

Redesigning Processes in Municipalities: A Case Study on Developing Process Architecture and Mapping Processes

Belediyelerde Süreçlerin Yeniden Tasarlanması: Süreç Mimarisi Geliştirme ve Süreç Haritalama Üzerine Bir Örnek Olay Çalışması

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ABSTRACT

Process oriented management approaches constitute the most important source of forming an effective management mechanism. This source assures that the institution is correctly understood by all its stakeholders, mutual work areas are defined, collaborative working culture towards certain goals are adopted. Within the framework of process management, defining the processes via reviewing the activities of the institution, modeling or mapping these processes with a standard language, determining the performance indicators to provide for traceability turns into a total reconstruction effort within the institution. Local administrations are those public institutions that need process oriented management the most due to their structure and their activities related to the regulations as well as due to their direct interaction with their citizens. In this study, the importance of process management within the framework of public administrations is emphasized and the structure of the process architecture is presented that came to light as a result of the project study that was carried out privately in a certain municipality; the processes defined within the proposed architectural structure are exemplified in accordance with work processes modeling and notation.

Keywords: Business Process Management, Municipalities, BPMN.

ÖZET

Süreç odaklı yönetim modelleri, kurumun tüm paydaşları tarafından doğru anlaşılması, ortak çalışma alanlarının tanımlanması, belirli hedefler doğrultusunda birlikte çalışma kültürünün benimsenmesi ve etkin bir yönetim mekanizmasının oluşturulmasının en önemli girdisini oluşturmaktadır. Bu kapsamda, kurum faaliyetlerinin gözden geçirilerek süreçlerin tanımlanması, bu süreçlerin standart bir dil ile modellenmesi veya haritalandırılması, izlenebilirliği sağlamak için performans göstergelerinin belirlenmesi, kurum içinde tam bir yeniden yapılandırma çalışmasına dönüşmektedir. Yerel yönetimler, yapısı ve mevzuata bağlı faaliyetleri ve vatandaşlarıyla doğrudan etkileşimde bulunmaları nedeniyle, süreç odaklı yönetime en çok gereksinim duyan kamu kurumlarıdır. Bu çalışmada, yerel yönetimler kapsamında süreç yönetiminin önemi ve belirli bir belediye özelinde yapılan proje çalışması sonucunda ortaya çıkan süreç mimarisinin yapısı sunulmakta; önerilen mimari yapı bünyesinde tanımlanan süreçler, iş süreçleri modelleme ve notasyonuna uygun biçimiyle örneklendirilmektedir.

Anahtar kelimeler: İş Süreçleri Yönetimi; Belediyeler; Süreç Yönetimi; BPMN

1. INTRODUCTION

It is possible for institutions to reach the determined performance level subject to a certain strategic plan with an appropriate organization structure. Action plans and performance programs are developed based on the strategic plan to achieve institutional goals. Furthermore, performance actions and performance programs can only be

carried out through the processes in today's dynamic institutions. In a world that is rapidly changing, as the needs of societies differentiate, the obligation arises to review the way institutions transact business and their operational structure. Reconstruction efforts are contextualized together with process management in the world and in Turkey. Process management and related applications show themselves with the

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effort to use the human resources effectively and efficiently both in public and private sector. One of the institutions that needs such efforts in public sector is the municipalities.

According to Yildirim (2014), L. Wallock and W. Saharp drew attention to "the most important metaphor "organism" in the 19th century" as stated in their book *Visions of Modern City* because the phenomenon of "City" which has taken the writers and philosophers under its spell as some kind of "giant humane creature" is changing its shell. The definition of large urban areas is now based on "atom", nuclear city and the suburbs surrounding it. The transition from this "organism" to the "atomic particle", from biology to physics, is the indication of our vision of the modern city as complicated and insecure. Maybe these two metaphors function in different ways as well as serving different needs. Therefore, cities ought to be evaluated, as a system consisting of many components and the administration of a city should be realized with a process-oriented approach to lead all of its components towards a common goal.

Public institutions manage their processes to realize the goals they determined to accomplish the strategic plans they formed in accordance with their missions and visions. The correct management of the processes and resources is important to reach the goals. The criteria associated with these goals play a pivotal role for evaluation. Through performance measurement, the indispensable matters for the improvement of both the process performance and the institutional performance are determined. Attaining the metrics regarding the performance management from process models make it possible to establish the infrastructure of a performance management related with the strategic approach and processes of the institution (Aysolmaz et al., 2011).

Process oriented management approaches constitute the most important source of forming an effective management mechanism. This source assures that the institution is correctly understood by all its stakeholders, mutual work areas are defined, collaborative working culture towards certain goals are adopted. Within the framework of process management, defining the processes via reviewing the activities of the institution, modeling or mapping these processes with a standard language, determining the performance indicators to provide for traceability turns into a total reconstruction effort within the institution. Local administrations are

those public institutions that need process oriented management the most due to their structure and their activities related to the regulations as well as due to their direct interaction with their citizens.

In the study carried out within this framework, the importance of process management within the framework of local administrations is emphasized and the structure of the process architecture is presented that came to light as a result of the project study that was carried out privately on the example of a Metropolitan Municipality in Turkey; the processes defined within the proposed architectural structure are exemplified in accordance with business processes modeling and notation. During the construction of the proposed architecture, value-oriented classifications were made on common quality attributes which were created for those activities carried out over common units. Value definitions were made on this architectural structure that might form an input for the core processes of municipalities; the whole architecture was attained by the addition of administrative and support processes that were proposed to build and apply.

2. PROCESS MANAGEMENT IN MUNICIPALITIES

2.1. Process Management

The process, which can be defined as the series of activities transforming the institutional resources into useful output, is arranged according to the institution strategies by a certain authorized person or a responsible organizational unit. Process management on the other hand is putting together the resources for the benefit of institution; planning and putting into practice innumerable series of activities to create value through transformation when necessary.

Aguilar-Savén (2004) explained the concept of the business process as "the combination of a set of activities within an enterprise with a structure describing their logical order and dependence whose objective is to produce a desired result", and emphasized the importance of selecting a particular notation or a language to identify and analyze the work flows of an enterprise. The main idea behind these modeling efforts is to improve and redesign or reengineer the processes to reach the target points. Business process reengineering (BPR), one of the critical activities of quality management, covers

evaluating the processes and their structures to improve the quality of the business by eliminating the waste in business activities, and then disseminating the redesigned processes by standardizing them through a proper documentation. This effort generally requires a well-planned and long-term project management. Gunesakaran and Kobu (2002) explained the BPR through the particular types of changes, i.e. fundamental, radical, dramatic, and positioned the concept of BPR as the activities serving for fundamental changes to maintain the quality level and the continuous improvement within an organization.

Kettinger et al. (1997) proposed a methodology explaining the stages of such a project. According to their research, one of the milestones of BPR projects is related to the modeling and documenting business processes in organizations. However, there is no unique methodology for building a process architecture or modeling processes. Several frameworks and notations have been developed to represent business processes. Mendling et al. (2010a) discussed the adequacy of the current frameworks, especially, SEQUAL, i.e. a well-known framework, and proposed seven process modeling guidelines to fulfill the gaps and eliminate the quality issues in existing frameworks.

Modeling of the process architecture and processes that are addressed within the scope of process management, observing the whole within any institution, revealing the process interactions, monitoring the processes through performance indications, in other words, forming effective management mechanisms play a critical importance among such environments where dynamism and ambiguity are intensive.

Within the concept of process architecture, first value chains and main processes are positioned, following this stage sub-processes are modeled for each component of the chain. Therefore, the general architecture of the process is presented. Detail process models carry the reference document property that are used to establish a common language and effective process management mechanism within the institution while analyzing the processes, reviewing and designing them. Different flows, different policies and scenarios might be tried on these models and advanced analyses could be carried out for the most convenient flow. Planning the improvement activities over these models enable

obtaining results related with different cases without spoiling the active flow with very low costs (Dumas et al., 2013).

The processes are brought into a visual, standard and easily-understood state according to internal and external stakeholders of institutions using process mapping techniques. These maps might be reorganized if necessary with further improvements. The process maps or models which provide the process to be accurately defined visually, serve to determine the time span, stages, bottleneck possibilities of the process and the necessary resources. The interactions and relationships between the processes might require the process holders to work together and go towards coordination in the activities. Thus, more effective use of institutional resources and improvement of the performance might be provided. It is important that the processes that are well-defined and the leaders and authorized persons of which are determined are supported with a good technological infrastructure. The fast and correct running of processes is enabled with qualified, competent workforce, a good process map, appropriate technology and other supplementary resources.

In accordance with the mission and vision of the institution, the operational/main processes provide the bases for the production of products/services and information, stationary and financial sources; support processes provide the way to manage resources. These processes are monitored and controlled via management processes which are responsible for the development of the institution's performance. Process management and a management mechanism that might be established via related approaches create a positive influence on financial improvement, being able to provide the right product or service, efforts for enhancing the customer satisfaction which are considered within the scope of enhancing the institutional performance level (Turetken et al., 2011; Kohlbacher and Reijers, 2013; Jeston and Nelis, 2013). In this context, process performance is a key issue to achieve quality goals especially for the municipalities which are large-scale institutions managing several processes and providing various services. Thus, it means that their institutional performance is restricted by the performance of the processes. A successful process management system is only possible with the help of an efficient process

architecture in which all processes are defined and integrated.

For modeling and documentation of business processes, various notations or languages can be found in the existing literature. The selection is often made based on the purpose of modeling and also detail level of processes. Modelling concept, meaning, concept relationship, comprehensibility, coherence, and completeness have been considered as the major criteria for selecting the way of modeling (Hommes and Reijswoud, 2000). Logical representation is another issue for modelling the details of processes.

Data structures and data flows are often the focus of modeling in information systems, and Data Flow Diagrams (DFD) are used to represent the data flows over the process flows in these systems. Use of DFDs has been reconsidered after the concept of object-oriented programming and Unified Modeling Language (UML) have raised. Unified Modeling Language (UML) provides different modeling perspectives for standardizing the requirements of a software, and suggests activity diagrams to model business processes with its logical work flow (Jacobson et al., 1999; Aggarwal and Sinha, 2003; Razavian and Khosravi, 2008). Giaglis (2001) compared the modeling techniques used in business process management (Flowcharting, IDEF, Petri nets, etc.) to the techniques used in information system modeling (DFD, Entity Relationship diagram, State diagram, IDEF, UML) from different perspectives. Gemino and Wand (2004) also conducted a detailed research to evaluate the use of UML and other notations in requirements engineering in terms of the grammar structures of the notations.

When state based work flows are required, then Petri nets are the one of the most common modeling notation. Processes can be modeled and analyzed in details with the help of Petri nets because of its flexible use on control flows. It has its own mathematical structure and notation that supports building advanced models to understand process behaviors and to provide in-depth decision support for decision problems. Petri nets also have a competency that it can easily model stochastic behavior and be converted into the other notations (Murata, 1989; Van der Aalst, 1998).

Yet another workflow language (YAWL) was proposed by Van Der Aalst and Ter Hofstede (2005). Their research started as a comparative analysis of

the current process modeling notations and their work flow patterns, and then they revealed the main differences of the notations. The findings were used to develop this new language that takes Petri nets as a starting point and adds new abilities to obtain a complete workflow model.

Event Process Chain (EPC) notation considers the idea of even-transaction from customers' perspective, provides a formalism that supports BPR activities for identifying and redesigning critical business processes. EPC is different from the other modeling languages in representing the process over event flows. Each operation or sub process is triggered by an event and finalized by another event. Using this event-process structure, organizations can easily discover potential or existing bottlenecks in their processes (Kim, 1995; Mendling et al., 2010b). Sarshar and Loos (2005) compared of EPC and Petri nets in terms of their characteristics in control flow, hence revealed the differences and advantages or disadvantages of using those notations over the tested hypothesis.

IDEF is a family of modeling languages which is used to identify data flows, entity relationships, and process models. IDEF0, IDEF1x, and IDEF3 are the most common methods where IDEF3 represents the required ontology and the semantic rules for process modeling. The methods of IDEF provides nested modeling to support the ease of use and to improve the understandability of models (Menzel and Mayer, 1998).

The Business Process Modeling Notation (BPMN) (BPMI.org, 2006) is a commonly preferred industry standard for the graphical modeling of business processes. BPMN provides a variety of constructs that are more detailed and functional than other popular languages whereas some redundancies in its constructs that have still been investigated by process analysts (Recker et al., 2005; Zur Muehlen and Recker, 2008) analyzed the ontological structure of BPMN and suggested some improvements.

There exist many more techniques which have been developed for different purposes. Recker et al. (2009) investigated the particular number of process models and represented a comparative study on the current use of the models and notations. Their research stated that DFD, IDEF3, and BPMN performed best in representing the systems

completely and comprehensively, although BPMN has some redundant symbols that can be used for the same purposes.

In spite of some disadvantages for its complicated structure, BPMN is still among the most preferred modeling languages. Its comprehensive structure to represent every detail of the work flow, integration ability to be used in process execution or simulation platforms maintain the preference level in a high position by process analysts. By considering those advantages, BPMN is preferred as the language to represent the process models of the selected local management. an support a standard service patterns.

2.2. Municipalities and Process Management Efforts

Socio-economic and technological environment, where business processes can no longer remain effective for a long time, forces municipalities to manage a constant change. Municipal administrators need to review their business processes to manage constrained resources, to meet increased service expectations of their stakeholders, and to adopt to new economic and legislative regulations (Doyle, 2004). These efforts generally handled within quality and performance management activities.

Quality management and performance measurement studies have an increasing trend in the recent papers handling the problems in public sector including municipalities. Processes are generally developed and improved within a quality management system. Institutions commonly adopt ISO 9000 systems to construct an efficient management system based on process approach. Chu and Wang (2001) conducted a retrospective questionnaire survey of managerial perceptions about ISO implementation in the public sectors of Taiwan with a view to providing answers to the questions related to the reasons, benefits, key successful factors, and optimum scenarios for implementation. Hellein and Bowman (2002) determined the impact of implementation on quality management in four Florida state government agencies and the role of the Implementation stage was found as the critical point in success of those quality programs.

Ongaro (2004) reported one stop shops which regulated in order to decrease the business license related work which create the greatest amount of red type business in public administration. This is an innovation for public management reforms and lead

reengineering of public management and decrease the bureaucracy which traditionally because of heavy regulation of business performances on economic activities cause the negative impact on small and medium size businesses.

Waal (2010) presented a framework based on the high-performance organization (HPO) and the results of applying this framework in the public sector worldwide. The findings of this study revealed several themes that public sector needs to achieve a high performance. Some of the themes are related to process management and one of them is declared as:

“Make sure that the processes are really improved, simplified, and aligned to be able to strengthen the organization’s client dedication. Set up a training program to accomplish this task, and appoint a dedicated process manager who will watch over the quality of the process of improvement” (Waal, 2010, p.91).

Considering the theme given above, it is possible to come across with many studies in different levels related with processes in the municipalities or in a general framework in local administrations. It is clearly observed from the published reports on realized activities that the awareness about concepts such as process management, process improvement and process approach. However, these studies which start as an obligation of efforts within the scope of quality management systems rather than the necessity for process management might be turned into benefits through internalizing where they are applied and might become a real part of management mechanisms. Actually, when compared with such efforts where the rules are not clear, it might seem quite easy to design the process architecture of an institution all the efforts of which are determined via legal acts and the process models within this architecture.

Presenting the common process model and mapping efforts with an architectural structure is an application area encountered in international studies (Torres, 2007). Particularly in European cities this potential has been far more quickly discovered; the processes are not only modeled but also developed via current technological possibilities and turned into a system that can be accessible and traceable at any given time (Schunselaar *et al.*, 2014). Service oriented architectural structures are being defined for processes that are transferred to the automation

system to communicate with other service applications and to be able to design gateways to provide data exchange between institutions and as such an overall process integration is being made realizable (Christiansson, 2011).

Metropolitan municipalities are very large organizations and have many work flows for their services. It is not possible to model and follow them individually to manage them for adoption to change. This study, different from the previous ones, proposes a process architecture for metropolitan municipalities where processes are grouped with respect to the structure and independent from the departments they are carried out. This proposal creates a modularity to develop models for both existing and new processes. This study also exemplifies a process model within this architecture to emphasize the modularity.

3. METHODOLOGY

Municipalities generally adopt functional organizational structure and build independent work flows under each function related to the stakeholders. However, the services especially associated with citizens are carried out through many stages by different functions without a process-oriented approach, thus the performance of the service as a whole cannot be measured or below the expectations of the citizens, even if each related function individually performs its best. Contrarily to the functional structure, process-oriented approach handles each type of a service as a process with tangible performance measures and links its stage to the related organizational unit and then assigns one of the organizational unit a responsibility to trace the entire process form beginning to the end. Each organizational unit in the process plans and conducts the related work to achieve final process goals rather than individual goals. Top management of municipalities then should build a structured process management system based on a particular scheme to create values for internal and external stakeholders. This scheme is called as process architecture (Dumas *et al.*, 2013) including directly processes or the infrastructure that will be linked to one or more processes. In this context, the research questions of this study are that “how a process architecture should be developed in a municipality as a part of public sector that provides several services for citizens and other stakeholders” and “how

process design activities should be carried out”. These research questions require two-stage modeling and implementation: 1) building a process architecture; and 2) modeling a process.

One of the structures proposed in the study of Dumas *et al.* (2013) was selected to build the process architecture that forms the first stage of the study. Within this scope, the institution was imagined as a house; the stakeholders of this house were shown according to their position in the process with input and output relations. Furthermore, the competitors and other environmental factors were also placed to form the borders of the house (institution). Administrative processes were indicated on the roof of the house; the basic processes or those basic value groups that contain these processes were indicated in the middle block and in the final section the necessary support processes for the basic processes to work effectively were indicated.

In the second stage of the study, the method was determined on how the processes defined in the architecture were to be modeled. BPMN 2.0 (Business Process Model and Notation) was adopted which is defined as the modeling and notation of business processes to build and map process models. BPMN is a standard aiming at the design of business processes and forming a common language during the efforts for best figuration (OMG, 2009). SIPOC (Suppliers-Inputs-Process-Outputs-Customers) structure was used during the application of this notation through integration (Ozdoglu *et al.*, 2015). BPMN involves the symbols such as activities, events, messages, etc. that might represent all the information related with the details of the process. Nowadays, besides mapping of processes, a tendency is being formed towards providing a more detailed monitoring including system automation and the data processing tools developed as a result of these tendencies are being designed to work in coordination with BPMN. Process simulations might be carried out via these tools, different scenarios could be analyzed; moreover, through process mining, with the help of intelligent algorithms, it might be visualized whether for example the process is proceeding as designed as well as analyzing its performance competence etc. (Van der Aast, 2011; Van der Aast, 2013).

The proposed architecture and a process modeling example built within this architecture were included in the case study part.

4. A CASE STUDY

At the request of a metropolitan municipality (MM), in line with strategic targets and within the framework of national act number 6360, setting forth the organizational status of the municipality and job descriptions, in addition the reorganization of its structure with institutions subsidiary to the municipality, determining activities such as workloads, process architecture, alternative performance criteria, measurement models were realized within the one-year project duration. Within the scope of this article, examples were given from those applications implemented during the related stages of process management work.

The MM is an institution directed with a rather intensive hierarchical internal organization structure. Besides departments and directorates within its organization, it conducts its activities in interaction with stakeholder relationships with those related private sector institutions, unions, chambers, audit mechanisms and other institutions and organizations. The System interaction table showing the municipality's internal and external stakeholders according to their proximity is presented in Figure 1.

The strategic targets, organizational status and the structure of subsidiary institutions of the MM were determined in the conducted studies. Then, the relationship between the strategic targets and work areas of the MM and its subsidiary institutions were determined and the activities that need to be carried out and the values that need to be created towards reaching these targets were defined. Starting off with the necessity that institutions require to be

managed via a process oriented approach in line with social and scientific changes and developments and that the processes require to be improved; with the support of benchmarking and change engineering approaches, studies such as carrying out process and work load analyses, reviewing job descriptions, etc. were initiated in the MM.

The natural road to design a process management starts with defining values that an institution wants to create. The values are the key statements providing basic sources to decide about what sort of processes should be defined as core processes. When combined with managerial and supportive processes, the institution's process architecture appears and can be completed by the linking the values or processes with stakeholders and also linking the processes if they are related. This architecture then acts as a big picture of that institution and can be used as a managerial instrument. The proposed architectural structure is presented in Figure 2, where the processes formed via rearranging of those activities that were carried out within the body of the MM were grouped and the relationships between each other were shown. The process map showing which stages a large-scale area project would go through is presented in Figure 3 under the heading "arrangements for a modern looking city" which is one of the values defined within this architecture.

The planned values and the related processes to the values should be developed by considering common properties and steps in process flow in order to obtain modular processes and build the new ones on the main modules based on the intersections among processes.

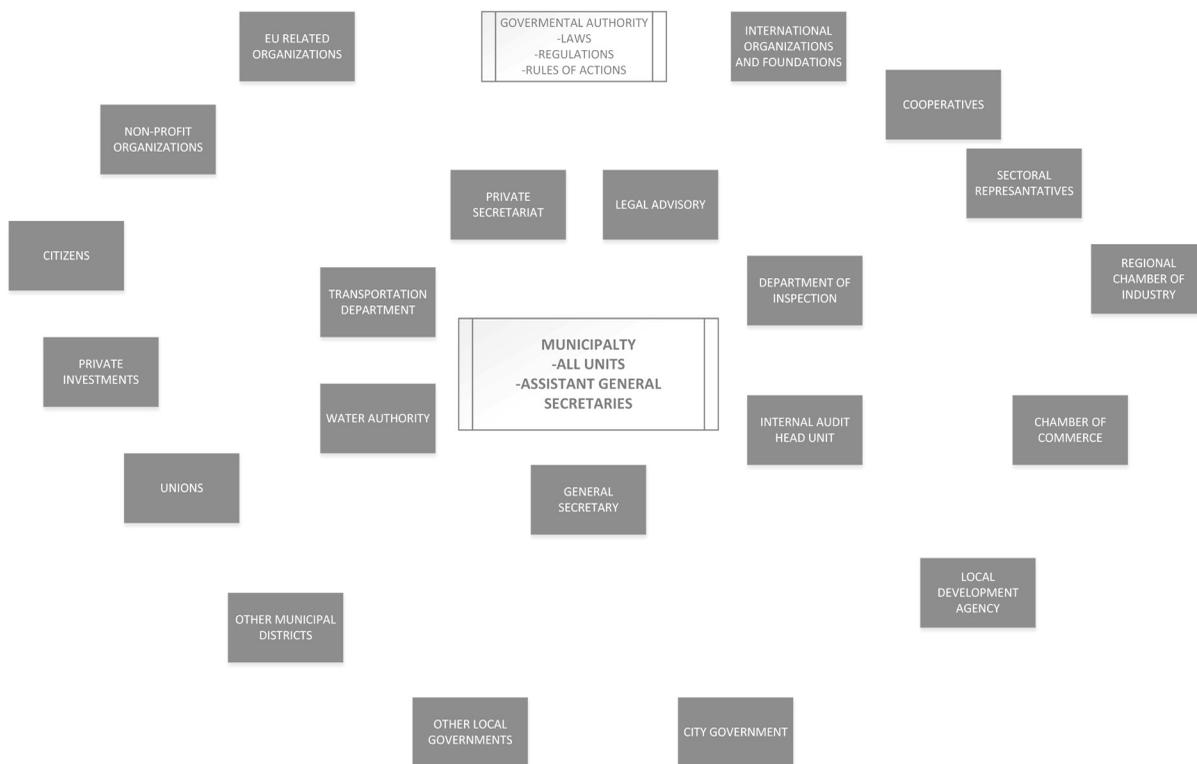


Figure 1: Interactions among Organizational Units of Municipality, Internal, and External Stakeholders

This approach would minimize the number of processes and provide an efficient way for management. For example, municipalities manage several projects to improve the physical view of cities, and these projects have different sizes and durations, and also carried out by different organizational units. Instead of defining different processes for different organizational units, one can develop modular processes such as small-scale and large-scale reconstruction projects and then add the differences special to the project handled by each organizational unit. In this paper, a process-modeling example was given for a large-scale field project (Figure 3).

Municipalities often come up with various projects, and each project has its own milestones and activities managed by the different departmental units of the municipality. Even if each project has special distinct characteristics and an original plan for managing the activities, the legislative arrangements and the workflows are not different from project to project. The main distinction is observed in the size of the project. This finding was evaluated as the grouping criterion to model such projects, and then two processes were modelled as base models to identify any kind of project managed within the

municipality. With the help of these base models, any new project with its workflow and abstract performances can be identified by adding minor differences onto the base model. Figure 3 represents a base process model for a large-scale field project such as constructing a new exhibition area with buildings and environmental arrangements. In this kind of a project, the process steps start within the City Planning and Construction Department, and then the further steps follow Mapping and Geographical Information Systems Department, Construction Auction Department, Municipality Board, Project Development Department, Property Management Department, Land Registry and Cadastre Department, Constructive Works Department, Infrastructure and Construction Department, Recreation Facilities Department, Procurement Department, Auctions and Contracts Department, Machine Procurement and Maintenance Department, and finally Promotion and Protocol Planning Department, respectively. The process steps are handled by these departments with respect to the decision points determined as conditions to continue the further steps (Figure 3). The differences occur in the detailed design of the projects.

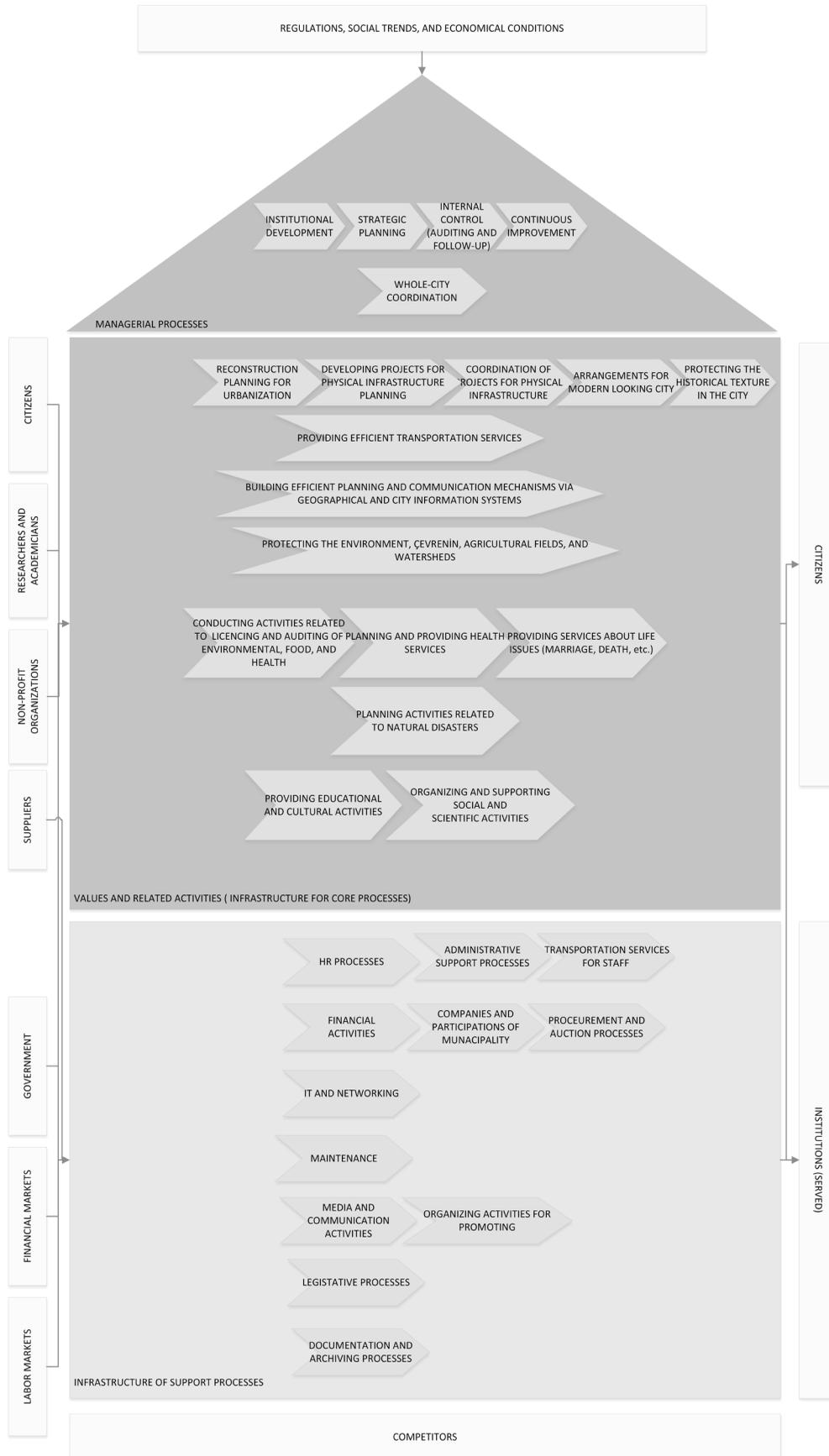


Figure 2: The Proposed Process Architecture for the Municipality

Before realizing Figure 3, meetings were held with related process holder units those are responsible to fulfil the requirements of the processes; in these meetings information was gathered on issues such as which stages each unit passed through while arranging Large-Scale Areas, which institutions/units they established a relationship with under which conditions, stakeholders for related process, etc. Following these, the Figure 3 related with the mentioned BPMN 2.0 notation was developed. The process model in Figure 3 focuses on the details about recreation planning where the details of the process steps at the other departments are presented as sub-processes, i.e., process symbols with "+" signs. This arrangement is needed for modularity and with the help of this modularity nested processes can be opened on purpose of process improvement. BPMN 2.0 notation also provides flexibilities to model multiple decision points and branch the steps depending of the occurrences of particular events. Furthermore, these models can be simulated within particular platforms supporting BPMN, and analyzed over different scenarios by the management to develop alternative plans and to guarantee the desired performance level of the processes.

5. CONCLUSION

Modeling of the process architecture and processes that are addressed within the scope of process management, observing the whole within any institution, revealing the process interactions, monitoring the processes through performance indicators, in other words, forming effective management mechanisms play a critical importance among such environments where dynamism and ambiguity are intensive.

In Turkey, a common process architecture does not exist within the privacy of local administrations. Yet, a structure of process architecture open to common use nationally would provide an environment for all small or big local administration groups to understand each other's operations; therefore, an integration could be achieved on the basis of operations carried out with other related public institutions.

Metropolitan municipalities are very large organizations and have many work flows for their services. It is not possible to model and follow them individually to manage them for adoption to change. This study, different from the previous ones, proposes a process architecture for metropolitan municipalities

where processes are grouped with respect to the structure and independent from the departments they are carried out.

In this study, the general process architecture prepared within the scope of the project carried out with a metropolitan municipality in Turkey as a proposal; an example was given on how the processes within this architectural structure would be mapped. The processes that include the activities which were carried out by many different departments together were analyzed using example process maps formed for the processes defined within the architectural body and improvement points were determined. Hereby, it can be provided that participant municipality applications are actually realized. Thus, the improvement points might easily be determined on the maps, the realized improvements might be monitored and the potential influences of any change that is made over the architecture on the overall system might be made predictable. Consequently, besides an organization model within this structure where the processes are being improved becoming operative, it might be provided that the citizens to whom the service is offered are informed about the improvement of services and also it might be provided that the employees feel their responsibilities and feel happy.

A common architecture that might be used nationally might be agreed upon the proposed architecture and an example through a wider project that would be carried out gathering different municipalities together and the processes might be shaped according to this common architecture. Thus, those problems that might arise within common defined processes might be solved together and comparative studies might be carried out evaluating improvement opportunities. This circumstance would as well form a systematic structure and convenience for those supervising parties.

In the further studies, process simulations may be carried out via these modeling schemes, different policies on the processes can be analyzed. Moreover, through process mining, with the help of more intelligent algorithms, it is possible to find out if the processes perform as desired with respect to their performance indicators. These kind of analyses require event-logs generated by an efficient information system.

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