdivision process. That process map is shown in Figure 3. As Figure 7 shows, the major changes in the

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"To-Be" map may be:

Direct application work order assignment data entry by Secretariat, with no delay.
Reduce management checks through digital access to base map and registry system.
Requiring digital survey plat applications.
Eliminate drafting through COGO (digital coordinate geometry).
Parallel plat quality checking and field verification.
Elimination of multiple logbooks among functions (for each hand-over).

"As-Is" and "To-Be" process mapping are the central steps in process improvement projects. However, we should not get mired down in excessive "As-Is" detail; the objective is to aggressively eliminate, simplify, or improve our "To-Be" processes by using appropriate land administration investments including digital base maps (e.g., ortho-photos), COGO software, GPS receivers, Electronic Field Books, Total Stations, etc.

A successful process improvement effort results in a positive answer to the key process design or improvement question: Is this the most efficient and effective process for accomplishing the process goals, and can it be aided by the identified land administration investments?

4. PROCESS-ORIENTATION OF ICT IVESTMENTS IN LAND ADMINISTRATION

Using process mapping as tool, the following key land registration and cadastre business process management questions can be posed and answered:

- Do we understand these processes?

- Have appropriate process subgoals been set?

- Is process performance managed?

- Are sufficient resources allocated to each process?

- Are the interfaces between process steps being managed?

- Can the processes be improved or their interfaces?

- Are the appropriate land administration investments identified to enable these improvements?
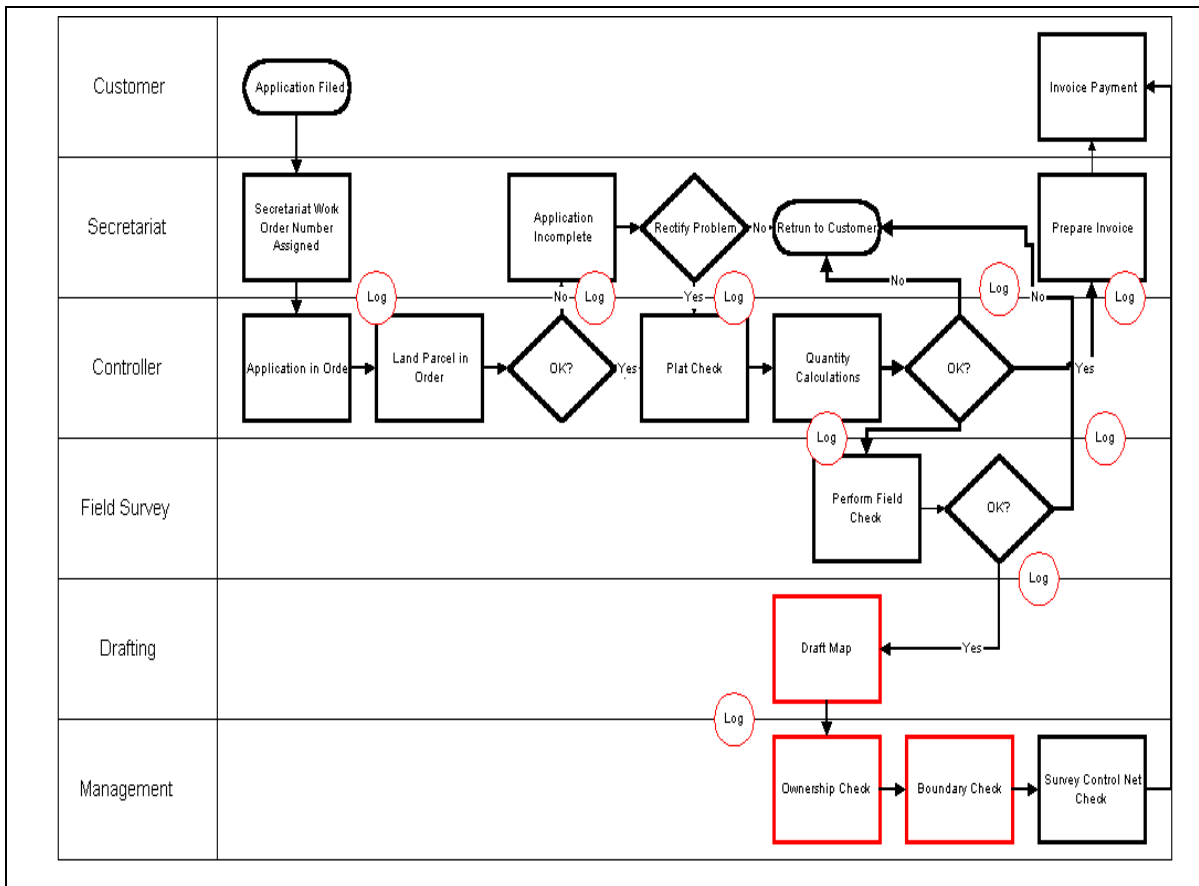
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Figure 2—Subdivision Plat Application Process "As-Is" Process Map

−   It should be noted that, only last step involves the introduction land administration goods and services investments.

It is a proposal of this paper that, traditional land administration projects agencies emphasize the technical aspects of the projects in the form of land administration goods and services. Nevertheless, these investments are merely inputs into the business processes of land registration and cadastre. As such, they are enablers of the land administration improvements. The real targets of opportunity are the land administration business processes which are enabled by these investments but usually do not receive the proper level of attention. The paper proposed a two-part approach to rectify this situation whereby: (a) the "core" business processes are identified and targeted for investment; and (b) improvements to these business processes are identified and implemented.

The approach to the identification of core business processes was based on determining their salience and worth to the organizations. Subsequently, a process can be labeled as core, semi-core, or non-core. The core and semi-core business processes are to be targeted for improvement and investment. The non-core business processes are proposed for elimination or outsourcing. The core (and semi-core) business processes are then analyzed for improvements—through application of land administration investments. The tool used to

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define the business process steps and the needed improvements is "process-mapping". Process-mapping is a very simple and powerful tool to quickly identify and map business processes so that potential deficiencies can be revealed and targeted for improvement.
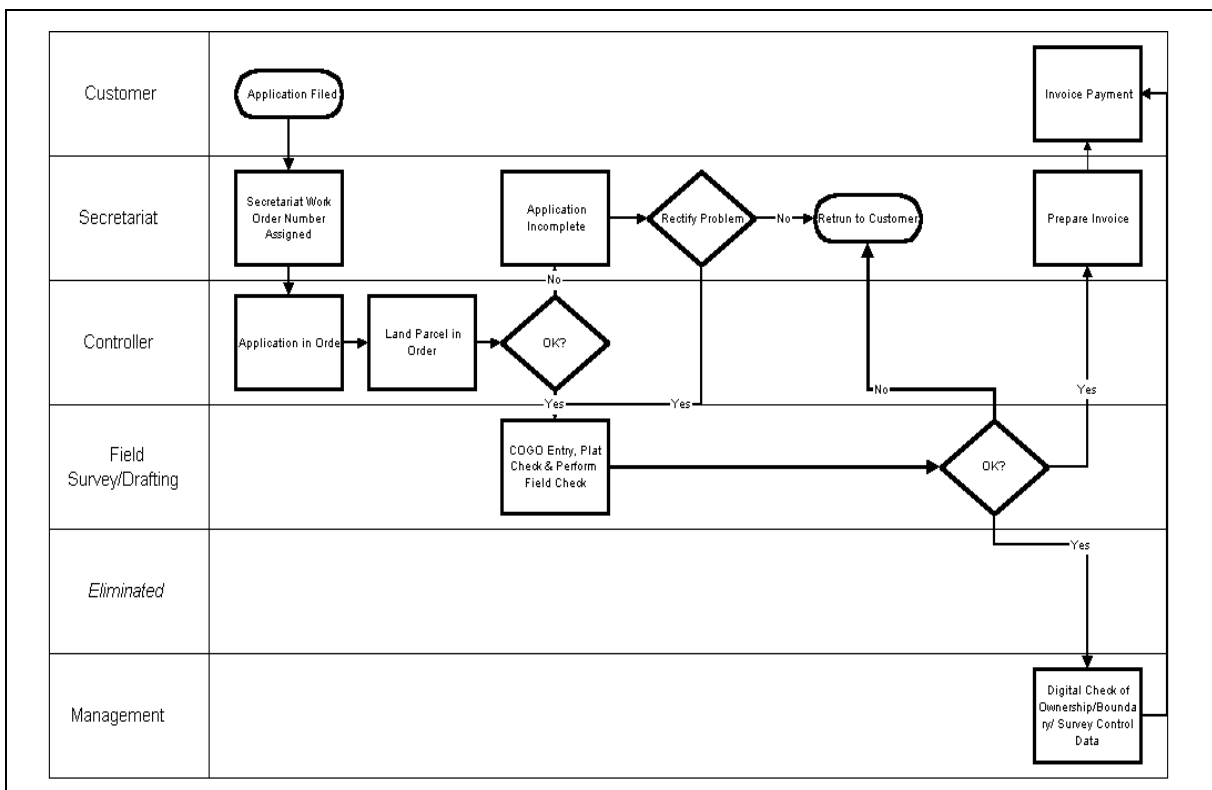

Figure 3—Subdivision Plat Application Process "To-Be" Process Map

It is the belief of this author backed up by tangible results that, by standing the traditional motto of land administration ICT project "Let's map the ground so that cadastral mapping and surveying can be more easily done with ICT" on its head and saying, "I have a land administration business process to improve, how can I use ICT investments to do so?", we can increase the effectiveness and efficiency of land registration and cadastre ICT investments significantly.

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