Gov-PCDM: GOVERNMENT PROCESS CAPABILITY DETERMINATION MODEL

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ABSTRACT

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Quality problems in public domain have significant impact on society. They usually materialize as employee and citizen dissatisfaction, high costs and defect rates. As better processes will result in higher quality, the government processes need to be improved. There is a lack of systematic guidance on how to improve the quality of government processes. Although the customization of process capability/maturity models to specific domains/sectors might help, the public sector has special characteristics, which call for a specific process improvement model. This thesis presents Government Process Capability Determination Model, referred as Gov-PCDM, which utilizes the basic principles of a software process capability model of ISO/IEC TR 15504 and specializes the model for the government domain. It includes the governmental specific process definitions, a method including how to perform the assessment in a structured way, and a measurement framework providing objective rating. It is a structured and standardized approach that enables assessment of the governmental processes in a consistent, repeatable manner. It is assisted by adequate measures with guidance on actions to take to increase quality in government institutions. Development and validation of the proposed model are achieved through case studies. We performed a multiple case study, including 25 process assessment in total in four different organizations, is performed for validation. The results show that the Gov-PCDM is applicable for identifying the current state of the process capability and the gaps with the assessed capability level of the processes performed in governmental organizations.

Keywords: Business Process Improvement, Process Capability Determination, Government, SPICE, ISO/IEC TR 15504

ÖZ

Gov-PCDM: Kamu Süreç Yetenek Seviyesi Ölçüm Modeli

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Kamu kurumlarındaki kalite problemlerinin önemli etkileri vardır. Kalite problemleri genellikle çalışan ve vatandaş memuniyetsizliği, yüksek maliyet ve hata oranı olmaktadır. Başarılı süreçlerin yüksek kalite sağladığını düşünürsek, devlet kurumlarında gözlemlenen bu kalite problemlerinin giderilmesi, süreçlerin iyileşmesi ile sağlanabilir. Literatür taramamız sonucunda, kamu süreç kalitesini nasıl iyileştirileceğine dair sistematik bir rehberin eksikliği tespit edilmiştir. Olgunluğa ulaşan süreç yetenek/olgunluk modellerinin sektöre özel uyarlanması son zamanlarda en çok görülen eğilimlerden biridir. Bu doğrultuda, bu tez kapsamıda ISO/IEC TR 15504 yapısını temel alan bir yaklaşımla, kamu süreçlerini tutarlı bir şekilde uygulamak, yönetmek ve diğer kamu kurumları ile karşılaştırabilmek için Gov-PCDM olarak adlandırılan Kamu Süreç Yetenek Seviyesi Ölçüm Modeli geliştirilmiştir. Gov-PCDM, kamuya özgü süreç tanımları, yapısal bir şekilde değerlendirmenin nasıl yapılacağını anlatan bir metod ve objektif değerlendirme sağlayan bir ölçüm yapısı içermektedir. Gov-PCDM yapısal ve standart bir yaklaşım ile kamu süreçlerini değerlendirerek, tutarlı, tekrar edilebilir ve uygun ölçümler ile destekli, kamu kurumunda kaliteyi iyileştirmek için nelerin yapılması gerektiğini sunarak kalite iyileştirme çalışmalarının yapılmasını sağlamaktadır. Önerilen modelin geliştirilmesi ve geçerlemesi vaka çalışmaları ile yapılmıştır. 4 farklı organizasyonda yürütülen toplam 25 farklı kamu süreci değerlendirilerek çoklu vaka çalışması yapılmıştır. Elde edilen sonuçlar,,Gov-PCDM'in kamu süreç yetenek seviyesini ve belirlenen yetenek seviyesinin eksikliklerini belirlemek için kullanılabileceğini göstermiştir.

Anahtar Kelimeler: İş Süreçlerini İyileştirme, Süreç Yetenek Seviyesi Belirleme, Kamu, SPICE, ISO/IEC TR 15504

dedicated to my beloved family

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ABBREVIATIONS

BP : BPs

CAF: Common Assessment Framework

CMMI: Capability Maturity Model Integrated

EA: Enterprise Architecture

EAMM: Enterprise Architecture Maturity Model

ERMP: External Relationship Management Process

F.A. : Fully Achieved

FPRMP: Financial and Physical Resources Management Process

Gov-PAM: Government Process Assessment Model

Gov-PCDM: Government Process Capability Determination Model

Gov-PRM: Government Process Reference Model

GP: Generic Practice

GPI: Generic Practice Indicator

HRM: Human Resources Management

IAMP: Inspection and Auditing Management Process

ICT: Information and Communication Technology

IRMP: Information Resources Management Process

ISO: International Organization for Standardization

L.A.: Largely Achieved

METU: Middle East Technical University

N.A.: Not Achieved

P.A. : Partially Achieved

PA: Process Attribute

PIMP: Public Investment Management Process

SPICE: Software Process Improvement and Capability Determination

SPMP: Strategy and Policy Management Process

TQM: Total Quality Manageme

CHAPTER 1

INTRODUCTION

At the latest since Manifesto for Business Revolution [1], the management and improvement of business processes are core tasks of organizational design [2]. Model-based process improvement involves the use of a structured framework to guide the improvement of an organization's processes. As the organization steadily improves its process capability, organizational competence increases, and organization become more capable [3]. The process capability level reflects how far an organization has progressed toward continuously improving in any specific area. It is an evolutionary plateau on an organization's improvement path from ad hoc practices to a state of continuous improvement [4]. A process capability model refers to a roadmap for implementing the vital practices for one or more domains of organizational processes. It contains the essential elements of effective processes for one or more disciplines. It is developed to represent stages or levels of process capability, as well as each stage's characteristics and relationships to other stages [5].

As a result of capability assessment of the process and achieving an improvement road-map to the next level, and performing the actions in the road-map, the process is improved. Hammer [6] defines process improvement as "*A structured approach to performance improvement that centers on the disciplined design and careful execution of a company's end-to-end business process*." The main objectives of business process improvement initiatives are downsizing, reducing administrative costs, reforming administrative systems, decentralization of authority within agencies, empowerment of front-line workers, cultural change, quality of service improvement, and efficiency of agency work practice improvement.

In the past ten years, more public sector organizations have been focusing on implementing business process improvement methodologies. The motivation to make change is driven primarily by the goals of reducing cost, increasing efficiencies and improving quality [7; 8]. Quality problems in the public domain have a significant impact on society. As better processes will be reflected in higher quality, the government processes have to be improved. The customization of process capability/maturity models to specific domains/sectors might help. Since the public sector has special characteristics compared to the private sector, which calls for a specific process improvement model. Accordingly, this thesis presents a structured process capability determination model for government domain. It utilizes

the basic principles of a software process capability model of ISO/IEC TR 15504 and specialize the model for the government domain.

This chapter starts with a discussion of the statement of the problem. Then, the purpose and significance of the study are described. In the following section research strategy and research questions are presented. The chapter ends with the description of the organization of the thesis.

1.1 Problem Statement

The government agencies are non-profit-oriented organizations. Quality problems in the agencies as results in inefficiency, citizen dissatisfaction, and high defect rates. Conversely, the government agencies are under increasing pressure to show that their services are customer-focused and that continuous performance improvement is being carried out. There are some quality improvement initiatives in the government domain, however, quality improvement in this domain can be problematical because of its specific characteristics [9; 10] as the necessity of being firmly based in-law of decisions, culture, multiple stakeholders for many processes, multitude of weakly structured processes, high concentration of decisions and manual processes, actions of primarily bound to laws and regulations, etc. While ICT has the potential for improvement of the governmental service quality, the automation practices in the agencies have not provided the expected efficiency improvements. The reason is frequently discussed as carrying existing process defects to the automation [11; 12]. It is also stated in [13; 14] that, Enterprise Architecture (EA) in the government domain has to be transformed from being IT-centric to business-centric. Nevertheless, only a limited number of researchers have investigated the necessary changes of business processes in the government domain [15].

Assuming that successful processes will be reflected in higher government administration success, the government processes have to be improved. In this regard, an increasingly important contribution to the government administration transformation is to be made by applying private sector business process improvement approaches. Nonetheless, known maturity models do not take the specialties of government domain into consideration. Therefore, it is necessary to design and evaluate a domain-specific maturity model before applying it in the area of government [16].

1.2 Purpose of the Study

There are various well-accepted Process Capability/Maturity Models (PCMMs), such as ISO/IEC TR 15504 [17]-[20], CMMI (Capability Maturity Model Integration) [21]. The ISO/IEC TR 15504 standard has recently entered a revision cycle. It will be gradually replaced by a new series of standards: the ISO/IEC 33000 series [22]. These models are used as an evaluative and comparative basis for process improvement and/or assessment, assuming that higher process capability or

organization maturity is associated with better performance. Observed benefits of these models includes cost savings, more involved employees, improved and predictable quality as well as productivity, generating a consistency of process capture and use [23]. Customizing ISO/IEC TR 15504 [17]-[20] to different sector is subject of growing interest in the literature. Since ISO/IEC TR 15504 [17]-[20] is not limited to software development processes, many initiatives proposed for various domains such as automotive sector [24], enterprise processes [25], IT security [26], IT service management [27], knowledge management [28], internal financial control [29], industrial processes [30], regulation compliance [31], medical devices [32] and space [33]. We intend to utilize the same approach for government domain.

The purpose of this study is developing the Government Process Capability Determination Model (Gov-PCDM) by customizing ISO/IEC TR 15504 standard [17]-[20] by developing process definitions for government instead of software domain as well as by developing a method to provide a disciplined guidance to perform a process capability assessment systematically for governmental organization. The aim of Gov-PCDM is to provide the base for improving the processes of governmental organizations. It pursues a structured and standardized approach by assessing relevant processes in order to perform quality improvement initiatives in a consistent, repeatable manner, assessed by adequate metrics with guidance on what to do to increase quality in government institutions. Gov-PCDM focuses to provide improvement in governmental business processes to provide benefits of generic process improvement models (i.e:CMMI, ISO 15504 etc.) as increasing in service quality, in customer and employee satisfaction, as well as decreasing in operating cost.

Gov-PCDM includes a method to implement Gov-PCDM in an organization to achieve its benefits and to be useful by providing a disciplined guidance to perform a process capability assessment. The method becomes a roadmap that shows the next steps to take when determining the capability level of the process. The proposed method can be executed as a process in governmental organizations. Thus, it can be performed throughout the life of the organization to assess its processes.

The Gov-PCDM is intended to fulfill the following four high-level requirements:

- Enable each public agency to evaluate its processes in detail.
- Enable each public agency to identify the current state of its process capability.
- Enable each public agency to compare itself against other agencies evaluated with the same model.
- Suggest to feasible improvement roadmaps that public agencies can follow to improve their levels of process capability.

To briefly describe, the structure of the Gov-PCDM, shown in Figure 1 below, is made up of two dimensions.

The process dimension consists of governmental business processes. This dimension is characterized by process purpose statements which are the essential measurable objectives of a process: process outcomes, BPs, and work products which are constructed based on the standard of ISO/IEC TR 15504- part 2. As a result of analyzing the governmental organizations, we classified governmental processes into two main groups; one of them is common processes performed across all governmental agencies; such as human resource management process. We named them as Management of Government Resources and Support Processes (MGRSPs). The second category consists of agency-specific processes performed only by an agency. For instance; curriculum development for primary education is just performed in ministry of education. We developed generic process definition for these process. Government Process Reference Model (Gov-PRM) is constructed based on these classifications. The process definitions of MGRSPs are defined, given in Appendix-A. A generic process definition which can be applied to all governmental specific processes is developed for governmental agency-specific processes assessment, given in Appendix-B. These definitions are needed to make the level-one assessment to check if the process is performed. The customization of ISO 15504 for government domain covers developing Gov-PRM to perform level-one assessment. ISO 15504 cannot be applied to government institutions without Gov-PRM.

The capability dimension, which is characterized by a series of process attributes, is applicable to any process, which represents measurable characteristics necessary to manage a process and improve its capability to perform. Capability levels and process attributes are adapted from ISO/IEC TR 15504-part 5. Government Process Assessment Model (Gov-PAM) is given in Appendix-C.

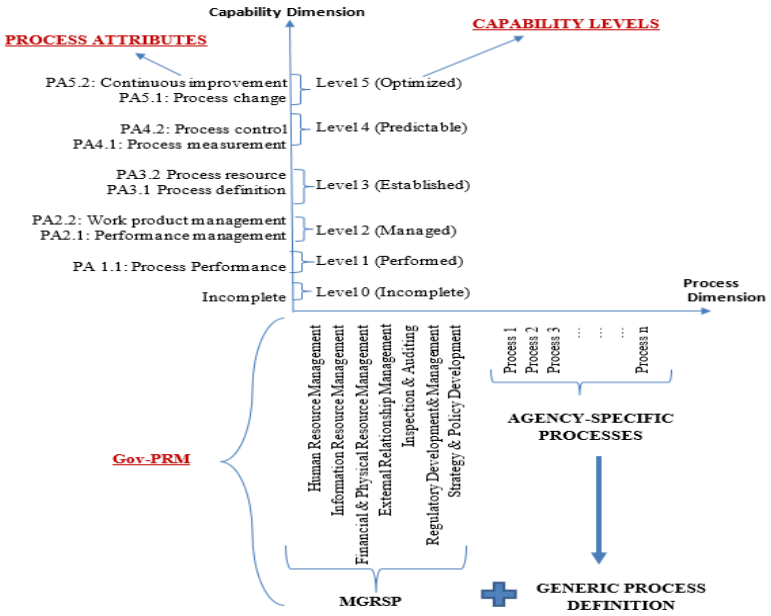

Figure 1.1. Gov-PCDM Structure

1.3 Significance of the Study

The Gov-PCDM includes the governmental specific process definitions, a method including how to perform the assessment in a structured way, and a measurement framework providing objective rating. The process definitions include both common processes performed across all governmental agencies, and a generic process definition which can be applied all the governmental specific processes. The governmental processes capability level can be assesses based on SPICE owing to these developed process definitions. The method presents the process of government process capability in a detailed way. Therefore, it provides application of the model in a structured and reliable way. The measurement framework is adapted based on SPICE.

The Gov-PCDM provides the base for improving the public processes. It pursues a structured and standardized approach by assessing the governmental processes in order to perform quality improvement initiatives in a consistent, repeatable manner, assisted by adequate measures with guidance on what to do to increase quality in government institutions.

The Gov-PCDM offers a common point-of-reference with different levels that describe behaviors, practices, and processes that regularly produce desired outcomes. It becomes a roadmap that shows the next steps to take when creating solid, sophisticated, repeatable process management capabilities and can direct organizations that lack process discipline on how to become highly organized and efficient.

As a result of literature review given in Chapter 2, although studies for improving quality in the public domain provide benefits from different aspects, it is observed that they do not aim to improve process quality directly to guarantee the consistency of services with each other through the use of standard processes where the capability level can be assessed and improved with a guidance.

The difference of the Gov-PCDM from other SPICE based models is including the generic process definition which can be applied across all governmental processes and management of governmental resources process definitions as well as the process of governmental process capability assessment. The generic process definition is given in Appendix B. The MGRSPs definitions are given in Appendix-A. The method is described in Chapter 3. These contributions provide enhancing the applicability of the SPICE in a different domain. The SPICE community supports applicability of the standard to domains other than software.

The developed Government Process Capability Method, given in Chapter 3, provides detailed procedures describing how an assessment is prepared and conducted as a process, although SPICE does not provide such a description.

The Model provides guidance to the assessors with base and generic practices, as well as example work products.

1.4 Research Strategy

The research strategy followed through this thesis study is given step by step in Figure 2. The study is performed in the nature of the “qualitative research”. Descriptions given by Creswell [34] justify the selection. He mentions that; in qualitative research, researchers collect data in the natural settings through the overview of the documents, observing the behavior or interviewing the participants. Data can be collected from multiple sources and the research process flows from forth to back and back to forth until a comprehensive model is developed [34].

We realized the necessity of such a model during our projects in governmental agencies. Then, we performed a literature survey on current governmental process improvement models, as a result of the literature review, we found out that there is no well-defined government specific structured process improvement model. This literature review was presented in national software engineering symposium in 2014 [35]. After that, an exploratory case study, given in Chapter 4, was performed to control if the customization of ISO/IEC TR 15504 for government domain is applicable. The study was presented at the Spice Conference in 2014 [36]. Public investment management process performed in the Ministry of Development in Turkey was defined in an ad-hoc fashion, assessed its capability level, and a road-map to improve the process capability level was derived in the study. As a result of the study, although initial findings indicated the usefulness and adequacy of the proposed approach; the necessity of a methodology incorporating guidelines for government specific process definition was determined. In order to satisfy this determined necessity, the methodology was developed. The corresponding study of proposing an ISO/IEC TR 15504 based process improvement method for the government domain was presented at the Spice Conference in 2015 [37]. Generic Process Definition developed for agency-specific processes and the process definition of a Public Financial and Physical Resource Management (PFPRM), which is one of the MGRSPs, and conducting case studies by assessing the capability levels, and deriving road-maps to improve the process capability level were published [38-40].

After achieving the finalized version of the model, the Gov-PCDM is applied in four public organizations in the scope of the multiple case studies given in Chapter 4. We conducted formal assessments through semi-structured interviews with process practitioners, and evaluate the direct evidences. We analyzed the assessment process and present the result of each assessment as a report. Over the reports, we discussed the results with practitioners and asked if the results correctly represent the state of the process. We answered the following research questions in the light of the case studies:

RQ1: How suitable it is to use the Gov-PCDM with the purpose of identifying the current state of the process capability and the gaps with the assessed capability level and the gaps with the assessed capability level, as well as how well it provides roadmaps for improving the process capability of the governmental organizations.

RQ2: What are the strengths and weaknesses of the Gov-PCDM?

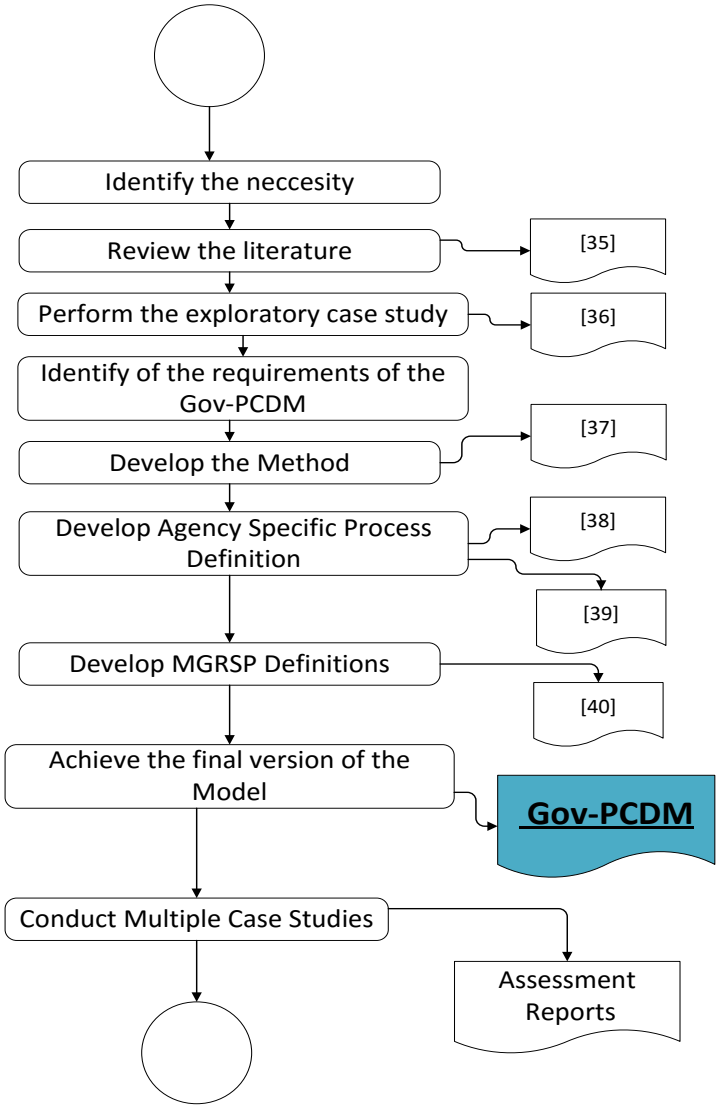

Figure 1.2. Research Methodology

1.5 Organization of the Thesis

The rest of this thesis is organized as follows:

Chapter two is a review of the literature in governmental process improvement methods, their strengths and weaknesses.

Chapter three describes the structure and components of Gov-PCDM we propose in this study. Process Descriptions of Management of Government Resources and Support Processes are provided in Appendix A. Generic Process Definition for agency-specific processes is given in Appendix B.

Chapter four describes both the exploratory case study and multiple case study conducted with exploration and validation purposes.

Chapter five describes the overall findings, achievements and future work.

CHAPTER 2

LITERATURE REVIEW

The purpose of this chapter is to review the literature to identify the existing models, providing process improvement in the government domain. Section 2.1 provides information about brief review of quality management models used in the government domain. Section 2.2 includes government maturity models classified into two main sub-sections as e-government maturity models and enterprise architecture maturity models. In Section 2.3, the business process improvement approach is described. The structure of the Gov-PCDM is influenced by the software process capability/maturity models. In Section 2.4 we briefly describe the structure of CMMI and ISO/IEC TR 15504 -SPICE. Then the evaluation of the literature is summarized in section 2.5. Finally, the relationship of the literature and the Gov-PCDM is explained in section 2.6.

2.1 Quality Management Models in Government Domain

Quality nowadays represents a valuable strategic weapon for politicians, scientists and administrative personnel alike, in order to improve the effectiveness of public services and citizens' satisfaction [42]. In fact, public organizations undergo great pressure in order to provide high quality services to improve their performance, and to conform to government regulations [43]. Thus, there are a number of quality initiatives in the public sector, such as Total quality management (TQM) and Common Assessment Framework (CAF) [44].

2.1.1 Total Quality Management

Total quality management (TQM) consists of organization-wide efforts to install and make permanent a climate in which an organization continuously improves its ability to deliver high-quality products and services to customers.
Important aspects of TQM include customer-driven quality, training, leadership, preventing defects and continuous improvement. TQM highlights defining quality, making quality measurable and standardization. ISO 9000 [45] was published as an international standard in 1988.
Some of the Turkish public sector institutions began to implement TQM practices in the second half of 1990s. It should be stated that such practices are being adopted at individual, organizational and departmental levels, rather than having a systemic

character and being organized by the central government, as has been the case in some other developed countries [46].
TQM practices in public institutions are a controversial issue in the literature [47-49]. It is asserted in [48] that TQM should be modified based on the characteristics of the public sector. Because of its specific characteristics, the number of governmental institutions among OECD countries having ISO 9000 certification is limited [50].
Literature suggests that there is a need of process improvement along with quality management initiatives [51; 52]. Process improvement is the core to various models of quality excellence such as ISO 9001, European Quality Award, Canadian Quality Award, MBNQA and Deming Prize.

2.1.2 Common Assessment Framework

CAF [44] is the common European quality management instrument for the public sector. It is inspired by the Excellence Model of the European Foundation for Quality Management (EFQM) to assess and measure public management qualities. As illustrated in Figure 2.1, it has 9 main criteria as leadership, strategy & planning, people, partnerships & resources, processes, people results, citizen/customer-oriented results, social responsibility results, and key performance results. Each criterion is further broken down into a list of sub-aspects. The 28 sub-criteria identify the main issues that need to be considered when assessing an organization.

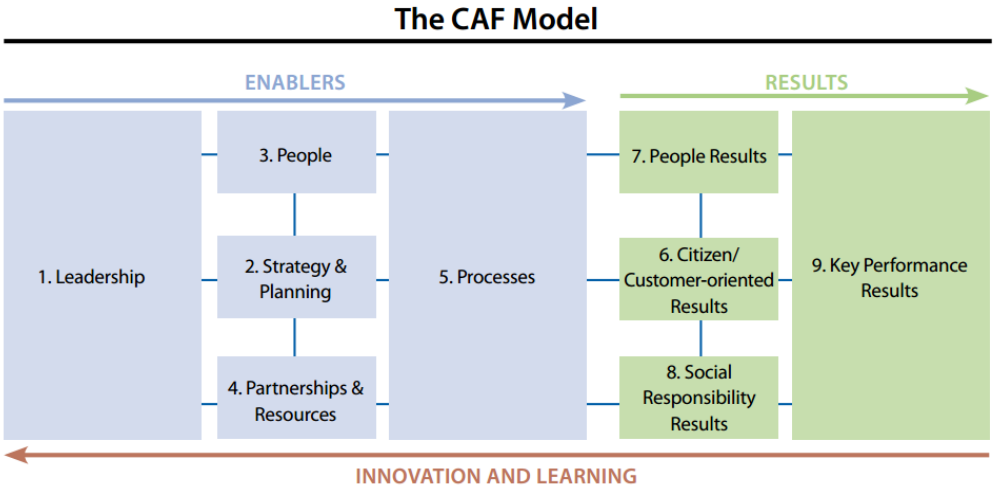

Figure 2.1. The Common Assessment Framework (CAF) Structure [44]

2.2 Maturity Models in Government Domain

Governments have started transformation and modernizations after TQM initiatives. Enterprise Architecture (EA) and e-government initiatives have arisen [53].

2.2.1 Government Enterprise Architecture Maturity Models

In the last decades, significant dependency of many organizations on information systems is observed [54]. Governments are faced with threats on their information assets every day. This is while they are heavily dependent on these assets. Therefore, producing accurate and business aligned information environment is perceived as an inevitable need. EA is widely considered as a suitable solution in this context. Government EA describes organizational structures, information and technology infrastructure. It includes relationships among layers of business, application, information, technology, and security.

Enterprise Architecture Maturity Models (EAMM) is developed to improve performance and efficiency of EA. Thus, increasing information sharing, and reducing incorrect and unnecessary information are provided. The level of the EA is determined as a result of evaluation of Critical Success Attributes (CSA). Increased maturity level possesses increased performance and efficiency of the government EA.

The objectives of EAMMs are defined in [55] as follows:

- Increasing in performance, effectiveness, efficiency, and value generation in terms of planning, development, and operation according to the strategy
- Decreasing the expenditure of costs and time in terms of development and operation
- Obtaining better understanding and knowledge of the enterprise and its structures as well as their evolvement, e.g. The organizational structure and the corresponding communications

In the scope of this thesis, we investigated EAMM developed for public domain which can be listed as Enterprise Architecture Management Maturity Framework (EAMMF) [56], Extended Enterprise Architecture Maturity Model (E2AMM) [57], Architecture Capability Maturity Model (ACMM) [58], Enterprise Architecture Assessment Framework (EAAF) [59] as defined in Table 2.2.

2.2.1.1 *The Enterprise Architecture Management Maturity Framework (EAMMF)*

The United States (U.S.) Government Accounting Office (GAO) is an independent, nonpartisan agency that works for the U.S. Congress. It investigates how the federal government spends taxes and gives advice for more efficient usage. The GAO developed the EA management maturity framework (EAMMF) [56] and defined it as "*It is a benchmarking tool for planning and assessing enterprise architecture efforts"*. The foundation for this model refers to the CIO Council's practical guide to Federal Enterprise Architecture [60] The EAMMF was determined for common use in improving the EA management at federal agencies. The first version of EAMMF was published in February 2002, updated in April 2003 to version 1.1. Second version is released in 2010.

In measuring EA related activities, the GAO started by creating a framework comprised of three dimensional views. The first dimension is called **stages** to measure hierarchical stages of management readiness. There are seven maturity stages; Stage 0: Creating EA Awareness; Stage 1: Establishing EA institutional commitment and direction; Stage 2: Creating the management foundation for EA development and use; Stage 3: Developing initial EA versions; Stage 4: Completing and using an initial EA version for targeted results; Stage 5: Expanding and evolving the EA and its use for institutional transformation; Stage 6: Continuously improving the EA and its use to achieve corporate optimization. The second one is named **attributes** to manage critical success factors of EA. The last dimension is called **elements** that will generate the basic guidelines for the United States Chief Information Officer (CIO) council. The elements describe a practice or a condition that is regarded to be needed for effective EA management Overall, there are 59 core elements defined that should be fulfilled.

2.2.1.2 *Extended Enterprise Architecture Maturity Model (E2AMM)*

The Institute for Enterprise Architecture Developments (IFEAD) introduced Extended Enterprise Architecture Maturity Model (E2AMM) [57] that provides a route for extending the EA and enhancing procedures in the organization. Accordingly, as EA becomes mature changes within the organization will be more predictable and effective. To provide a pattern to follow and measure maturity, they defined a six level model, as can be seen in Table 2.1.

Table 2.1 Extended Enterprise Architecture Maturity Model

Maturity Level	*Characteristic*	*Milestone*
Level 0 (No EA extension)	No Extension of EA	Insufficient awareness between parties
Level 1 (Initial)	Unforeseen participation within parties	Awareness brings the initial principle of alignment
Level 2 (Under Development)	Visible awareness for the needs of partnership	Involving more parties in the program
Level 3 (Defined)	Parties involved adequately in collaboration and information exchange	High level officials amongst parties aware the benefit of the program.
Level 4 (Managed)	High level officials review the program periodically.	Governance arrangement and management are available
Level 5 (Optimized)	High level officials intensively involved in the optimization process	Measurement metrics are ready to manage the affected environment

In addition to these levels, eleven ***measurement elements*** are given to clearly specify essential dimensions to measure, i.e. Business and technology strategy alignment, extended enterprise involvement, executive-management involvement, business unit's involvement, extended enterprise architecture program office,

extended EA developments, extended EA results, strategic governance, enterprise program management, holistic extended EA, enterprise budget and procurement strategy.

2.2.1.3 *IT Architecture Capability Maturity Model*

The Operating Units of the Department of Commerce (DoC) has developed an IT Architecture Capability Maturity Model (ACMM) [58] to aid in conducting such assessments. The goal is to enhance the overall odds for success of the IT Architecture by identifying weak areas and providing a defined path towards improvement. ACMM consists of six levels as 0. None 1. Initial 2. Under Development 3. Defined 4. Managed 5. Measured and nine architecture characteristics as follows: 1. Architecture Process, 2. Architecture Development, 3. Business Linkage, 4. Senior Management Involvement, 5. Operating Unit Participation, 6. Architecture Communication, 7. IT Security, 8. Governance, 9. IT Investment and Acquisition Strategy.

2.2.1.4 *Enterprise Architecture Assessment Framework (EAAF)*

After setting out the Federal Enterprise Architecture Framework (FEAF) [60] the US government came out with an EA assessment framework [59] to ensure that government EA initiatives are measurable in a comprehensive way.

This maturity model was mainly derived from the US Government EA related frameworks, for measuring the maturity of EA programs within the US governments. This model comes with three criteria: completion capability, use capability and results capability. These criteria link to the US FEAF. It is based on the continuous representation of the CMMI. Thus, it defines six levels of maturity and thirteen Key Performance Indicators (KPIs). Activities and artifacts are described for each level of KPI for reaching a level in a certain KPI.

We compared the government enterprise architecture maturity models in Table 2.2. Specialization states if the organizations developed it for its own EA only or for all the federal government. If the EA maturity model is developed for specifically for one EA, it is classified as specific, if the EA maturity model is suitable for assessing the maturity level of EA in all federal agencies, it is classified as general. Evaluation Detail is classified into low/middle/High based on the number of characteristics considered for determining the level of the EA. The models are classified as low/middle/high for the aspect of Improvement Strategy, which provides information about if the model provides a strategy to improve the maturity level.

Table 2.2 Comparison of Government Enterprise Architecture Maturity Models

	EAMMF[56]	**E2AMM [57]**	**ACMM [58]**	**EAAF [59]**
Developer	USA, Government Accountability Office	USA, Institute for EA Developments	USA, Department of Commerce	USA, The Office of Management and Budget
Last Version	2010	2006	2008	2009
Specialization	General	General	Specific	Specific
Detail Evaluation	Middle	High	Middle	High
Number of CSA	4	11	9	13
Number of Maturity Level	7	6	6	6
Improvement Strategy	Middle	Low	Low	Middle
Provided Benefit	Determine the EA level in a standard manner	Decrease the redundant and inconsistent data, increase the information sharing	Determine the weaknesses of IT structure	Improve the EA performance, Efficiently management of EA

2.2.2 E-government Maturity Models

E-Government is the use of information and communication technologies (ICTs) to improve the activities of public sector organizations. It provides government services as electronically secure, seamless and fast to be delivered to citizens through a common point. The benefits of e-government are as follows; reducing paperwork, loss of time, and increasing individual participation, and hence developing a democratic culture; reducing intensive communication between agencies.

E-government Maturity Models provide IT-based assessment to transition to e-government applications by evaluating technological, organizational, functional adequacy. Increasing maturity level which is observed as a result of assessment provides more sophisticated e-government structure. They focus on e-services, web-based communication, and interoperability. Examples of e-government maturity models can be listed as United Nation's Model [61], Gartner's Model [62], Siau and Yong's Model [63], MAGENTA [64], Deloitte&Touché's Model [65], Layne&Lee's Model [66], Andersen&Henriksen's Model [67], Hiller's Model [68], Moon's Model [69]. The e-government maturity models and their stages are summarized in the Table 2.3.

Table 2.3 E-Government Maturity Models

Model	Stages	Focus
UN's Five Stage Model [61]	• Emerging • Enhanced • Interactive • Transactional • Integrated	Functionality
Gartner's Four Stage Model [62]	• Web presence • Interaction • Transaction • Transformation	Functionality
• Siau and Yong's Five Stage Synthesised Model [63] • MAGENTA (Singapore e-gov. Programme) [64]	• Web presence • Interaction • Transaction • Transformation • E-democracy	Functionality Citizen-orientation Democracy
Deloitte and Touché's Six Stage Model [65]	• Information publishing / dissemination • Official two-way transaction • Multi-purpose portals • Portal personalization • Clustering of common services • Full integration and enterprise transaction	Access Service presence
Layne and Lee's Four Stage Model [66]	• Catalogue • Transaction • Vertical integration • Horizontal integration	Functionality
Andersen&Henriksen [67]	• Cultivation • Extension • Maturity • Revolution	Functionality Citizen-orientation
• Hiller and Belanger's [68] • Moon's Five Stage Model [69]	• Simple information dissemination (one-way communication) • Request and response (two-way communication) • Service and financial transaction • Vertical and horizontal integration • Political participation	Interoperability

2.3 Business Process Capability Improvement

At the latest since Hammer and Champy's Manifesto for Business Revolution [70], the management and improvement of business processes are core tasks of organizational design [71]. Model-based process improvement involves the use of a structured framework to guide the improvement of an organization's processes. Many approaches for evaluating process capability improvement were influenced by the work of Philip Crosby [70] and Watts Humphrey [71]. Crosby introduced the concept of a "quality management maturity grid" with five stages of capability for initiatives intended to manage quality in organizations. Process capability is defined as "the inherent ability of a process to produce planned results" [3]. As a process capability increases, it becomes more standardized and measurable. As the organization steady improves its process capability, organizational competence increases, and organization becomes more mature [3] Capability level is defined as "a measure of effectiveness in any specific process" [72]. The process capability level is reflective of how far an organization has progressed toward continuously improving in any specific area. It is an evolutionary plateau on an organization's improvement path from ad hoc practices to a state of continuous improvement [4]. Finally, a process capability model refers to a roadmap for implementing the vital practices for one or more domains of organizational processes. It contains the essential elements of effective processes for one or more disciplines. It is developed to represent stages or levels of process capability, as well as each stage's characteristics and their relationship to other stages [5].

As a result of capability assessment of the process and achieving an improvement road-map to the next level, and performing the actions in the road-map, the process is improved. Hammer [6] defines process improvement as "A structured approach to performance improvement that centers on the disciplined design and careful execution of a company's end-to-end business process." The main objectives of business process improvement initiatives; downsizing, reducing administrative costs, reforming administrative systems, decentralization of authority within agencies, empowerment of front-line workers, cultural change, quality of service improvement, and efficiency of agency work practice improvement.

In the past ten years, more public sector organizations have been focusing on implementing business process improvement methodologies. The motivation to make changes is driven primarily by the goals of reducing cost, increasing efficiencies and improving quality [7; 8].

2.4 Software Process Capability/Maturity Models

2.4.1 Capability Maturity Model Integration (CMMI)

A Capability Maturity Model (CMM) including CMM Integration [21] is a methodology, including used to develop and refine an organization's software development process. It provides software organizations with guidance on how to gain control of their processes for developing and maintaining software and how to

evolve toward a culture of software engineering and management excellence. The CMM was designed to guide software organizations in selecting process improvement strategies by determining current process maturity and identifying the few issues most critical to software quality and process improvement. It was developed and is promoted by the Software Engineering Institute (SEI), a research and development center sponsored by the U.S. Department of Defense (DoD). The history of CMMI is given in the Figure 2.2 below.

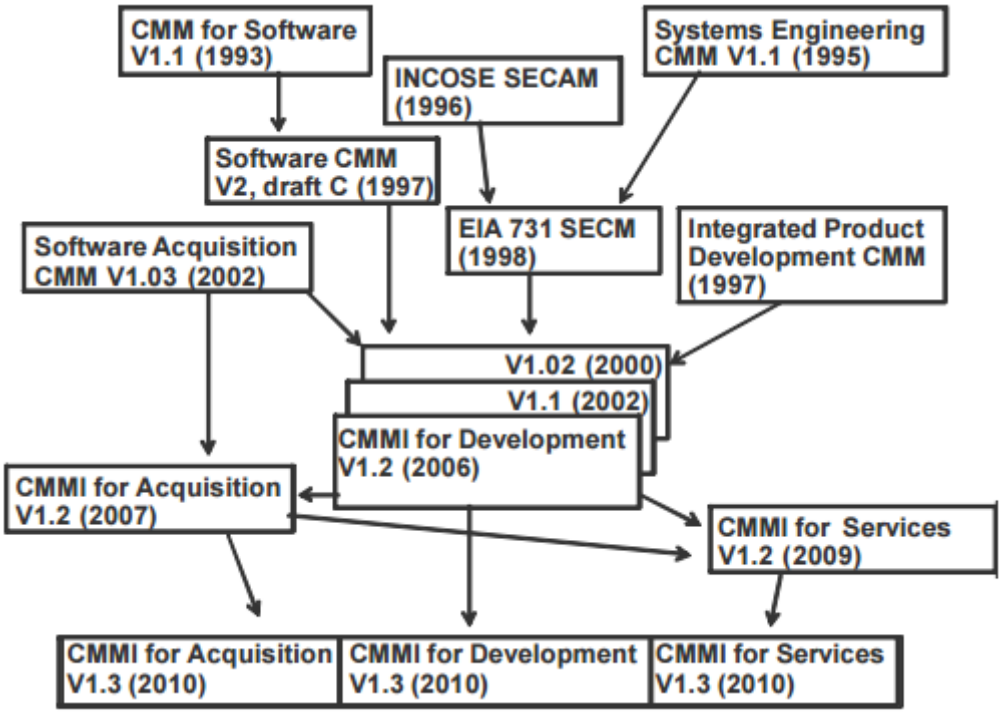

Figure 2.2. CMM History

CMMI is currently addressing three areas of interest:

1. Product and service development — CMMI for Development (CMMI-DEV) [73]
2. Service establishment, management, — CMMI for Services (CMMI-SVC) [74]
3. Product and service acquisition — CMMI for Acquisition (CMMI-ACQ) [75]

All CMMI models (i.e., acquisition, development, services) are produced from the CMMI Framework. This framework contains all of the goals and practices that are used to produce CMMI models that belong to CMMI constellations. All CMMI models contain 16 core process areas. These process areas cover basic concepts that are fundamental to process improvement in any area of interest.

A maturity level in the staged approach is a defined and enclosed step in improvement, consisting of a number of **Process Area** specific to that stage. Process Areas are the basic structuring elements, which all models have in common. A Process Area describes related practices of a certain process issue e.g. project management or IT security.

The staged approach of CMMI defines five maturity levels for an organizational processes. Every maturity level is the foundation for the next level and cannot be omitted. The stages are:

- **Maturity level 1: Initial** (chaotic, ad hoc, heroic) – is the starting point for an evaluation of a new process. The process is uncontrolled and reactive. Reactive describes an action only triggered by external events, errors, and defects. Although, an organization at level one can be able to create functional products, but the success of the creation and efficiency in creating this product depends largely on the employees.
- **Maturity level 2: Repeatable** (project management, process discipline) – describe a repeatedly used process. The process is also reactive.
- **Maturity level 3: Defined** (institutionalized) – the process is defined and confirmed as a standard process. It is proactive, that means an organization causes the development of events through sophisticated planning and target-oriented acting.
- **Maturity level 4: Managed** (quantified) – process management and measurement takes place.
- **Maturity level 5: Optimizing** (process improvement) – process management includes deliberate process optimization and improvement.

Components of the CMMI are given in Figure 2.3. A Process Area is a cluster of related practices in a process issue. The CMMI defines that a Process Area has a number of specific goals and generic goals. A **specific goal** describes what has to be implemented to satisfy the Process Area. To achieve satisfaction of this specific goal the model defines a number of activities expected to result in the achievement of this specific goal. These activities are named as specific practices and each is associated with a capability level. A **generic goal** describes the institutionalization that the organization must achieve at that capability level. The achievement of a generic goal in a Process Area signifies improved control in planning and implementing the processes associated with that Process Area. The CMMI has five generic goals and each of these goals is a part of every Process Area. The CMMI also defines a number of generic practices for institutionalization to ensure that the processes associated with the Process Area will be effective, repeatable, and lasting. In the continuous representation, each generic practice maps to one generic goal.

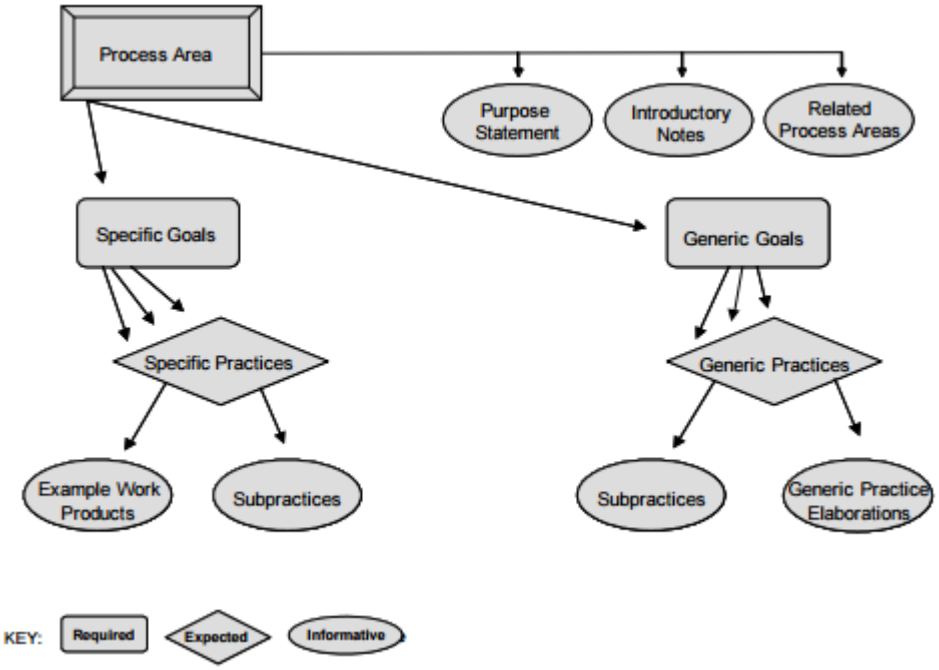

Figure 2.3. Components of CMMI

2.4.2 Software Process Improvement and Capability Determination Model

Software Process Improvement and Capability dEtermination Model (SPICE) also known as ISO/IEC TR 15504 standard [17-20] aims to provide a structured assessment framework for the software development processes and related business management functions [17-20].

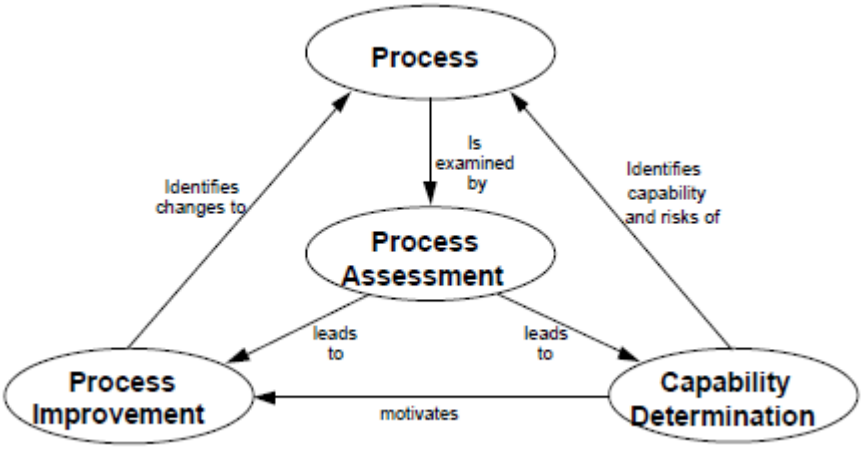

Figure 2.4. Software Process Assessment [17]

It provides process assessment, facilitates a basis for use in process capability determination and process improvement as well as process rating which represents an objective image of the current state of a process. The relationship among process, capability determination, process assessment and process improvement as shown in Figure 2.4 [17].

ISO/IEC TR 15504 [17-20] consists of ten parts as following:

- **Part 1: Concepts and vocabulary** – definition of the fundamental concepts and terminology
- **Part 2: Performing an assessment**- definition of the requirements for assessments and for reference models
- **Part 3: Guidance on performing an assessment** – providing help for the execution of assessments
- **Part 4: Guidance on use for process improvement and process capability determination** – providing help for the application of assessments for process improvement
- **Part 5: An exemplar process assessment model** – definition of an exemplary process assessment model (PAM) which is based on the ISO/IEC 12207 standard as a process reference model (PRM)
- **Part 6: An exemplar system life cycle process assessment model** – process assessment model for system usage based on the ISO 15288
- **Part 7: Assessment of organizational maturity** – addressing maturity levels of organizations and assessment classes
- **Part 8: An exemplar process assessment model for IT service management** – an example of an IT Service Management Process Assessment Model (PAM) based on the ISO/IEC 20000-1
- **Part 9: Target process profiles**- guideline for target process profiles for capability determination and improvement purposes
- **Part 10: Safety extension**- guideline for the necessary means and information for measuring the processes capability and also possible process improvement actions definitions when the software/system under development is safety-related.

ISO/IEC TR 15504- Part 2 [17] which is the only normative part of the standard, the other parts serve as examples, explanations and information. It gives organizations the minimum requirements for process assessment and process model design. It includes definitions of general elements for performing the assessment and describes the phases of an assessment including planning, data collection, data validation, process attribute rating, reporting and roles and responsibilities. It also describes the measurement framework for process capability (capability dimension) with all process attributes and defines the minimum rating requirements.

ISO/IEC TR 15504 Part-5 [20] which is an informative part, gives a detailed description of the structure of the process assessment model in conformance to the requirements defined in Part-2. Part-5 includes purpose (the high level overall objective for performing the process), outcomes (demonstrating the successful achievement of process purpose), BPs (activity that addresses the purpose of a

particular process), and work products for the software development processes as well as indicators (work products and practices). Capability dimensions in Part 2 are expanded to include the generic practices which are assessment indicators in Part 5.

ISO/IEC TR 15504 consists of two dimensions: capability dimension and process dimension. Capability dimension allows the capability levels ranging from “Incomplete” level to “Optimizing” pf each process to be measured independently as shown in Figure 2.5. Each level is characterized by process attributes. On the other hand, process dimension includes group of processes defined in conformance to ISO/IEC 12207- "Systems and software engineering -- Software life cycle processes" [76].

The PAs are independent of any process and applicable to all of them. Each PA defines a particular aspect of process capability. The extent of PA achievement is characterized on a defined rating scale. The combination of PA achievement and a defined grouping of PAs together determine the process capability level.

- **Level 5 (Optimizing):** The process performance is optimized to meet current and future business needs.
    - Process Attribute 5.1 Process innovation
    - Process Attribute 5.2 Continuous optimization
- **Level 4 (Predictable):** The process is performed consistently in practice within defined control limits. The quality of work products is quantitatively known.
    - Process Attribute 4.1 Process measurement
    - Process Attribute 4.2 Process control
- **Level 3 (Established):** The process is managed and performed using a defined process. Projects are using a tailored version of the standard process.
    - Process Attribute 3.1 Process definition
    - Process Attribute 3.2 Process deployment
- **Level 2 (Managed):** The process is managed and performed using a defined process. Projects are using a tailored version of the standard process.
    - Process Attribute 2.1 Performance management
    - Process Attribute 2.2 Work product management
- **Level 1 (Performed):** BPs of the process are performed ad hoc and poorly controlled. Work products of the process are identifiable.
    - Process Attribute 1.1 Process performance
- **Level 0 (Incomplete):** There is general failure to attain the purpose of the process. There are little or no easily identifiable work products or outputs of the process.

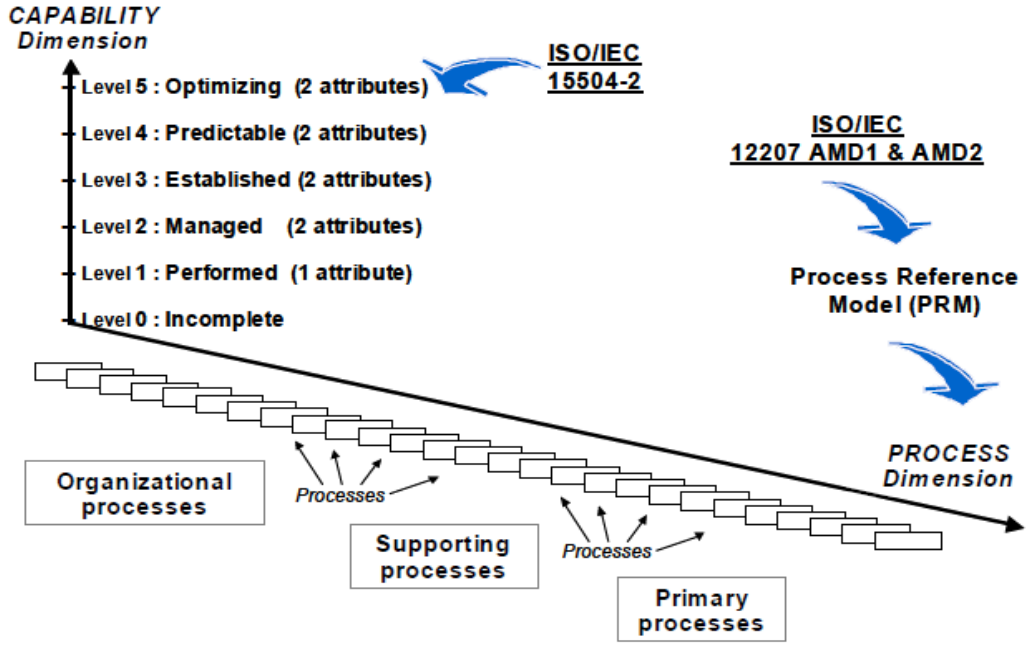

Figure 2.5. Process Assessment Model Structure of SPICE [17]

Process Capability Assessment is performed based on Process Attribute Indicators which are the means of achieving the capabilities addressed by the considered PAs. Evidence of process attribute indicators support the judgment of the degree of achievement of the PA. The indicators for from level 2 to level 5 are as following;

- Generic Practices (GP)
- Generic Resources (GR)
- Generic Work Products (GWP)

On the other hand, the indicators used in Process Performance Assessment performed only at Performed Process Level (Level-1) are;

- BPs (BP)
- Work Products (WP)

The fulfillment of a PA is measured along a scale from 0 – 100% in the following predefined stages:

- **N.A. (not achieved):** 0 – 15%: There are no or only very limited indications of PA fulfillment
- **P.A. (partially achieved):** 16 – 50%: There are some indicators that the PA is implemented to the measured extent. In some aspects the process remains unpredictable, though

- **L.A. (largely achieved):** 51 – 85%: There is evidence that the PA is implemented to the measured extend in a useful and systematic way. Process performance might still show some weaknesses
- **F.A. (fully achieved):** 86 – 100%: There is evidence for a complete and systematic PA execution to the measured extent. Process performance does not show any significant shortcomings due to the analyzed processes

A process instance is defined to be at capability level k if all process attributes below level k satisfy the rating F.A. and the level k attribute(s) are rated as F.A. or L.A., as defined in ISO/IEC TR 15504-Part 5 [20].

2.4.3 Reasoning Behind the Selection of ISO/IEC TR 15504 as a Basis Model

Although there are different ways to describe a model, we selected to use ISO/IEC TR 15504 as a basis for the structure of Gov-PCDM. The major reason of our selecting ISO/IEC TR 15504 as a basis is its well-defined and commonly accepted structure described above.

2.5 Evaluation of the Literature

We evaluated existing models in the literature from the aspects of type, target, and assessment type, provided benefits, maturity improvement approach and their scopes as given in Table 2.4. The scope coverage of the models is evaluated as low/middle/high.

2.1 The relationship of the Literature with the Gov-PCDM

Literature suggests that there is a need of process improvement along with quality management initiatives [51; 52]. Process improvement is core to various models of quality excellence. Literature review points out that, there are studies for improving quality in the public domain, however, although they provide benefits from different aspects, they do not aim to improve process quality directly to guarantee the consistency of services with each other through the use of standard processes where the capability level can be assessed and improved with guidance. The aim of developing Gov-PCDM is to address this aspect.

While e-government initiatives have the potential to improve the quality of governmental services, existing processes should be improved beforehand [12]. Automation practices in governmental institutions have not provided the expected efficiency improvements in Turkey, since the automation of processes is carried out existing process defects [11]. As pointed out in [13; 14]. Enterprise Architecture in the public sector has to be transformed from being IT-centric to business-centric. However, only a few papers deal with the necessary changes in business processes in the government domain [77]. In order to fill this gap, we developed Gov-PCDM to determine the capability level of the governmental processes and to generate a guideline to improve the process capability level.

Table 2.4 Evaluation of the Literature

	CAF	**EAMM**	**E-gov MM**	**SW-PCMMs**
Type	Criteria oriented	Characteristics-oriented	IT-Oriented	Process Oriented
Target	General Quality Management	Enterprise Architecture	E-Service	Process Improvement
Assessment	• Criteria • Sub-Criteria • Score	• Categories • Characteristics	• Technological infrastructure • Functionality	• Processes • Capability Levels
Provided Benefits	• Standard Quality Management Evaluation • Benchmarking • Determine weaknesses	• Establishing EA in a standard way • Decreasing inconsistent and inaccurate data • Increasing information sharing	• Web-based communication • E-service	• Improving Quality • Improving Performance • Decreasing Costs
Maturity Improvement	• No level • Score is giving for each criteria • The low-scored criteria is planned to improve	• Attributes to check for each level are defined • Current level is determined and improvement strategy is established	• Content and functions are defined for each level. • Current level is determined and improvement strategy is established	A detailed road-map is established

The relationship of the model with literature is summarized in the Figure 2.6 below. Gov-PCDM is used to benchmark the governmental agencies in a standard and consistent way as CAF, the strategy of the Gov-PCDM is quality improvement as TQM. The process assessment mechanism of the Gov-PCDM is based on the ISO/IEC TR 15504 , a software process capability maturity model. Successful application of the Gov-PCDM contributes to provide a standard public EA and e-service quality improvement as EA maturity models and e-government maturity models, respectively. The details of the Gov-PCDM are given in Chapter 3.

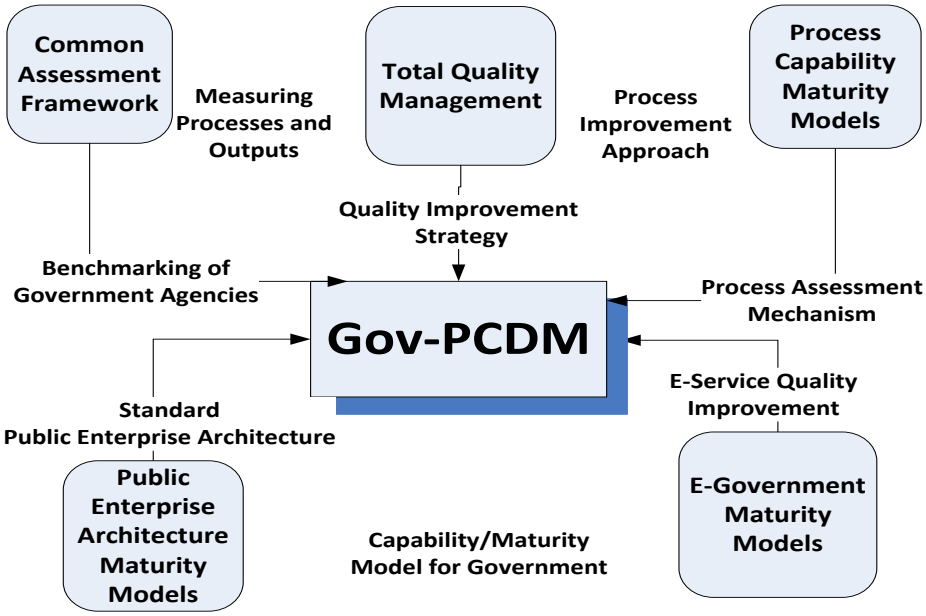

Figure 2.6. The relationship of the Gov-PCDM with the Literature

CHAPTER 3

GOVERNMENT PROCESS CAPABILITY DETERMINATION MODEL

Government Process Capability Determination Model (Gov-PCDM) is developed for capability determination of processes performed in government institutions. The Gov-PCDM is based on the assumption that the quality of business service depends on process quality which can be determined as process capability. High process capability can be achieved by applying an iterative procedure of process capability assessments and improvement. Process assessment is the systematic process of identifying gaps in organizational performance between what is and what could be or what should be.

The Gov-PCDM provides the base for improving the public processes. It pursues a structured and standardized approach by assessing the governmental processes in order to perform quality improvement initiatives in a consistent, repeatable manner, assisted by adequate measures with guidance on what to do to increase quality in government institutions.

This chapter presents the structure, brief descriptions of the components and the method to be followed during performing the governmental process capability assessment.

3.1 The Structure of the Gov-PCDM

The structure of the Gov-PCDM, developed based on well-accepted software process improvement model of ISO 15504 [17-20], is made up of two dimensions as seen in Figure 1.1 in the first chapter.

The process dimension consists of governmental business processes. This dimension is characterized by process purpose statements which are the essential measurable objectives of a process: process outcomes, BPs, and work products which are constructed based on the standard of ISO/IEC TR 15504- part 2 [17].

The capability dimension, which is characterized by a series of process attributes, is applicable to any process, which represents measurable characteristics necessary to manage a process and improve its capability to perform. Capability levels and process attributes are adapted from ISO/IEC TR 15504-part 5 [20].

3.1.1 Government Process Reference Model (Gov-PRM)

Gov-PRM constitutes the process dimension of Gov-PCDM. We classified Governmental business processes into two main groups. One of them is Agency-Specific Process which is performed specifically for one institute, such as: birth, death and marriage registration process is performed just in the civil registry office. A generic process definition is developed for being used level 1 assessment of agency-specific processes. The second one is Management of Government Resources and Support Processes (MGRSPs), common processes across the governmental agencies, refer to the support activities that enable the government to operate efficiently, There are 7 main classes for MGRSPs as human resource management, information resource management, financial& physical resource management, external relationship management, inspection& auditing, regulatory development and management, strategy& policy development.

3.1.2 Government Process Assessment Model (Gov-PAM)

Government Process Assessment Model (Gov-PAM) constitutes the capability dimension of the Gov-PCDM. Assessment procedures related to details of activities such as planning, briefing of the participants, data collection and validation and reporting are based on ISO/IEC TR 15504-part 3 [18]. Process capability is classified into six levels in ISO/IEC TR 15504-part 2 [17]: as Level 0: Incomplete: Level 1: Performed: Level 2: Managed: Level 3: Established: Level 4: Predictable: Level 5: Optimizing. In the abstract, the framework, as illustrated in Figure 3.1, builds an environment as follows;

- **Level 0- Incomplete:** The organization does not perform the process.
- **Level 1- Performed:** The organization performs the process, but it has no consistent way of performing its work. Since most work processes are ad hoc.
- **Level 2- Managed:** Practices can be repeated in the organization.
- **Level 3- Established:** The organization has the ability to identify which practices work best in its unique environment.
- **Level 4- Predictable:** The organization begins managing its processes through the data that describes its performance and variations in performing best practices are reduced.
- **Level 5- Optimizing:** The organization uses its profound, quantitative knowledge of the practices which are continuously improved to enhance their capability.

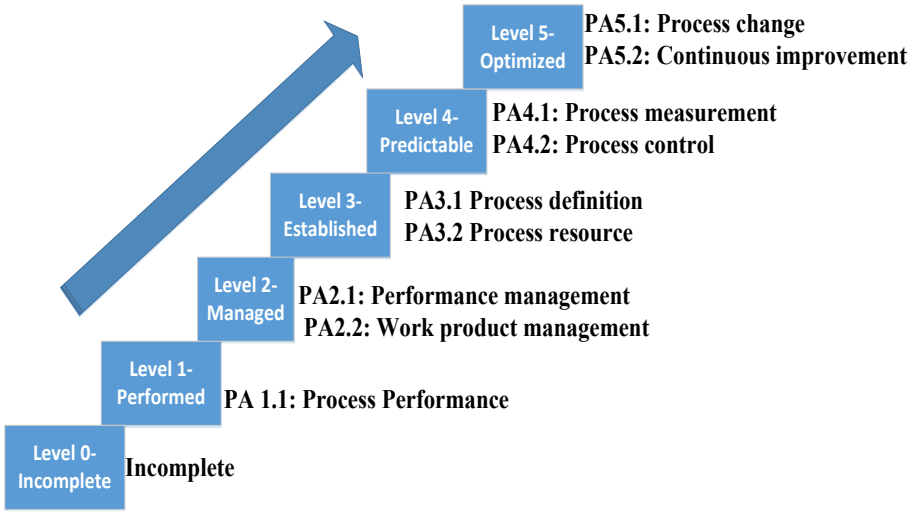

Figure 3.1 Gov-PCDM Capability Levels (Adapted from [17])

The measure of capability is based upon a set of process attributes (PA). Process capability indicators are the means of achieving the capabilities addressed by the considered PAs. As illustrated in Figure 3.2 , PA of Level one is Process Performance attribute which is a measure of the extent to which the process purpose is achieved. Developed process definitions are used for Level one assessment. For the assessments of levels two to five, we use exactly the same 'generic practices indicators', 'generic resources indicators' and 'generic work products indicators' as the exemplar PAM provided by the ISO/IEC TR 15504 - part 5 [20].

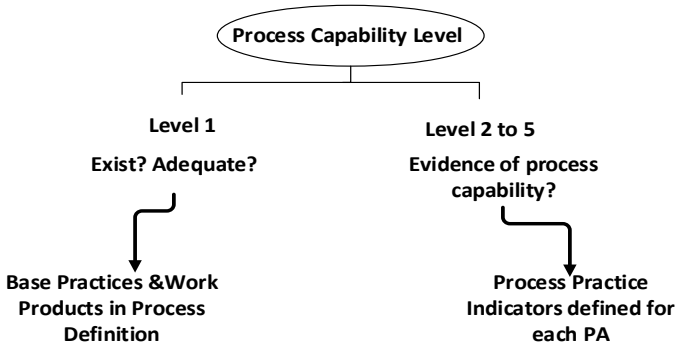

Figure 3.2 The Relationship between Capability Levels and Assessment Indicators

The capability level of each process instance is determined by rating process attributes. For example, to determine whether a process has achieved capability level 1 or not, it is necessary to determine the rating achieved by PA1.1 (Process Performance Attribute). A process that fails to achieve capability level 1 is at capability level 0. Each process attribute is measured by an ordinal rating F.A. (Fully

Achieved) (86% to 100% of achievement), L.A. (Largely Achieved) (51% to 85% of achievement), P.A. (Partially Achieved) (16% to 50% of achievement), or N.A. (Not Achieved)) (1% to 15% of achievement) that represents the extent of achievement of the PA. A process instance is defined to be at capability level k if all process attributes below level k satisfy the rating F.A. and the level k attribute(s) are rated as F.A. or L.A., as defined in ISO/IEC TR 15504 - part 5 [20]. Process Capability level ratings are given in *Table* 3.1.

Table 3.1 Process Capability Level Ratings

Process Attributes	Level 1 (Performed)	Level 2 (Managed)	Level 3 (Established)	Level 4 (Predictable)	Level 5 (Optimizing)
PA 1.1 Process Performance	L.A. or F.A.	F.A.	F.A.	F.A.	F.A.
PA 2.1 Performance Man.	-	L.A. or F.A.	F.A.	F.A.	F.A.
PA 2.2 Work Product Man.	-	L.A. or F.A.	F.A.	F.A.	F.A.
PA 3.1 Process Definition	-	-	L.A. or F.A.	F.A.	F.A.
PA 3.2 Process Resource	-	-	L.A. or F.A.	F.A.	F.A.
PA 4.1 Process Measurement	-	-	-	L.A. or F.A.	F.A.
PA 4.2 Process Control	-	-	-	L.A. or F.A.	F.A.
PA 5.1 Process Change	-	-	-	-	L.A. or F.A.
PA 5.2 Continuous Imp.	-	-	-	-	L.A. or F.A.

The achievement of PA is determined by checking BPs (BPs) for PA 1.1. or generic practices indicators (GPIs) for other PAs by assessing the capacity of the three types of deemed evidence: *Direct:* Outputs as a result of an activity. *Indirect:* In general, documents presenting that an activity has been carried out, and *Comments:* thoughts of those involved in the process being evaluated. BPs and GPIs are measured as same as measuring PAs by rating F.A, L.A, P.A, and N.A based on evidences. The rating of PA 1.1 is calculated based on the rating of BPs by considering BPs ratings. The ratings of PA from 2.1 to 5.2 are calculated by considering GPIs ratings.

3.2 Development of the Process Definitions

Process definitions are developed to perform assessment of Level-1. BPs defined in the process definition are used to check if the process is performed. Process definition is characterized by process purpose statements which are the essential measurable objectives of a process; process outcomes, BPs, and work products.

- The purpose describes the goal of performing the process;
- The outcomes express the observable results expected from the successful performance of the process;
- The BPs are a list of actions that may be used to achieve the outcomes;
- The work products are separately identifiable bodies of information produced and stored for human use during a system life cycle.

3.2.1 Development of Process Definitions for Management of Resources and Support Processes (MGRSP)

Management of Government Resources and Support Processes (MGRSPs), common processes across the governmental agencies, refers to the support activities that enable the government to operate efficiently. The development of MGRSPs, which are defined in Figure 1.1 as human resource management, information resource management, financial& physical resource management, external relationship management, inspection& auditing, regulatory development and management, strategy & policy development, is illustrated in Figure 3.3 .

Process Definitions of MGRSPs are developed by harmonizing existing quality improvement models and standards as FEAF (Federal Enterprise Architecture Framework) [78], APQC (American Process Qualification Center) [79], ISO/IEC TR 15504 [17-20], CMMI-DEV [73], CMMI-SVC [74], People-CMM [4] based on the policies and business rules of the processes. After the establishment of the draft version of each process definition, it is formally reviewed by five process owners who are working in the related department in the government organizations. They are requested to provide verbal and written feedback on the following questions:

(1) Are the major elements of the process definition of MGRSPs; such as purpose, outcomes, BPs well defined and articulated?

(2) Is there any information you want to add in the process definition of MGRSPs?

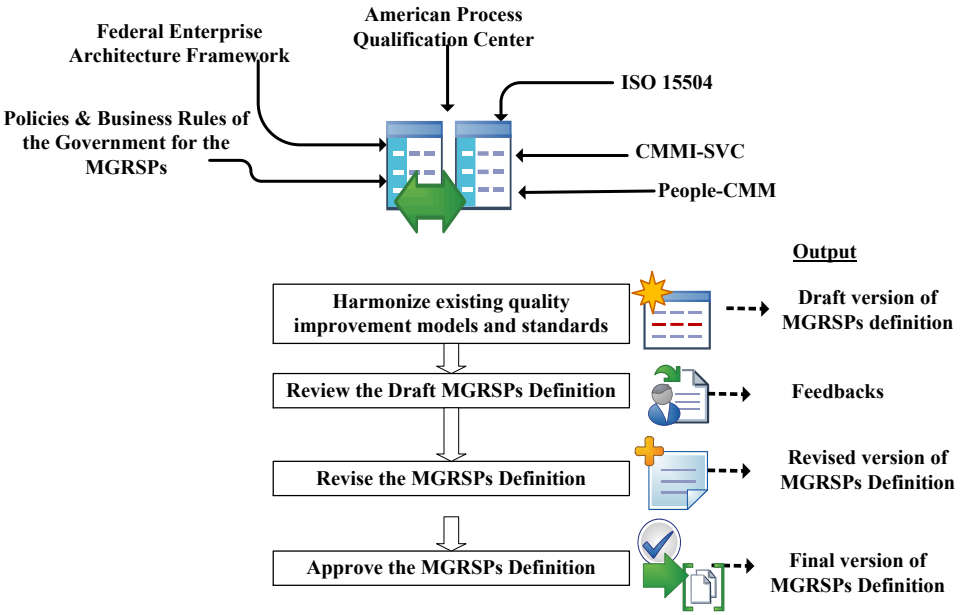

Figure 3.3 The Development of Process Definition of MGRSP

The feedback is used to refine and revise the model. Revised version of the process definition of MGRSPs is reviewed and approved by the management with executive responsibility within two different governmental organizational units by two people. Consequently, the final version of the process definition of MGRSPs which is given in Appendix-A is achieved.

3.2.2 Development of Generic Process Definition for Agency-Specific Processes

The generic process definition is developed to use for capability determination of the agency-specific processes of governmental organizations. It is also including level 1 process performance indicators. The generic process definition is established on the basis of process modeling diagrams of 40 different agency-specific processes performed in five different public agencies. The developed generic process definition is reviewed by 30 process owners working in 10 different departments. It is formally approved by the management with executive responsibility within two different organizational units and the supervisor of this thesis who has both professional and academic experience in using ISO/IEC TR 15504 after reviewing the generic process definition.

The ISO/IEC 15504-Part 2 [17] requires the process outcomes to be the minimum set of results to achieve the process purpose. This requirement excludes improvement activities from the process outcome list. Therefore, the Action Workflow Loop (AWL) is appropriate for our study. Thus, we propose to use the AWL introduced by Medina-Mora [80]. He created the AWL which breaks down the business process as a loop constituted of four generic phases: proposal, agreement, performance, and satisfaction as seen in Figure 3.4.

- **Proposal:** The customer requests completion of a particular action according to some stated conditions of satisfaction.
- **Agreement:** The two parties come to a mutual agreement on the conditions of satisfaction, including the times by which further steps will be taken. This agreement is only partially explicit in the negotiations, resting on a shared background of assumptions and standard practices.
- **Performance:** The performer declares to the customer that the action is complete.
- **Satisfaction:** The customer declares that the completion is satisfactory.

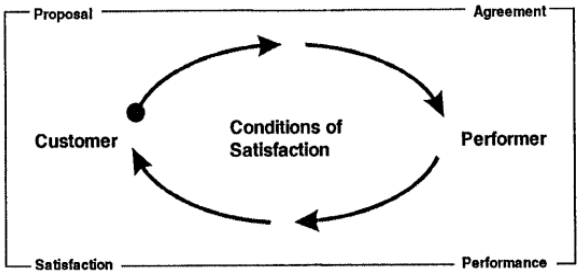

Figure 3.4 Process Phases by Medina-Mora [80]

In the context of our study, we customize this AWL for the government domain by defining outcomes and BPs for each phase to verify the process is completely defined. The customer is mainly higher level management, and performer is a public agency. The loop works in the government domain as follows;

- **Proposal:** Higher level management request the particular action to perform by the way of publishing law, decree law etc. All processes performed in the government must be based on the specific law. Outcome 1 is defined for this phase.

Outcome 1: Politics/strategy is defined

- **Agreement:** Some of the documents as regulation, legislation, or guidelines, including what to do for the process are published. The requirements of the process, such as maximum budget to use are derived and allocated to the process. Interactions are conducted for this phase, such as receiving information about derived requirement. Outcome 2, 3, and 4 are defined for this phase.

Outcome 2: Policies and guidelines are published
Outcome 3: Requirements are derived and allocated
Outcome 4: Interactions with involved parties is managed

- **Performance:** The public agency communicates with other departments/agencies (if necessary) and applies technical methods to perform the work. How to perform the work differs according to the objective of the process. We classify process objectives in the government domain in 3 main groups as; generating a document, evaluating an application, and providing a service. Interactions are conducted while performing technical effort. Outcome 4 and 5 cover this phase.

Outcome 4: Interactions with involved parties is managed
Outcome 5: Technical effort is performed to obtain the result

- **Satisfaction:** Higher level management declares the satisfactory completion by approving it. Additionally, approved result should be informed to all stakeholders by using communication mechanisms. There are interactions in this phase as well, such as sending the documents to approve. Outcome 4, 6, and 7 cover this phase.

Outcome 4: Interactions with involved parties is managed
Outcome 6: Approval of the result is achieved
Outcome 7: Results are made available to all related parties

BPs are activities that address the process purpose. Implementing the BPs of a process should achieve the basic outcomes that reflect the process purpose. BPs are defined for the defined 7 outcomes in the generic process definition. The generic process definition is given in Appendix-B. We classified the BPs for outcome 5 into 3 main groups. It changes according to the objective of the process, as seen details in

Appendix-B. For instance; if the process objective is generating a document, BPs classified into section A as BP7A, BP8A, and BP9A; if the objective is to evaluate an application, BPs classified into section B as BP7B, BP8B, BP9B; if the objective is to provide a service, BPs classified into section C as BP7C, BP8C, BP9C, BP10C should be used to check whether outcome 5 is achieved during level 1 assessment. The other BPs are common for each objective.

The perspective of the generic process description is to enhance the government process description with a structured way to create processes and to write the process description. It specified describing at an abstract level the governmental processes and it is considered to be the minimum necessary to meet ISO/IEC TR 15504 requirements. Any organization may define their own processes by tailoring it in order to suit it to its specific environment and circumstances to conform their respective Process Reference Models and Process Assessment Models.

Government Process Capability Determination Method, described in the following section, explains how to conduct the process capability level assessment in a structured way.

3.3 Government Process Capability Determination Method

It is essential to provide a systematic way to implement an approach in an organization to achieve its benefits and to be useful. We propose Government Process Capability Method which is a disciplined guidance for governmental organizations to perform process capability assessment systematically. The method becomes a roadmap that shows the next steps to take when determining the capability level of the process. The proposed method can be executed as a process in governmental organizations. Thus, it can be performed throughout the life of the organization to assess its processes. This process consists of 4 phases as seen in the Figure 3.5 below.

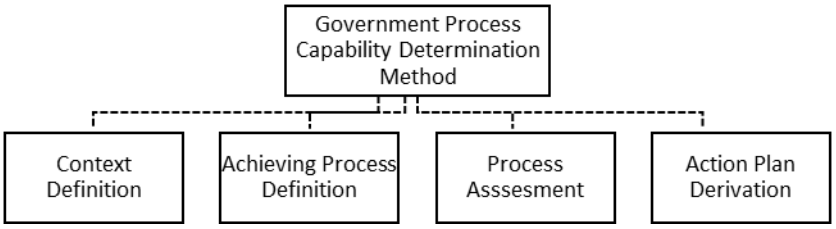

Figure 3.5 Phases of Government Process Capability Determination Method

In the Context Definition Phase, all process owners, top management, stakeholders meet in a kick-off meeting. They collectively define the aim and scope of the government process capability determination project. Project execution plan is produced at the end of the meeting.

In the Achieving Process Definition Phase, if the process selected for capability determination is an agency-specific process, the generic process definition given in Appendix-B is used. If the process is MGRSP, one of the process definitions given in Appendix-A is, used for level-1 assessment to check if the process is performed.

In the Process Assessment Phase, the process is assessed based on ISO/IEC TR 15504 -Part 3 [18] and Part 5 [20] and as a result of this phase, assessment report is produced.

In the Action Plan Derivation Phase, action plan to improve the capability level of the assessed process is derived for the assessment report based on ISO/IEC TR 15504-Part 4 [19].

As a result of successful implementation of this process;

- A target capability appropriate to the particular specified requirement is identified
- Reviews of the governmental processes are carried out to determine their suitability for the particular specified requirement in the light of process assessment results
- Strengths and weaknesses within the assessed processes are identified
- An action plan for process improvement is achieved

The proposed method is described and its phases in detail in the sub-sections.

3.3.1 Context Definition

This phase sets up the organization for government process improvement initiative. The primary goal is to determine processes to be improved. Thus, a structural frame of the organization in terms of a high level process, and their relationship are achieved in this phase. Figure 3.6 illustrates the process diagram for the context definition phase. First, the participants determine and state the aim and objectives for process improvement. The processes that will be determined and the roles that participate in those processes are depicted on scope diagram. The assessment and review teams are established. Roles are mapped to the stakeholders, the execution plan is documented and approved by all participants.

Roles participating in this phase are as follows:

- Process owners include the individuals that participate in the execution of the processes.
- Stakeholders may include all individuals that are affected by execution of the processes
- The moderator who can be a consultant or expert on ISO/IEC TR 15504 [17]-[20] outside from the organization or a participant inside the organization familiar with the ISO/IEC TR 15504 [17]-[20].
- Top management supports process improvement and ensures that processes promote the vision and mission of the organization.

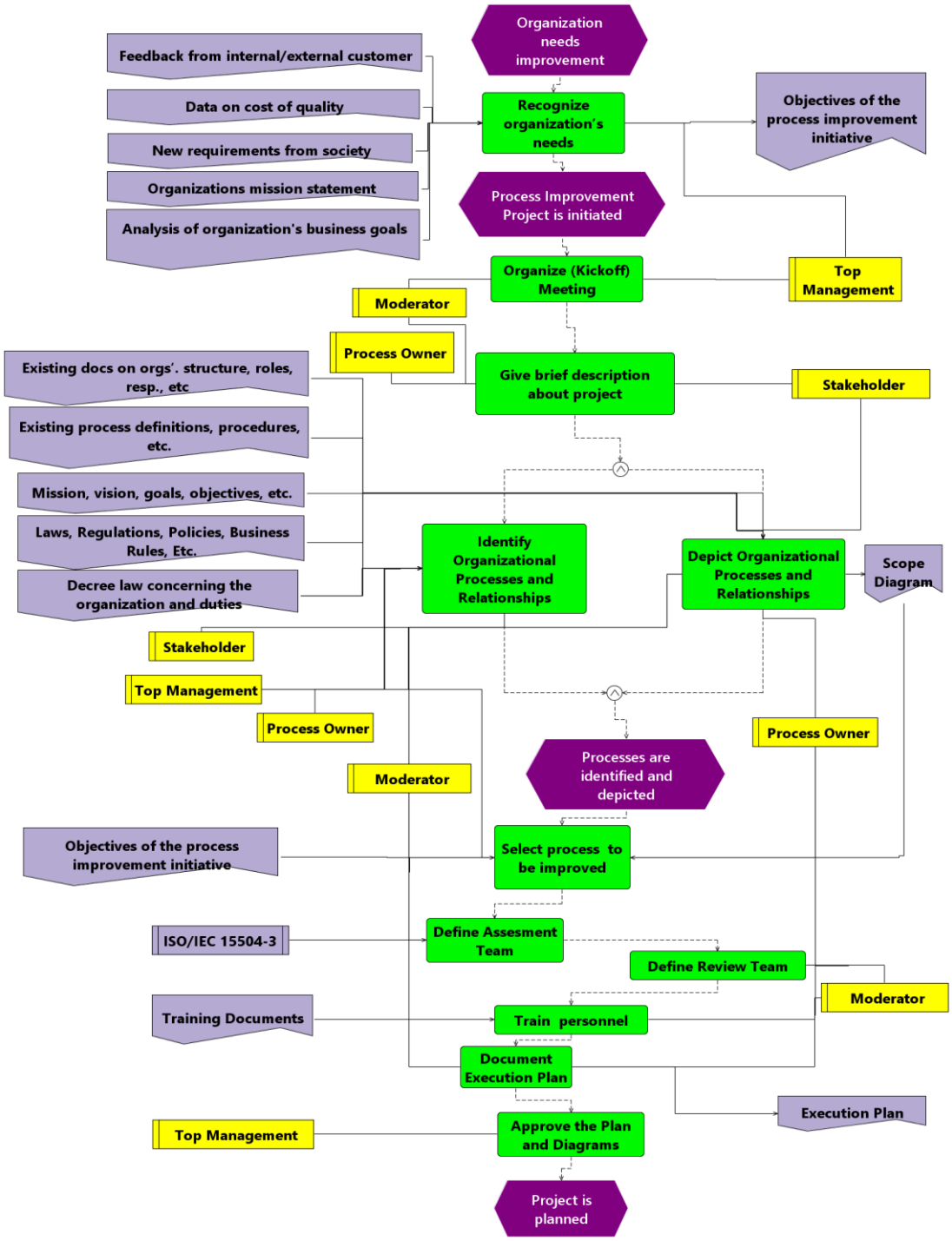

Figure 3.6 Context Definition Phase

Following subsections describe the activities of this phase in detail.

i. **Recognize organization's needs**: Government process improvement initiatives start with the recognition of the organization's needs and business goals. The recognition derives from any of the following: organizations mission statement: organization's business goals: data on cost of quality: feedback from internal/external customer: new requirements from society. The objectives of the process improvement initiatives are defined based on analysis of these inputs in terms of quality, time to market, cost, employee and customer satisfaction.

ii. **Organize (Kickoff) Meeting**: After recognizing organizations need for the process improvement, the process improvement program is started. It should be considered as a project in its own right, and planned, resourced and managed accordingly. The organization initiates the project with a kickoff meeting that brings all related process owners, stakeholders and top management together.

iii. **Give a Brief Description about Project:** The moderator introduces the aim of the project and Gov-PCDM and presents a brief overview of the path to be followed.

iv. **Identify Organizational Processes and Relationships:** Variety of resources, including existing process definitions and procedures; documents representing the organizational structure, roles and responsibilities; resources representing organization's mission, vision, goals and objectives; laws, regulations, policies, business rules; or any related documents such as quality standards, handbooks, and etc. can be used for identifying the organizational processes and relationship.

Business process is defined as 'collection of related, structured activities or tasks to serve particular goal(s) for a particular customer(s)'. Goals are derived from organization's vision and aligned with its mission: the reason for its existence. The overall goal of a business process can be decomposed into sub-goals. A goal-driven and a collaborative approach in identifying and judging processes is generally necessary. This is because different groups of people in the organization are likely to identify and judge the processes and their salience differently.

Governmental business processes are classified into 2 main groups as Agency-Specific Process and MGRSPs as described in section 3.1. The first one should be defined by the organization by using the developed generic process definition given in Appendix-B. The granularity level of the agency-specific process identification and the level of formality applied must be nearly same. In order to provide this, the moderator has some responsibilities as follows:

- Envisaging the top view of processes as a whole, explaining and analyzing it
- Facilitating and monitoring the definition process
- Providing guidance to the agency-specific process definers

- Facilitating the maintenance of individual agency-specific process definitions
- Validating that the resulting of an agency-specific process definition is all that should be performed to serve the goal of that project.

v. **Depict Organizational Processes and Relationships:** The coverage on a scope diagram represents the processes and their relationships as well as the roles that participate in these processes.

vi. **Select Processes to Be Improved:** The participants in the meeting set the priorities of the process improvement objectives. The processes and their relationships should be analyzed in order to evaluate which processes have a direct impact on the improvement objectives identified.

vii. **Define Assessment Team**: Assessment team consists of competent assessor who can lead or be part of, and staffs from the quality management department of the organization if there is.

viii. **Define Review Team:** Review team is responsible for reviewing the agency-specific process definitions. The team can consist of the moderator, staff from the quality management department, and executive members who manage the respective process.

ix. **Train Personnel:** The moderator, or if possible trainer from outside the organization who has knowledge about ISO 15504 train related staff about process definition, process assessment, and analyzing assessment results. Agency-specific process definers, and assessors attend this training. Training documents are used.

x. **Documenting Project Execution Plan:** The moderator (project leader) document project execution plan includes work assignments, time, risk and configuration management plans. The scope, role assignments for moderator, agency-specific process definers, and assessors, the schedule and other concerns such as, risk and configuration management are documented on an Execution Plan. The plan is approved by all participants and it is baselined before the description phase and the consequent changes are communicated to all parties.

xi. **Approve the Plan and Diagrams:** As the final step of context definition phase, generated project execution plan is approved by the top manager.

Depending on the scope, once the aim is determined, roles and responsibilities are assigned, the execution plan and process diagrams are approved, and the kickoff meeting is closed. Subsequent meetings will be arranged to perform succeeding activities.

3.3.2 Achieving Process Definition

Users need the process definition for performing Level 1 assessment to check whether the process is performed. We follow the ISO/IEC TR 15504-2 [17] standard to determine what the process definition should contain. Process Definitions of MGRSPs, given in Appendix-A, and Generic process definition, given in Appendix-B, for agency-specific processes are used. The Generic Process Definition guides process owners for agency-specific process definition including title, purpose, outcomes, BPs, information items. Achieving Process Definition for agency-specific processes includes following steps;

i. Define Process Title: The title identifies the principle concern of the process and distinguishes the process from other processes in the model. Some examples for process title as follows: Strategy and Policy Management, Law Development.

ii. Define Process Purpose: The purpose of the process describes the goal of performing the process. In cases where processes might be thought to overlap, the purpose should be used to characterize the scope or bounds of the process. Goal-driven approach is used in this definition. Once the process identified, the main goal of the process will be defined. It is a candidate for the purpose of the process. Since governmental processes are established based on the laws, procedures, etc. The purpose of the process is written in the related laws or legislation like Decree Law Concerning the Organization and Duties in Turkish government.

iii. Define Process Outcomes: An outcome is an observable and assessable result of the successful achievement of the process purpose. In order to define the outcomes of governmental process, related laws, regulations, and policies are used as resource. Generic outcomes defined in Generic Process Description for agency-specific processes are given in Appendix-B.

iv. Define BPs (Activities): The BPs are a list of actions that may be used to achieve the outcomes. Rather than describing the results of executing a process, activities describe a set of actions that might be undertaken to execute the process.

v. Define Information Items: Information items are process products that are identifiable bodies of information produced and stored for human use. Laws, decree laws, regulations, legislations, guidelines, application documents, generated reports, approved documents, communication records [e-mails, minutes of meetings, etc] can be information items of the agency- specific governmental processes.

The description of an information item consists of a name and a set of characteristics.

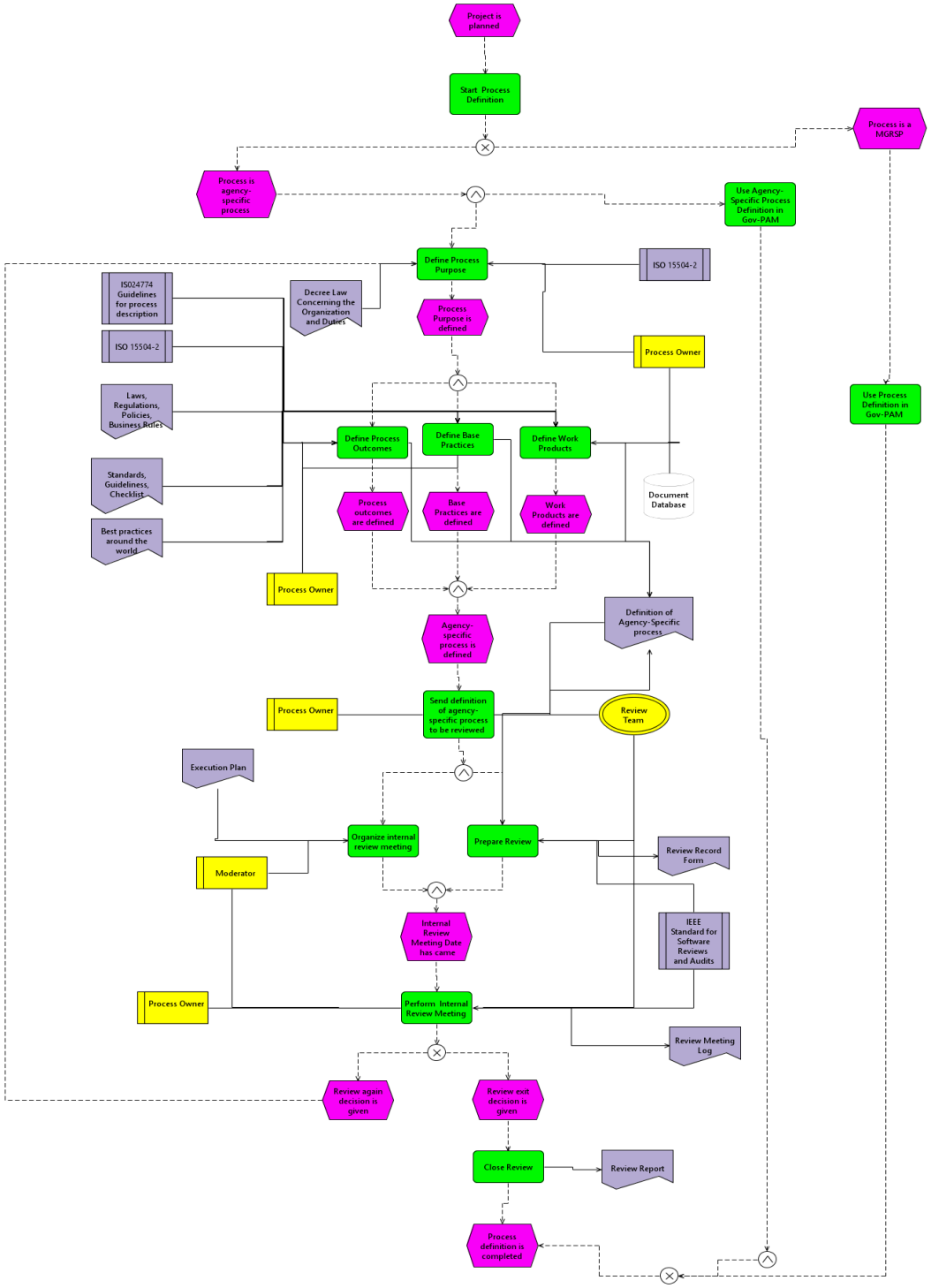

Figure 3.7 Achieving Process Definition Phase

a. *Information item name***:** The name associated with the information item characteristics. This name is provided as an identifier of the type of information item that the practice or process might produce. Organizations may call these information items by different names. The name of the information item in the organization is not significant. Similarly, organizations may have several equivalent information items which contain the characteristics defined in one information item type. The formats for the information items can vary.

b. *Information item characteristics:* The potential characteristics associated with the information item type. Characteristics may relate to the purpose and use of an information item, and its contents, format and quality.

The use of generic types to classify information items simplifies the application of consistent structure, content and format of similar information items, and supports the usability of process models.

vi. Review Process Definition: The owner of the process definition initiates a review process upon sending the document to review team identified in the project plan. Review materials (checklists, standards, guidelines, etc.) and also review time and place are identified.

vii. Perform Internal Review Meeting: Internal review meeting covers the following steps in sequence:

- The review team members report the anomalies they found. The review team focuses on creating a unified anomaly list and the recorder enters each anomaly, location, description, and classification on Review Meeting Log.
- At the end of the review meeting, the review team has the anomaly list reviewed with the team to ensure its completeness and accuracy. The moderator allows time to discuss every anomaly where disagreement occurred. The moderator does not allow the discussion to focus on resolving the anomaly but on clarifying what constitutes the anomaly.
- To close the review meeting, an exit decision is taken to determine if the document meets the review criteria. The review team identifies the product disposition as one of the following:

Giving review exit decision means that the document is accepted as is or with only minor issues (so, it requires no further verification). Giving review again decision is that another review is required to verify rework. The owner shall resend the updated document/product and the review process shall be executed again. The next review, at a minimum, examines the document areas changed to resolve anomalies identified in the last review as well as side effects of those changes.

After completing the review of agency-specific process definition, process definitions process is completed. The next step is process assessment.

3.3.3 Process Assessment

Assessment is conducted by an assessment team whose member(s) are from the Organizational Unit. The requirements for performing an assessment defined in ISO/IEC TR 15504-Part 2 [17] aim at achieving a greater degree of uniformity in the approach to process assessment. The assessment team consists of competent assessor who can lead or be part of, and staffs from the quality management department of the organization if there is. The competent assessor can be from inside the organization, but assessor drawn from outside the organizational unit may appear to be more credible on account of a more independent viewpoint. The assessment team follows the ISO/IEC TR 15504 -Part 3 [18] as the documented procedural approach for conducting the assessment. Details of the assessment activities such as planning, documenting assessment plan, briefing of the participants, data collection and validation are put together into an assessment plan and an assessment report. The Gov-PAM adapted from ISO/IEC TR 15504 -Part 5 [20] is given in Appendix-C.

i. **Document assessment plan:** This step includes followings;

- The activities to be performed in conducting the assessment;
- The resources and schedule assigned to these activities;
- The identity and defined responsibilities of the participants in the assessment;
- The criteria to verify that the requirements
- A description of the planned assessment outputs.

ii. **Collect Data:** Collection of data required for evaluating the processes within the scope of the assessment and additional information in a systematic way.

- Each process identified in the assessment scope shall be assessed on the basis of objective evidence;
- The objective evidence gathered for each attribute for each process assessed shall be sufficient to meet the assessment purpose and scope
- The identification of the objective evidence gathered shall be recorded and maintained to provide the basis for verification of the ratings

iii. **Validate Data:** validating the data collected is performed to

- Confirm that the evidence collected is objective;
- Ensure that the objective evidence is sufficient and representative to cover the scope and purpose of the assessment;
- Ensure that the data as a whole is consistent.

iv. **Rate process attributes**: A rating shall be assigned based on validated data for each process attribute:

- The set of process attribute ratings shall be recorded as the process profile for the defined organizational unit;

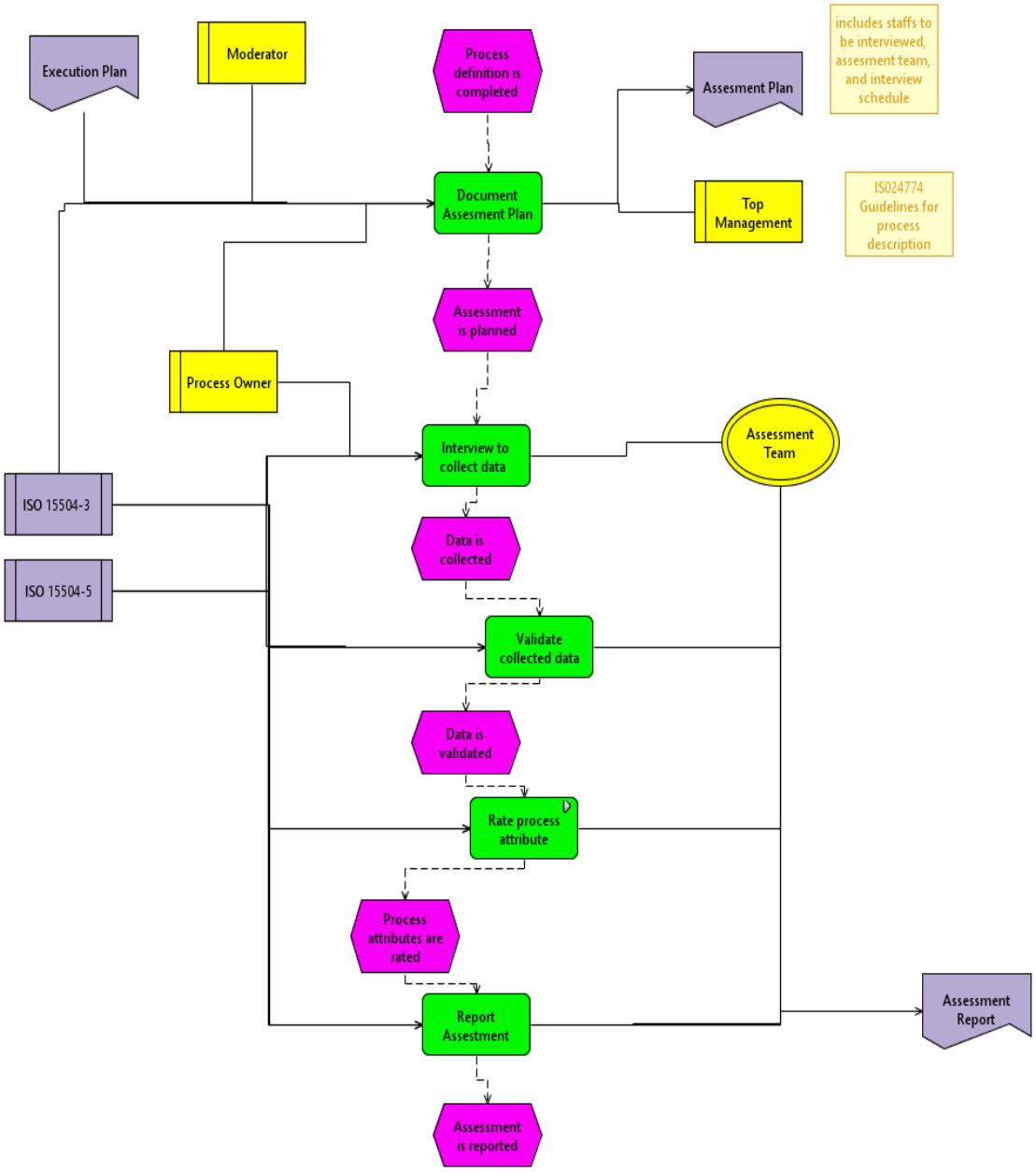

Figure 3.8 Process Assessment Phase

- during the assessment, the defined set of assessment indicators in the Gov-PAM, given in Appendix-C, shall be used to support the assessors' judgement in rating process attributes in order to provide the basis for repeatability across assessments;
- the decision-making process that is used to derive rating judgements shall be recorded; traceability shall be maintained between an attribute rating and the objective evidence used in determining that rating;

Process Capability is classified into six levels. Details of Process rating sub-process are defined in section 3.1.2.

v. Report Assessment: the assessment results including inputs, evidences, and necessary additional information for present to sponsor or their delegated authority.

3.3.4 Action Plan Derivation

Based on assessment findings, improvement plan to shift to next capability level is generated taking ISO/IEC TR 15504-Part 4: Guidance on Use for Process Improvement and Process Capability Determination as a reference [19]. Defined steps are as described in Figure 3.9. Based on assessment findings, improvement plan to shift to next capability level is generated. The sub-phases are described as following:

i. Analyze assessment strengths and weaknesses: Strengths are defined as processes with the highest process capability level rating within a process category or a set of interrelated processes may show an opportunity for improving the effectiveness of the rest of the process category or set of interrelated processes. Weaknesses are defined as processes with missing practices and low process attribute ratings are identified.

ii. Identify process-related risks: Process-related risk is assessed from the probability of a particular problem occurring, and from its potential consequence.

iii. Identify opportunities for improvement: Opportunities for improvement is derived based on the weaknesses of the process. Additionally, client and customer expectations, which provide opportunities for improving customer satisfaction.

iv. Analyze effectiveness measurements: Organizations with previous experience in process improvement may already have measurement in place. Where these are related to the existing organization's business goals and derived improvement objectives, it may be beneficial to analyze the current measurements to better understand what improvement is needed.

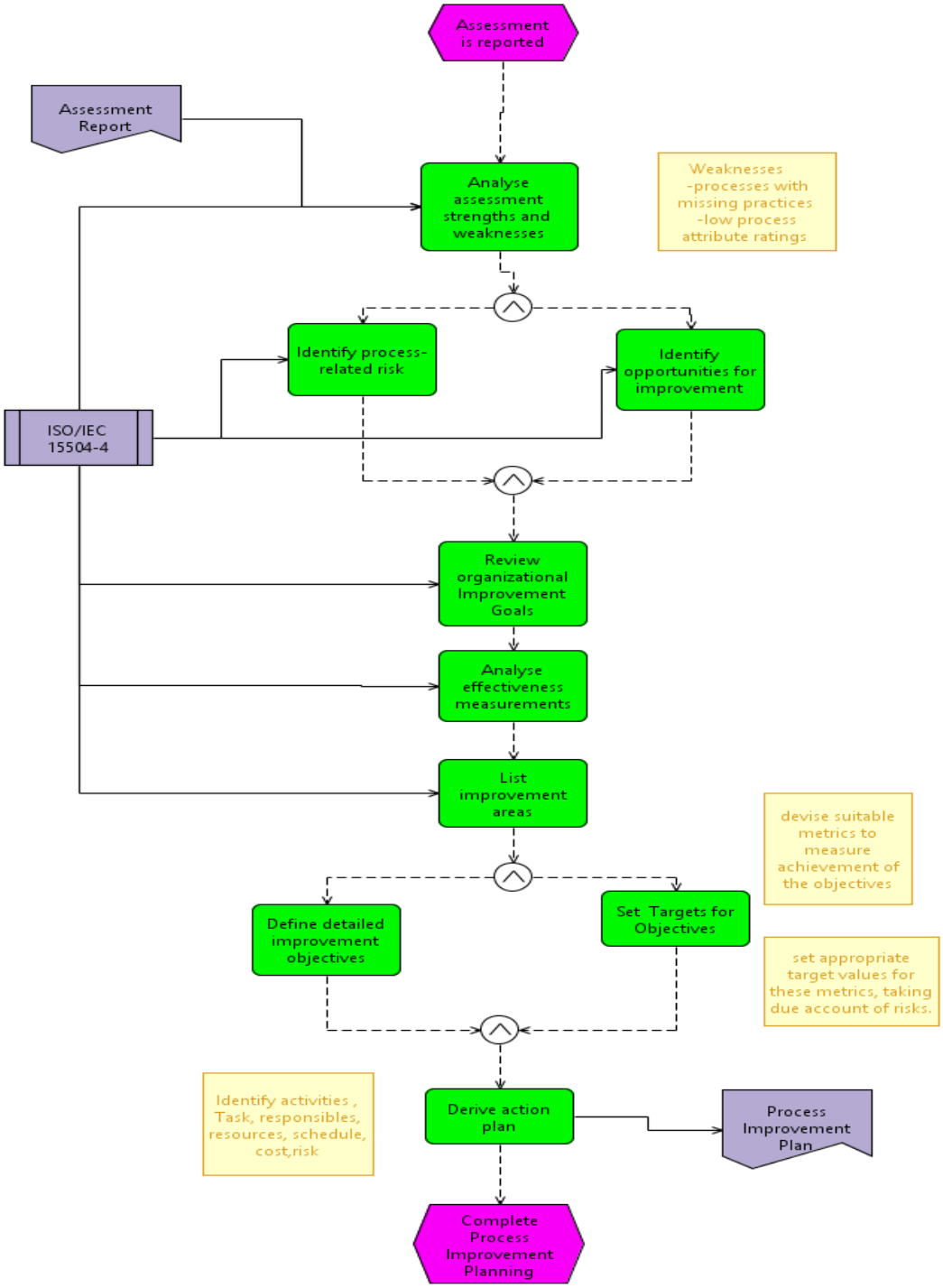

Figure 3.9 Action Plan Derivation

v. **List improvement areas:** A prioritized list of improvement areas should be compiled from all of the factors listed above. The selected improvement areas define the scope of the improvement actions.

vi. **Define detailed improvement objectives:** Targets for improvement should be set for each improvement area. These may be either quantitative objectives for process performance, or target process profiles, or a combination of the two. They should be set with regard to the organization's business goals which can be objectively measured, and which can reasonably be achieved.

vii. **Set targets for objectives**: includes devising suitable metrics to measure achievement of the objectives and setting appropriate target values for these metrics, taking due account of the risks.

viii. **Derive action plan**: A set of actions to improve processes should be developed to meet the objectives and targets set in the previous step**.**

As a result of this phase; strengths and weaknesses of the processes are identified based on assessment findings. Process related risks are assessed from the probability of a particular problem occurring, and its potential consequence are identified. Opportunities for improvement are derived based on the identified weaknesses of the processes. Processes and their relationships are analyzed in order to evaluate which processes have a direct impact on the organizational objectives identified in the Execution plan. A prioritized list of improvement areas is compiled from all of the factors listed above. Targets for improvement are set with regard to the organization's business goals which can be objectively measured, and which can reasonably be achieved. Finally the action plan is derived, it includes activities, tasks, responsibles, resources, schedule, cost, and risk.

CHAPTER 4

APPLICATION OF GOV-PCDM

This chapter presents the application of Gov-PCDM in case study settings. Case study research is selected as the qualitative method. Case study research is *"the most common qualitative method used in information systems*" [34]. It is appropriate in many ways to answer the research questions and propose a solution relevant to the purpose of this study.

To evaluate the applicability of the Gov-PCDM in different cases, to collect more data to be able to answer our research questions and to deal with the problems of validity in case study research, we applied multiple case study research.

The research strategy proposed in this study conforms many of the qualitative research properties [34]. For this study, we need to collect data in its natural setting, the assessor is the key instrument in collecting the data, there are multiple forms of data and we need to conduct inductive data analysis.

The case studies are conducted by the protocol template proposed by Yin [81]. We mostly used five of the most common six sources of evidence for the case studies to collect data: "documents, interviews, direct observation, participant-observation and physical artifacts" [81], as appropriate in different case studies we conduct. This is especially important to overcome construct validity and reliability problems.

We initially performed an exploratory case study to check if the SPICE based government process capability determination model is applicable and usable in government domain as well as the needs of the developed model to be consistently applied across all governmental institutions. The exploratory study is given in Section 4.1. Then, we developed the Gov-PCDM and the validation of the model is evaluated in a multiple case study setting. The multiple case studies, conducted with the developed Gov-PCDM are given in Section 4.2. Process definitions of MGRSPs given in Appendix-A and generic process definition, given in Appendix-B, are used for level-one assessments. Gov-PAM, given in Appendix-C, is followed during assessments.

4.1 Exploratory Case Study

4.1.1 Exploratory Case Study Design

The design type of the study is a single exploratory case study published in [36]. It is conducted prior to developing the Gov-PCDM.

The objective of the study is to investigate the usefulness and applicability of the SPICE based government specific process capability determination model in assessing the process capability level and identifying a roadmap for process improvement in a governmental organization.

The measure used in the research is the capability level of the governmental process.

4.1.1.1 Case Study Selection

Case Selection Strategy is to select an organization that has been subject to one of our previous studies where we analyze their processes. From this perspective, the organization will enable us better to observe if the approach capable of revealing these strengths and weaknesses and indicating the capability level of the process.

Another criterion for the selection of the process is that the necessity of process improvement.

The last criterion for the selection of the case study is having belief of the organization on the necessity of the study for determination of the process capability level and generating a road-map for process improvement.

4.1.1.2 Case Study Research Questions

The research questions of this exploratory case study are as follows;

RQ1: How suitable is the application of SPICE based governmental process capability determination model to be used with the purpose of identifying the current state of a government process capability and the gaps with the assessed capability level. Accordingly how well it provides roadmaps for improving the process capability of the governmental organizations?

RQ2: What are the necessities of the SPICE based governmental process capability determination model?

4.1.1.3 Field Procedure, Data Collection, and Limitations

ISO/IEC TR 15504 - Part 2 [17] is followed for achieving the process definition of PIMP and ISO/IEC TR 15504 - Part 3 [18] is followed during conducting the assessment for process capability determination. Government Process Assessment Model given in Appendix-C is followed during assessments.

The measure of capability is based upon a set of PAs. GPIs are the means of achieving the capabilities addressed by the considered PAs. Evidence of GPIs supports the judgment of the degree of achievement for the PAs.

The level-1 assessment is performed concerning the BPs, outcomes and work products described in the process definition (regarding process attribute PA 1.1) with the focus of checking if the base-practices are performed. The rating is performed based on evidences gathered from the semi-structured interviews, reported in the assessment report in [82], as follows: F.A. (Fully Achieved) means 86% to 100% of achievement of the BPs, L.A. (Largely Achieved) means 51% to 85% of achievement of BPs, P.A. (Partially Achieved) means 16% to 50% of achievement of BPs, N.A. (Not Achieved) means 1% to 15% of achievement of BP. The numeric values of the PAs will be obtained by taking into consideration of BP ratings for the final rating of PA 1.1. The same logic is valid for calculating BP rating.

After the assessment, the assessment results are shared with the process owners. Following the meeting, in order to check usefulness and adequacy of the proposed approach, the open-ended structured questionnaire below is utilized.

- Are measuring process capability and obtaining guideline for improvement useful?
- Do you think that applying these suggestions will improve the process performance?
- Is there any information you want to add in process definition?
- Is there any missing item(s) in guideline for improvement list?

4.1.2 Case Study Implementation

Public Investment Management Process (PIMP) is selected for the exploratory case study. One of the reason for this selection is that we have already investigated the strengths and weaknesses of the PIMP in the scope of a project. Another reason is that the PIMP is critical for the development of the country. PIMP is one of the most important processes performed in the Ministry of Development. National financial resources should be used properly to enrich people's lives and improve organizational performance. Evaluating and improving investment management capabilities provides significant benefits for the government. Thus, authorities in the Ministry of Development requested to discover the weaknesses of the process to improve the process performance.

Turkish Republic Ministry of Development is an expert based organization which plans and guides the country's development process in a macro approach and focuses on the coordination of policies and strategy development. It has 38 departments, 818 employees. Semi-structured interviews were conducted with 8 different process owners who perform the process. The duration of interviews for each was around 60 minutes.

During the assessment, we observed that people tend to highlight the positive practices of their job a therefore, contradictory questions also need to be asked related to practices. Direct evidences were also collected and reviewed in the scope of the assessment.

4.1.2.1 Process Definition of the Public Investment Management Process

PIMP is defined *(ad-hoc)* by us together with the process owners. In particular, the process is defined in a prescriptive procedural manner. So, the first task to be undertaken is to define the process based on the standard of ISO/IEC TS 15504-part 2 whose process elements are as follows:

- The title is a descriptive heading for a process;
- The purpose describes the goal of performing the process;
- The outcomes express the observable results expected from the successful performance of the process;
- The BPs are a list of actions that may be used to achieve the outcomes;
- The work products are separately identifiable bodies of information produced and stored for human use during a system or the software life cycle.

Process Definition of PIMP includes the following steps:

- Investigating documents related to Policies & Business Rules of the Turkish Government. (Decree law concerning the organization as well as duties, and process-specific documents containing the corresponding business-rules are examined in order to define the process.)
- Interviewing the stakeholders.
- Reviewing worldwide best practices related to the process in hand.
- Taking similar processes from international standards as a reference.
- The definition is formally reviewed and approved by the management with executive responsibility within the organizational unit and by the thesis advisor who has both professional and academic experience in using ISO/IEC TR 15504.

Accordingly, the defined PIMP is given in

Table 4.1. Once approved, the process definition became our Government Process Reference Model (albeit including only one process). At this point it is necessary to build a Process Assessment Model (PAM).

Table 4.1 Public Investment Management Process Definition

Process Title	**Public Investments Management**
Process Purpose	The Purpose of the Public Investment Management Process is to provide public investment politics that are consistent with priorities identified in development plans and programs; to create, monitor and review the public investment program; and also to coordinate, analyze, investigate and support the public investments projects.
Process Outcomes	1) Investment politics are identified and evaluated in light of 5 years-development plan and middle-term financial plan which are interpreted at sector or sub-sector levels to determine priorities. 2) Pre-feasibility study is performed to identify relevant alternatives before undertaking a full-fledged feasibility study to improve agencies projects effectiveness. 3) Public investment policies and guideline are determined. 4) Budget allocation for each public agency in the strategic level is performed. 5) Public investment projects are submitted by the public agencies with basic project information, including project objective, expected results and estimated budget (Feasibility analysis). 6) Submitted projects are evaluated. 7) Accepted public investment projects are monitored and reported. 8) Funding review is performed for the accepted public investment projects and revisions are done if necessary.
BPs	BP1: Create and manage public investment politics, policies and plans. [Outcomes: 1] BP2: Evaluate pre-feasibility study: [Outcomes: 1;2] BP3. Develop public investment policies and guideline. [Outcomes: 1;3] BP4: Allocate budget to public agencies as high-level planning. [Outcomes:1;4] BP 5: Submit public investment projects. [outcomes 1;2;3;4;5] BP 6: Evaluate public investment projects.[Outcome 3;6] BP 7: Evaluate submitted as aggregated or bulk project [Outcome 6] BP 8: Announce accepted projects. [Outcome 6] BP 9: Monitor accepted public investment projects [Outcome 7] BP 10: Track projects progress against plans [Outcomes: 5;7] BP 11: Adjust projects[Outcome: 8] BP 12: Perform project close-out review[Outcomes: 5;6;7]

Table 4.1 Public Investment Management Process Definition *(Continued)*

Work Products	
Inputs	**Outputs**
5-years Development Plan [Outcome:1]	
Middle-Term Financial Plan [Outcome:1]	
Public Investment Policies and strategies [Outcome:5]	Public Investment Policies and strategies [Outcome:3]
Public Investment Project Preparing Guideline [Outcome:5]	Public Investment Project Preparing Guideline [Outcome:3]
Investment Allocation Ceiling by Agencies [Outcome: 6]	Investment Allocation Ceiling by Agencies [Outcome: 4]
Project proposals[Outcome:6]	Project proposals [Outcome:5]
Feasibility report [Outcome:6]	Feasibility report [Outcome:5]
Project financial plan[Outcome:6]	Project financial plan[Outcome:5]
Project schedule[Outcome:6]	Project schedule[Outcome:5]
	Public Investment Program [Outcome:6]
	Book of Public Investments Breakdown by Province [Outcome:6]
	Progress status record[Outcome:7]
Project status report[Outcome:8]	
	Review Records[Outcome:7]
Project Performance Data [Outcome: 7]	
Tracking system [Outcome:7]	
Additional-allocation request [Outcome:8]	

4.1.2.2 *Process Assessment*

Audit procedures related to details of activities such as planning, briefing of the participants, data collection and validation and reporting are based on ISO/IEC TR 15504-Part 3: Guidance on Performing an Assessment [18] as the documented procedural approach for conducting the assessment. This ensured assessment planning, assessment performing, data collection and creating documents in a standard format. Process Assessment is performed by the participants in the organization responsible for the quality assurance and us.

A visit of 2 days was performed in order to make the PIMP assessment, for which evidence gathering techniques as conducting semi-structured interviews with process stakeholders to be evaluated (so the documentation as law, decree-law, policies, or other documents using for the process is inspected) and the process owners responsible for actual execution of the PIMP. The assessment team used this information to create the assessment report [82]

PA of Level 1 is Process performance attribute which is a measure of the extent to which the process purpose is achieved. The process definition as given in

Table 4.1 are used for Level 1 assessment. The outcomes are controlled if they are achieved, and correspondingly defined BPs are checked if they are performed. For the assessments of levels 2 to 5, we use 'generic practices indicators', 'generic resources indicators' and 'generic work products indicators', given in Appendix-C.

4.1.3 Analysis of the Results

The result of this assessment in the case study is that the capability level of the PIMP performed in the Ministry of Development in Turkey is Level 2 with the following rationale based on collected and validated evidence. In order to define the process as at capability level k, all process attributes below level k should satisfy the rating F.A. and the level k attribute(s) should be rated as F.A. or L.A. Each Process Attribute assessed deeply. More details of the assessment are given in the technical report [82]. Summary of the evidences is given in the Table 4.2.

Table 4.2 Public Investment Management Assessment Result

Level	Attribute	Evidences	Assessment Value	Result
Level 1	Process Performance	The process clearly achieved its purpose by maintaining steady public investment management selection and monitoring.	Fully Achieved	LEVEL 2
Level 2	Performance Management	The performance is planned and managed but quality assurance objectives and performance quality criteria are not defined.	Largely Achieved	
	Work Product Management	Work products are defined but their quality criteria are not identified. Additionally, change control is not established, and real time data for revised project is not gathered.	Largely Achieved	
Level 3	Process Definition and Tailoring	The standard process is defined in governmental documents but the sequence and interaction of standard process with other process, plus infrastructure and work environment needs of the process are not defined. Definition of metrics/methods/ criteria monitoring effectiveness and suitability of the process is missing.	Partially Achieved	
	Process Deployment	The deployment rules are known by the personnel. Required human, information, infrastructure resources are available but there is no conformance/test to verify the defined process satisfies the requirements. Additionally, data required to understand the behavior, suitability and effectiveness of the defined process are not identified/collected.	Partially Achieved	

4.1.3.1 Guideline for Improvement Capability of the Process

The road map to improve the capability level of investment management processes is derived from the assessment evidences in the technical report [82]. The aim is to turn negative evidences into positive evidences of process capability indicators supporting the judgment of the degree of achievement of the process attribute. For example; for performance management attribute; first indicator is to identify the objectives for the performance of the process. However, the quality assurance objectives of the process are not defined for the performed process. Thus, necessity of defining quality assurance objectives and other issues is indicated in the guideline as follows:

- Quality assurance objectives of the process should be defined.
- Metrics/methods/criteria should be defined for monitoring effectiveness and suitability of the process.
- Performance quality criteria should be defined and performance of the employees should be monitored.
- Quality criteria of the work products should be identified.
- Quality criteria for reviewing and approving the content of the work products should be defined.
- For HR Qualification, personnel qualifications should be identified, Required exam scores and bachelor degree are not sufficient.
- Standardization for evaluation project should be applied. Criteria and their weights should be determined.
- Monitoring and reporting processes should be performed with real-time data.
- Data required understanding the behavior; suitability and effectiveness of the defined process should be identified/ collected and used for improvement.
- Internal audit and management review should be conducted.
- Training for deploying the process should be performed.
- Change Control of the projects should be established.
- Project revisions should be controlled systematically.
- Revision status of the projects should be available.
- Real-time data for revised project details should be available.
- Revised project details should be available to everyone.
- Resolving issues arising from work product reviews should be tracked systematically.
- The sequence and interaction of standard process with other processes should be defined.
- The infrastructure and work environment needs of the process should be defined.

4.1.3.2 Comparing the Result with ITIM

ITIM (Information Technology Investment Management) [85] which is developed for improving capability of IT investment projects management process is an accepted federal management framework for IT investment decision making in USA Government. It is an independent specific capability model developed for public investment management. It is used to check whether our proposed approach and findings are consistent with such an accepted domain specific framework.

PIMP performed in the Ministry of Development is assessed with ITIM by us and process owners. Since critical maturation steps required to move to the next stage is described properly in the ITIM, the assessment is performed easily. The capability level is assessed as Level 2 and improving to level 3 is described as follows in the ITIM;

- Criteria should be created and maintained.
- The analysis associated with examining the merits of each investment should be performed.
- Performance reviews should be conducted.
- Evaluation with classifying projects should be standardized.

As a result; our findings with the developed model are consistent with the ITIM; our proposed approach covers improvement list of ITIM, additionally, it provides more detailed guidance on what improvement activities to implement.

4.1.3.3 Interviews with the Stakeholders

To address our research questions, the process capability assessment of PIMP is executed and process improvement road-map is achieved.

To address our research questions, the process capability assessment of PIMP is executed and process improvement road-map is achieved. After performing the assessment, assessment results are shared with process owners in a meeting. We conducted follow-up interviews to check usefulness and adequacy of the proposed approach with 5 process owners, 4 of them have more than 5 years' work experiences. One of them has 2 years' work experiences as public investment project manager. The open-ended structured questionnaire, given in section 4.1.1.3, is performed. All of answers for the first two question are positive. They think that generated guideline is useful, and applying this suggestion will improve the process performance of the public investment management process, and they also confirm the process definition. While answering the last question, they point out some possible improvement areas such as interoperability with other government agencies. However, this is out of our scope and is primarily related to e-government initiatives. As a result, initial findings indicated the usefulness and adequacy of the proposed approach.

While conducting the exploratory case study, we observed the necessity of a methodology incorporating guidelines for government specific process definition. The process was defined in ad-hoc manner, however, it should be performed in a structured and standardized way.

4.1.4 Threats to Validity

As a result of the application of the exploratory case study research, some possible threats to validity arises. During the planning phase of the exploratory case study, actions were planned to overcome these threats. Here we explain, for each threat, the actions conducted to avoid the threats and the situation.

Regarding the **construct validity**, it considers if the constructs in the case study are well-structured or subjective to the judgment. To avoid these problems, the information is collected from the participants with different roles (process owner, process stakeholder, and executive member) and from multiple sources, including documentations (Laws, decree-laws, regulations, and previous years' project investment plans), interviews and observations of the participants.

As for **internal validity**, it is our concern as we try to make conclusions on the outputs derived by means of applying the methodology. In order to avoid these problems, we discussed the findings with process owners in a meeting after the assessment to eliminate any bias in assessment findings. The analysis shows that the decision to use the proposed approach to guide PIMP assessment in governmental organizations allowed us to obtain reliable information on the state of their capability level of PIMP and use it to improve them.

As regards **external validity and reliability**, before the conduct of the case study, we did not validate the approach. Since, the reason we are performing multiple case study is to validate the model step by step. We designed this study as a single exploratory case study. Assessing one process in an organization limited us to observe the applicability of the approach for different process capability levels apart from level 0 to level 3.

4.2 Multiple Case Study

Following the development of the methodology of Gov-PCDM in a standard and structured way as well as the development of the governmental process definitions *(including MGRSPs and Agency-Specific process),* we aimed to conduct a multiple case study to validate the model. The multiple case study design, implementation and analysis of findings are given in this section.

4.2.1 Multiple Case Study Design

The design type of the study is multiple case study. It is conducted after the developing the Gov-PCDM.

The objective of the study is to investigate if the proposed model of Gov-PCDM can be utilized for assessment of the process capability level determination in a governmental organization and identifying if the Gov-PCDM could be used as a roadmap for the governmental organizations for process improvement.

The measure used in the research is the capability level of the governmental processes.

Sources of evidences are the process capability level assessment interviews, follow-up interviews conducted with process stakeholders after sharing the assessment results in a meeting, and the information-gathering documents especially defined for the process. To validate the information, the assessment team gathers information independently from the documents to be evaluated (so the

documents as law, decree-law, policies, or other documents using for the process are inspected) and the person involved (participant) in the actual execution of this process. We plan to conduct formal assessments through semi structured group interviews with process owners, and evaluate the direct evidences. People from different roles are planned to be involved in the interviews to obtain tacit knowledge directly from practitioners. These roles are planned to include at least two process owner, and one executive member. After the process capability level assessments, we plan to prepare assessment reports, shared assessment results with process participants in a meeting and discuss the findings with the follow-up interviews to obtain their opinion on the assessment results after the meeting. We plan to record the interviews for further analyzes.

4.2.1.1 Case Study Selection

We plan to perform case studies at least three different organizations to increase the reliability of the study. For the selection of the organizations, we will pay attention to observability of every part of the Gov-PCDM. We will look for organizations which are at different capability levels in their processes. We aim to select cases from different governments to observe if the Gov-PCDM is applicable to different governments.

Case Selection Strategy is to select an organization that has been subject to one of our previous studies where we analyze their processes. Since, we have already investigated the strengths and weaknesses of the processes. From this perspective, the organization will enable us better to observe if the approach capable of revealing these strengths and weaknesses and indicating the capability level of the process. Another criterion for the selection of the process is that the necessity of process improvement. The last criterion for the case study selection is that having the belief of the organization on the necessity of the studies for determination of the process capability level and generating a road-map for process improvement. Without such a belief, the study might be perceived as a burden as part of the daily studies of the organization. Only then, does it make sense for the organization to allocate resources for the study. This consideration is significant, since the success of the work on process assessment is highly dependent on the contribution of the process owners.

4.2.1.2 Case Study Research Questions

We defined the following research questions in accordance with the objectives above:

RQ1: How suitable it is to use the Gov-PCDM with the purpose of identifying the current state of the process capability and the gaps with the assessed capability level and the gaps with the assessed capability level, as well as how well it provides roadmaps for improving the process capability of the governmental organizations.

RQ2: What are the strengths and weaknesses of the Gov-PCDM?

4.2.1.3 Field Procedure, Data Collection, and Limitations

Audit procedures related to details of activities such as planning, briefing of the participants, data collection and validation and reporting are based on ISO/IEC TR 15504-Part 3: Guidance on Performing an Assessment [18] as the documented procedural approach for conducting the assessment. This ensured assessment planning, assessment performing, data collection and creating documents in a standard format. Process Assessment is performed by the participants in the organization responsible for the quality assurance and by us.

A visit will be performed in order to make each process assessment, for which evidence gathering techniques as inspections of the documents (the documentation as law, decree-law, policies, or other documents using for the process) and as conducting semi-structured interviews with process stakeholders and the process owners responsible for actual execution of the process. The assessment team will use this information to create the assessment reports for each agency.

The measure of capability is based upon a set of process attributes (PA). Process capability indicators are the means of achieving the capabilities addressed by the considered PAs. Evidence of process capability indicators supports the judgment of the degree of achievement for the PAs. PA of Level 1 is Process performance attribute which is a measure of the extent to which the process purpose is achieved. Developed process definitions (Agency-Specific and MGRSP) as given Appendix A and B are used for Level 1 assessment. For the assessments of levels 2 to 5, we use exactly the same GPIs as the exemplar PAM provided by the ISO/IEC TR 15504 -part 5 [20]. They are given Government Process Assessment Model in Appendix-C.

The level-1 assessment is performed concerning the BPs, outcomes and work products described in the process definitions regarding PA 1.1 *(Both MGRSP and generic process definitions)* with the focus of checking if the BPs are performed. The rating is performed based on evidences gathered from the semi-structured interviews and inspected documents, reported in the assessment report in [86-89] as follows: F.A. (Fully Achieved) means 86% to 100% of achievement of the BPs, L.A. (Largely Achieved) means 51% to 85% of achievement of BPs, P.A. (Partially Achieved) means 16% to 50% of achievement of BPs, N.A. (Not Achieved) means 1% to 15% of achievement of BP. The numeric values of the PAs were obtained by taking consideration of BP ratings for the final rating of PA 1.1. The same rating mechanism is valid for PAs rating, i.e: F.A. (Fully Achieved) means 86% to 100% of achievement of the PA. In order to define the process as at capability level k, all PAs below level k should satisfy the rating F.A. and the level k attribute(s) should be rated as F.A. or L.A. More detail of the assessment is given in the assessment reports [86-89].

After the assessment, the assessment results are shared with process owners. Following the meeting, in order to check usefulness and adequacy of the proposed approach, the open-ended structured questionnaire below is utilized.

- Are measuring process capability and obtaining guideline for improvement useful?

- Do you think that applying to these suggestions will improve the process performance?
- Is there any information you want to add in process definition?
- Is there any missing item(s) in guideline for improvement list?

4.2.2 Case Study Implementation

Turkish Republic Ministry of Development, North Cyprus Turkish Republic Ministry of Health and, North Cyprus Turkish Republic Ministry of Labor and Social Security are selected for the multiple case study. Case Studies are selected among the organizations that have been subject to one of our previous studies where we analyze their processes. The processes performed in the Ministry of Health and Ministry of Labor and Social Security in North Cyprus Turkish Republic are deeply analyzed in the scope of an e- government project, and the processes of the Ministry of Development are analyzed in the scope of research and development of information map project (BİHAP). We have already investigated the strengths and weaknesses of the processes. The Graduate Student Selection process performed in Informatics Institute is selected for agency-specific process assessment. Since we are participating in the process, we know the strengths and weaknesses of it. From this perspective, the organizations will enable us better to observe if the Gov-PCDM capable of revealing these strengths and weaknesses and indicating the capability level of the process.

The organizations are from different governments as Turkish Republic and North Cyprus Turkish Government. The organizations have a belief in the necessity of the capability level determination of their processes and generating road-map for process improvement.

The information on the capability level of the processes was obtained by analyzing and summarizing the information collected on each organization's process. Following the assessment of the processes, the assessment results are shared with process stakeholders for each process performed in each organization. Their response is given in the *Interviews with the Stakeholders* section under each of the process assessments.

4.2.2.1 Challenges we faced during the conduct of case studies

The objectivity of the Judgement*:* In order for an assessment to generate and transfer confidence on its results, the assessment must include significant measurement. That is, the entities to be measured (in our case, PAs) must possess properties that can be mapped to a set of values of the defined type (for example: integer, ordinals, elements of a set) [89]. The Gov-PCDM developed based on ISO/IEC TR 15504 complies with this theory-of-measure- related requirement by establishing a mapping between a PA and an ordered set of values as N.A., P.A, L.A, and F.A. To deal with the effects of subjectivity in this measurement process and reduce uncertainty in the results, Gov-PCDM has checkable indicators. These record the types of objective evidence that link to the process reference model

elements, and permit an objective judgment of the achievement of the PAs. Additionally, requirements for documenting the assessment process (including evidences for any decision made by the assessors and the records of their findings) reduce the subjectivity.

***Open-ended questions*:** We observed that asking open-ended questions is a better way of obtaining the tacit knowledge of team members. However, there is a side effect of this approach. We could not obtain the exact information or it may take longer than we expected. Thus, we use the approach to start with open-ended questions (i.e: how do you….) and direct the assessed person with examples when things get complicated. Direct questions, including if the BPs and generic practice indicators are performed are asked.

4.2.2.2 Backgrounds

Organization-1: Republic of Turkey Ministry of Development plans and guides the country's development process in a macro approach and focuses on the coordination of policies and strategy development. It has 38 departments, 818 employees. The existing processes are analyzed and semi-structured interviews are conducted in the scope of the research and development of information map project (BİHAP). Since we have already known strengths and weaknesses, of the processes, the application of the Gov-PCDM methodology to them took less time, around 60 minutes for each process. As a result of the assessment, gathered evidences are reported in the assessment report [86] for the organization-1, Turkish Republic Ministry of Development in Turkey.

Organization-2: Turkish Republic of Northern Cyprus Ministry of Health is in charge of regulating the health care system. 87 people are working in the ministry except employees working in hospitals. The existing processes are analyzed and modeled based on the semi-structured interviews conducted in the scope of an e-government project. The duration of interviews for each person was around 120 minutes. Since we have already known strengths and weaknesses, of the processes, the application of the Gov-PCDM methodology to them took less time, around 40 minutes for each process. Then, the assessment results are shared with the process stakeholders. As a result of the assessment, gathered evidences are reported in the assessment report [87] for the organization-2, North Cyprus Turkish Republic Ministry of Health.

Organization-3: Ministry of Labor and Social Security is responsible for labor and social security affairs. 141 employees are working in the ministry. The existing processes are analyzed and modeled based on the semi-structured interviews conducted in the scope of an e-government project. The duration of interviews for each person was around 120 minutes. Since we have already known strengths and weaknesses, of the processes, the application of the Gov-PCDM methodology to them took less time, around 40 minutes for each process. As a result of the assessment, gathered evidences are reported in the assessment report [88] for the organization-2, North Cyprus Turkish Republic Ministry of Labor and Social Security.

4.2.3 Assessment of Management of Governmental Resources and Support Processes (MGRSPs)

4.2.3.1 Human Resource Management Process

Organization-1: The personnel management department is responsible for carrying out all works related to employees. 10 employees are working in the department, 1 of them is the head of the personnel management department.

Organization-2: There is no personnel or human resource department. Accounting office is dealing with paper works related to hiring, retirement, and salary payment in the ministry. 5 people working in accounting office are dealing with personnel management activities.

Organization-3: There is no personnel or human resource department in the ministry. Accounting office is dealing with hiring, retirement, and salary payment. 8 people working in accounting office are dealing with personnel management activities.

4.2.3.1.1 Level-1 Assessment

Level-1 assessment results given in Table 4.3 include grading of BPs in organization 1, 2, and 3. One example for grading BPs based on evidences, gathered during assessment, is as follows. The details of the assessment are reported in the assessment report [86-89].

- *BP1.1 for Organization-1:* Human capital management strategy is written in the yearly performance plan. Human capital management policies are strictly defined in governmental regulations. I.e: public personnel regulation. Thus, this sub-BP is rated as F.A.
- *BP1.2 for Organization-1:* The human capital management plan is developed by the personnel department. Thus, this sub-BP is rated as F.A.
- *BP1.3 for Organization -1:* The human capital management plan is monitored and updated on yearly. Thus, this sub-BP is rated as F.A.
- *BP1.1 for Organization-2& Organization-3:* Human capital management strategy is not defined. However, human capital management policies are strictly defined in governmental regulations i.e.: Public personnel regulations. Regulation of public personnel in related ministry. Thus, this sub-BP is rated as L.A.
- *BP1.2 for Organization-2& Organization-3:* The human capital management plan is not developed officially, however the employee necessity is reported orally to senior managers of ministry by the executive members of the related department in the meetings. Thus, this sub-BP is rated as P.A.
- *BP1.3 for Organization-2& Organization-3:* The human capital management plan is not monitored and updated officially. There is no produced work product for this. However, the existing plan, which is not written anywhere, is updated based on the orally reported employee necessities, strategic decisions and yearly budget. Thus, this sub-BP is rated as P.A.

As a result of the assessment, final rating of PA 1.1 is determined based on the ratings of BPs. Since the assessment value of 51% to 85% achievement of BPs is Largely Achieved, P.A. 1.1 for Organization-1 is rated as ***Largely Achieved***, and the assessment value of 16% to 50% of achievement of BPs is Partially Achieved, the final ratings of P.A. 1.1 for the Organization-2 and Organization-3 are ***Partially Achieved***.

Table 4.3 HRM Capability Level-1 Assessment Results

BPs	Org.-1	Org.-2	Org.-3
BP1: Create and manage human resources (HR) planning, policies, and strategies.	**F.A.**	**L.A.**	**L.A.**
BP.1.1. Develop human resources strategy	F.A.	L.A.	L.A.
BP.1.2 Develop and implement human resource plans	F.A.	P.A	P.A
BP.1.3. Monitor and update plans	F.A.	P.A	P.A
BP2: Manage Reward and Recognition	**N.A.**	**N.A.**	**N.A.**
BP3: Manage Employee Performance	**L.A**	**N.A.**	**N.A.**
B.P.3.1 Define performance objectives	F.A.	N.A.	N.A.
BP.3.2. Develop performance management approaches/feedback	P.A.	N.A.	N.A.
B.P.3.3 Review, appraise, and manage employee performance	P.A.	N.A.	N.A.
B.P.3.4 Evaluate and review performance program	P.A.	N.A.	N.A.
B.P.3.5. Manage team performance	P.A	N.A.	N.A.
BP4: Recruit, Source, and Select Qualified Staff	**F.A.**	**L.A.**	**L.A.**
B.P.4.1 Create and develop employee requisitions	F.A.	L.A.	L.A.
B.P.4.2 Recruit/Source candidates	F.A.	F.A.	F.A.
B.P.4.3 Screen and select candidates	F.A.	F.A.	F.A.
B.P.4.4. Manage pre-placement verification	F.A.	F.A.	F.A.
B.P.4.5 Manage new hire/re-hire	F.A.	L.A.	L.A.
B.P.4.6 Track candidates	P.A.	N.A.	N.A.
BP5: Develop and Train Employees	**L.A.**	**P.A.**	**P.A.**
B.P.5.1. Manage employee development	F.A.	L.A.	L.A.
B.P.5.2. Develop and manage training programs	L.A.	P.A.	P.A.
B.P.5.3 Develop and manage employee orientation programs	F.A.	F.A.	F.A.
B.P.5.4 Manage employee relations	N.A.	N.A.	N.A.
B.P.5.4 Develop functional/ process competencies	L.A.	P.A.	P.A.
B.P.5.5 Develop management/leadership competencies	N.A.	N.A.	N.A.
B.P.5.6 Develop team competencies	N.A.	N.A.	N.A.
B.P.5.7 Evaluate the overall effectiveness of the agency's employee development approach	P.A.	N.A.	N.A.

Table 4.3 HRM Capability Level-1 Assessment Results *(Continued)*

BPs	Org.-1	Org.-2	Org.-3
BP6: Support Staff Interaction and Collaboration	**L.A.**	**P.A.**	**P.A.**
BP7: Empower Teams	**N.A.**	**N.A.**	**N.A.**
BP8: Evaluate staff performance	**P.A.**	**N.A.**	**N.A.**
BP9: Provide Feedback on Performance	**N.A.**	**N.A.**	**N.A.**
BP10: Motivate Personnel	**L.A.**	**L.A.**	**L.A.**
BP10.1. Manage employee satisfaction	N.A.	N.A.	N.A.
BP10.2. Deliver programs to support work/life balance for employees	N.A.	N.A.	N.A.
BP10.3. Develop family support systems	F.A.	F.A.	F.A.
BP10.4. Ensure employee involvement	N.A.	N.A.	N.A.
BP10.5. Manage internal Communications	F.A.	P.A.	L.A.
BP10.6. Manage and administer employee benefits	F.A.	F.A.	F.A.
BP10.7. Manage workplace health and safety	L.A.	L.A.	L.A.
BP11: Maintain Staff Information	**F.A.**	**L.A.**	**L.A.**
BP11.1.Manage employee information	F.A.	L.A.	L.A.
BP11.2. Manage employee communication	F.A.	L.A.	L.A.
BP12: Manage Redeployment and retirement of employees	**F.A.**	**F.A.**	**F.A.**

4.2.3.1.2 Level-2 Assessment

4.2.3.1.2.1 PA 2.1. Performance Management Attribute Assessment

4.2.3.1.2.1.1 Organization-1

Generic Practice Indicators (GPI) of Performance Management Attribute and their evidences for organization 1 are given at Table 4.4. As a result of assessment, the assessment Value for performance management attribute is ***Largely Achieved*** based on the all evidences, work products and resource indicators given below.

Table 4.4. Evidences for GPIs of Performance Management Attribute for HRM Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1. Identify the objectives for the performance of the process.	-Objectives for the performance for the process is defined in the yearly Performance Plan.	-	F.A.
2.1.2. Plan and monitor the performance of the process to fulfill the identified objectives.	-Activities, and resource usage for achieving the objectives are defined in the yearly Performance Plan. -Process activities and tasks are defined in the job description. -Process performance is monitored by the related personnel.	Performance indicators related to training and presenting the organization, service quality performance indicators like number of employee complaints are omitted. They are not monitored.	L.A.
2.1.3. Adjust the performance of the process.	The performance plan is published in yearly. It is monitored during the year.	It is not adjusted.	L.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles and responsibilities are identified job definitions document.	The needs for process performance experience, knowledge and skills are not defined.	L.A.
2.1.5. Identify and make available resources to perform the process according to plan.	-Resources to achieve the objectives of the process are planned in yearly performance plan. -Since it is not project-based job, human resource necessity does not change frequently.	-	F.A.
2.1.6. Manage the interfaces between involved parties.	Office of Personnel Management Director assigns responsibilities of the involved parties and manages communications between the involved parties.	-	F.A.

Available generic resource indicators:

- ✓ Communication mechanism; E-mail is widely used for information exchange.
- ✓ Employee Information System
- ✓ Information repository

- ✓ Facilities and infrastructure resources

Available work product indicators:

- ✓ Yearly Performance Plan
- ✓ Job descriptions (including activities, responsible personnel etc.)
- ✓ Meeting record

4.2.3.1.2.1.2 Organization-2&Organization-3

Generic Practice Indicators (GPI) of Performance Management Attribute and their evidences for organization 2 & organization 3 and are given in Table 4.5 below. Since the evidences are the same for the two of the organizations, the results are given in one table, Table 4.5 instead of two separated tables. The assessment Value is ***Partially Achieved*** based on the all evidences, work products and resource indicators given below.

Table 4.5. Evidences for GPIs of Performance Management Attribute for HRM Process of Organization 2&3

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
2.1.1. Identify the objectives for the performance of the process.		Objectives for the performance for the process are not defined.	N.A.
2.1.2. Plan and monitor the performance of the process to fulfill the identified objectives.		Activities, and resource usage for achieving the objectives are not defined and monitored.	N.A.
2.1.3. Adjust the performance of the process.		It is not adjusted.	N.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles are defined in the law of establishment, tasks and operating principles published for departments.	The needs for process performance experience, knowledge and skills are not defined.	L.A.
2.1.5. Identify and make available resources to perform the process according to plan.	Since it is not project-based job, human resource necessity does not change frequently.	The information necessary to perform the process is not identified	L.A.
2.1.6. Manage the interfaces between involved parties.	Responsibilities of the involved parties are assigned and communications between the involved parties are managed	-	F.A.

Available generic resource indicators:

- ✓ Communication mechanism; papers

Available work product indicators:

- ✓ -

4.2.3.1.2.2 PA 2.2. Work Product Management Attribute Assessment

4.2.3.1.2.2.1 Organization-1

GPIs of Work Product Management Attribute and their evidences for Organization 1. Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.6. Evidences for GPIs of Work Product Management Attribute for HRM Process of Organization 1

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
2.2.1. Define the requirements for the work products	Objectives for the performance for the process is defined in the yearly Performance Plan.	-	F.A.
2.2.2. Define the requirements for documentation and control of the work products.	-Activities, and resource usage for achieving the objectives are defined in the yearly Performance Plan. -Process activities and tasks are defined in the job description. -Process performance is monitored by the related personnel. - *Hizmet içi ve intibak eğitimlerine katılması planlanan kişi sayısı* - *Tez Değerlendirme ve Yeterlik Sınav Sayısı* - *Yetiştirilmek amacıyla yurt dışına gönderilmesi planlanan personel sayısı* -- *Bakanlığımızı tanıtmak amacıyla düzenlenecek toplantı sayısı*	-Performance indicators are related to training and presenting the organization, service quality performance indicators like number of employee complaints are omitted. -They are not monitored.	L.A.
2.2.3. Identify, document and control the work products.	• The performance plan is published in yearly. It is monitored during the year.	It is not adjusted.	L.A.
2.2.4. Review and adjust work products to meet the defined requirements.	• Roles and responsibilities are identified job definitions document.	The needs for process performance experience, knowledge and skills are not defined.	L.A

4.2.3.1.2.2.2 Organization-2&Organization 3

GPIs of Work Product Management Attribute and their evidences for Organization 2 and 3 are given in Table 4.7. Assessment Value is ***Partially Achieved*** based on the evidences, work products and resource indicators.

Table 4.7. Evidences for GPIs of Work Product Management Attribute for HRM Process of Organization 2&3

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.3.1. Define the requirements for the work products	Since it is a standard supplementary process, few documents are standardized.	-The requirement for the work products are not defined -Quality criteria of the work products are not identified -Work product approval criteria are not defined	P.A.
2.3.2. Define the requirements for documentation and control of the work products.	Documents are stored in archive department. -The distribution of the documents is defined.	-Dependencies between work products are not identified -Documents are stored in the paper format. There is no a document management system. -There is no such a mechanism for traceability.	P.A.
2.3.3. Identify, document and control the work products.	Controlling a few of standardized work products is performed manually.	-Change control is not established for work products -There is no an appropriate access mechanism for documents.	P.A.
2.3.4. Review and adjust work products to meet the defined requirements.	Since work products are standardized such as forms, pay rolls, etc reviewing and adjusting are not necessary.	There is no a review and adjusting mechanism.	P.A

Available generic resource indicators:

- ✓ Employee Information System
- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ Intranet
- ✓ Document Management System

4.2.3.1.3 Level-3: Established Process

4.2.3.1.3.1 Process Definition Attribute Assessment

4.2.3.1.3.1.1 Organization-1

GPIs of Process Definition Attribute and their evidences for Organization 1 are given in Table 4.8 Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.8. Evidences for GPIs of Process Definition Attribute for HRM Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
3.1.1. Define the standard process that will support the deployment of the defined process.	Job descriptions include fundamental process elements i.e: related governmental laws, activities etc.	Guidance for the process is not provided. Job descriptions include what to do instead of how to do it.	L.A.
3.1.2. Determine the sequence and interaction between processes so that they work as an integrated system of processes.		The sequence and interaction of activities are not documented.	N.A.
3.1.3. Identify the roles and competencies for performing the standard process.	Process performance roles are identified in the job description document. The competences for the roles are defined in the Job Analysis Form.		F.A.
3.1.4. Identify the required infrastructure and work environment for performing the standard process.	The infrastructure and work environment needs of the process are defined in Job Analysis Form.	-	F.A.
3.1.5. Determine suitable methods to monitor the effectiveness and suitability of the standard process.	-Effectiveness of the process is monitored with performance metrics defined in the yearly performance plan. -Internal auditing and review are performed for paying salaries.	-	F.A.

Available work product indicators:

- ✓ Job Descriptions, Job Analysis Form, Yearly Performance Plan

4.2.3.1.3.2 Process Deployment Attribute

4.2.3.1.3.2.1 Organization-1

GPIs of Process Deployment Attribute and their evidences for Organization 1 are given at Table 4.9. Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.9. Evidences for GPIs of Process Deployment Attribute of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
3.2.1. Deploy a defined process that satisfies the context specific requirements of the use of the standard process.	Governmental Regulations define specific requirements of the process. Supplementary process performs in a same way with satisfying requirements.	Verification of conformance of defined process with standard process requirements is not done officially.	L.A.
3.2.2. Assign and communicate roles, responsibilities and authorities for performing the defined process.	The roles and responsibilities of the roles are defined in the Job Analysis Form.		F.A.
3.2.3. Ensure necessary competencies for performing the defined process.	The competences of the assigned personnel are defined in the Job Analysis Form.	The trainings which are needed to deploy the process are not defined and implemented.	L.A.
3.2.4. Provide resources and information to support the performance of the defined process.	Required human resources and information are available, allocated and used.	-	F.A.
3.2.5. Provide adequate process infrastructure to support the performance of the defined process.	-Infrastructure and work environment is available. -Organizational support to effectively manage via tools such as Intranet, e-mails, telephone etc.	-	F.A.
3.2.6. Collect and analyze data about performance of the process to demonstrate its suitability and effectiveness.	Data required to understand behavior, suitability and effectiveness of the defined process are identified in the Job Analysis Form.	Identified data are not collected.	L.A.

Available work product indicators:

- Government regulations, Job Analysis Form, Intranet, e-mails

4.2.3.1.4 HRM Process Assessment Results

In order to define the process as at capability level k, all process attributes below level k should satisfy the rating F.A. and the level k attribute(s) should be rated as F.A. or L.A. Accordingly, the capability level of the HRM Process performed is determined as level-1- performed for organization 1 and Level-0 incomplete for organizations 2 and 3, as seen at Table 4.10.

Table 4.10. HRM Process Assessment Results

Process Attributes	**Organization-1**	**Organization-2**	**Organization-3**
P.A.1.1 Process Performance	L.A.	P.A.	L.A.
P.A.2.1 Performance Management	L.A.	P.A.	P.A.
P.A.2.2 Work Product Management	L.A.	P.A.	P.A.
P.A.3.1 Process Definition	L.A.		
P.A. 3.2 Process Deployment	L.A.		
….			
Result	**Level-1 Performed**	**Level-0 Incomplete**	**Level-0 Incomplete**

4.2.3.1.5 Guideline for Improvement Capability of the HRM Process

The roadmap to improve the capability level of the HRM is derived from the assessment evidences for each organization. The aim is to turn negative evidences into positive evidences of the BPs. The aim of the satisfying level-1 requirements is achieving all BPs as fully achieved. The aim of the satisfying level-2 to level 5 requirements is achieving all GPI as fully achieved. Guideline to improve the HRM capability level is derived based on assessment findings. They are listed as below.

For Organization-1, Organization-2 and Organization-3;

1) Develop Employee Performance Management System
   - Identify process performance experience, skills, knowledge and needed trainings to deploy the process
   - Identify, collect and monitor employee performance indicators
   - Set targets for employee performance indicators, monitor and adjust them if necessary
   - Evaluate and review the performance program
   - Create Personnel performance criteria
   - Evaluate staff performance
   - Provide feedback on performance
2) Develop Rewarding/Incentive Mechanism
   - Identify rewards and provide to give them to employees who deserves.
3) Provide Lessons Learned Database
4) Separate the unproductive employees

5) Work-product Management
   - Define requirement of work product
   - Define quality criteria and approve work products based on these criteria before releasing
   - Define relations between work products
6) Configuration Management
   - Provide change control mechanism for the work product.
7) Work Flow Management
   - Define activities, tasks and resources
   - Define sequence of activities

For Organization-2 & Organization-3

8) Develop, implement and update human resource plans.
9) Reengineer the organization and set a department to deal with personnel management.
   - Recruit, Source, and Select Qualified Staff
   - Develop and train employees
   - Manage orientation and training programs
   - Manage employee relations
   - Develop functional/ process competencies
   - Evaluate the overall effectiveness of the agency's employee development approach
   - Support Staff Interaction and Collaboration
   - Empower Teams
   - Motivate personnel
10) Develop a personnel management information system to maintain staff information.
11) Develop knowledge sharing platform.
12) Document job definitions.

For Organization-1

8) Process Management
   - Verify the conformance of defined process with standard process requirements officially.
   - Identify and collect date to monitor process performance

4.2.3.1.6 Interviews with the Stakeholders

The assessment results are presented with senior managers of the organizations, process stakeholders and process owners in a meeting. The ratings for each BP and evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for HRM assessment and improvement, and they aim to follow this same approach for future process improvement cycles to move from a chaotic and unpredictable HRM to tangible one.

In order to check usefulness and adequacy of the Gov-PCDM, interviews were conducted with all members after the meetings. The interviews took about 10 minutes. The open-ended structured questionnaire below is utilized. Interviews are conducted with 26 people in total. 11, 6, and 9 people (6, 2 and 5 of them are process owners) in organization-1, 2, 3 respectively. 10 of them have more than 5 years' work experiences. 8 of them have 3 years' work experiences, 8 of them have less than 2 years' work experience. The findings in the conducted interviews, given in Table 4.11, support our proposed approach. All of the answers for the first two questions are responded as 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the HRM. They also confirm that process definition of HRM covers all outcomes of the process.

While answering the last question, two of the responders pointed out some possible improvement areas such as interoperability of involved parties; such as public service commission in organization-2 and 3 for recruitment practices. However, this is out of our scope and is primarily related to e-government initiatives. Three responder from Organization-1 indicated that configuration management is not so important for human resource management process in government. Since standardized work products are used in general. Two responders from Organization-2 stated that some of the BPs, checked for level-1 assessment, are not performed because of understaffing problem and the Gov-PCDM does not discover this.

Organization-1 is already aware of the necessity of an Employee Performance Management System, and they are working on it. In the strategic plan of the ministry, it is indicated that definition of activities and their sequence flow should be completed before 2018. The organization 2 and 3 have already planned to establish a department for just performing human resource management practices and they are working on development of a personnel management system.

Table 4.11 Results of Interview with the Stakeholders for HRM Process

Question	Survey Type	Response
Q1) Are measuring HRM capability and obtaining guideline for improvement useful?	5 points Likert scale	4 on median
Q2) Do you think that applying these suggestions will improve the HRM performance?	5 points Likert scale	4 on median
Q3) is there any information you want to add in process definition of HRM? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	Interoperability

4.2.3.2 Financial And Physical Resource Management Process

4.2.3.2.1 Level-1 Assessment

As a result of assessing process attribute of process performance (PA 1.1) for Financial and Physical Resource Management Process (FPRMP), it is Fully Achieved***, Largely Achieved, and Largely Achieved*** for the organizations 1, 2 and 3 respectively. The detail of capability leve-1 assessment results are given in Table 4.12.

Table 4.12 FPRMP Capability Level-1 Assessment Results

BPs	**Org.-1**	**Org-2**	**Org-3**
MGRSP3.BP1: Establish and maintain a strategy and policies for financial and physical resource management [Outcome: 1]	**F.A.**	**F.A.**	**F.A.**
3.1.1. Build strategic plan to support business objectives	F.A.	F.A.	F.A.
3.1.2. Design capital structure	F.A.	F.A.	F.A.
MGRSP3.BP2: Perform budgeting: [Outcome:1,2]	**F.A.**	**L.A.**	**F.A.**
3.2.1 Develop annual budget proposal	F.A.	F.A.	F.A.
3.2.2 Get approve for the budget from ministry of finance	F.A.	F.A.	F.A.
3.2.3 Develop periodic detailed financial plan/budgets and forecasts based on approved budget	F.A.	F.A.	F.A.
3.2.4 Allocate resources	L.A.	F.A.	F.A.
3.2.5 Manage financial risk	L.A.	N.A.	P.A.
3.2.6. Manage fee administration, where applicable	-	F.A.	F.A.
MGRSP3.BP3: Procure goods/services or works: [Outcome:1,2,3]	F.A.	F.A.	F.A.
3.3.1 Recognize need and requirements.	F.A.	L.A.	L.A.
3.3.2 Prepare technical contract.	F.A.	F.A.	F.A.
3.3.3 Conduct market research to calculate approximate cost.	F.A.	F.A.	F.A.
3.3.4 Determine tender procedure.	F.A.	F.A.	F.A.
3.3.5 Prepare documents related to tender including proposal evaluation criteria.	F.A.	F.A.	F.A.
3.3.6 Obtain approval for the tender.	F.A.	F.A.	F.A.
3.3.7 Define tender committee.	F.A.	F.A.	F.A.
3.3.8 Publish invitation for bid.	F.A.	F.A.	F.A.
3.3.9 Review tender documents.	F.A.	F.A.	F.A.
3.3.10 Receive tender proposals.	F.A.	F.A.	F.A.
3.3.11 Apply evaluation criteria to select a provider, negotiate contract terms and conditions to resolve open items and select the contractor.	F.A.	L.A.	L.A.
3.3.12 Invite the selected contractor to sign the contract.	F.A.	F.A.	F.A.
3.3.13 Monitor contractor performance.	L.A.	P.A.	P.A.
3.3.14 Close the contract after ensuring that each party's performance meets contractual requirements.	F.A.	F.A.	F.A.

Table 4.12 FPRMP Capability Level-1 Assessment Results **(Continued)**

BPs	Org.-1	Org-2	Org-3
MGRSP3.BP4: Process finance and accounting transactions: [Outcome: 1,3,4]	**F.A.**	**L.A.**	**L.A.**
3.4.1 Process accounts payable	F.A.	F.A.	F.A.
3.4.2 Process accounts receivable, credit, and collections	-	L.A.	L.A.
MGRSP3.BP5: Manage physical resources [Outcome: 1,5]	**L.A.**	**P.A.**	**L.A.**
3.5.1 Acquire and redeploy assets	F.A.	P.A.	F.A.
3.5.2 Manage facilities	F.A.	L.A.	F.A.
3.5.3 Manage physical risk	N.A.	N.A.	N.A.
3.5.4 Dispose nonproductive physical assets	F.A.	P.A.	L.A.
MGRSP3.BP6: Operate Warehousing [Outcome: 1,6]	**L.A.**	**P.A.**	**P.A.**
3.6.1 Track inventory deployment	F.A.	P.A.	P.A.
3.6.2 Receive, inspect, and store deliveries	F.A.	F.A.	F.A.
3.6.3 Track product availability	F.A	P.A.	P.A.
3.6.4 Record taking out of store	F.A	F.A.	F.A.
3.6.5 Track inventory accuracy	L.A.	P.A.	P.A.
3.6.6 Track third-party logistics storage and shipping performance	N.A.	N.A.	N.A.
3.6.7 Manage physical finished goods inventory	L.A.	L.A.	L.A.
MGRSP3.BP7: Report information	**F.A.**	**F.A.**	**F.A.**
3.7.1 Provide external financial information	F.A.	F.A.	F.A.
3.7.2 Provide internal financial information	F.A.	L.A.	L.A.
MGRSP3.BP8: Conduct internal and external audits: [Outcome: 8]	**F.A.**	**L.A.**	**L.A.**
3.8.1 Develop and implement audit strategy	F.A.	L.A.	L.A.
3.8.2 Plan an audit	F.A.	P.A.	P.A.
3.8.3 Perform Auditing	F.A	L.A.	L.A.
3.8.4 Identify corrective actions from the audit report	F.A	L.A.	L.A.
3.8.5 Track actions for audit report	F.A.	L.A.	L.A.

4.2.3.2.2 Level-2 Assessment

4.2.3.2.2.1 PA 2.1. Performance Management Attribute Assessment

4.2.3.2.2.1.1 Organization-1

Generic Practice Indicators (GPI) of Performance Management Attribute and their evidences for organization 1 are given at Table 4.13 Assessment Value is ***Largely Achieved*** based on the all positive evidences, work products and resource indicators given below.

Table 4.13. Evidences for GPIs of Performance Management Attribute for FPRMP Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1 Identify the objectives for the performance of the process.	Objectives for the performance for the process is defined in strategic plan as "financial management and control system will be strengthen" performance. Performance indicators are defined in the strategic plan as number of agency-specific standard, number of report for strategic plan monitoring and evaluation.	-	F.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	- Activities, tasks and resource usage for achieving the objectives are defined.	-There is no workflow management system to define activities etc. -The risk is not taking into consideration.	L.A.
2.1.3. Adjust the performance of the process.	The performance plan is published in yearly. It is monitored during the year.	It is not adjusted.	L.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles and responsibilities are identified and the needs for process performance experience, knowledge and skills are defined in the task analysis form.	The needs for process performance experience, knowledge and skills are not defined.	L.A.
2.1.5. Identify and make available resources to perform the process according to plan.	Since it is not project-based job, human resource necessity does not change frequently. Information necessary to perform the process is identified in the regulations.	-	F.A.
2.1.6 Manage the interfaces between involved parties.	Ministry of Finance, accountancy department, finance and administrative affairs departments are mainly involved and e-budget, SGBnet, ERPnet are used to manage communication between involved parties.	-	F.A.

Available generic resource indicators:

- ✓ Expense Management System
- ✓ e-Budget
- ✓ SGBnet
- ✓ ERPSnet
- ✓ Intranet
- ✓ Facilities and infrastructure resources

Available work product indicators:

- ✓ Strategic Plan of the Ministry of Development
- ✓ Yearly Performance Plan
- ✓ Task Analysis Form

4.2.3.2.2.1.2 Organization-2 & Organization-3

GPI of Performance Management Attribute and their evidences for organization 2&3 are given at Table 4.14 Assessment Value is ***Largely Achieved*** based on the all evidences, work products and resource indicators given below.

Table 4.14. Evidences for GPIs of Performance Management Attribute for FPRMP Process of Organization 2&3

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1 Identify the objectives for the performance of the process.	The scope of the process performance is known as a tacit knowledge.	Performance objectives are not identified.	P.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	-	-There is no workflow management system to define activities etc. -The risk is not taking into consideration. Activities, tasks and resource usage for achieving the objectives are not defined	N.A.
2.1.3. Adjust the performance of the process.		It is not adjusted.	N.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles are defined in the law of establishment, tasks and operating principles published for departments.	The needs for process performance experience, knowledge and skills are not defined.	L.A.

Table 4.14. Evidences for GPIs of Performance Management Attribute for FPRMP Process of Organization 2&3 (Continued)

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.5 Identify and make available resources to perform the process according to plan.	Since it is not project-based job, human resource necessity does not change frequently. Infrastructure resource are made available for all related parts of ministry of finance, and the accounting department of the ministry.	-	F.A.
2.1.6 Manage the interfaces between involved parties.	Responsibilities of the involved parties are assigned and communications between the involved parties are managed.	-	F.A.

Available generic resource indicators:

- ✓ e-maliye
- ✓ Facilities and infrastructure resources

4.2.3.2.2.2 PA 2.2. Work Product Management Attribute Assessment

4.2.3.2.2.2.1 Organization-1

GPIs of Work Product Management Attribute and their evidences for Organization 1 are given at Table 4.15 Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.15. Evidences for GPIs of Work Product Management Attribute for FPRMP Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Work products are in a standardized form, as payment order preparation request payment order, payment transferring document, documents used in warehouse.	Definitions of the requirements, quality criteria, work product approval criteria of work products are not in a well-documented form.	L.A.
2.2.2 Define the requirements for documentation and control of the work products.	-Document management is provided through intranet. -Some of work products for are in a standard format.	-Dependencies between work products are not identified clearly. -Requirements for the approval of the work products are not defined.	L.A.
2.2.3 Identify, document and control the work products.	-Work products to be controlled is known. -Revisions of the work products are stored in information systems as SGBnet, e-budget. Etc.	- Change control of the work products is not established. - Versions of the work products are not assigned to product configurations as applicable.	L.A.
2.2.4 Review and adjust work products to meet the defined requirements.	Self-Assessment is performed to find defaults of the work products.	- There is no requirement list to check during assessment.	L.A.

Available generic resource indicators:

- ✓ Employee Information System
- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ Intranet
- ✓ Document Management System

4.2.3.2.2.2.2 Organization-2&3

GPIs of Work Product Management Attribute and their evidences for Organization 2&3 are given at Table 4.16 below; assessment Value is Partially Achieved based on the evidences, work products and resource indicators.

Table 4.16. Evidences for GPIs of Work Product Management Attribute for FPRMP Process of Organization 2&3

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Work products are in a standardized form, as payment order preparation request payment order, payment transferring document, documents used in warehouse.	-The requirement for the work products are not defined -Quality criteria of the work products are not identified -Work product approval criteria are not defined	L.A.
2.2.2 Define the requirements for documentation and control of the work products.	Some of work products for are in a standard format.	-Dependencies between work products are not identified clearly. -Requirements for the approval of the work products are not defined. -Documents are stored in the paper format. There is no a document management system. -There is no such a mechanism for traceability.	P.A.
2.2.3 Identify, document and control the work products.	Controlling a few of standardized work products is performed manually.	- Change control of the work products is not established. - Versions of the work products are not stored and not assigned to product configurations as applicable. - There is no an appropriate access mechanisms for documents.	P.A.
2.2.4 Review and adjust work products to meet the defined requirements.	Since work products are standardized such as forms, pay rolls, etc reviewing and adjusting are not necessary.	There is no a review and adjusting mechanism.	P.A.

4.2.3.2.3 Level-3: Established Process

4.2.3.2.3.1 Process Definition Attribute Assessment

4.2.3.2.3.1.1 Organization-1

GPIs of Process Definition Attribute and their evidences for Organization 1 are given at Table 4.17 Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.17. Evidences for GPIs of Process Definition Attribute for FPRMP of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
3.1.1 Define the standard process that will support the deployment of the defined process.	The process is defined in the fundamental process elements i.e: related governmental laws, activities etc.	Guidance for the process is not provided. Related documents include what to do instead of how to do it.	L.A.
3.1.2 Determine the sequence and interaction between processes so that they work as an integrated system of processes.		The sequence and interaction of activities are not documented.	N.A.
3.1.3 Identify the roles and competencies for performing the standard process.	Process performance roles are identified in the regulations. The competences for the roles are defined in Job Analysis Form.		F.A.
3.1.4 Identify the required infrastructure and work environment for performing the standard process.	The infrastructure and work environment needs of the process are defined in Job Analysis Form.	-	F.A.
3.1.5 Determine suitable methods to monitor the effectiveness and suitability of the standard process.	Effectiveness of the process is monitored with performance metrics defined in yearly performance plan. Internal and external auditing and review are performed in financial department.	-	F.A.

Available work product indicators:

- ✓ Job Descriptions, Job Analysis Form, Yearly Performance Plan

4.2.3.2.3.2 Process Deployment Attribute

4.2.3.2.3.2.1 Organization-1

GPIs of Process Deployment Attribute and their evidences for Organization 1 are given at Table 4.18. Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.18. Evidences for GPIs of Process Deployment Attribute for FPRMP of Organization 1

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
3.2.1 Deploy a defined process that satisfies the context specific requirements of the use of the standard process.	Governmental Regulations define specific requirements of the process. Supplementary process performs in a same way with satisfying requirements.	Verification of conformance of defined process with standard process requirements is not done officially.	L.A.
3.2.2 Assign and communicate roles, responsibilities and authorities for performing the defined process.	The roles and responsibilities of the roles are defined in Job Analysis Form.		F.A.
3.2.3 Ensure necessary competencies for performing the defined process.	The competences of the assigned personnel are defined in Job Analysis Form.	The trainings which are needed to deploy the process are not defined and implemented.	L.A.
3.2.4 Provide resources and information to support the performance of the defined process.	Required human resources and information are available, allocated and used.	-	F.A.
3.2.5 Provide adequate process infrastructure to support the performance of the defined process.	• Infrastructure and work environment is available. • Organizational support to effectively manage via tools such as Intranet, e-mails, telephone etc.	-	F.A.
3.2.6 Collect and analyze data about performance of the process to demonstrate its suitability and effectiveness.	Data required to understand behavior, suitability and effectiveness of the defined process are identified in Job Analysis Form.	Identified data are not collected.	L.A.

Available work product indicators:

- Government regulations, Job Analysis Form, Intranet, e-mails

4.2.3.2.4 FPRMP Assessment Results

The capability level of the FPRMP performed is determined as level-2-managed for organization 1 and Level-1 performed for organizations 2 and 3, as seen at Table 4.19.

Table 4.19. FPRMP Assessment Results

Process Attributes	Organization-1	Organization-2	Organization-3
P.A.1.1 Process Performance	F.A.	L.A.	L.A.
P.A.2.1 Performance Management	L.A.	L.A.	L.A.
P.A.2.2 Work Product Management	L.A.	P.A.	P.A.
P.A.3.1 Process Definition	L.A.		
P.A. 3.2 Process Deployment	L.A.		
Result	**Level-2 Managed**	**Level-1 Performed**	**Level-1 Performed**

4.2.3.2.5 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of the FPRMP is derived from the assessment evidences for each organization. The aim is to turn negative evidences into positive evidences. Guideline to improve the FPRMP capability level is derived based on assessment findings. They are listed as below.

For Organization-1, Organization-2 and Organization-3;

1) Work-product Management
    - Define requirement of work product
    - Define quality criteria and approve work products based on these criteria before releasing
    - Define relations between work products
    - Deploy review and adjustment mechanism
2) Configuration Management
    - Provide change control mechanism for the work product.
    - Manage versions of the work products
3) Work Flow Management
    - Define activities, tasks, responsible employees, authorities and resources
    - Define sequence and interaction of activities
4) Process Management
    - Verify the conformance of defined process with standard process requirements officially.
    - Identify and collect date to monitor process performance
    - Monitor and adjust the process performance indicators if necessary
5) Risk Management System
    - Define risks related to fulfill objective of the process.
    - Manage Financial Risk

6) Problem and issue management mechanism
    - Define how to adjust the objective when needed.

For Organization-2 & Organization-3

7) Deploy Expense Management System
8) Deploy Asset Management System
9) Deploy Warehouse Management System
10) Deploy Internal and External Auditing Mechanism

4.2.3.2.6 Interviews with the Stakeholders

The assessment results are presented with senior managers of the organizations, process stakeholders and process owners in a meeting. The ratings for each BP and evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for FPRMP assessment and improvement. In order to check usefulness and adequacy of the proposed approach, interviews were conducted with all members after the meeting. The interviews took about 10 minutes. The open-ended structured questionnaire given at Table 4.20 is utilized. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions are responded as 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the FPRMP. They also confirm that process definition of FPRMP covers all outcomes of the process. While answering the last question, two of the responders pointed out some possible improvement areas such as interoperability of involved parties; such as public procurement agency to keep track in stages in procurements in organization 1. However, this is out of our scope and is primarily related to e-government initiatives.

Table 4.20 Results of Interview with the Stakeholders for FPRMP Process

Question	Survey Type	Response
Q1) Are measuring FPRMP capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the FPRMP performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of FPRMP? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	Interoperability

4.2.3.3 Information Resource Management Process

4.2.3.3.1 Level-1 Assessment

As a result of assessing process attribute of process performance (PA 1.1) for Information Resource Management Process (IRMP) given in Table 4.21, it is Fully Achieved***, Not Achieved, and Largely Achieved*** for the organizations 1, 2 and 3 respectively.

Table 4.21 IRMP Capability Level-1 Assessment Results

BPs	Org.-1	Org-2	Org-3
MGRSP2.BP1: Establish and maintain a strategy and requirements for information management [Outcome: 1,3]	**F.A**	**N.A**	**N.A**
1.1 Build strategic plan to support business objectives	F.A	N.A	N.A
1.2 Define enterprise system architectures	F.A	N.A	N.A
1.3 Plan and forecast information technologies/methodologies	F.A	N.A	N.A
MGRSP2.BP2: Establish Information Management Capability[Outcome:3]	**F.A**	**P.A**	**F.A**
2.1 Develop Information Management services and solution delivery strategy	F.A	P.A	F.A
2.2 Develop Information Management support strategy	F.A	N.A	F.A
2.3 Manage Information Management infrastructure resources	F.A	L.A	F.A
2.4 Manage Information Management infrastructure operations	F.A	L.A	F.A
2.5 Support Information Management services and solutions	F.A	L.A	F.A
MGRSP2.BP3: Execute Information Management: [Outcome: 2,3,5]	**F.A**	**N.A.**	**L.A**
3.1 Define the enterprise information architecture (information elements, composite structure, logical relationships and constraints, taxonomy, and derivation rules)	F.A	N.A	N.A
3.2 Manage information resources	F.A	N.A	L.A.
- Define the enterprise information/data policies and standards	F.A	N.A	N.A
- Develop and implement data and content administration	F.A	N.A	L.A.
- Perform enterprise data and content management (Acquire and collect, store, modify/update, delete, enable retrieval information)	F.A	N.A	L.A.
MGRSP2.BP4: Develop and implement security, privacy, and data protection controls [Outcome: 4,5]	**F.A**	**N.A.**	**L.A**
4.1 Establish information security, privacy, and data protection strategies and levels	F.A	N.A	L.A
4.2 Test, evaluate, and implement information security and privacy and data protection controls	F.A	N.A	L.A
4.3 Plan and manage continuity and disaster recovery	F.A	N.A	L.A
MGRSP2.BP5: Facilitate Information Sharing and Communication [Outcome: 3,5]	**F.A**	**N.A**	**L.A**
5.1 Manage external communications systems	F.A	N.A	L.A
5.2 Manage internal communications systems	F.A	N.A	L.A
5.3 Prepare and distribute publications	F.A	N.A	N.A
MGRSP2.BP6: Establish Information Standards [Outcome: 5]	**F.A**	**N.A.**	**N.A.**
6.1 Define the enterprise information/data policies and standards	F.A	N.A	N.A
6.2 Develop and implement data and content administration	F.A	N.A	N.A
6.3 Establish enterprise data standards	F.A	N.A	N.A

4.2.3.3.2 Level-2 Assessment

4.2.3.3.2.1 PA 2.1. Performance Management Attribute Assessment

4.2.3.3.2.1.1 Organization-1

GPIs of Performance Management Attribute and their evidences for organization 1 are given at Table 4.22. Assessment Value is ***Fully Achieved***.

Table 4.22 Evidences for GPIs of Performance Management Attribute for IRMP of Organization-1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1 Identify the objectives for the performance of the process.	Objectives for the performance for the process is defined in yearly Performance Plan, Information Society Action Plan and ISO 27000 standard.	-	F.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	-Activities, and resource usage for achieving the objectives are defined in the yearly Performance Plan. -Historical data for performance management is kept as log records, firewall records, help desk records etc. -ISO 27000 Standards to be used are identified and available. -Risks for information security are defined and available.		F.A.
2.1.3. Adjust the performance of the process.	The performance plan is published in yearly. It is monitored during the year.	It is not adjusted.	L.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles and responsibilities are identified and the needs for process performance experience, knowledge and skills are not define in the task analysis form.		F.A.
2.1.5 Identify and make available resources to perform the process according to plan.	-Additional infrastructure resources to achieve the objectives of the process are defined and made available. -Since it is not project-based job, human resource necessity does not change frequently.	-	F.A.
2.1.6 Manage the interfaces between involved parties.	-Office of Management Services Director assigns responsibilities of the involved parties and manages communications between the involved parties. -Users communicate with responsible people through help desk or via mail.	-	F.A.

Available generic resource indicators:

- ✓ Communication mechanism; E-mail is widely used for information exchange.
- ✓ Facilities and infrastructure resources
- ✓ Help Desk

Available work product indicators:

- ✓ Information Society Action Plan
- ✓ Yearly Performance Plan
- ✓ ISO 27000 related documents (identified risks, objectives etc)
- ✓ Log records
- ✓ Firewall records

4.2.3.3.2.1.2 Organization-3

Generic Practice Indicators (GPI) of Performance Management Attribute and their evidences for organization 3 are given at Table 4.23 Assessment Value is ***Partially Achieved***.

Table 4.23 Evidences for GPIs of Performance Management Attribute for IRMP of Organization-3

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1 Identify the objectives for the performance of the process.		Performance objectives are not identified.	N.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.		Activities, tasks and resource usage for achieving the objectives are not defined	N.A.
2.1.3. Adjust the performance of the process.		It is not adjusted.	N.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles are defined in the law of establishment, tasks and operating principles published for departments.	The needs for process performance experience, knowledge and skills are not defined.	L.A.
2.1.5 Identify and make available resources to perform the process according to plan.	-Since it is not project-based job, human resource necessity does not change frequently. -Infrastructure resource are made available for all related parts		F.A.
2.1.6 Manage the interfaces between involved parties.	Responsibilities of the involved parties are assigned and communications between the involved parties are managed.		F.A.

4.2.3.3.2.2 PA 2.2. Work Product Management Attribute Assessment

4.2.3.3.2.2.1 Organization-1

GPs of Work Product Management Attribute and their evidences are given at Table 4.24 According to all positive evidences, work products and resource indicators, the work product management attribute is evaluated as a ***Fully Achieved.***

Table 4.24. Evidences for GPIs of Work Product Management Attribute for IRMP of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1. Define the requirements for the work products	The requirements, quality criteria, work product approval criteria for the information security of work products are defined for ISO 27000 standards.		F.A
2.2.2. Define the requirements for documentation and control of the work products.	-Documents required for ISO 27000 standard are provided. -Document management is provided through intranet.	-Dependencies between work products are not identified clearly.	F.A
2.2.3. Identify, document and control the work products.	-System Management Change Tracking chart for system management is used.	-Versions of the work products are not assigned to product configurations as applicable.	F.A
2.2.4. Review and adjust work products to meet the defined requirements.	-Self-Assessment is performed to find defaults of the current system.	-	F.A

Available generic resource indicators:

- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ Intranet
- ✓ Electronic Document Management System

Generic Work Product

- ✓ System Management Change Tracking chart
- ✓ Internal Control Action Plan
- ✓ ISO 27000 standards related documents

4.2.3.3.2.2.2 Organization-3

GPs of Work Product Management Attribute and their evidences are given. At Table 4.25. According to all negative evidences, work products and resource indicators, the work product management attribute is evaluated as a ***Not Achieved***.

Table 4.25. Evidences for GPIs of Work Product Management Attribute for IRMP of Organization 3

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.3.1. Define the requirements for the work products		-The requirement for the work products are not defined -Quality criteria of the work products are not identified -Work product approval criteria are not defined	N.A
2.3.2. Define the requirements for documentation and control of the work products.	Some of work products for are in a standard format.	-Dependencies between work products are not identified clearly. -Requirements for the approval of the work products are not defined. -There is no such a mechanism for traceability.	P.A
2.3.3. Identify, document and control the work products.		- Change control of the work products is not established. - Versions of the work products are not stored and not assigned to product configurations as applicable. - There is no an appropriate access mechanisms for work products.	N.A
2.3.4. Review and adjust work products to meet the defined requirements.		There is no a review and adjusting mechanism.	N.A

4.2.3.3.3 Level 3: Established Process

4.2.3.3.3.1 PA 3.1: Process Definition Attribute

4.2.3.3.3.1.1 Organization-1

According to all positive and negative evidences as well as work products given at Table 4.26, the process definition attribute is evaluated as ***Largely Achieved.***

Table 4.26. Evidences for GPIs of Process Definition Attribute for IRMP of Organization-1

GPI	Positive Evidence	Negative Evidence	Assessment Value
3.1.1 Define the standard process that will support the deployment of the defined process.	Task analysis forms include fundamental process elements i.e: related governmental laws, activities etc.	Guidance for the process is not provided. Task Analysis Forms include what to do instead of how to do it.	L.A
3.1.2 Determine the sequence and interaction between processes so that they work as an integrated system of processes.	The sequence and interaction of activities are described as processor and successor tasks Task Analysis Form.	It is not described as a diagram.	L.A
3.1.3 Identify the roles and competencies for performing the standard process.	Process performance roles are identified in Task Analysis Form.	The competences for the roles are not defined specifically.	L.A
3.1.4 Identify the required infrastructure and work environment for performing the standard process.	The infrastructure and work environment needs of the process are defined in Task Analysis Form.	-	F.A
3.1.5 Determine suitable methods to monitor the effectiveness and suitability of the standard process.	Effectiveness of the information security is monitored with performance metrics defined in ISO 27000 standards. Internal auditing and review are performed.	-	F.A

Available work product indicators:

- ✓ Task Analysis Form
- ✓ Internal Auditing Action Plan
- ✓ ISO 27000 standards related documents

4.2.3.3.3.2 PA 3.2 Process Deployment Attribute

According to number of positive and negative evidences given at Table 4.27, the process deployment attribute is evaluated as ***Largely Achieved***.

Table 4.27. Evidences for GPIs of Process Deployment Attribute for IRMP of Organization-1

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
3.2.1 Deploy a defined process that satisfies the context specific requirements of the use of the standard process.	Governmental Regulations define specific requirements of the process. Supplementary process performs in a same way with satisfying requirements.	Verification of conformance of defined process with standard process requirements is not done officially.	L.A
3.2.2 Assign and communicate roles, responsibilities and authorities for performing the defined process.	The roles and responsibilities of the roles are determined and communicated.		F.A
3.2.3 Ensure necessary competencies for performing the defined process.	-	- The competences and trainings which are needed to deploy the process are not defined and implemented.	N.A
3.2.4 Provide resources and information to support the performance of the defined process.	Required human resources and information are available, allocated and used.	-	F.A
3.2.5 Provide adequate process infrastructure to support the performance of the defined process.	-Infrastructure and work environment is available. -Organizational support to effectively manage via tools such as Intranet, e-mails, telephone etc.	-	F.A
3.2.6 Collect and analyze data about performance of the process to demonstrate its suitability and effectiveness.	Data required to understand behavior, suitability and effectiveness of the defined process are identified in task Analysis Form.	-Identified data are not collected. -Result of analysis is not used.	L.A

Available work product indicators:

- Government regulations, Task Analysis Form, Intranet, e-mails

4.2.3.3.4 Level 4: Predictable Process

4.2.3.3.4.1 PA 4.1: Process Measurement Attribute

4.2.3.3.4.1.1 Organization-1

According to all positive and negative evidences given at Table 4.28 as well as work products, the process measurement attribute is evaluated as a ***Partially Achieved.***

Table 4.28. Evidences for GPIs of Process Measurement Attribute for IRMP of Organization-1

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
4.1.1 Identify Process Information Needs in relation with business goals.	Process stakeholders and their information needs are identified. Objectives for the performance for the process is defined in yearly Performance Plan, Information Society Action Plan and ISO 27000 standard	Not all of the process measurement objectives are defined in quantitative manner.	P.A
4.1.2 Derive process measurement objectives from process information needs.	Historical data for performance management is kept as log records, firewall records, help desk records etc.		P.A
4.1.3 Establish quantitative objectives for the performance of the defined process according to the alignment of the process with the business goals.			P.A
4.1.4 Identify product and process measurement that support the achievement of the quantitative objectives for process performance.	Frequency of data collection for log records, firewall records, help desk records is defined.	-Detailed measures are not defined to support monitoring, analysis and verification needs of process and product goals. -Verification mechanism for base and derived measures is not defined.	P.A

Table 4.28. Evidences for GPIs of Process Measurement Attribute for IRMP of Organization-1 *(Continued)*

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
4.1.5 Collect product and process measurement results through the defined process.	Data collection mechanism is defined for log, firewall and help desk records Required data is collected for log, firewall and help desk records in reliable manner.	-Data collection mechanism is not defined for other measures. -Other required data for measuring process performance is not collected in reliable manner.	L.A
4.1.6 Use the results of the defined measurement to monitor and verify the achievement of the process performance objectives.		-There is no statistical techniques to be used to quantitatively understand process performance. -Trends of process behavior are not identified.	N.A

Available Work Products

- Databases for log records, firewall records, help desk records

4.2.3.3.4.2 PA 4.2: Process Control Attribute

4.2.3.3.4.2.1 Organization-1

According to all negative evidences given at as well as work products, the process control attribute is evaluated Table 4.29 as a not achieved.

Table 4.29. Evidences for GPIs of Process Control Attribute for IRMP of Organization-1

GPI	Positive Evidence	Negative Evidence	Assessment Value
4.2.1 Determine analysis and control techniques appropriate to control the process performance.		Process control analysis methods and techniques are not defined. Selected techniques are not validated.	N.A
4.2.2 Define parameters suitable to control the process performance.		-Standard process definition is not modified to include the selection of parameters for process control. -Control limits for selected based are not defined.	N.A
4.2.3 Analyze process and product measurement results to identify variations in process performance.		-Measures are not analyzed. -Each out-of-control case is not analyzed.	N.A
4.2.4. Identify and implement corrective actions to address assignable causes.		Corrective actions are not determined and implemented.	N.A
4.2.5 Re-establish control limits following corrective actions.		Process control limits are not re-calculated to reflect process changes and corrective actions.	N.A

4.2.3.3.5 Information Resource Management Process Assessment Results

The capability level of the Information Resource Management Process performed is determined as level-3- managed for organization 1 and Level-0 incomplete in organization-2 and Level-1 performed in organization 3 as given at Table 4.30.

Table 4.30 IRMP Assessment Results

Process Attributes	Organization-1	Organization-2	Organization-3
P.A.1.1 Process Performance	F.A.	N.A.	L.A.
P.A.2.1 Performance Management	F.A.		P.A.
P.A.2.2 Work Product Management	F.A.		N.A.
P.A.3.1 Process Definition	L.A.		
P.A. 3.2 Process Deployment	L.A.		
P.A. 4.1 Process Measurement	P.A		
PA. 4.2 Process Control	N.A.		
…			
Result	**Level-3 Established**	**Level-0 Incomplete**	**Level-1 Performed**

4.2.3.3.6 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of the Information Resource Management Process is derived from the assessment evidences for each organization. The aim is to turn negative evidences into positive evidences of the BPs. The aim of the all BPs and GPIs as fully achieved. Guideline to improve the IRMP capability level is derived based on assessment findings. They are listed as below.

Organization-1

1) Process Measurement
    - Define quantitative objectives for process performance
    - Specify measures for process
    - Define data to be collected as specified in plans and measures
    - Define explicit criteria for data validation
    - Define frequency of data collection
    - Develop applicable measurement techniques
    - Define tasks and schedules to collect and analyze data
    - Use process measurement tools and results databases
    - Use tools for data analysis and measurement
    - Monitor process performance based on results of measurement.
    - Apply suitable analysis and control techniques
    - Determine control limits of variations
    - Analyze measurement data for special causes of variation
    - Determine corrective actions to address special causes of variation
2) Work Flow Management
    - Define activities, tasks, responsible employees, authorities and resources
    - Define sequence and interaction of activities
3) Process Definition
    - Define and implement the competences and trainings which are needed to deploy the process

Organization-2

1) Establish and maintain a strategy and requirements for information management
2) Develop Information Management support strategy
3) Execute Information Management
4) Develop and implement security, privacy, and data protection controls
5) Facilitate Information Sharing and Communication
6) Establish Information Standards

Organization-3

1) Establish and maintain a strategy and requirements for information management
2) Define enterprise system architectures
3) Define the enterprise information architecture (information elements, composite structure, logical relationships and constraints, taxonomy, and derivation rules)
4) Establish Electronic Document Management System
5) Establish Facilities and infrastructure resources (Servers, systems, programs, protection networks etc.)
6) Establish Information sharing and Communication mechanism; such as giving and e-mail account to employees for information exchange.
7) Store Log records
8) Use Standards as (ISO 27001/27002)
9) Develop National Cyber Security Action Plan
10) Develop Governmental Policies
11) Document Information Society Strategy Document
12) Document Information Society Strategy Action Plan
13) Document Information Security Management System Documents (policy, procedures, reports, test results etc.)

4.2.3.3.7 Interviews with the Stakeholders

The assessment results are presented with senior managers of the organizations, process stakeholders and process owners in a meeting. The ratings for each BP and GPI as well as evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for IRMP assessment and improvement, and they aim to follow this same approach for future process improvement cycles. In order to check usefulness and adequacy of the proposed approach, interviews were conducted with all members after the meetings. The interviews took about 10 minutes. The open-ended structured questionnaire given at Table 4.31 is utilized. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions are responded as over 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the IRMP. They also confirm that process definition of IRMP covers all outcomes of the process.

Since Organization-1 has been preparing to be certified ISO 27000 standard, work product management and performance management attributes for the process of information resource management are fully achieved and the IRMP performed in this organization is rated as Level-3. There are studies in the literature showing positive correlation among ISO 15504 and ISO 27000.

Table 4.31 Results of Interview with the Stakeholders for IRMP

Question	Survey Type	Response
Q1) Are measuring IRMP capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the IRMP performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of IRMP? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No

4.2.3.4 External Relationship Management Process

4.2.3.4.1 Level-1 Assessment

As a result of assessing process attribute of process performance (PA 1.1) for External Relationship Management Process (ERMP) as given at Table 4.32 it is Largely Achieved***, Partially Achieved, and Largely Achieved*** for the organizations 1, 2 and 3 respectively.

Table 4.32 ERMP Capability Level-1 Assessment Results

BPs	Org-1	Org.-2	Org-3
MGRSP4.BP1. Develop Relationships	**F.A.**	**P.A.**	**P.A.**
4.1.1 Manage inter jurisdictional relationships	F.A.	N.A.	N.A.
4.1.2 Manage international relationships	F.A.	L.A.	N.A.
4.1.3. Manage cross-agency relationships	F.A	P.A.	P.A.
4.1.4 Manage industrial relationships	F.A.	L.A.	L.A.
MGRSP4.BP2. Establish Interactive Communication Methodologies and Structures with Stakeholders and Partners	L.A.	**P.A.**	**P.A.**
MGRSP4.BP3. Identify Relationship Attributes	**F.A.**	**F.A.**	**F.A.**
BP 4.3.1 Manage agency legal issues	F.A.	F.A.	F.A.
BP 4.3.2 Mange agency contractual issues	F.A.	F.A.	F.A.
BP 4.3.3 Provide advice on legal and ethical policy	F.A.	F.A.	F.A.
MGRSP4.BP4. Identify Value Creation Opportunities	L.A.	**N.A.**	**N.A.**
MGRSP4.BP5. Manage Complaints and Compliments	N.A.	**N.A.**	**P.A.**
MGRSP4.BP6. Manage media	F.A.	**P.A.**	**L.A.**
BP 4.6.1 Manage community relations	**F.A.**	N.A.	L.A.
BP 4.6.2 Manage media relations	F.A.	P.A.	L.A.
BP 4.6.3 Manage press release	**F.A.**	L.A.	L.A.
MGRSP4.BP7. Manage Legislative Obligations	F.A.	**F.A.**	**F.A.**
BP 4.7.1 Manage agency legislative compliance and obligations	F.A.	F.A.	F.A.
BP 4.7.2 Manage review of agency policy in-line with legislative changes	F.A.	F.A.	F.A.

4.2.3.4.2 External Relationship Management Process Assessment Results

Assessment results given at Table 4.33, the capability level of the ERMP is determined as level-1- performed in organization 1 and Level-0 incomplete in organization-2 and organization 3.

Table 4.33. ERMP Assessment Results

Process Attributes	Organization-1	Organization-2	Organization-3
P.A.1.1 Process Performance	L.A.	P.A.	P.A.
…			
Result	**Level-1 Performed**	**Level-0 Incomplete**	**Level-0 Incomplete**

4.2.3.4.3 Guideline for Improvement Capability of the ERMP

The roadmap to improve the capability level of the ERMP is derived from the assessment evidences for each organization. The aim is to turn negative evidences into positive evidences of the BPs. The aim of the satisfying level-1 requirements is achieving all BPs as fully achieved. Guideline to improve the ERMP capability level is derived based on assessment findings. They are listed as below.

For Organization-1&Organization 2 &Organization 3

1) Analyze market for each sector and establish a contact-list and communication plan to contact to whom when necessary.
2) Establish a storyboard.
3) Manage Complaints and Compliment.
4) Document Value Creation Opportunities.
5) Automize some important cooperative interactions, such as providing information sharing with ministry of finance and public procurement institutions.

Organization 2 &Organization 3

6) Establish a contact-list and communication plan to contact to whom when necessary.
7) Establish a storyboard.
8) Establish Interactive Communication Methodologies and Structures with Stakeholders and Partners

4.2.3.4.4 Interviews with the Stakeholders

Since there are not any department or employee working on this process in Organization 2 and Organization 3, the interviews were conducted only in organization-1. The assessment results are presented with senior manager of the organization, process stakeholders and process owners in a meeting. The ratings

for each BP and evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for ERMP assessment and improvement. In order to check usefulness and adequacy of the proposed approach, interviews were conducted with all members after the meeting. The interviews took about 10 minutes. The open-ended structured questionnaire given at Table 4.34 is utilized. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions are responded as over 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the ERMP. They also confirm that process definition of ERMP covers all outcomes of the process.

Table 4.34 Results of Interview with the Stakeholders for ERMP Process

Question	Survey Type	Response
Q1) Are measuring ERMP capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the ERMP performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of ERMP? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No

4.2.3.5 Inspection & Auditing Management Process

4.2.3.5.1 Level-1 Assessment

As a result of assessing process attribute of process performance (PA 1.1) as given at Table 4.35 for Inspection & Auditing Management (IAMP), it is Fully Achieved***, Not Achieved, and Not Achieved*** for the organizations 1, 2 and 3 respectively.

Table 4.35 IAMP Capability Level-1 Assessment Results

BPs	Org-1	Org-2	Org-3
MGRSP5.BP1: Develop and implement inspection and audit strategy:. [Outcome: 1]	**F.A**	**N.A**	**N.A**
5.1.1 Determine risk criteria	F.A	N.A	N.A
5.1.2 Range risk assessment	F.A	N.A	N.A
5.1.3 Develop and implement the strategy	F.A	N.A	N.A
MGRSP5.BP2: Plan the audit: [Outcome:1,2]	**F.A**	**N.A**	**N.A**
5.2.1 Identify scope	F.A	N.A	N.A
5.2.2 Form the team	F.A	N.A	N.A
5.2.3 Determine attendees	F.A	N.A	N.A
5.2.4 Define resource requirements	F.A	N.A	N.A
5.2.5 Develop the schedule for the auditing	F.A	N.A	N.A
5.2.6 Determine entry and exit criteria for the audit	F.A	N.A	N.A
MGRSP5.BP3: Conduct the survey	**F.A**	**N.A**	**N.A**
MGRSP5.BP4: Analyze the survey result: [Outcome: 1,2,3]	**F.A**	**N.A**	**N.A**
5.4.1 Analyze the collected data	F.A	N.A	N.A
5.4.2 Identify risks	F.A	N.A	N.A
5.4.3 Identify corrective actions	F.A	N.A	N.A
5.4.4 Determine priority of actions for resolutions	F.A	N.A	N.A
5.4.5 Generate final inspection and auditing report	F.A	N.A	N.A
5.4.6 Distribute the report	F.A	N.A	N.A
MGRSP5.BP5: Perform post-audit evaluation: [Outcome: 1,4]	**F.A**	**N.A**	**N.A**
5.5.1 Control achievement against audit plan and schedule	F.A	N.A	N.A
5.5.2 Control compliance with appropriate laws, regulations.	F.A	N.A	N.A
5.5.3 Control risk management	F.A	N.A	N.A
MGRSP3.BP6: Perform follow-up evaluation Track actions for resolutions of identified problems by survey. [Outcome: 1,6]	**F.A**	**N.A**	**N.A**
MGRSP5.BP3: Conduct the survey: [Outcome:1,2]	**F.A**	**N.A**	**N.A**

4.2.3.5.2 Level-2 Assessment

4.2.3.5.2.1 PA 2.1. Performance Management Attribute Assessment

4.2.3.5.2.1.1 Organization-1

Generic Practice Indicators (GPI) of Performance Management Attribute and their evidences for organization 1 are given at Table 4.36. Assessment Value is ***Fully Achieved*** based on the all positive evidences, work products and resource indicators given below.

Table 4.36. Evidences for GPIs of Performance Management Attribute for IAMP of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1 Identify the objectives for the performance of the process.	Objectives for the performance for the process is defined in strategic plan. Performance indicators are defined in the strategic plan as number of audit, acceptance rate of proposed corrective actions. -The scope of the process performance is defined.	-	F.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	-Audit plan is developed. -Activities, tasks and resource usage for achieving the objectives are defined. -Process performance is monitored as number of audit, acceptance rate of proposed activities.	-There is no workflow management system to define activities etc. -The risk is not taking into consideration.	L.A.
2.1.3. Adjust the performance of the process.	The performance plan is published in yearly. It is monitored during the year.	It is not adjusted.	L.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles and responsibilities are identified and the needs for process performance experience, knowledge and skills are defined in the task analysis form.	-	F.A.
2.1.5. Identify and make available resources to perform the process according to plan.	-Since it is not project-based job, human resource necessity does not change frequently. -Information necessary to perform the process is identified in the regulations.	- -	F.A.
2.1.6. Manage the interfaces between involved parties.	Audit is performed for all departments in the ministry by internal auditing department's employee. "İcden Yazılım" and Intranet and e-mail are used for communication.	- -	F.A.

Available generic resource indicators:

- 5018 Public Financial Management and Control Law
- Public Internal Auditing Guideline

- İçden yazılım
- Communication Methods- E-mail
- Intranet
- Facilities and infrastructure resources

Available work product indicators:

- Strategic Plan of the Ministry of Development
- Yearly Performance Plan
- Task Analysis Form

4.2.3.5.2.2 PA 2.2. Work Product Management Attribute Assessment

4.2.3.5.2.2.1 Organization-1

GPIs of Work Product Management Attribute and their evidences for Organization 1 are given at Table 4.37. Assessment Value is Largely Achieved based on the evidences, work products and resource indicators.

Table 4.37. Evidences for GPIs of Work Product Management Attribute for IAMP Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Work products are in a standardized form proposed by the government, as survey questions.	Definitions of the requirements, quality criteria, work product approval criteria of work products are not in a well-documented form.	L.A.
2.2.2 Define the requirements for documentation and control of the work products.	-Document management is provided through icden yazılım and intranet. -Dependencies between work products are identified and understood clearly.	-Requirements for the approval of the work products are not defined.	L.A.
2.2.3 Identify, document and control the work products.	-Work products to be controlled is known. -Revisions of the work products are stored in information system as İcden Yazılım.	- Change control of the work products is not established. - -Versions of the work products are not assigned to product configurations as applicable.	L.A.
2.2.4 Review and adjust work products to meet the defined requirements.	-Self-Assessment is performed to find defaults of the current work products. Department manager reviews the work products as well.	Review is not performed formally.	L.A.

Available generic resource indicators:

- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ İcden Yazılım
- ✓ Electronic Document Management System
- ✓ Intranet

4.2.3.5.3 Inspection & Auditing Management (IAMP) Assessment Results

The capability level of the Inspection & Auditing Management Process performed is determined as level-1- performed for organization 1 and Level-0 incomplete in organization-2 and organization 3 as given at Table 4.38.

Table 4.38. Inspection & Auditing Management Process Assessment Results

Process Attributes	Organization-1	Organization-2	Organization-3
P.A.1.1 Process Performance	F.A.	N.A.	N.A.
P.A.2.1 Performance Management	F.A.		
P.A.2.2 Work Product Management	L.A		
…			
Result	**Level-2 Managed**	**Level-0 Incomplete**	**Level-0 Incomplete**

4.2.3.5.4 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of the Inspection & Auditing Management Process is derived from the assessment evidences for each organization. The aim is to turn negative evidences into positive evidences of the BPs. The aim of the satisfying level-1 requirements is achieving all BPs as fully achieved. Guideline to improve the Inspection & Auditing Management capability level is derived based on assessment findings. They are listed as below.

Organization-1

1) Work-product Management
   - Define requirement of work product
   - Define quality criteria
   - Define appropriate review and approval of work products. And also, review the work products based on this definition.
   - Define relations between work products
2) Configuration Management
   - Assign versions of the work products to product configurations as applicable.
   - Change control of the work products (keep version status, etc.)
3) Workflow Management

- A workflow management system to define activities, tasks, responsible employees and authorities and also sequence and interaction between processes.

4) Process Management
   - Verify the conformance of defined process with standard process requirements officially.
   - Monitor and adjust the process performance indicators if necessary
5) Risk Management System
   - Defining risks related to fulfill objective of the process.
6) Problem and issue management mechanism
   - Defining how to adjust the objective when needed.

Organization-2 and Organization-3

1) Establish a department for internal auditing
2) Develop Laws, Regulations, and Guidelines for internal auditing
3) Produce Audit methodology
4) Develop Audit Plan including forming the team, identifying scope, assessing auditors, determining critical areas for the survey and survey questions
5) Keep assessment/Audit Record and document audit report
6) Analyze the auditing Result and request an action plan for the proposed corrective actions from the related department.
7) Perform Post-evaluation and document post-evaluation report
8) Perform follow-up evaluation and document follow-up evaluation Report

4.2.3.5.5 Interviews with the Stakeholders

Since there are not any department or employee working on this process in Organization 2 and Organization 3, the interviews were conducted only in organization-1. The assessment results are presented with senior managers of the organizations, process stakeholders and process owners in a meeting. The ratings for each BP and evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for IAMP assessment and improvement, and they aim to follow this same approach for future process improvement. In order to check usefulness and adequacy of the proposed approach, interviews were conducted with all members after the meetings. The interviews took about 10 minutes. The open-ended structured questionnaire given at Table 4.39 is utilized. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions are responded as over 3.5 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the IAMP. They also confirm that process definition of IAMP covers all outcomes of the process.

Table 4.39 Results of Interview with the Stakeholders for IAMP

Question	Survey Type	Response
Q1) Are measuring IAMP capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the IAMP performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of IAMP? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No

4.2.3.6 Regulatory Management Process

4.2.3.6.1 Level-1 Assessment

As a result of assessing process attribute of process performance (PA 1.1) for Regulatory Management as given at Table 4.40, it is ***Fully Achieved, Largely Achieved, and Largely Achieved*** for the organizations 1, 2 and 3 respectively.

Table 4.40 Regulatory Management Process Capability Level-1 Assessment Results

BPs	Org-1	Org-2	Org-3
MGRSP6.BP1: Establish and maintain a strategy and policies for regulatory development and management [Outcome: 1]	**F.A.**	**N.A.**	**N.A.**
MGRSP6.BP2: Publish the regulatory development policies and guidelines [Outcome: 2]	**F.A.**	**N.A.**	**N.A.**
MGRSP6.BP3: Collect regulatory proposals [Outcome: 3]	**F.A.**	**F.A.**	**F.A.**
MGRSP6.BP4: Develop exposure draft [Outcome: 1,2,3,4]	**F.A.**	**F.A.**	**F.A.**
MGRSP6.BP5: Assess feasibility of the draft regulatory [Outcome: 1,2,3,4]	**F.A**.	**N.A**.	**N.A**.
6.5.1. Describe anticipated impact of the regulatory proposal	**F.A.**	**N.A.**	**N.A.**
6.5.2. Describe the degree and nature of the risks posed by various substances or activities within its jurisdiction.	**F.A.** F.A.	**N.A.** N.A.	**N.A.** N.A.
6.5.3. Assess both the costs and benefits of the intended regulation	F.A.	N.A.	N.A.
MGRSP6.BP6: Consult to all stakeholders [Outcome: 1,2,3,4,5]	F.A. F.A.	F.A. F.A.	F.A. F.A.
6.6.1. Consult outside of the government structure	F.A.	P.A	P.A.
6.6.2. Consult inside of the government structure	**F.A.**	**F.A.**	**F.A.**
6.6.3. Evaluate their opinions	**F.A.**	**F.A.**	**F.A.**
6.6.4. Revise the exposure draft if necessary.	**F.A.**	**F.A.**	**F.A.**
MGRSP6.BP7: Approve the draft regulatory [Outcome: 1,2,3,4,5,6]	**F.A.**	**F.A.**	**F.A.**
MGRSP7.BP8. Review the draft regulatory [Outcome: 1,2,4]	**F.A.**	**F.A.**	**F.A.**
MGRSP7.BP9. Evaluate the regulatory	**F.A.**	**F.A.**	**F.A.**
MGRSP7.BP10. Publish on Official Gazette			

4.2.3.6.2 Level-2 Assessment

4.2.3.6.2.1 PA 2.1. Performance Management Attribute Assessment

4.2.3.6.2.1.1 Organization-1

GPIs of Performance Management Attribute and their evidences for Regulatory Management Process performed in organization 1 are given at Table 4.41 Assessment Value is ***Largely Achieved*** based on the all positive evidences, work products and resource indicators given below.

Table 4.41. Evidences for GPIs of Performance Management Attribute for Regulatory Management Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Asses. Value
2.1.1 Identify the objectives for the performance of the process.	Objectives for the performance are defined in yearly performance program.		F.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	-Activities, tasks and resource usage for achieving the objectives are defined. -Key milestones for the process are established.	-There is no workflow management system to define activities etc. -The risk is not taking into consideration. -Process work product reviews are not planned. -Process performance is not monitored.	L.A.
2.1.3. Adjust the performance of the process.	The performance plan is published in yearly.	It is not adjusted.	P.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles and responsibilities are identified and the needs for process performance experience, knowledge and skills are defined in the task analysis form.		L.A.
2.1.5 Identify and make available resources to perform the process according to plan.	Since it is not project-based job, human resource necessity does not change frequently. Information necessary to perform the process is identified in the regulations.		F.A.
2.1.6 Manage the interfaces between involved parties.	-General directorate of legislation development and publication, all stakeholder differing for each regulatory are mainly involved. -There are reviews and corrective actions.		F.A.

Available generic resource indicators:

- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ Intranet

Generic Work Product

- ✓ Form for opinions of stakeholders about draft
- ✓ Yearly Performance Plan
- ✓ Strategic Plan of the Ministry of Development
- ✓ Yearly Performance Plan
- ✓ Task Analysis Form

4.2.3.6.2.2 PA 2.2. Work Product Management Attribute Assessment

4.2.3.6.2.2.1 Organization-1

GPIs of Work Product Management Attribute and their evidences for Organization 1 are given at Table 4.42. Assessment Value is Largely Achieved based on the evidences, work products and resource indicators.

Table 4.42. Evidences for GPIs of Work Product Management Attribute for Regulatory Management Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Work products are in a standardized form.	Definitions of the requirements, quality criteria, work product approval criteria of work products are not in a well-documented form.	L.A.
2.2.2 Define the requirements for documentation and control of the work products.	Document management is provided through electronic document management system.	-Dependencies between work products are not identified clearly. -Requirements for the approval of the work products are not defined.	L.A.
2.2.3 Identify, document and control the work products.	-Work products to be controlled is known. -Revisions of the work products are stored.	- Change control of the work products is not established. - Versions of the work products are not assigned to product configurations as applicable.	L.A.
2.2.4 Review and adjust work products to meet the defined requirements.	Self-Assessment is performed to find defaults of the current regulatory.	-	F.A.

Available generic resource indicators:

- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ Intranet

Generic Work Product

- ✓ Form for opinions of stakeholders about draft
- ✓ Draft regulatory

4.2.3.6.3 Regulatory Management Process Assessment Results

The capability level of the Regulatory Management Process (RMP) performed is determined as level-2- managed for organization 1 and Level-1 performed in organization-2 and organization 3 as given in Table 4.43.

Table 4.43. Regulatory Management Process Assessment Results

Process Attributes	Org-1	Org-2	Org-3
P.A.1.1 Process Performance	F.A.	L.A.	L.A.
P.A.2.1 Performance Management	L.A.		
P.A.2.2 Work Product Management	L.A		
…			
Result	**Level-2 Managed**	**Level-1 Performed**	**Level-1 Performed**

4.2.3.6.4 Guideline for Improvement Capability of the Regulatory Management Process

The roadmap to improve the capability level of the RMP is derived from the assessment evidences for each organization. Guideline to improve the Regulatory Management capability level is derived based on assessment findings. They are listed as below.

For Organization-1

1) Work-product Management
   - Define requirement of work product
   - Define quality criteria
   - Define appropriate review and approval of work products. And also, review the work products based on this definition.
   - Define relations between work products
2) Configuration Management
   - Assign versions of the work products to product configurations as applicable.
   - Change control of the work products (keep version status, etc.)
3) Workflow Management

- A workflow management system to define activities, tasks, responsible employees and authorities and also sequence and interaction between processes.

4) Process Management
   - Verify the conformance of defined process with standard process requirements officially.
   - Monitor and adjust the process performance indicators if necessary
5) Risk Management System
   - Defining risks related to fulfill objective of the process.
6) Problem and issue management mechanism
   - Defining how to adjust the objective when needed.

Organization 2 &Organization 3

1) Document a guideline including strategy and policy of regulatory development.
2) Publish a law for implementation of regulatory development in the public agencies
3) Document feasibility report for regulatory proposal
4) E-document management system to share draft regulation with related stakeholders.

4.2.3.6.5 Interviews with the Stakeholders

The assessment results are presented with senior managers of the organizations, process stakeholders and process owners in a meeting. The ratings for each BP and evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for RMP assessment and improvement. In order to check usefulness and adequacy of the proposed approach, interviews were conducted with all members after the meeting. The interviews took about 10 minutes. The open-ended structured questionnaire given at Table 4.44 is utilized. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions are responded as over 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the RMP. They also confirm that process definition of RMP covers all outcomes of the process. There is a project for establishing e-document management system in organization 2 and organization 3. A law including implementation of regulatory development has been waiting for parliament approval. These feedbacks also support Gov-PCDM.

Table 4.44 Results of Interview with the Stakeholders for RMP Process

Question	Survey Type	Response
Q1) Are measuring RMP capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 5
Q2) Do you think that applying these suggestions will improve the RMP performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of RMP? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No

4.2.3.7 Strategy and Policy Management Process

4.2.3.7.1 Level-1 Assessment

As a result of assessing process attribute of process performance (PA 1.1) for Strategy and Policy Management Process (SPMP) as given in Table 4.45. it is ***Fully Achieved, Not Achieved, and Not Achieved*** for the organizations 1, 2 and 3 respectively.

Table 4.45 SPMP Capability Level-1 Assessment Results

BPs	Org-1	Org-2	Org-3
MGRSP7.BP1: Establish and maintain a strategy and policies for strategy and policy development and management	**F.A**	P.A	P.A
MGRSP7.BP2: Publish the strategy and policy development policies and guidelines	**F.A**	N.A	N.A
MGRSP7.BP3: Monitor the external environment:	**F.A**	N.A	N.A
7.3.1. Identify and monitor economic trends	**F.A**	N.A	N.A
7.3.2. Identify political and regulatory issues	**F.A**	N.A	N.A
7.3.3. Identify and monitor social and cultural changes	**F.A**	N.A	N.A
7.3.4. Assess and monitor new technology innovations	**F.A**	N.A	N.A
MGRSP7.BP4: Define organizational strategy	**F.A**	N.A	N.A
7.4.1. Develop agency organizational vision and mission	**F.A**	N.A	N.A
7.4.2. Develop organizational strategies	**F.A**	N.A	N.A
7.4.3. Develop organizational goals			
7.4.4. Design the organizational structure and relationships between organizational units	**F.A**	N.A	N.A
7.4.5. Identify and define collaborative processes	**F.A**	N.A	N.A
MGRSP7.BP5: Document the strategic plans	**F.A**	N.A	N.A
MGRSP7.BP6: Consult to all stakeholders	**F.A**	N.A	N.A
MGRSP7.BP7: Approve the strategy document			
MGRSP7.BP8. Publish the strategy document			

4.2.3.7.2 Level-2 Assessment

4.2.3.7.2.1 PA 2.1. Performance Management Attribute Assessment

2.1.6.1.1.1.1 Organization-1

GPIs of Performance Management Attribute and their evidences for organization 1 are given at Table 4.46, Assessment Value is ***Largely Achieved*** based on the all positive evidences, work products and resource indicators given below.

Table 4.46. Evidences for GPIs of Performance Management Attribute for SPMP of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.1.1 Identify the objectives for the performance of the process.	Objectives for the performance are defined in yearly performance program.		F.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	-Activities, tasks and resource usage for achieving the objectives are defined. -Key milestones for the process are established.	-There is no workflow management system to define activities etc. -The risk is not taking into consideration. -Process work product reviews are not planned. -Process performance is not monitored.	L.A.
2.1.3. Adjust the performance of the process.	The performance plan is published in yearly.	It is not adjusted.	P.A.
2.1.4. Define responsibilities and authorities for performing the process.	Roles and responsibilities are identified and the needs for process performance experience, knowledge and skills are defined in the task analysis form.		L.A.
2.1.6. Identify and make available resources to perform the process according to plan.	Since it is not project-based job, human resource necessity does not change frequently. Information necessary to perform the process is identified in the regulations.	-	F.A.
2.1.7 Manage the interfaces between involved parties.	-All stakeholder differing for each strategy are mainly involved. -There are reviews and corrective actions.		F.A.

Available generic resource indicators:

- ✓ MS Office- Documentation Support Tool

- ✓ Communication Methods- E-mail
- ✓ Intranet

Generic Work Product

- ✓ Form for opinions of stakeholders about draft
- ✓ Yearly Performance Plan
- ✓ Strategic Plan of the Ministry of Development
- ✓ Yearly Performance Plan
- ✓ Task Analysis Form

4.2.3.7.2.2 PA 2.2. Work Product Management Attribute Assessment

4.2.3.7.2.2.1 Organization-1

GPIs of Work Product Management Attribute and their evidences for Strategy and Policy Management Process performed in the Organization 1 are given at Table 4.47 Assessment Value is ***Largely Achieved*** based on the evidences, work products and resource indicators.

Table 4.47. Evidences for GPIs of Work Product Management Attribute for SPMP Process of Organization 1

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Work products are in a standardized form.	Definitions of the requirements, quality criteria, work product approval criteria of work products are not in a well-documented form.	L.A.
2.2.2 Define the requirements for documentation and control of the work products.	Document management is provided through electronic document management system.	-Dependencies between work products are not identified clearly. -Requirements for the approval of the work products are not defined.	L.A.
2.2.3 Identify, document and control the work products.	-Work products to be controlled is known. -Revisions of the work products are stored.	- Change control of the work products is not established. - Versions of the work products are not assigned to product configurations as applicable.	L.A.
2.2.4 Review and adjust work products to meet the defined requirements.	Self-Assessment is performed to find defaults of the current regulatory.	-	F.A.

Available generic resource indicators:

- ✓ MS Office- Documentation Support Tool
- ✓ Communication Methods- E-mail
- ✓ Intranet

4.2.3.7.3 Strategy and Policy Management Process Assessment Results

As given in Table 4.48, the capability level of the SPMP is determined as level-1-performed for organization 1 and Level-0 incomplete in organization-2 and organization 3.

Table 4.48. SPMP Assessment Results

Process Attributes	Organization-1	Organization-2	Organization-3
P.A.1.1 Process Performance	F.A.	L.A.	L.A.
P.A.2.1 Performance Management	L.A.		
P.A.2.2 Work Product Management	L.A		
…			
Result	**Level-2 Managed**	**Level-1 Performed**	**Level-1 Performed**

4.2.3.7.4 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of SPMP is derived from the assessment evidences for each organization. Guideline to improve the SPMP capability level is derived based on assessment findings. They are listed as below.

For Organization-1

1) Work-product Management
   - Define requirement of work product
   - Define quality criteria
   - Define appropriate review and approval of work products. And also, review the work products based on this definition.
   - Define relations between work products
2) Configuration Management
   - Assign versions of the work products to product configurations as applicable.
   - Change control of the work products (keep version status, etc.)
3) Workflow Management
   - A workflow management system to define activities, tasks, responsible employees and authorities and also sequence and interaction between processes.
4) Process Management
   - Verify the conformance of defined process with standard process requirements officially.
   - Monitor and adjust the process performance indicators if necessary
5) Risk Management System
   - Defining risks related to fulfill objective of the process.
6) Problem and issue management mechanism
   - Defining how to adjust the objective when needed.

Organization 2 &Organization 3

1) Document strategy, policies and guideline including strategy and policy development.
2) Prepare, share, collect comments from all related parties, revise based on comments and publish the strategy document.
3) E- Document management system to share draft strategy document with all related stakeholders.
4) Web-site to publish the strategy document.

4.2.3.7.5 Interviews with the Stakeholders

Since there are not any department or employee working on this process in Organization 2 and Organization 3, the interviews were conducted only in organization-1. The assessment results are presented with senior managers of the organizations, process stakeholders and process owners in a meeting. The ratings for each BP and evidences for that rating is explained. The derived guideline for process improvement is also shared. They reported the main benefits of the assessment as realizing the need for SPMP assessment and improvement. In order to check usefulness and adequacy of the proposed approach, interviews were conducted with all members after the meeting. The interviews took about 10 minutes. The open-ended structured questionnaire given at Table 4.49 is utilized. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions are responded as over 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the SPMP. They also confirm that process definition of SPMP covers all outcomes of the process.

Table 4.49 Results of Interview with the Stakeholders for SPMP Process

Question	Survey Type	Response
Q1) Are measuring SPMP capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the SPMP performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of SPMP? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No

4.2.4 Assessment of Agency-Specific Processes

4.2.4.1 The Public Investment Management Process

Public investment management process performed in the Ministry of Development in Turkey was defined in an ad-hoc fashion and assessed as an exploratory case study to check if customization of ISO/IEC TR 15504 for government domain is applicable. The process was not defined applying a generic process definition. As a result of the study, although initial findings indicated the usefulness and adequacy of the proposed approach; the necessity of a methodology incorporating guidelines for government specific process definition was determined.

Ad-hoc defined outcomes and BPs are below. When we apply the generic process definition approach to the same process, it is observed that there are some missing BPs in the definition although they are performed. Since the objective of technical effort is evaluating an application, BPs of 1, 2, 3, 4, 5, 6 and 7B, 8B and 9B are used.

BPs of 5 and 9B are missing in the ad-hoc process definition, although accepted projects are documented as a report and the report is approved by three bureaucratic levels before the announcement.

As a result, it is observed that the generic process definition serves as a guideline to process owners to define their processes without any missing practice.

Table 4.50 Ad-Hoc defined BPs in

Table 4.1 and their corresponds in developed generic process definition

Ad-Hoc Defined BPs in Table 4.1	**Corresponds in Developed Generic Process Definition**
BP1: Create and manage public investment politics, policies and plans	**BP1:** Develop a strategy for the process
BP2: Evaluate pre-feasibility study by organizing meetings with public institutions.	**BP4:** Establish interactive communication methodologies and structures with involved parties
BP3: Develop public investment policies and guideline	**BP2:** Publish policies and guidelines
BP4: Allocate budget to public agencies as high-level planning.	**BP3:** Define requirements for the process
BP 5: Submit public investment projects.	**BP7B:** Receive Application
BP 6: Evaluate public investment projects	**BP8B:** Evaluate Application(s)
BP 7: Evaluate submitted as aggregated or bulk project	**BP8B:** Evaluate Application(s)
BP 8: Announce accepted projects.	**BP6:** Share results with involved parties

4.2.4.2 The Graduate Student Selection Process

The Graduate Student Selection Process performed in METU Informatics Institute is assessed based on Gov-PCDM. Institutes' processes are derived by applying a top-down approach by thesis writer, who has both professional and academic experience in business process management domain as well as 4 years working experience as an academic staff in the institute, together with an administrative staff. The graduate student selection process is one of the most critical process performed in the institute. A massive volume of paper, including transcripts, test scores, and letter of recommendations further hampers the process. It is observed that there is a need to improve the process performance to achieve academic and operational excellence. Thus, the graduate student selection process is selected to improve process capability level with a guidance on what to do to increase quality.

4.2.4.2.1 Process Definition

Since the process is an agency-specific process, the generic process definition, seen in Table 7.8 Generic Process Definition, is used for assessing process attribute of Level 1, which is process performance attribute. Since the objective of technical effort is evaluating an application, BPs of 1, 2, 3, 4, 5, 6 and 7B, 8B and 9B are used.

The purpose of the graduate student selection process is to select masters' and PhD students with different knowledge bases for programs.

4.2.4.2.2 Level-1 Assessment

Process performance attribute of Level 1 assessment covers checking whether the process achieves its defined outcomes. During the assessment, it is observed that all BPs stated in the generic process description are fully achieved in the graduate student selection process. Details of the assessment activities such as planning, briefing of the participants, data collection and validation, and reporting are put together into an assessment plan document and an assessment report in [89].

4.2.4.2.3 Level-2 Assessment

4.2.4.2.3.1 PA 2.1. Performance Management Attribute Assessment

GPIs of Performance Management Attribute and their evidences for Graduate Student Selection Process. Assessment Value is ***Largely Achieved*** based on the all evidences, work products and resource indicators given below. Process work products' reviews are not planned. The performance is planned and managed informally, performance quality criteria are not defined and not monitored.

Table 4.51 Process Outcomes and Evidences of Process Performance Attribute of Graduate Student Selection Process

BPs	**Evidences**	**Assessment Value**
BP1. Develop a strategy for the process	2547 number higher education law is defined by the Higher Education Institute.	F.A.
BP2. Publish policies and guidelines	METU Education Regulation is published to include guideline of graduate student selection.	F.A.
BP3. Define requirements for the process	Maximum number of students to select for the graduate program is decided by the institutional academic committee.	F.A.
BP4. Establish interactive communication methodologies and structures with involved parties	– Announcement including application period and required qualifications is done through the web site. – Webpage for submitting application is activated when the application period comes. – Employees from student relations department control the submitted documents, inform appliers if there is a missing or incorrect after receiving the applications. – The finalized list is sent to the Head Student Relations Department of METU.	F.A.
BP5: Achieve approval for the result	Academic and management committees of the institute approve finalized accepted application list.	F.A.
BP6: Share results with involved parties	– Candidate list for call for interview is published on the institute web page. – The result is published on the webpage.	F.A.
BP7B: Receive Application(s)	– Student candidates apply to the program. Fill the application form, collect necessary documents and send/submit them to student relations department of the institute.	F.A.
BP8B: Evaluate Application(s)	– Applications are evaluated by the determined criteria as CGPA, Test Scores, Recommendation letters etc. and candidates who get call for oral interview are determined by the academic committee. – The interview is performed. – The academic committee evaluates the interview results, and finalizes accepted application list.	F.A.
BP9B: Document the result	Finalized accepted application list is documented	F.A.

Table 4.52. Evidences for GPIs of Performance Management Attribute of Graduate Student Selection Process

GPI	Positive Evidence	Negative Evidence	Asses. Value
2.1.1 Identify the objectives for the performance of the process.	-Objectives and scope are identified in Decree Law Concerning the Organization and Duties of organization	-	F.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.	-The process is performed according to procedures. -Key milestones are defined -Cycle-time is strictly defined.	Process work product reviews are not planned.	L.A.
2.1.3. Adjust the performance of the process.	Since milestones are strictly defined, adjustments are not allowed.	-	P.A.
2.1.4. Define responsibilities and authorities for performing the process.	- Responsibilities and authorities for performing the process are assigned.	-	L.A.
2.1.5 Identify and make available resources to perform the process according to plan.	-Available resource for the performing the process which is human resource for one-year in the related departments and infrastructure are defined and provided.	-	F.A.
2.1.6 Manage the interfaces between involved parties.	-Communication is assured between involved parts.	There is no such a computerized system to manage interfaces btw involved parties.	F.A.

Generic Resources:

- Human resources with identified responsibilities and authorities
- Facilities and infrastructure resources
- Communication mechanism; E-mail is widely used for information exchange.
- Decree Law Concerning the Organization and Duties of organization

4.2.4.2.3.2 PA 2.2. Work Product Management Attribute Assessment

GPIs of Work Product Management Attribute and their evidences for Graduate Student Selection Process are given at Table 4.53. According to all positive and negative evidences, work products and resource indicators, the work product management attribute is evaluated as ***Largely Achieved***. There are some evidence and some achievement of the approach of managing work products in the graduate student selection process. But some aspects of achievement of the work product management attribute are unpredictable.

Table 4.53. Evidences for GPIs of Work Product Management Attribute of Graduate Student Selection Process

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	-Project requirements/ form templates for submission are defined in METU graduate student application page.	-Quality criteria of the work products are not identified. -Quality criteria for reviewing and approving the the work products are not defined.	L.A.
2.2.2 Define the requirements for documentation and control of the work products.	-Requirements for the submitted applications are defined. -Templates of the application forms are defined in the guideline. -Dependencies between work products are identified -Requirements of accepting application is defined but not documented.		F.A.
2.2.3 Identify, document and control the work products.	- Approved accepted application list is published with an identification number once a year and they are controlled via database. -The work products to be controlled are revisions of applications	-Change Control is not established to projects. - The work products are not controlled in accordance with requirements.	L.A.
2.2.4 Review and adjust work products to meet the defined requirements.	-Submitted applications are reviewed and evaluated against defined requirements. -For the issues arising from work product reviews, communication is established with agency via e-mail.	-No review mechanism for performed interview. Resolving issues arising from work product reviews is not tracking systematically.	L.A.

Generic Resources:

- E-mail for communication mechanism
- MS Office- Documentation Support Tool

Generic Work Products:

- Procedures for defining requirements
- Guideline for requirements of applications

4.2.4.2.4 Level 3: Established Process

4.2.4.2.4.1 PA 3.1: Process Definition Attribute

According to all positive and negative evidences as well as work products given at Table 4.54, the process definition attribute is evaluated as ***Partially Achieved.***

Table 4.54. Evidences for GPIs of Process Definition Attribute for Graduate Student Selection Process

GPI	Positive Evidence	Negative Evidence	Assessment Value
3.1.1 Define the standard process that will support the deployment of the defined process.	- Process model is constructed. -Procedure is defined in the METU Education Regulation.	Guidance including how to perform the process is not defined clearly.	F.A
3.1.2 Determine the sequence and interaction between processes so that they work as an integrated system of processes.	- Process model is constructed.		L.A
3.1.3 Identify the roles and competencies for performing the standard process.	-	Competencies, roles, and responsibilities are not defined formally.	P.A
3.1.4 Identify the required infrastructure and work environment for performing the standard process.	-	The infrastructure and work environment needs of the process are not defined.	N.A
3.1.5 Determine suitable methods to monitor the effectiveness and suitability of the standard process.	-	-There are no metrics/methods/criteria defined for monitoring effectiveness and suitability of the process. -There is no conduction of internal audit and management review.	N.A

4.2.4.2.4.2 PA 3.2 Process Deployment Attribute

According to number of positive and negative evidences given at Table 4.55, the process deployment attribute is evaluated as ***Partially Achieved***.

Table 4.55. Evidences for GPIs of Process Deployment Attribute for Graduate Student Selection Process

GPI	**Positive Evidence**	**Negative Evidence**	**Assessment Value**
3.2.1 Deploy a defined process that satisfies the context specific requirements of the use of the standard process.	-	-There is no conformance/test to verify the defined process satisfies the requirements. -Defined process is not selected from the standard process.	N.A
3.2.2 Assign and communicate roles, responsibilities and authorities for performing the defined process.	-Communicate roles are assigned. -Roles and responsibilities of the actor in the process are known as a tacit knowledge	Roles and responsibilities of the actor in the process are not defined formally.	L.A
3.2.3 Ensure necessary competencies for performing the defined process.		-The competences of the assigned personnel are not identified. -There is no training available for deploying the process.	N.A
3.2.4 Provide resources and information to support the performance of the defined process.	-Required human resources are made available and allocated. -Required information is made available and allocated.	-	F.A
3.2.5 Provide adequate process infrastructure to support the performance of the defined process.	-Infrastructure and work environment is used and maintained. -Organizational support to effectively manage via tools such as e-mails, telephone is available.	-	F.A
3.2.6 Collect and analyze data about performance of the process to demonstrate its suitability and effectiveness.	-	-Data required to understand the behavior, suitability and effectiveness of the defined process are not identified/collected. Thus, they are not used for improvement.	N.A

4.2.4.2.5 Graduate Process Assessment Results

The result of the graduate student selection process assessment based on Gov-PCDM is that the capability level of the graduate student selection process

performed in the Informatics Institute in METU is Level 2 with the following rationale based on collected and validated evidence in Table 4.56 In order to improve the capability level of the graduate student selection process to Level 3, assessment values of the process attributes should be as follows; Performance and Work Product Management attributes: Fully Achieved, Process Definition and deployment attributes: Largely or Fully Achieved.

Table 4.56 Graduate Student Selection Process Assessment Result

Process Attributes	Organization-1	Result
P.A.1.1 Process Performance	F.A.	
P.A.2.1 Performance Management	L.A.	
P.A.2.2 Work Product Management	L.A.	**Level-2**
P.A.3.1 Process Definition	P.A.	
P.A. 3.2 Process Deployment	P.A.	
….		

4.2.4.2.6 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of the processes is derived from the assessment evidences in the technical report [89]. The aim is to turn negative evidences into positive evidences of process capability indicators supporting the judgment of the degree of achievement of the process attribute. For example; for performance management attribute; the second indicator (Generic Practice 2.1.2) is to plan and to monitor the performance of the process to fulfill the identified objectives. Negative evidence, observed while interviewing with process stakeholders for this indicator is that process work product reviews are not planned. Thus, necessity of reviewing work products is indicated in the guideline as follows:

- Review of the work products should be planned and performed in accordance with the requirements.
- Performance quality criteria should be defined and performance of the employees should be monitored.
- Quality criteria of the work products should be identified.
- Quality criteria for reviewing and approving the content of the work products should be defined.
- HR qualification should be identified.
- Standardization for evaluation of oral interview should be applied. Interview criteria and their weights should be determined.
- Monitoring and reporting processes should be performed.
- Accepted applications list revisions should be controlled systematically. Resolving issues arising from work product reviews should be tracked systematically.
- Data required understanding the behavior; suitability and effectiveness of the defined process should be identified/ collected and used for improvement.
- Internal audit and management review should be conducted.
- Metrics/methods/criteria should be defined for monitoring effectiveness and suitability of the process.

4.2.4.2.7 Interviews with the Stakeholders

In order to check usefulness and adequacy of the proposed approach, follow-up interviews were conducted with the process stakeholders. Interviews are conducted with 3 process stakeholders. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions given at Table 4.57 are responded as 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the graduate student selection process. They thought that the biggest contribution to the improvement of the process is provided by defining quality criteria/metrics/methods and monitoring the effectiveness and suitability of the process. While answering the last question, they point out some possible improvement areas such as carrying on application through an electronic system including all involved parties students, head of student relations department of METU, academic committee, management committee, and student relations of the institute. However, this is out of our scope and is primarily related to atomization. They also confirm that the generic process definition covers all outcomes of the process.

Table 4.57 Results of Interview with the Stakeholders for Graduate Student Selection Process

Question	Survey Type	Response
Q1) Are measuring graduate student selection process capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the graduate student selection process performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of graduate student selection process? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	Automatization

4.2.4.3 Importation Permissions Management Process

Importation Permissions Management Process performed in Ministry of Health of North Cyprus Turkish Republic is assessed based on Gov-PCDM. Ministries processes are derived by applying a top-down approach by thesis writer, who has both professional and academic experience in business process management domain. The Importation Permissions Management Process is one of the most critical process performed in the Ministry. A massive volume of paper further hampers the process. It is observed that there is a need to improve the process performance to achieve operational excellence. Thus, the Importation Permissions Management Process is selected to improve process capability level with a guidance on what to do to increase quality.

4.2.4.3.1 Process Definition

Since the process is an agency-specific process, the generic process definition, seen in Table 7.8 is used for assessing process attribute of Level 1, which is process performance attribute. Since the objective of technical effort is evaluating an application, BPs of 1, 2, 3, 4, 5, 6 and 7B, 8B and 9B are used.

The purpose of the Importation Permissions Management Process is to evaluate the applications for importation.

4.2.4.3.2 Level-1 Assessment

Process performance attribute of Level 1 assessment covers checking whether the process achieves its defined outcomes. Details of the assessment activities such as planning, briefing of the participants, data collection and validation, and reporting are put together into an assessment plan document and an assessment report in [87]. The assessment value for Process Performance Attribute is determined as ***Largely Achieved*** based on the evidences given at Table 4.58.

Table 4.58 Process Outcomes and Evidences of Process Performance Attribute of Importation Permissions Management Process

BPs	**Evidences**	**Assessment Value**
BP1. Develop a strategy for the process	-Foreign trade (regulation and control) law which covers importation. -There is no law, decree law directly including importation strategy or politics.	P.A.
BP2. Publish policies and guidelines	There is no guideline or policy including how to perform the process	N.A.
BP3. Define requirements for the process	Human resource requirement is defined	F.A.
BP4. Establish interactive communication methodologies and structures with involved parties	– Citizens who desire to import to the country apply for importation by coming to the office and when the imported food arrives to country, custom office calls to the department. -No electronic mechanism to manage applications and to receive arriving information.	L.A.
BP5: Achieve approval for the result	Head of the department approve the decision of accept/decline of the importation of the food.	F.A.
BP6: Share results with involved parties	Citizen who applies has to come to the office to learn the result. Citizen distribute the result to all related parties such as custom department	L.A.
BP7B: Receive Application(s)	– The application is received by form. There is no electronic system for the application.	F.A.
BP8B:Evaluate Application(s)	– Employees evaluates the applications.	F.A.
BP9B: Document the result	- The result is documented.	F.A.

4.2.4.3.3 Level-2 Assessment

4.2.4.3.3.1 PA 2.1. Performance Management Attribute Assessment

GPIs of Performance Management Attribute and their evidences for Importation Permissions Management Process. Assessment Value is ***Not Achieved*** based on the all evidences, work products and resource indicators given at Table 4.59. Process work products' reviews are not planned. The performance is planned and managed informally, performance quality criteria are not defined and not monitored.

Table 4.59. Evidences for GPIs of Performance Management Attribute for Importation Permissions Management Process

GPI	**Positive Evidence**	**Negative Evidence**	**Asses. Value**
2.1.1 Identify the objectives for the performance of the process.		objectives for the performance for the process is not defined	N.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.		-Performance indicators are related to training and presenting the organization, service quality performance indicators like number of employee complaints are omitted. They are not monitored. -Activities, and resource usage for achieving the objectives are defined -Process activities and tasks are not defined. -Process performance is not monitored	N.A.
2.1.3. Adjust the performance of the process.		The performance plan is not adjusted.	N.A.
2.1.4. Define responsibilities and authorities for performing the process.		The needs for process performance experience, knowledge and skills are not defined. Roles and responsibilities are not identified job definitions document.	N.A.
2.1.5 Identify and make available resources to perform the process according to plan.	-Since it is not project-based job, human resource necessity does not change frequently. -HR necessity is planned.		F.A.
2.1.6 Manage the interfaces between involved parties.		It is not managed.	N.A.

4.2.4.3.3.2 PA 2.2. Work Product Management Attribute Assessment

GPIs of Work Product Management Attribute and their evidences for Importation Permissions Management Process are given at Table 4.60 According to all positive and negative evidences, work products and resource indicators, the work product management attribute is evaluated as ***Partially Achieved***.

Table 4.60. Evidences for GPIs of Work Product Management Attribute for Importation Permissions Management Process

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Since it is a standard supplementary process, few work products (Application forms) are standardized.	-The requirement for the work products are not defined -Quality criteria of the work products are not identified -Work product approval criteria are not defined	P.A.
2.2.2 Define the requirements for documentation and control of the work products.	Application Records are stored in physical files.	- Dependencies between work products are not identified -Documents are stored in physically.	P.A.
2.2.3 Identify, document and control the work products.	Controlling a few of standardized work products is performed manually.	- Change control is not established for work products	P.A.
2.2.4 Review and adjust work products to meet the defined requirements.		There is no defined requirement for the work products to review and adjust.	N.A.

4.2.4.3.4 Importation Permissions Management Process Assessment Results

The result of the Importation Permissions Management Process assessment based on Gov-PCDM is that the capability level of the Importation Permissions Management Process performed in the Ministry of Health in North Cyprus Turkish Republic is Level 1 with the following rationale based on collected and validated evidence given at Table 4.61. In order to improve the capability level of the Importation Permissions Management Process to Level 2, assessment values of the process attributes should be as follows; Process Performance attribute: Fully

Achieved and Performance and Work Product Management attributes: Largely or Fully Achieved.

Table 4.61 Importation Permissions Management Process Assessment Result

Process Attributes	Organization-2	Result
P.A.1.1 Process Performance	L.A.	
P.A.2.1 Performance Management	N.A.	
P.A.2.2 Work Product Management	P.A.	**Level 1- Performed**

4.2.4.3.5 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of the processes is derived from the assessment evidences in the technical report [87]. The aim is to turn negative evidences into positive evidences of process capability indicators supporting the judgment of the degree of achievement of the process attribute.

- *Publishing law including strategy/politics for importation*
- *Publishing a guideline including how to perform permission to importation.*
- *Developing a software to manage interaction with involved parties and to make application result to all related parties*.
- Define objectives for the performance for the process.
- Define activities, and resource usage for achieving the objectives.
- Define process activities and tasks.
- Monitor process performance and adjust if necessary.
- Define performance indicators for service quality like number of employee complaints.
- Define requirements to perform the process, i.e: process performance experience, knowledge and skills are not defined.
- Document job definition to define roles and responsibilities.

4.2.4.3.6 Interviews with the Stakeholders

In order to check usefulness and adequacy of the proposed approach, follow-up interviews were conducted with the process stakeholders. Interviews are conducted with 4 process stakeholders. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions given at Table 4.62 are responded as 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the importation permission management process. They also confirm that the generic process definition covers all outcomes of the process.

Table 4.62 Results of Interview with the Stakeholders for Importation Permission Management Process

Question	Survey Type	Response
Q1) Are measuring graduate student selection process capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the graduate student selection process performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of graduate student selection process? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No.

4.2.4.4 *Disable Citizen's Employment Management Process*

Disable Citizen's Employment Management Process performed in Ministry of Labor and Social Security of North Cyprus Turkish Republic is assessed based on Gov-PCDM. Ministries processes are derived by applying a top-down approach by thesis writer, who has both professional and academic experience in business process management domain. The Disable Citizen's Employment Management Process is one of the most critical process performed in the Ministry. A massive volume of paper further hampers the process. It is observed that there is a need to improve the process performance to achieve operational excellence. Thus, Disable Citizen's Employment Management Process is selected to improve process capability level with a guidance on what to do to increase quality.

4.2.4.4.1 Process Definition

Since the process is an agency-specific process, the generic process definition, seen in Table 7.8 Generic Process Definition , is used for assessing process attribute of Level 1, which is process performance attribute. Since the objective of technical effort is evaluating an application, BPs of 1, 2, 3, 4, 5, 6 and 7B, 8B and 9B are used.

The purpose of the Disable Citizen's Employment Management Process is to evaluate the applications for salary for disable citizens.

4.2.4.4.2 Level-1 Assessment

Process performance attribute of Level 1 assessment covers checking whether the process achieves its defined outcomes. Details of the assessment activities such as planning, briefing of the participants, data collection and validation, and reporting are put together into an assessment plan document and an assessment report in [88].

The assessment result is ***Largely Achieved*** based on the evidences given at Table 4.63.

Table 4.63 Process Outcomes and Evidences of Process Performance Attribute of Disable Citizen's Employment Management Process

BPs	**Evidences**	**Assessment Value**
BP1. Develop a strategy for the process	There is a law including strategy of citiziens having disabilities employment. (Özürlüleri Koruma Rehabilite ve İstihdam Yasası)	F.A.
BP2. Publish policies and guidelines	There is no guideline or policy including how to perform the process	N.A.
BP3. Define requirements for the process	Human resource requirement is defined and allocated.	F.A.
BP4. Establish interactive communication methodologies and structures with involved parties	Citizens having disability who desire to apply for having a disability salary or recruitment, come to the office. -No electronic mechanism to manage applications and to receive arriving information.	P.A.
BP5: Achieve approval for the result	Head of the department approve the decision of accept/decline of giving disability salary.	F.A.
BP6: Share results with involved parties	Citizen who applies has to come to the office to learn the result. Citizen distribute the result to all related parties such as custom department	P.A.
BP7B: Receive Application(s)	– The application is received by form. There is no electronic system for the application.	F.A.
BP8B:Evaluate Application(s)	– Employees evaluates the applications.	F.A.
BP9B: Document the result	-The result is documented. -There is no electronic mechanism used for it.	L.A.

4.2.4.4.3 Level-2 Assessment

4.2.4.4.3.1 PA 2.1. Performance Management Attribute Assessment

GPIs of Performance Management Attribute and their evidences for Disable Citizen's Employment Management Process. Assessment Value is ***Not Achieved*** based on the all evidences, work products and resource indicators given at Table 4.64. Process work products' reviews are not planned. The performance is planned and managed informally, performance quality criteria are not defined and not monitored.

Table 4.64. Evidences for GPIs of Performance Management Attribute for Disable Citizen's Employment Management Process

GPI	Positive Evidence	Negative Evidence	Asses Value
2.1.1 Identify the objectives for the performance of the process.		objectives for the performance for the process is not defined	N.A.
2.1.2 Plan and monitor the performance of the process to fulfill the identified objectives.		-Performance indicators are related to training and presenting the organization, service quality performance indicators like number of employee complaints are omitted. They are not monitored. -Activities, and resource usage for achieving the objectives are defined -Process activities and tasks are not defined. -Process performance is not monitored	N.A.
2.1.3. Adjust the performance of the process.		The performance plan is not adjusted.	N.A.
2.1.4. Define responsibilities and authorities for performing the process.		-The needs for process performance experience, knowledge and skills are not defined. -Roles and responsibilities are not identified job definitions document.	N.A.
2.1.5 Identify and make available resources to perform the process according to plan.	Resources to achieve the objectives of the process are planned. Since it is not project-based job, human resource necessity does not change frequently.		F.A.
2.1.6 Manage the interfaces between involved parties.		It is not managed.	N.A.

4.2.4.4.3.2 PA 2.2. Work Product Management Attribute Assessment

GPIs of Work Product Management Attribute and their evidences for Disable Citizen's Employment Management Process are given at Table 4.65. According to all positive and negative evidences, work products and resource indicators, the work product management attribute is evaluated as Partially Achieved.

Table 4.65. Evidences for GPIs of Work Product Management Attribute Disable Citizen's Employment Management Process

GPI	Positive Evidence	Negative Evidence	Assessment Value
2.2.1 Define the requirements for the work products	Since it is a standard supplementary process, few work products (Application forms) are standardized.	-The requirement for the work products are not defined -Quality criteria of the work products are not identified -Work product approval criteria are not defined	P.A.
2.2.2 Define the requirements for documentation and control of the work products.	Application Records are stored in physical files.	- Dependencies between work products are not identified -Documents are stored in physically.	P.A.
2.2.3 Identify, document and control the work products.	Controlling a few of standardized work products is performed manually.	- Change control is not established for work products	P.A.
2.2.4 Review and adjust work products to meet the defined requirements.	Since work products are standardized, reviewing and adjusting is not necessary.		N.A.

4.2.4.4.4 Disable Citizen's Employment Management Process Assessment Results

The result of the Importation Disable Citizen's Employment Management Process assessment based on Gov-PCDM is that the capability level of the Disable Citizen's Employment Management Process performed in the Ministry of Labor and Social Security in North Cyprus Turkish Republic is Level 1 with the following rationale based on collected and validated evidence in Table 4.66. In order to improve the capability level of the Disable Citizen's Employment Management Process to Level 2, assessment values of the process attributes should be as follows; Process Performance attribute: Fully Achieved and Performance and Work Product Management attributes: Largely or Fully Achieved.

Table 4.66 Disable Citizen's Employment Management Process Assessment Result

Process Attributes	Organization-1	Result
P.A.1.1 Process Performance	L.A.	
P.A.2.1 Performance Management	N.A.	
P.A.2.2 Work Product Management	P.A.	**Level 1- Performed**

4.2.4.4.5 Guideline for Improvement Capability of the Process

The roadmap to improve the capability level of the processes is derived from the assessment evidences in the technical report [88]. The aim is to turn negative evidences into positive evidences of process capability indicators supporting the judgment of the degree of achievement of the process attribute.

- Publishing a guideline including how to perform the employment of disable citizens' management.
- Developing a software to manage interaction with involved parties and to make application result to all related parties.
- Define objectives for the performance for the process.
- Define activities, and resource usage for achieving the objectives.
- Define process activities and tasks.
- Monitor process performance and adjust if necessary.
- Define performance indicators for service quality like number of employee complaints.
- Define requirements to perform the process, i.e: process performance experience, knowledge and skills are not defined.
- Document job definition to define roles and responsibilities.

4.2.4.4.6 Interviews with the Stakeholders

In order to check usefulness and adequacy of the proposed approach, follow-up interviews were conducted with the process stakeholders. Interviews are conducted with 3 process stakeholders. The findings in the conducted interviews support our proposed approach. All of the answers for the first two questions given at Table 4.67 are responded as 4 in 5 points Likert scale. They think that achieving a road map to guide what to do for increasing process capability is useful, all of the suggestions indicated in the guideline will improve the process performance of the disable citizen's employment management process. They also confirm that the generic process definition covers all outcomes of the process.

Table 4.67 Results of Interview with the Stakeholders for Disable Citizen's Employment Management Process

Question	Survey Type	Response
Q1) Are measuring graduate student selection process capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the graduate student selection process performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of graduate student selection process? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	No.

4.3 Threats to Validity

As a result of the application of case study research, some possible threats to validity arise. During the planning phase of the case studies, actions were planned to overcome these threats. Here we explain, for each threat, the actions conducted to avoid the threats and the situation.

– Regarding the ***construct validity***, it considers if the constructs in the case study are well-structured or subjective to the judgment [81]. The construct validity may be a problem if the case study activities are not appropriate to evaluate the method, metrics collected and observations are not interpreted in a correct way and interviews are not conducted in a way to reach correct results to answer the research questions [81;91;92]. To avoid these problems, the information is collected from the participants with different roles (process owner, process stakeholder, and executive member) and from multiple sources, including documentation (Laws, decree-laws, regulations), interviews and observations of the participants. Furthermore, the use of templates proposed by Yin [81] related to each activity of the field procedure allowed us to maintain a chain of evidence with traceability between research questions, recorded information, evidences and analysis.

-As for the ***internal validity***, it is our concern as we try to make conclusions on the outputs derived by means of applying the Gov-PCDM. Application of multiple case studies is especially important to overcome this threat. The outputs delivered as a result of applying the Gov-PCDM shows that the decision to use the proposed methodology to guide the process assessment in governmental organizations allowed them to obtain reliable information on the state of their capability level of processes and use it to improve them. The quality of the assessment results may be affected not only by the application of Gov-PCDM methodology, but by also various conditions. To avoid this risk and reveal how the outputs are affected because of the application of the methodology, a chain of evidence was maintained while conducting the study and reporting the results. The evidences collected during the case studies were provided in detail in the technical reports [86-88] and referenced from the relevant points in these case study reports. Different sources of evidences as interviews with stakeholders, inspecting documents, laws, regulations, etc. related to the process were utilized to analyze the results and answer the research questions as a whole. The resulting outputs were validated by the related stakeholders by conducting the interviews.

– Regarding ***external validity*** dealing with the concern of the generalizability of the results of the case study [91], analytical generalization rather than a statistical generalization of the results are tried to be found in the case studies to some broader theory [81]. We conducted multiple case studies where we can apply for replication logic to overcome this threat. We initially applied the approach as an exploratory case study to check the usefulness and applicability of the assessment methodology. These first application results were reviewed, approved, and refined

the protocol and the field procedure of the case study. Then, the case studies at Ministry of Development were carried out using this material. Finally, the replication material of the case study was applied to Ministry of Health and Ministry of Labor and Social Security in North Cyprus, so that the replication of the case study could be performed in the remaining two organizations. We ensured that we applied the replication logic consistently through the cases by means of Gov-PCDM as guiding to implement the methodology. We ensured that consistent outputs could be delivered through multiple executions of the same or different cases.

-Regarding ***reliability*****,** many actions were taken to prevent reliability problems and ensure that other researchers can conduct the same study following the methodology. Firstly, a case study protocol defined by Yin [81] was followed and explained in detail in for each case study, where the objectives, corresponding research questions, plan, sources of the evidences of the case study are identified and the assessment method is defined in the Gov-PCDM in detail. We developed the replication material of the case study after the Ministry of Development, and it was applied to the Ministry of Health and Ministry of Labor and Social Security in North Cyprus. It was observed that following this material at all the cases in the two of the organizations resulted in similar findings and conclusions to those obtained in the cases in the first organization.

4.4 Discussion

As described in the previous sub-sections, we performed a multiple case study, including 25 process assessment in total in four different organizations, is performed as the research methodology to evaluate the Gov-PCDM. The case studies are as follows;

- **Exploratory Case Study**- Turkish Republic Ministry of Development- Public Investment Management Process

- **Multiple Case Study**
    - Management of Government Resources and Support Processes Assessments in 3 different organizations (Turkish Republic Ministry of Development, North Cyprus Turkish Republic Ministry of Health, and North Cyprus Turkish Republic Ministry of Labor and Social Security)
        1. Human Resources Management Process
        2. Financial and Physical Resource Management Process
        3. Information Resource Management Process
        4. External Relationship Management Process
        5. Inspection& Auditing Process
        6. Regulatory Development and Management Process
        7. Strategy and Policy Management Process
    - Agency-Specific Process Assessments

- Public investment management process in Ministry of Development in Turkey
- The Graduate Student Selection Process performed in M.E.T.U. Informatics Institute
- Importation Permissions Management Process performed in Ministry of Health of North Cyprus Turkish Republic
- Disable Citizen's Employment Management Process performed in Ministry of Labor and Social Security of North Cyprus Turkish Republic

The summary of the Assessment for MGRSPs are given in the Table 4.68 below. The summary of the agency-specific processes are given in the Table 4.69. The process capability level of Information Resources Management Process in Ministry of Development is level 3 which is the highest one among all case studies. Since the ministry has been preparing to be certified ISO 27000 standard, work product management and performance management attributes of the process of information resource management are assessed as fully achieved. There are studies in the literature showing positive correlation among ISO 15504 and ISO 27000.

Table 4.68 Overview of Multiple Case Study Results for MGRSPs

MGRSP	Organization-1	Organization-2	Organization-3
Human Resource Management	Level 1	Level 0	Level 0
Financial & Physical Resource Management	Level 2	Level 1	Level 1
Information Resource Management	Level 3	Level 0	Level 1
External Relationship Management	Level 1	Level 0	Level 0
Inspection & Auditing	Level 2	Level 0	Level 0
Regulatory Development& Management	Level 2	Level 1	Level 1
Strategy & Policy Development	Level 2	Level 1	Level 1

Table 4.69 Overview of Agency- Specific Process Assessment Result

Process	PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	Capability Level
Public Investment Management Process in Ministry of Development	F.A	L.A	L.A	P.A	P.A	**Level 2**
Graduate Student Selectıon Process in METU Informatics Institute	F.A	L.A	L.A	L.A	P.A	**Level 2**
Importation Permissions Management in TRNC Ministry of Health	L.A	N.A	P.A	-	-	**Level 1**
Disable Citizen's Employment Management Process in TRNC Ministry of Labor and Social Security	L.A	N.A	P.A	-	-	**Level 1**

Some processes performed in the North Cyprus Turkish Republic are rated as Level-0: Incomplete. BPs indicating if the process is performed are missing in these processes. There are some projects already going on in the ministries to fulfill some of these determined gaps. Such as establishing a separate department for just working on human resource activities and starting to use a human resource management system across all government institutions.

The assessment results are shared with process stakeholders at a meeting for each process performed in each organization. Interviews were conducted with the process stakeholders after the meetings. Their opinions for each process are presented under the sections of *Interviews with the Stakeholder* in this chapter. The integrated questionnaire result is given in the Table 4.70. We used 5 points scale in the first two questions. It includes options as: strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points), strongly disagree (1 points). The median of the responses is calculated from the 52 responders in total.

Table 4.70 The Overall Questionnaire Result

Question	Survey Type	Response
Q1) Are measuring the process capability and obtaining guideline for improvement useful?	5 points Likert scale	Median: 4
Q2) Do you think that applying these suggestions will improve the process performance?	5 points Likert scale	Median: 4
Q3) is there any information you want to add in process definition of the process? Please write, if any.	Open-end	No.
Q4) is there any missing item(s) in guideline for improvement list? Please write, if any.	Open-end	○ Interoperability ○ Understaffing problem ○ Not importance of configuration management

Median of the responses for the first two questions are 4. Based on this result, it can be said that they agree that achieving a road map to guide what to do for increasing process capability is useful, and the suggestions indicated in the guideline will improve the process performance. They also confirm that process definitions cover all outcomes of the process. All responders replied as No for the third questions. They indicated some missing items in the guideline derived after the assessment as understaffing problem, and necessity of interoperability with other agencies. Additionally, 2 responders from the HRM department stated that the generic practices related to the configuration management in the PA 2.2. Work Product Management is not important for the HRM practices.

Considering the results of case studies with respect to the research questions, we achieved the following results.

RQ1: How suitable is the Gov-PCDM to be used with the purpose of identifying the current state of the process capability and the gaps with the assessed capability level. Accordingly how well it provides roadmaps for improving the process capability of the governmental organizations?

Considering the multiple case study results and the opinions of the interviewees on the results, we conclude that we could use the Gov-PCDM to identify the process capability level and to provide roadmap for governmental organizations process improvement. The concrete evidence that shows the benefit of our approach is the questionnaire responses.

The median of the answers for the first question of *"Are measuring the process capability and obtaining guideline for improvement useful?*" Is 4 over 5 point Likert scale, and for the second question of *"Do you think that applying these suggestions will improve the process performance?*" It is 4 over 5 point Likert scale. Achieving such high ratios for finding the gaps in the process is an indicator of how successful

the Model in revealing process improvement opportunities and the potential of the Model for the use of government process capability level assessment.

RQ2: What are the strengths and weaknesses of the Gov-PCDM?

We interpreted the strengths and weaknesses of Gov-PCDM based on the results of the multiple case study.

In the model, we defined a standardized and structured process capability assessment model for government model. Gov-PCDM provides enabling each governmental organization to evaluate its processes in detail, identifying the current state of its processes capability; comparing itself against other organizations evaluated with the same model; and achieving feasible improvement roadmap to follow for improving their process capability levels. It can be concluded from the response of the second question, the responders agree that the application of the suggestion indicated in the guideline improves the process performance.

The assessment model provides objective ratings by establishing a mapping between a Process Attribute and an ordered set of values as N.A., P.A, L.A, and F.A. To deal with the effects of subjectivity in this measurement process and reduce uncertainty in the results, Gov-PCDM has checkable indicators. That results in providing a mechanism for consistent expression of result profile in a repeatable and reliable manner.

In order to evaluate the efficiency of the guideline for improvement, we asked them *"is there any missing item(s) in guideline for improvement list? Please write, if any."* as an open-end question. Their responses include the followings:

Interoperability: There is a need for integrated information systems across the governmental agencies in order to improve the process. The Gov-PCDM does not have any practice indicator to check the interoperability.

Not importance of configuration management: Three responder from organization-1 indicated that some activities and documents used are standardized in the governmental agencies. It is not project-based, and it is regularly done. For these activities, some indicators related to configuration management as assigning versions of the work products and change control of the work products (keep version status, etc.) in PA 2.2: Work Product Management Attribute are not so necessary for the governmental process quality.

Understaffing problem: Two responders performing HRM practices in Organization-2 gave a comment that some BPs cannot be performed because of the understaffing problem. They do not have enough employee. However, there is no item in the guideline related to this problem.

When we criticize the model in terms of its components and the application results, the following issues emerge:

Inability to perform level 5 assessment: In the multiple case study conducted, we observed the occurrence of four capability levels from 0 to 3. However, we could not observe the occurrence of capability level of Level 4 and Level 5. We could not perform level 5 assessment because the highest capability level assessed is level-3. Observation of every capability level for each process attribute shows both the perspective of the case studies conducted and the capability of Gov-PCDM in specifying and representing diversities between capability levels.

Not having e-government specific process attributes: Since the starting point of the Gov-PCDM is stated in the introduction section as determining defects of the processes before automatization of it. Correspondingly, after improving the process, the results of the automatization projects will be more successful. There are studies in the literature about measuring maturity levels of e-government initiatives as discussed in the chapter 2. There are some attributes as integration, interaction, etc. for measuring the interoperability level in the e-government maturity models. However, in the scope of this thesis, we did not aim to provide e-government maturity measurement approach and recorded this opportunity as a future study.

Self-Assessment Approach: The process owners instead of assessment team can assess their process capability level in a more comprehensive way. The development of a self-process-assessment approach covering a comprehensive set of practices and alternative answers that are compatible with Gov-PCDM is also recorded as a future study.

The necessity of a tool supporting the assessment: During the case studies, the assessment team use a template of an Excel file to follow the base and generic practices for checking and to record the gathered evidences. Development of a tool supporting the assessment will be helpful for the assessors.

Organizational Maturity: There is no relationship defined between assessment of process capability and determination of organizational maturity. ISO/IEC TR 15504 - Part 7 includes this relationship for software organizations. The Gov-PCDM provides as the primary means of understanding the current state of an organization's processes, and on using the results of the assessment to formulate and prioritize improvement plans. An Organizational Maturity Model provides a general framework for an organization to achieve progressive improvements in their organizational maturity. A maturity level is a well-defined evolutionary plateau toward achieving a mature organization. The starting point of the Gov-PCDM is determining the capability level of the governmental processes rather than the maturity level of the government institutions. However, the definition of this relationship is recorded as a future study.

Number of Defined Process: The main processes performed in governmental institutions are defined in Gov-PCDM. A generic process definition is also defined for the agency-specific processes. However, in the next version of the model, some

BPs defined in the current version of the model, can be extended by defining them as a process. Such as, documentation, quality management and knowledge management can be defined as a process. Although, we measured generic practices related to documentation, knowledge management and quality management in the current version of the Gov-PCDM, definition of the BPs related to these processes and assessing them will be beneficial for the governmental institutions. The extension of the process set is recorded as a future study.

Inability to measure social attributes: The principles and characteristics which are valid for the public sector constitute special conditions for task fulfillment in public authorities in comparison to private sector organizations. Such as; government culture, bureaucratic barriers, political legitimization, the dramatic impact of the changing 'Board of Directors' every 4-5 years, strict hierarchical structure possessing a clear line of authority, high level of division of work and specialization, horizontal and vertical structure of administration (de-central task fulfillment). The Gov-PCDM does not measure social attributes, however, it detects their effects on the processes. Measurement of the social attributes is related to social sciences, it is out of scope of Gov-PCDM which is a descriptive model in the sense that it describes essential attributes of governmental processes.

CHAPTER 5

CONCLUSION

Domain specific business process improvement models more than welcomed by the industries in recent years. Although the concept of process improvement models is not new, the application of process improvement models to the public sector has not been extensively studied. A government specific business process capability determination model, entitled as Gov-PCDM, is developed to fulfill the necessity of tailoring business process improvement model of SPICE-ISO/IEC TR 15504 for the specifications of the government domain. We customized the ISO/IEC TR 15504 by developing government process reference model including managerial governmental process definitions as well as a generic process definition which can be applied all the governmental specific processes. The purpose of Gov-PCDM is to offer the base to improve the governmental processes. It pursues a structured and standardized approach by assessing governmental processes in order to accomplish quality improvement initiatives in a consistent, repeatable manner, assessed by adequate metrics with guidance on what to do for increasing quality in the government organizations.

In this chapter, the contributions achieved by the proposed methodology are summarized and limitations as well as planned future work are presented.

5.1 Summary of the Thesis Study

We realized the necessity of a process improvement model developed based on the specialties of government domain during our projects at governmental agencies. Then, we performed a literature survey on existing models, providing process improvement. As a result of the literature review, it is found out that there is a gap for a structured process improvement model for government domain. This literature review, given in chapter 2, was presented in national software engineering symposium in 2014 [35]. After that, an exploratory case study, given in section 4.1, was performed to evaluate if the customization of ISO/IEC TR 15504 for government

domain is applicable. The study was presented at the SPICE Conference in 2014 [36]. Public investment management process performed in the Ministry of Development in Turkey was defined in an ad-hoc fashion, assessed its capability level, and a road-map to improve the process capability level was derived in the study. As a result of the study, although initial findings indicated the usefulness and adequacy of the proposed approach; the necessity of a methodology incorporating guidelines for government specific process definition was determined. In order to satisfy this determined necessity, the methodology was developed. The corresponding study of proposing government process capability determination method given in section 3.3 was presented at the SPICE Conference in 2015 [37].

As a result of analyzing the governmental organizations, we classified governmental processes into two main groups; one of them is common processes performed across all governmental agencies; such as human resource management process. We named them as Management of Government Resources and Support Processes (MGRSPs). The second category consists of agency-specific processes performed only by an agency. For instance; birth, death and marriage registration process is performed just in the civil registry office. Government Process Reference Model (Gov-PRM) is constructed based on these classifications. The process definitions of MGRSPs, given in Appendix-A, are defined. A generic process definition, given in Appendix-B, is developed for governmental agency-specific processes assessment. The research methodology of how to develop the process definitions is described in detail in section 3.2. Government Process Assessment Model, given in Appendix-C, is constructed based on ISO/IEC TR 15504 -Part 5.

After achieving the finalized version of the model, the Gov-PCDM is validated through the implementation of the model in four public organizations in the scope of the multiple case studies. MGRSPs are assessed in 3 different governmental organizations which are Turkish Republic Ministry of Development, North Cyprus Turkish Republic Ministry of Health, and North Cyprus Turkish Republic Ministry of Labor and Social Security. Agency specific processes from 4 different organizations which are Turkish Republic Ministry of Development, North Cyprus Turkish Republic Ministry of Health, and North Cyprus Turkish Republic Ministry of Labor and Social Security and Middle East Technical University, Informatics Institute, are assessed. We conducted formal assessments through semi-structured interviews with process practitioners, and evaluate the direct evidences. We analyzed the assessment process and present the result of each assessment as a report. Over the reports, we discussed the results with practitioners and asked if the results correctly represent the state of the process. The findings, presented in chapter 4, indicate the usefulness and adequacy of the proposed approach.

5.2 Contributions

The major contribution achieved in this study is the Government Process Capability Determination Model, including governmental specific process definitions, a method including how to perform the assessment in a structured way and measurement framework providing objective rating. It is designed to be a complete solution for

government process capability assessment with its fully compatible structure. It provides the base for improving the public processes. It pursues a structured and standardized approach by assessing the governmental processes in order to perform quality improvement initiatives in a consistent, repeatable manner, assisted by adequate measures with guidance on what to do to increase quality in government institutions. There is no such an approach in the existing literature. As a result of literature review given in Chapter 2, although studies for improving quality in the public domain provide benefits from different aspects, it is observed that they do not aim to improve process quality directly to guarantee the consistency of services with each other through the use of standard processes where the capability level can be assessed and improved with a guidance. The aim of developing Gov-PCDM is to fill this gap.

The developed Gov-PRM including generic process definition, which can be applied across all governmental processes, and MGRSPs definitions, covering common governmental resources management processes, provides customization of ISO 15504 standard for government domain.

The developed Government Process Capability Method, given in Chapter 3, provides detailed procedures describing how an assessment is prepared and conducted as a process, although ISO 15504 does not provide such a description.

The Model provides guidance to the assessors with base and generic practices, as well as example work products.

In this study, we observed applicability of the Model through multiple case studies, the existing models in the literature do not include such applications. The processes in the case studies are determined as different capability levels. As a result of them, it is derived as the Gov-PCDM can be used to determine different capability levels and to generate a road-map for process improvement to next capability level of several different process from various domains. The responses from the process stakeholders show that they agree that achieving a road map to guide what to do for increasing process capability is useful, and the suggestions indicated in the guideline will improve the process performance.

Defining Gov-PCDM based on ISO/IEC TR 15504–(SPICE) will enhance the applicability of the Model. The SPICE community supports the applicability of the standard to other domains rather than software.

Finally, the multiple case study results showed that the Model is successful at identifying process defects at different process capability levels and capable of proving road-map for moving one step higher process capability level.

5.3 Limitations

We identified the following limitations regarding this study as follows:

- We observed the occurrence of four capability levels from 0 to 3 in the multiple case study conducted. However, we could not observe the occurrence of capability level of Level 4 and Level 5. We could not perform level 5 assessment because the highest capability level assessed is level 3. Evaluation of the applicability and usefulness of the generic practices indicated in level 5 is needed for improving the completeness of the model. However, it is so hard to find an organization having a process which's capability level is 4.

- We evaluated one agency-specific process for each of the organizations, however, more agency-specific process assessment needs to be evaluated both to improve the reliability of the results and to make inferences throughout organizations.

- The same agency-specific process performed in another agency (i.e: for graduate student selection process) or in another country (ie.: public investment management process) needs to be performed to improve the reliability and generalizability of the results.

- The applicability of the model is checked in four different agencies, the MGRSPs are assessed in three different agencies, and some of them are not performed. Increasing number of the agencies improves the reliability of the results.

- The case studies are from two different countries, evaluation applicability of the model in different countries' governmental agencies will improve the generalizability of the results.

5.4 Future Work

We identified the following improvement opportunities regarding Gov-PCDM corresponding to defined weaknesses in section 4.3.

- Development of a government process capability self-assessment approach covering a comprehensive set of questions and alternative answers that are compatible with Gov-PCDM. Publish of the approach over the internet and the collection of new assessment data from various government organizations from different countries and benchmarking the data.

- Development of a tool regarding Gov-PCDM to support the assessment activities.

- Extending government process assessment model by adding e-government specific process attributes to provide an integrated approach.

- Performing more case studies in different agencies and countries.

- The definition of the Government Organizational Maturity Model scope and the selection of the basic and extended process sets.

- Extending the number of defined processes by adding knowledge management, documentation, and quality management as a process.

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APPENDICES

7.1 APPENDIX- A: Process Definitions of Management of Government Resource and Support Processes (MGRSPs)

7.1.1 Human Resource Management Process Definition

Table 7.1 Human Resource Management Process Definition

Process ID	MGRSP.1
Process Name	Human Resource Management
Process Purpose	The purpose of the Human Resource Management process is to provide the organization with individuals who possess skills and knowledge to perform their roles, motivate through clear career paths, and to work together as a cohesive group.
Process Outcomes	As a result of successful implementation of the Human Resource Management process: 1) Committed work is matched to human resources, and individuals are recruited, and employees with the right skills and competencies selected, and transitioned into assignments. 2) Human capital management planning, policies, and strategies are developed to ensure governmental organizations are able to recruit, select, develop, train, and manage workforce in accordance with merit system principles. 3) Objectives related to committed work are defined against which performance can be measured. Feedback regarding performance against these objectives is provided to continuously enhance performance to ensure agency employees are demonstrating competencies required of their work assignments. 4) Individuals are compensated and rewarded based on their contribution and value to the organization. 5) Individual and group workforce activities and information are coordinated. 6) A comprehensive employee development approach is designed, developed, implemented or enhanced to ensure that agency employees have the right competencies and skills for current and future work assignments. 7) Knowledge is readily available and shared for interaction. 8) Employee separation program is conducted to assist employees in transitioning to non-government employment; facilitates the removal of unproductive, non- retirement. Performing employees; and assists employees in transitioning to retirement.

Table 7.1 Human Resource Management Process Definition *(Continued)*

BPs	**MGRSP.1.BP1: Create and manage human resources (HR) planning, policies, and strategies.** Develop a strategy for human resource management, including how needed skills and competencies will be identified, developed or acquired, personnel performance evaluated, career development established, and personnel are motivated and matched to current and future business needs, at both the organizational and unit levels [Outcomes: 1,2, 6] Sub-functions of the practice are; BP.1.1. Develop human resources strategy BP.1.2 Develop and implement human resources plans BP.1.3. Monitor and update plans **MGRSP.1.BP2: Manage Reward and Recognition** provides to recognize and reward high performance, with both base pay increases and performance bonus payments. [Outcomes: 2, 3, 4] **MGRSP.1.BP3: Manage Employee Performance**. Design, develop and implement a comprehensive performance management strategy that enables managers to make distinctions in performance and links individual performance to agency goal and mission accomplishment. Define objective criteria that can be used to evaluate candidates and assess staff performance. [Outcome: 3] B.P.3.1 Define performance objectives BP.3.2. Develop performance management approaches/feedback B.P.3.3 Review, appraise, and manage employee performance B.P.3.4 Evaluate and review performance program B.P.3.5. Manage team performance **MGRSP.1.BP4: Recruit, Source, and Select Qualified Staff.** Establish a systematic program for recruitment and selection high-quality, productive employees with the right skills and competencies of staff competent to meet the needs of the organization. [Outcome: 1] B.P.4.1 Create and develop employee requisitions B.P.4.2 Recruit/Source candidates B.P.4.3 Screen and select candidates B.P.4.4. Manage pre-placement verification B.P.4.5 Manage new hire/re-hire B.P.4.6 Track candidates **MGRSP.1.BP5: Develop and Train Employees** designs, develops, and implements a comprehensive employee development approach to ensure that agency employees have the right competencies and skills for current and future work assignments. [Outcome: 5] B.P.5.1. Manage employee development B.P.5.2. Develop and manage training programs B.P.5.3 Develop and manage employee orientation programs B.P.5.4 Manage employee relations B.P.5.4 Develop functional/ process competencies B.P.5.5 Develop management/leadership competencies B.P.5.6 Develop team competencies B.P.5.7 Evaluate the overall effectiveness of the agency's employee development approach

Table 7.1 Human Resource Management Process Definition *(Continued)*

BPs	**MGRSP.1.BP6: Support Staff Interaction and Collaboration**. Support staff interaction and collaboration to enable staff to work together as a cohesive group. [Outcomes: 5, 7] **MGRSP.1.BP7: Empower Project Teams**. Empower teams to perform their job, by ensuring that they have: - an understanding of their job; - a shared vision or sense of common interest; - appropriate mechanisms or facilities for communication; and - support from management for what they are trying to accomplish. [Outcomes: 1, 5, 7] **MGRSP.1.BP8: Evaluate staff performance** Evaluate performance of the staff with respect to their contributions toward the goals of the organization as a whole. Ensure feedback is discussed with the staff. [Outcomes: 3, 4] **MGRSP.1.BP9: Provide Feedback on Performance**. Ensure feedback is provided, at least annually, to the staff through formal personnel evaluations on results of their performance. [Outcomes: 2, 3, 4, 7] **MGRSP.1.BP10: Motivate Personnel.** Provide adequate remuneration and benefits to employees in accordance with their individual contributions and value produced for the organization. [Outcome: 2,3] BP10.1. Manage employee satisfaction BP10.2. Deliver programs to support work/life balance for employees BP10.3. Develop family support systems BP10.4. Ensure employee involvement BP10.5. Manage internal Communications BP10.6. Manage and administer employee benefits BP10.7. Manage workplace health and safety **MGRSP.1.BP11: Maintain Staff Information.** Maintain adequate records of staff, including personnel details, information on skills, training completed, and on performance evaluations. [Outcomes: 3, 4, 5, 7] BP11.1.Manage employee information BP11.2. Manage employee communication **MGRSP.1.BP12: Manage Redeployment and retirement of employees** provides conducting efficient and effective employee separation programs that assist employees in transitioning to non-Government employment; facilitates the removal of unproductive, non-performing employees; and assists employees in transitioning to retirement. [Outcomes: 8]

Table 7.1 Human Resource Management Process Definition *(Continued)*

Work Products	Inputs	Outputs
	HR plan [Outcomes: 2]	HR plan [Outcomes: 1]
		HR policies [Outcomes: 2]
		HR strategies. [Outcomes: 2]
	HR needs analysis [Outcome: 1]	HR needs analysis [Outcome: 2]
	National Privacy laws [Outcome: 1]	
		Personnel performance criteria [Outcome: 3]
	Personnel record [Outcomes: 1]	Personnel record [Outcomes: 4,5,7]
	Training record [Outcomes:3, 5, 6]	Organization, project, individual training needs [Outcomes: 1, 5, 6]
		Training record [Outcomes: 3, 5, 6,7]
		Personnel performance evaluation [Outcomes: 2, 7]
		Personnel performance review record [Outcome: 7]

7.1.2 Information Resource Management Definition

Table 7.2 Information Resource Management Process Definition

Process ID	MGRSP.2
Title	Information Resource Management
Process Purpose:	The purpose of the Information Management process is to make relevant and timely information available to those who need it.
Outcomes	As a result of successful implementation of the Information Management process; 1.Information and content management strategy and requirements are established 2.An infrastructure is established and maintained to provide the mechanisms and media needed to support information management 3. Information is managed in accordance with established requirements and strategy. 4. Information is stored and protected from loss, damage, and unwarranted access. 5. Timely access to information is available to those that need it.

Table 7.2 Information Resource Management Process Definition (Continued)

BPs	**MGRSP2.BP1: Establish and maintain a strategy and requirements for information management:** Establish and maintain a strategy and requirements for information management. [Outcome: 1,3] 1.1 Build strategic plan to support business objectives 1.2 Define enterprise system architectures 1.3 Plan and forecast information technologies/methodologies **MGRSP2.BP2: Establish Information Management Capability:** Establish an infrastructure for information management including repository, tools, equipment, and procedures. [Outcome:3] 2.1 Develop Information Management services and solution delivery strategy 2.2 Develop Information Management support strategy 2.3 Manage Information Management infrastructure resources 2.4 Manage Information Management infrastructure operations 2.5 Support Information Management services and solutions **MGRSP2.BP3: Execute Information Management:** Collect, receive, and store information according to established strategy and procedures. [Outcome: 2,3,5] 3.1 Define the enterprise information architecture (information elements, composite structure, logical relationships and constraints, taxonomy, and derivation rules) 3.2 Manage information resources • Define the enterprise information/data policies and standards • Develop and implement data and content administration • Perform enterprise data and content management (Acquire and collect, store, modify/update, delete, enable retrieval information) **MGRSP2.BP4: Develop and implement security, privacy, and data protection controls** Protect information from loss, damage, or unwarranted access. [Outcome: 4,5] 4.1 Establish information security, privacy, and data protection strategies and levels 4.2 Test, evaluate, and implement information security and privacy and data protection controls 4.3 Plan and manage continuity and disaster recovery **MGRSP2.BP5: Facilitate Information Sharing and Communication:** Disseminate or provide timely access to information to those that need it. [Outcome: 3,5] 5.1 Manage external communications systems 5.2 Manage internal communications systems 5.3 Prepare and distribute publications

Table 7.2 Information Resource Management Process Definition (Continued)

BPs	**MGRSP2.BP6: Establish Information Standards** Establish requirements and standards for content and format of selected information items. [Outcome: 5] 6.1 Define the enterprise information/data policies and standards 6.2 Develop and implement data and content administration 6.3 Establish enterprise data standards	
Work Products	**Inputs**	**Outputs**
	Information Management plan [Outcomes: 1,3]	Information Management plan [Outcomes: 1]
	Information Management policies [Outcomes: 1,3]	Information Management policies [Outcomes: 1,5]
	Information Management strategies [Outcomes: 1,3]	Information Management strategies [Outcomes: 1]
	IT needs analysis [Outcome: 1,3]	IT needs analysis [Outcome: 1,2,3]
	National Privacy laws [Outcome: 1,3,5]	
	Log record [Outcomes: 3]	Log record [Outcomes: 2]
		Test records [Outcome: 4]
		Information Management Standard [Outcomes: 5]

7.1.3 Financial and Physical Resource Management Definition

Table 7.3 Financial and Physical Resource Management Process Definition

Process ID	MGRSP.3
Title	Financial and Physical Resource Management
Process Purpose	The purpose of financial and physical resource management is to deploy and use the government's resources, facilities and assets.
Outcomes	As a result of successful implementation of the financial and physical resource management process; 1. Financial and physical resource strategy and policies are established. 2. The detailed financial plan (budget) containing cost estimates for consumed resources and, where applicable, revenue projections for fees* received is generated. 3. Procurements of goods, services or works are performed based on public procurement law. 4. Finance and accounting transactions are handled for procured goods/services or works and receiving where applicable. 5. Physical resources are acquired, constructed and disposed. 6. Warehouse used for storing tangible physical resources is managed. 7. Reports including internal and external financial information are generated. 8. Internal and external audits are conducted. * Many government services issue licenses and permits and collect an associated fee.

Table 7.3 Financial and Physical Resource Management Process Definition (Continued)

BPs	**MGRSP3.BP1: Establish and maintain a strategy and policies for financial and physical resource management:** Establish and maintain a strategy and policies for financial and physical resource management. [Outcome: 1] 3.1.1. Build strategic plan to support business objectives 3.1.2. Design capital structure **MGRSP3.BP2: Perform budgeting:** Prepare periodic detailed budgets and plans and financial forecasts according to established strategy and policies.[Outcome:1,2] 3.2.1 Develop annual budget proposal 3.2.2 Get approve for the budget from ministry of finance 3.2.3 Develop periodic detailed financial plan/budgets and forecasts based on approved budget 3.2.4 Allocate resources 3.2.5 Manage financial risk 3.2.6. Manage fee administration, where applicable **MGRSP3.BP3: Procure goods/services or works:** Purchase goods/services or works based on the public procurement law [Outcome:1,2,3] 3.3.1 Recognize need and requirements. 3.3.2 Prepare technical contract. 3.3.3 Conduct market research to calculate approximate cost. 3.3.4 Determine tender procedure. 3.3.5 Prepare documents related to tender including proposal evaluation criteria. 3.3.6 Obtain approval for the tender. 3.3.7 Define tender committee. 3.3.8 Publish invitation for bid. 3.3.9 Review tender documents. 3.3.10 Receive tender proposals. 3.3.11 Apply evaluation criteria to select a provider, negotiate contract terms and conditions to resolve open items and select the contractor. 3.3.12 Invite the selected contractor to sign the contract. 3.3.13 Monitor contractor performance. 3.3.14 Close the contract after ensuring that each party's performance meets contractual requirements. **MGRSP3.BP4: Process finance and accounting transactions**: Process all the transactions related to purchasing products/services, paying, and receiving. [Outcome: 1,3,4] 3.4.1 Process accounts payable 3.4.2 Process accounts receivable, credit, and collections

Table 7.3 Financial and Physical Resource Management Process Definition (Continued)

BPs	**MGRSP3.BP5: Manage physical resources:** Establish requirements and standards for physical items which are acquired, constructed and disposed. [Outcome: 1,5] 3.5.1 Acquire and redeploy assets 3.5.2 Manage facilities 3.5.3 Manage physical risk 3.5.4 Dispose nonproductive physical assets **MGRSP3.BP6: Operate Warehousing** Collect, receive, and store assets according to established strategy and procedures. [Outcome: 1,6] 3.6.1 Track inventory deployment 3.6.2 Receive, inspect, and store deliveries 3.6.3 Track product availability 3.6.4 Record taking out of store 3.6.5 Track inventory accuracy 3.6.6 Track third-party logistics storage and shipping performance 3.6.7 Manage physical finished goods inventory **MGRSP3.BP7: Report information:** Report transactions to accounting department (internal) and court of accounts (external). [Outcome: 1,7] 3.7.1 Provide external financial information 3.7.2 Provide internal financial information **MGRSP3.BP8: Conduct internal and external audits:** Determine compliance of performed process with the requirements, plans, laws and procedures, as appropriate. [Outcome: 8] 3.8.1 Develop and implement audit strategy 3.8.2 Plan an audit 3.8.3 Perform Auditing 3.8.4 Identify corrective actions from the audit report 3.8.5 Track actions for audit report

Table 7.3 Financial and Physical Resource Management Process Definition (Continued)

	Inputs	Outputs
Work Products	5018 Public Financial Management and Control Law [Outcomes: 1,8] Budget Preparation Guideline [Outcomes: 2] 4734 Public Procurement Law [Outcomes: 3] 4735 Public procurement Contracts Law [Outcomes: 3] Asset Legislation [Outcomes: 5,6] Regulation on Prepayment Procedures and Principles [Outcomes: 2,3,4] Regulation on the Principles and Procedures of Internal Control and Preliminary Financial Control [Outcomes: 7,8] Payment Order Document [outcome:4]	Budget Proposal [outcome:2] Detailed financial plan [outcome:2] Warehouse Documents for (asset request stock-in, stock out, inspection and acceptation) [outcome:6] Appropriation Transfer Document [outcome:7] Audit Report [outcome 8]

7.1.4 External Relationship Management Definition

Table 7.4 External Relationship Management Process Definition

Process ID	MGRSP.4
Title	External Relationship Management
Process Purpose:	The purpose of the External Relationship Management process is to establish and maintain a good relationship between stakeholders and shareholders as other governmental agencies, industrial and international institutions, or community based on understanding the partners and their drivers.

Table 7.4 External Relationship Management Process Definition (Continued)

Outcomes	As a result of successful implementation of the external relationship management process; 1) Industry needs and drivers are understood and used as the basis for providing services. 2) Interactions and collaborative relationships are established and maintained. 3) Complaints and compliments are collected, recorded and managed to resolution. 4) A focus on value creation is established. 5) Contacts and communication with stakeholders and the partners are established and retained. 6) Public relations program is managed. 7) Legislative obligations are managed.
BPs	**MGRSP4.BP1. Develop Relationships**: Develop and document contacts and relationships with the partners and stakeholders. 1.1 Manage inter jurisdictional relationships 1.2 Manage international business 1.3. Manage cross-agency relationships 1.4 Manage industrial relationships **MGRSP4.BP2. Establish Interactive Communication Methodologies and Structures with Stakeholders and Partners** The provider shall have a named individual or individuals who are responsible for the whole external relationship process. **MGRSP4.BP3. Identify Relationship Attributes:** Identify and manage legal, ethical, and beneficiaries attributes. BP 3.1 Manage agency legal issues BP 3.2 Mange agency contractual issues BP 3.3 Provide advice on legal and ethical policy **MGRSP4.BP4. Identify Value Creation Opportunities:** proactively identify value creation opportunities and communicate them to the customer. **MGRSP4.BP5. Manage Complaints and Compliments:** Log and manage all complaints and compliments by analyzing existing information, obtaining feedback from customers and performing service reviews. **MGRSP4.BP6. Manage media:** Flow of information from agency to public is managed. BP6.1 Manage community relations BP6.2 Manage media relations BP 6.3 Manage press release **MGRSP4.BP7. Manage Legislative Obligations:** Legislative obligations are developed, documented and managed. BP 7.1 Manage agency legislative compliance and obligations BP 7.2 Manage review of agency policy in-line with legislative changes

Table 7.4 External Relationship Management Process Definition (Continued)

	Inputs	**Outputs**
Work Products	Market Analysis [Outcome 1, 4] Customer Feedback [Outcome 3, 5, 6]	Contact List [Outcome 2, 5] Value Creation Opportunities [Outcome 4] Storyboards [Outcome 1, 4] Communication Plan [Outcome 2, 5] Complaints and Compliment Register [Outcome 3] Media Press [outcome 6] Legislative obligations [outcome 7]

7.1.5 Inspection & Auditing Process Definition

Table 7.5 Inspection & Auditing Process Definition

Process ID	**MGRSP.5**
Title	**Inspection & Auditing**
Process Purpose:	The purpose of Inspections and Auditing is to methodical examine and review of regulated activities to ensure compliance with standards for regulated activity.
Outcomes	As a result of successful implementation of Inspections and Auditing process; 1. Inspection and auditing strategy is developed and implemented. 2. The survey is conducted at pre-determined mile-stones. 3. Collected data is analyzed to identify corrective actions. 4. The team performs a post-audit evaluation. 5. A follow-up evaluation is performed to verify the resolution of the report findings.

Table 7.5 Inspection & Auditing Process Definition(Continued)

BPs	**MGRSP5.BP1: Develop and implement inspection and audit strategy:** Develop and implement auditing strategy specifying the criteria for compliance with the laws, regulations, guidelines, requirement, and plans. [Outcome: 1] 5.1.1 Determine risk criteria 5.1.2 Range risk assessment 5.1.3 Develop and implement the strategy **MGRSP5.BP2: Plan the audit:** Plan the audit including forming the team, identifying scope and developing audit plan. [Outcome:1,2] 5.2.1 Identify scope 5.2.2 Form the team 5.2.3 Determine attendees 5.2.4 Define resource requirements 5.2.5 Develop the schedule for the auditing 5.2.6 Determine entry and exit criteria for the audit **MGRSP5.BP3: Conduct the survey:** Conduct the survey at pre-defined milestones. The survey includes a timely gathering and analysis of information gathered from process owners. [Outcome:1,2] **MGRSP5.BP4: Analyze the survey result**: Analyze the evidence to determine cause and quantifying the effect of the condition identified in the survey and generate final inspection and auditing report. [Outcome: 1,2,3 5.4.1 Analyze the collected data 5.4.2 Identify risks 5.4.3 Identify corrective actions 5.4.4 Determine priority of actions for resolutions 5.4.5 Generate final inspection and auditing report 5.4.6 Distribute the report **MGRSP5.BP5: Perform post-audit evaluation:** Perform post evaluation to discuss the strengths and weaknesses of the inspection and auditing and to suggest ways to improve the quality of future audit efforts. [Outcome: 1,4] 5.5.1 Control achievement against audit plan and schedule 5.5.2 Control compliance with appropriate laws, regulations. 5.5.3 Control risk management **MGRSP3.BP6: Perform follow-up evaluation** Track actions for resolutions of identified problems by survey. [Outcome: 1,6]

Table 7.5 Inspection & Auditing Process Definition(Continued)

	Inputs	**Outputs**
Work Products	Laws, Regulations, Guidelines [outcome 1] • Public Internal Auditing Guideline http://denetim.gtb.gov.tr/data/5343dbec487c8efae0b02514/KAMU%20%C4%B0%C3%87%20DENET%C4%B0M%20REHBER%C4%B0.pdf • 5018 Public Financial Management and Control Law http://www.idkk.gov.tr/Sayfalar/Mevzuat/Birincil%20Duzey%20Mevzuat/5018_Sayili_Kanun.aspx • Procedures and principles regarding the Internal Auditing and Pre-Financial Control http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.9813&MevzuatIliski=0&sourceXmlSearch= • Public Internal Control Standards Notice http://www.resmigazete.gov.tr/eskiler/2007/12/20071226-21.htm	Audit methodology [outcome 1]
	Audit Plan [Outcome 2]	
	Data Sources [Outcome 2]	
	Assessment/Audit Record [Outcome 2]	
	Audit report [Outcome 3]	Audit report [Outcome 2]
		Analysis Result [Outcome 3]
		Corrective Actions [Outcome 3]
	Post-evaluation meeting record [Outcome 4]	
		Post-evaluation report [Outcome 4]
	follow-up evaluation record [Outcome 5]	
		follow-up evaluation Report [Outcome 5]

7.1.6 Regulatory Development& Management Process Definition

Table 7.6 Regulatory Development& Management Process Definition

Process ID	MGRSP.6
Title	Regulatory Development& Management
Process Purpose:	The purpose of regulatory development and management is to develop regulatory as law, decree law as well as regulation and revise them based on arisen necessities.
Outcomes	As a result of successful implementation of the regulatory development and management process; 1. Regulatory development strategy and policies are established. 2. Policies and guidelines including how to develop regulatory are published. 3. Regulatory content is determined. 4. The exposure draft of the regulatory is developed. 5. The comments from all related government agencies for the exposure draft are collected. 6. Approval from upper level management for the draft is achieved. 7. The regulatory draft is reviewed and approved by the general directorate of legislation development and publication depending on the prime-ministry. 8. The draft regulatory is discussed, voted and approved by the Council of Ministers, Turkish Grand National Assembly and President of Republic, respectively. 9. The regulation is entered into force through publication in the Official Gazette.
BPs	**MGRSP6.BP1: Establish and maintain a strategy and policies for regulatory development and management:** Establish and maintain a strategy and policies for regulatory development and management. [Outcome: 1] **MGRSP6.BP2: Publish the regulatory development policies and guidelines:** Policies and guidelines including how to develop regulatory is published. [Outcome: 2] **MGRSP6.BP3: Identify the problem:** Identify the problem that it intends to address as well as the significance of the problem is assessed. [Outcome: 3] **MGRSP6.BP4: Review existing regulatory**: Review whether existing regulations (or other law) have created, or contributed to the problem that a new regulation is intended to correct, and whether those regulations (or other law) should be modified to achieve the intended goal of regulation more effectively. [Outcome: 1,2,3,4] **MGRSP6.BP5: Identify and assess available alternatives:** Investigate available alternatives to direct regulations, including providing economic incentives to encourage the desired behaviour, such as user fees or marketable permits, or providing information upon which choices can be made by the public. [Outcome: 1,2,3,4]

Table 7.6 Regulatory Development& Management Process Definition (Continued)

BPs	**MGRSP6.BP6: Develop exposure draft:** Develop exposure draft for the regulatory. [Outcome: 1,2,3,4] avoid regulations that are inconsistent, incompatible or duplicative with its other regulations or those of other federal agencies **MGRSP6.BP7: Assess feasibility of the draft regulatory:** Make a description of why the regulatory proposal is being made, what is being proposed, and how it will be accomplished; as well as a description of the anticipated impact of the proposal, including costs and benefits, where the regulatory is expected to have a major impact. [Outcome: 1,2,3,4] 6.7.1. Describe anticipated impact of the regulatory proposal 6.7.2. Describe the degree and nature of the risks posed by various substances or activities within its jurisdiction. 6.7.3. Assess both the costs and benefits of the intended regulation **MGRSP6.BP8: Consult to all stakeholders:** Contact with organizations and institutions outside of the provincial government structure, such as municipalities, industry associations, labour unions and other non-governmental organizations and inside of the government structure as other agencies might be affected by a proposed regulation or policy. [Outcome: 1,2,3,4,5] 6.8.1. Consult outside of the government structure 6.8.2. Consult inside of the government structure 6.8.3. Evaluate their opinions 6.8.4. Revise the exposure draft if necessary. **MGRSP6.BP9: Approve the draft regulatory:** Approve the exposure draft by upper level management. [Outcome: 1,2,3,4,5,6] **MGRSP7.BP10. Review the draft regulatory:** Perform the review intended to ensure that regulatory proposals are consistent with overall government policies, and that there is an adequate communications plan accompanying the proposed regulations. The agency revise the regulatory if necessary based on review result. . [Outcome: 1,2,4] **MGRSP7.BP11. Evaluate the regulatory:** Vote over the contents of regulatory and policy proposals at the provincial level by the Council of Ministers, Turkish Grand National Assembly and President of Republic, respectively. **MGRSP7.BP12. Publish on Official Gazette:** Publish the regulatory after approving by the President of Republic. Then, The regulation is entered into force.

Table 7.6 Regulatory Development& Management Process Definition (Continued)

	Inputs	**Outputs**
Work Products	4281 Regulation for procedures and principles of regulatory development [3,4,5,6,7,8,9] Form for opinions of stakeholders about draft [Outcome 5] Regulatory Impact Analysis Form [Outcome 6,7,8] Draft Regulatory [Outcome 5,6,7] Regulatory [Outcome 8,9]	4281 Regulation for procedures and principles of regulatory development [2] Regulatory Impact Analysis Form [Outcome 4] Draft Regulatory [Outcome 4] Regulatory [Outcome 7] Official Gazette [Outcome 11]

7.1.7 Strategy and Policy Management Process Definition

Table 7.7 Strategy and Policy Management Process Definition

Process ID	MGRSP.7
Title	Strategy and Policy Management
Process Purpose:	The purpose of strategy and policy management is strategic and organizational management and planning.
Outcomes	As a result of successful implementation of the strategy and policy management process; Strategy and policy management strategy and policies are established. Policies and guidelines including how to develop regulatory are published. Business concepts and organizational strategy and goals are defined. The strategic plan is documented. The comments from all related parties for the exposure draft are collected. The strategy document draft is reviewed and approved by upper level management. The strategy document is shared with all related parties.

Table 7.7 Strategy and Policy Management Process Definition (Continued)

BPs	**MGRSP7.BP1: Establish and maintain a strategy and policies for strategy and policy development and management:** Establish and maintain a strategy and policies for strategy development and management. [Outcome: 1] **MGRSP7.BP2: Publish the strategy and policy development policies and guidelines:** Policies and guidelines including how to develop strategy is published. [Outcome: 2] **MGRSP7.BP3: Monitor the external environment:** Monitor the environment economic trends, political and regulatory issues, social and cultural changes, and new technology innovations. [Outcome: 3] 7.3.1. Identify and monitor economic trends 7.3.2. Identify political and regulatory issues 7.3.3. Identify and monitor social and cultural changes 7.3.4. Assess and monitor new technology innovations **MGRSP7.BP4: Define organizational strategy:** Identify the organizational strategy, goals, organizational mission and vision. [Outcome: 2,3] 7.4.1. Develop agency organizational vision and mission 7.4.2. Develop organizational strategies 7.4.3. Develop organizational goals 7.4.4. Design the organizational structure and relationships between organizational units 7.4.5. Identify and define collaborative processes **MGRSP7.BP5: Document the strategic plans:** Develop organizational and business strategic and operational plans. [Outcome: 2,3,4] **MGRSP7.BP6: Consult to all stakeholders:** Contact with stakeholder which can be organizations and institutions outside of the agency, or inside of the agency. [Outcome: 2,3,4,5] 6.8.1. Consult outside of the agency 6.8.2. Consult inside of the agency 6.8.3. Evaluate their opinions 6.8.4. Revise the draft strategy document if necessary **MGRSP7.BP7: Approve the strategy document:** Approve the document by upper level management. [Outcome: 2,4,5,6] **MGRSP7.BP8. Publish the strategy document:** Publish the strategy document after getting approving. Thus, it is shared with all related parties. [Outcome: 2,4,7]

Table 7.7 Strategy and Policy Management Process Definition (Continued)

	Inputs	**Outputs**
Work Products	4281 Regulation for procedures and principles of strategy development in public agencies [Outcome2,3,4,5,6,7]	
	Stakeholders comments about draft strategy [Outcome 5]	
	Strategy Document [Outcome 5,6,7]	Strategy Document [Outcome 4]

7.2 APPENDIX-B: Generic Process Definition for Agency-Specific Processes

Table 7.8 Generic Process Definition

	The purpose of the process is derived from Decree Law Concerning the Organization and Duties of organization.
Outcomes	1) Politics/strategy is defined 2) Policies and guidelines are published 3) Requirements are derived and allocated 4) Interactions with involved parties is managed 5) Technical effort is performed to obtain the result 6) Approval of the result is achieved 7) Results are made available to all related parties
BPs	**BP1. Develop a strategy for the process:** Produce Strategy document by higher level management of government. i.e: law, decree law, etc. [Outcome:1] **BP2. Publish policies and guidelines:** Establish Policies and guidelines which include how work gets done. i.e: Regulations, legislation etc. [Outcome:1,2] **BP3. Define requirements for the process:** Obtain requirements for performing the process from higher level management. These requirements can be amount of budget, maximum number of people, or maximum amount of resource, etc. [Outcome:2,3,4] **BP4. Establish interactive communication methodologies and structures with involved parties:** A communication mechanism for receiving/storing/sending information or documents (if there is) with involved parties is established. [Outcome:4] **BP5: Achieve approval for the result:** Establish and maintain and approval mechanism from inside the agency and the institutions the agency is dependent on (if necessary) [Outcome:2,4,6] **BP6: Share results with involved parties**: Establish and maintain an informing mechanism for sharing results with all stakeholders. Publishing results on the web page of the agency, publishing in the official gazette, sending e-mail to involved parties can be some alternatives for sharing results. [Outcome:2,4,7]

Table 7.8 Generic Process Definition (*Continued)*

BPs	**A) <u>If the objective to perform technical effort is to create a document;</u>** **BP7A: Collect information**: Gather necessary information. It may occur in different ways as; requesting information from other departments/agencies, recording information from organized meetings, collecting information from intranet/internet, doing surveys/auditing/inspection. [Outcome:4,5] **BP8A: Analyze information**: Analyze/evaluate the collected information is analyzed by applying technical methods. [Outcome:5] **BP9A: Generate the document**: Create the document (report, plan, strategy etc.) based on analyzed information [Outcome:5]
	B) <u>If the objective of performing technical effort is to evaluate an application;</u> **BP7B:Receive Application(s**) Receive applications together with required documents [Outcome:4,5] **BP8B: Evaluate Application(s**) Analyze the application(s) based on defined evaluation criteria by applying technical methods[Outcome:5] **BP9B: Document the result** Generate reports including the result, if necessary. [Outcome:5]
	C) <u>If the objective of performing technical effort is to provide a service;</u> **BP7C: Establish resource management capability:** Establish a structure for management of the resource. It may include tools, equipment, resource, and procedures. [Outcome:5] **BP8C: Maintain the service management:** Collect, receive, store, and distribute the resource according to established strategy and procedures [Outcome:5] **BP9C: Support the service and solutions:** Collect complaint and compliments and manage to resolve [Outcome:4,5] **BP10C:Report information:** Generate reports for internal and external units if necessary [Outcome:5]

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A Structured Process Assessment Model for Public Personnel Management Process- Journal of Public Personnel Management

Extended version of the "Developing Process Definition for Financial and Physical Resource Management Process in Government Domain" is invited for Special Issue of Computer Standards and Interfaces among the conference papers presented in SPICE 2016