Universiteit Leiden

A Sustainable IT Governance model for Dutch Municipal Organizations

An IT Governance Research study
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Preface

Before you lie my thesis about 'IT governance for Dutch municipal organizations'. The research for this thesis concerns is the design of a sustainable IT governance model for Dutch municipal organizations. The research was carried out in one of the largest Dutch municipal organizations. The thesis is my final paper of the study "IT in Business & Public sector" at the University of Leiden in the Netherlands. The research period was from May 2017 to April 2018. The practical aspects of the research, such as obtaining access to the government documents, were time-consuming.

I want to thank my two supervisors Peter van Veen and Mohamed Atef for their patience and good guidance and also thank the respondents who participated in this study. I thank my family and especially my wife for their patience, understanding and unconditional support.

René Bijnaar Amsterdam,

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Abstract

The subject of my final paper for the study "Business in IT and Public sector" is the design and construction of a sustainable IT governance model for Dutch municipal organizations. Dutch municipal government organizations have the monopoly on the provision of public services to citizens (customers). Municipal organizations are aware of the fact that they use the taxpayer's money for running their business and want to deliver an excellent service to their citizens. They try to achieve this by carrying out their business processes in an efficient and cost-effective way.

The local government annually assesses the expenditures of Dutch municipal organizations and examines the extent to which the investments made comply with government policy and have created sufficient value for the citizen (for example, improvement of services). In addition, senior managers of municipal organizations evaluate to what extent investments in business operations have contributed to the realization of their business goals. For example, to what extent investments have led to a better alignment between the business processes and IT.

Dutch municipal organizations are aware that they are dependent on IT for the realization of this business goals. Their search for an IT Governance model that will enable them to structure and standardize their business processes in a sustainable way, started in the early eighties and on this moment continues. In order to meet their goals, municipal organizations need to have an IT Governance model that is able to structure and standardize their business processes and by doing so create value for their stakeholders and business.

The goal of this paper goal is to design and build the best IT management model for municipal organizations using the “Design Science” approach. The research starts by mapping the needs of municipal organizations to IT governance frameworks. This need is categorized per decision-making layer. Subsequently, the criteria that are important in designing a sustainable IT governance model were examined. The research continues with an extensive study on standard IT governance frameworks that are known by literature and are accepted by the business companies as valid IT governance frameworks. These IT governance frameworks are the building blocks for the design and building of the sustainable IT governance model. The research uses the design-science approach and has improved the design by testing the concept design in three iterative interview cycles. The iterative interview is held with IT specialists from the municipal organization of the study, the largest Dutch municipal organization (municipality of Amsterdam).

The best IT Governance model for municipal organizations is designed and built by:

- Examination of the IT Governance framework requirements as they exist in Dutch municipal government organizations.
- An extensive research on the standard IT governance frameworks that are known by the literature and are accepted by the business community.
- Examination of the criteria that are aimed at ensuring the sustainability of the best IT governance model for Dutch municipal organizations.

The purpose of this document is to help (Dutch) municipal organizations to improve their IT governance and to better align their company with IT. We think that by using this document as a reference, Dutch municipal organizations will be able to improve the alignment of their business with IT

Synopsis

Chapter 1; Introduction

This chapter provides a short historical overview of the search and efforts of Dutch municipal organizations towards IT governance, which enables them to permanently improve their company and align it with IT.

Chapter 2; Research method

The research uses the descriptive informed argument as a design evaluation method and the analytical optimization design evaluation method to demonstrate inherent optimal properties in designing and building the best IT governance framework for municipal organizations.

Chapter 3; Research questions

This chapter contains the main and sub-research questions for the design and construction of a sustainable IT Governance for Dutch municipal organizations.

Chapter 4; What is IT Governance

This chapter gives some background information about IT governance and gives an overview of the maturity levels of the Forrester Maturity model.

Chapter 5; ITG Requirements for a sustainable ITG model

This chapter indicates, for the different decision levels, the ITM requirements as investigated for Dutch municipal organizations

Chapter 6; ITG design and building criteria

This chapter indicates the design and construction criteria for a sustainable IT Governance model for Dutch municipal organizations.

Chapter 7; IT Governance Frameworks known by Literature

This chapter consists of an extensive investigation into standard IT governance frameworks that are known by literature and are accepted by the business environment as such valid IT Governance frameworks.

Chapter 8 Designing a sustainable IT Governance model

In this chapter, the Best IT Governance model for municipal organizations is designed and built on the basis of the IT Governance requirements for municipal organizations (chapter 5), the IT Governance design and construction criteria (chapter 6) and the literature study on IT governance frameworks (chapter 7).

Chapter 9; ITG frameworks that exist in the study case municipal organization

This chapter consist of the research on IT Governance frameworks that already exists in the study case municipal organization.

Chapter 10; The ITG status of the Study Case Municipal Organization

In this chapter the research uses standard ITG frameworks that are known by literature and accepted by the business community as a reference to examine the installed IT Governance framework processes in the study case municipal organization.

Chapter 11 The GAP analyses

This chapter withheld the GAP analyses of the ITG framework processes of the reference IT Governance frameworks that are used in chapter 10 and the IT Governance processes that already exists in the study case municipal organization.

Chapter12; Conclusions and recommendations

This chapter withheld the conclusions and recommendations.

Chapter 13 Literature list

This chapter consist of the literature list.

1 Introduction

In recent decades Dutch government Organizations have spent a lot of time, effort and money to find an IT governance that would help them to align their business to IT. The expectation of municipal organization to provide an excellent service to their citizens is not new but is something that have always been in the centre of the many reorganizations that municipal government organization have conducted through the years.

1.1 History

Throughout the years, Dutch government organizations have tried different management approaches to fulfil their business needs. They have used many different management models and approach to improve their overall business performance. In the 1980s, the New Public Management approach[1] (NPM) was introduced and used by large Dutch municipal organizations. The term 'New Public Management' was first defined by Hood (1991) and refers to a number of government reforms that took place from the 1970s to the 1990s (in the UK). These reforms concerned the efficiency of public administration and aimed at modernizing the functions of public administration. The new approach to public management was developed and introduced by academics in the UK and Australia and describes a management approach that was developed in the 1980s.

In the nineties Dutch government organizations replace the new management approach with the Digital Era approach[2], that was developed by Patrick Dunleavy & Helen Margetts, (1990). In this approach IT technology has a central position and IT was more used by government organizations for the fulfilment of their business need, which was aim at improving public services to customers (citizens). With the use of the digital Era management approach Dutch municipal Organizations seriously start to use IT as a management tool to improve municipal's business processes. The type writer with carbon paper to duplicate letters was replaced by computers with local storage (floppy disk) and matrix printers. The purchase and use of IT hardware have been steadily growing in the municipal Organization. By using management approach models like the Digital Era, government Organizations start to use IT as an enabler for the management of their business processes. In those days the business strategy towards the use of hard and software was focused on local usage and IT was in those days less seen as an Organization-wide enabler. Through the years, IT has become an important player in regard to the fulfilment of business objectives. Government organization are aware of that and are trying to (better) align their business processes to IT in order to create value for the business and their stakeholders (citizens, companies, politics).

1.2 The Alignment Model

Venkatraman and Henderson argue in 1993 that problems with realizing business value from IT investments are caused by the lack of alignment between the business- and IT strategy of organizations that invest, and the lack of a dynamic administrative process to ensure continuous coordination between the business and IT domains. The model distinguishes four perspectives on alignment, varying in the role and importance that ICT has in the organization:

The first vision (strategic development) - is the traditional vision in which the business strategy is the driving force that determines the functioning of the organization. ICT is a tool or commodity as energy and housing that must support operational needs. In the strategic development vision ICT has the smallest strategic impact (1).

In the second vision (Technological transformation) ICT is a bit higher on the agenda. The organization formulates a clear business strategy with clear scenarios and route maps. This strategy is picked up by the IT department and converted into an ICT strategy. In this way, it is determined which requirements ICT must meet and how it must further develop strategically. The vision of technological transformation is today the vision of the large Dutch municipal government organizations. In the third vision (competitive advantage) ICT has a more prominent role and is a catalyst for new ideas and technological innovation of the organization. These ideas are picked up by the organization and included in the business strategy from which these developments are given a place in the operation. In the fourth and final vision (Service Level), ICT has reached the highest level of maturity. Technological innovations are then absorbed almost effortlessly by the organization. Via a kind of 'AppStore' new functionalities are integrated into the operational processes.

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[1] *Christopher hood, Variations on a theme Accounting, Organizations and Society; The "new public management" in the 1980s: Volume 20, Issues 2–3, February–April 1995, Pages 93-109*

2 *Patrick Dunleavy Helen Margetts Sim, September 2005, New Public Management Is Dead—Long Live Digital-Era Governance, Journal of Public Administration Research and Theory, Volume 16, Issue 3, 1 July 2006,*

1.3 The Problem

In the eighties and nineties, the business strategy focused on the use of IT in relation to the provision of public services to customers. IT was used locally and was less seen as an IT enabler for the entire organization. In those days, business managers were used to place their requests on the desk of an IT department with the expectation that their daily business problems would be quickly solved. IT strategy and policy were determined by the business organization and the role of the IT departments was very limited. Nowadays IT of large Dutch municipal organizations translate the business strategy into an IT strategy in order to improve IT Service Support and the IT-Business alignment. In the alignment model of Venkatraman and Henderson this is represented by number 2. This is something that is easier said than done.

The problem for the Dutch government organization is that the many try-outs, implementations and use of various management approaches over the years have led to a fragmented and non-standardized IT infrastructure within Dutch municipalities. The fragmented and non-standardized IT infrastructure within Dutch municipal organizations has led to:

- Inefficient IT support to the user organization and business processes in the service chain.
- Inefficient management of IT resources, IT services.
- High-operational costs and IT investments.
- A lack of standardization, cooperation and coordination on business and IT projects.
- A lack of standardized policies and procedures for data processing and information provision.
- A lack of alignment between the business and IT on the various decision levels (operational, steering and strategic).

The aforementioned problems lead to a growing need among municipal organizations for sustainable IT governance. A sustainable IT Governance that enables them to better align their operational, managing and strategic IT processes with the business and create value for their company and stakeholders. Over the past decades, managers of municipal organizations have continuously searched for management approach models that they can use to improve their business processes and tailor them to the possibilities from IT

This research hopes to contribute in finding a sustainable IT Governance model that supports Dutch municipal organizations with the alignment of their business to IT and the value creation for their business and stakeholders. The aim of this document is to design and build the best IT governance model for Dutch municipal organizations. We believe that such a model will improve the alignment of business processes with IT and will enables municipal organizations to create long-term value creation for their business and stakeholders. From a scientific point of view, it can be stated that little research has been done into the practical use of IT governance in Dutch municipal organizations. Research in this area will add knowledge to science and assist government organizations in setting up an IT governance that will sustainably support their business processes and improve their business performance.

2 The Research Method

Government organizations are increasingly interested in IT management. Because they have become major users of IT, they are forced to modernize their services and administration (Min-Seok Pang, 2014)[3]. Pang researched the value creation through government use of information technologies (IT) and stated that the majority of the IT discipline studies focused on discovering IT business value for profit organizations and less on the performance effects of IT in public - sector organizations.

Public sector Information systems are implemented within an organization with the aim of improving the effectiveness and efficiency of that organization. The capacities of an information system and characteristics of the organization, its work systems, its people and the development and implementation methods together determine the extent to which this goal is achieved (Silver et al. 1995).

This research uses the Design Science method. The Design Science approach is a result-oriented research method for information technology. It offers specific guidelines for evaluations and iterations within research projects. Design science research focuses on the development and performance of (designed) artefacts with the express intention to improve the functional performance of the artefact.

In a Design Science research, in contrast to explanatory scientific research, the academic research objectives are of a more pragmatic nature. Research in these disciplines can be seen as a search for understanding and improvement of human performance. Renowned research institutions such as Media Lab from MIT, Stanford's Centre for Design Research, Carnegie-Mellon's Software Engineering Institute, Xerox's PARC and Brunel's Organization and System Design Centre use the Design Science Research approach.
The definition of the Oxford Dictionary for an artefact is that something that is observed in a scientific study or experiment is not naturally present but takes place as a result of the preparatory or research procedure (e.g. Designing a sustainable IT governance model for Dutch municipal organizations). Scientific research is to develop knowledge that can be used by professionals of the relevant discipline to design solutions for their field problems. (Joan Van Aken, 2016)[4]. According to Hevner[5] et al., the main goal of design research is to acquire knowledge and understanding of a problem domain by building and applying a designed artefact.

The Environment

The study case organization (city of Amsterdam) is one of the largest Dutch municipal organizations and works closely together in a Metropolis context with the other large Dutch municipal organizations and the national government. The three major Dutch municipal organizations work closely together in a Metropolitan environment, have the same product and the same services and share the same mission and share the vision to ensure the continuous delivery of public services to their customers (citizens) with the help of IT. They are putting efforts in collaboration and coordination of their IT government activities and are forced by country policy to do so in an efficient and cost-effective way to create value for the public sector and stakeholders (citizens, politics). The study case organization (city of Amsterdam) is the largest Dutch municipal organization in the Netherlands and works closely together other large Dutch municipal organizations in a metropolitan context. These municipal organizations offer the same government services to citizens and share the same legal obligation in the delivery of services to their citizens.

[3] *Min-Seok Pang, Journal of Technology, September 2014, volume 19, issue3, pp 187-205, IT resources, Organizational capabilities, and value creation in public-sector Organizations: a public-value management perspective*
[4] *Joan van Aken, A. Chandrasekaran and J. Halman; Conducting and publishing design science research, Journal of Operations Management Volumes 47–48, November 2016, Pages 1-8*
[5] *5 Hevner, Alan R.; March, Salvatore T.; Park, Jinsoo; and Ram, Sudha. 2004. "Design Science in Information Systems Research," MIS Quarterly, (28: 1).*

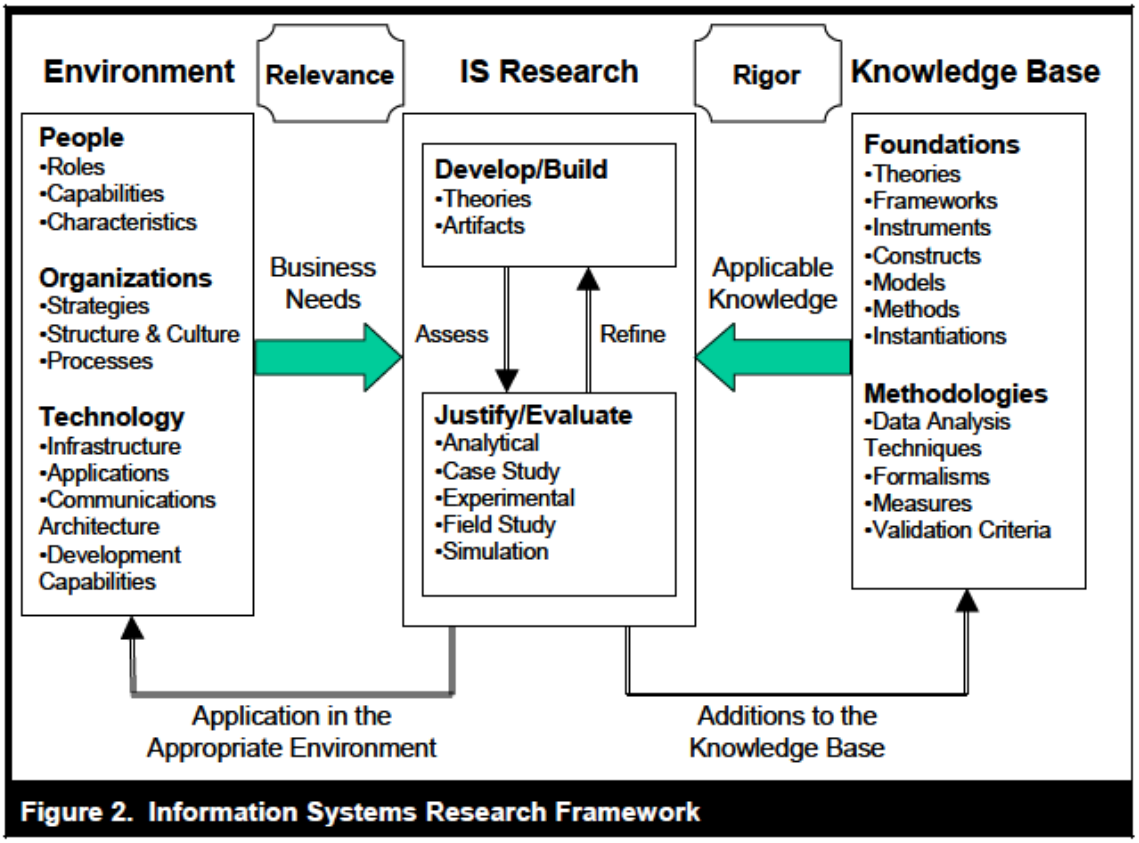

Figure 1 Design Science Model of Hevner

The Design Science Model

The Business needs

The business needs of Dutch municipal organizations have a direct relationship with their mission, namely to guarantee a continuous supply of public services to citizens. The vision of achieving this mission depends on the details, but a common objective of Dutch municipal organizations is to guarantee the continuous delivery of public services to their customers.

Today, the crucial role of IT as a major player in the delivery of government services and in achieving the organization's objectives is widely recognized. Managers within the municipal organizations are aware that IT governance is necessary for the realization of the organization's objectives. The municipal organizations need IT support for their business user organization, depend on the delivery of IT resources and services, need functional support and security of their IT information systems and must comply with legal guidelines when it comes to providing information and needing IT investments to create value for the organization.
Nowadays, municipal organizations are aware that IT governance is needed to better coordinate business needs. Dutch municipal organizations are occasionally called by local politicians to run their business more efficiently and cost-effectively.

The Knowledgebase

The knowledge base of the design science model lays the necessary foundation for well-structured and evidence-based underground for the development of an IT Governance model for municipal organizations. The pre-conditions for building a governance model for Dutch municipal organizations are preceded by a comprehensive literature study on IT Governance frameworks, the research findings on the IT Governance requirements for Dutch municipal organizations and the building criteria for a sustainable IT Governance model.

The Applicable knowledge

The applicable knowledge for the building of an IT Governance framework for Dutch municipal organizations is formed by:

- The research study on IT Governance frameworks that are recognize and known by the literature as standard frameworks and are accepted by the business community as valid and proven IT Governance frameworks.
- The research study on IT Governance frameworks that are already installed by Dutch municipal organizations.

The IS Research

The match between the literature study on IT Governance and the studied IT Governance requirements is used to extract the artefacts components (ITG frameworks) for the development and building of the best IT Governance for Dutch municipal organizations.

The research will use the descriptive informed argument as design evaluation method to use information from the knowledge base represented here by the literature study on IT Governance frameworks and the research study on IT Governance framework that are already installed in municipal organizations. Secondly the research will use the analytical optimization design evaluation method to demonstrate inherent optimal properties in the design and building of the best IT Governance for Dutch municipal organizations. The justification and evaluation phase consist of iterative interviews with IT specialists of municipal organizations.

The Design Science approach

Following a design science approach means that the research investigation starts with the identification of the problem and the clarification of the goals of a solution (requirements).

The Design of "The Best IT Governance model" consists of the following phases:

1. The first phase of the Design research focus on comparing the research on ITG frameworks that are recognize and known by literature and are accepted by the world-wide business community as valid and proven IT Governance frameworks.
2. The second phase of the research will examine and describe the ITG requirements of municipal government organizations.
3. The third phase of the research focus on the status of the IT Governance processes on the various decision-making levels of the study case municipal organization and the building criteria for a sustainable IT Governance model.
4. The fourth phase of the research focus on IT Government frameworks that are already exist on the various decision-levels (operational, steering and strategic) of the Study Case Municipal Organization.
5. The fifth and last phase of the research focus on the iterative test and the building of the sustainable IT Governance model.

The study on the installed and used ITG frameworks by large Dutch municipal organization is conducted in the municipality of Amsterdam, which is the Study Case Municipal Organization (SCMO) for this research. The research data for IT Governance framework that already exist on the various decision-levels of the Study case municipal organization is collected by examining the organizations literature and by holding surveys and interviews amongst senior managers, managers, staff members of the study case municipal organization. Since I work in the study case municipal organization, my own observation as researcher will also be added to the research.

3 Research Questions

Organizational processes of municipal organizations focus primarily on providing public services to citizens (customers). The organizational processes and the underlying decision-making are essential for a well-functioning government and IT is an important player in the supply chain.

Today, information is a crucial production factor for organizations. Experience shows that lower costs and higher profits have a relationship with the reliability of the information used. Information can therefore be seen as a driving force for realizing the business strategy. To maximize this benefit, organizations need to respond more quickly to internal and external changes in the surrounding business environment. "External" in terms of implementation and integration of new technological innovations to meet the needs of customers and "Internal customers". This can be done by organizing the organizational processes using IT more efficiently and cost-effectively.

To be able to respond timely and adequately to the ever-changing business environment, organizations need an IT that contributes to:

- Improving the operational performance of organization (IT) processes. (efficient and cost-effective);
- supporting and improving the decision-making processes (timely delivery of accurate and reliable information);
- Setting up an IT governance that offers the necessary flexibility for process optimization and improvement of IT functions. (i.e., IT delivery for business applications);
- IT governance that improves the quality and effective use of information systems by better managing IT risks, increasing IT flexibility and ensuring process efficiency.

Over the years, large Dutch municipalities have tried to manage organizations in a business-like way. To achieve this, they have put a lot of effort into investing a lot of taxpayers' money in trying out different management approaches. The New Public Management approach and the Digital Era Approach model (1990 Dunleavy & Margetts)[6]. Have been replaced in the course of time by other management approaches because they were unable to adapt to the changes in the Dutch municipal business environment. Despite these investments, Dutch municipal organizations are still looking for IT governance with which they can better tailor their business processes to IT. Their dream to offer an "excellent public service" to their citizens and other stakeholders is far from over.

The subject is an interesting study object, because not much research has been done on IT governance and IT governance framework at Dutch municipal organizations. The main goal of the research is to look for aspects of IT governance that can contribute to improving the IT Governance of Dutch municipal organizations and at the same time add new knowledge to the literature.

3.1 The Main Research Question

1. *On what aspects can the IT Governance of municipal organizations be improved?*
2. *What is the best IT Governance Model for Municipal Organizations?*

3.2 The Sub Research Questions

1. *What are the IT Governance requirements on the various decision-levels for Dutch municipal organizations?*
2. *What are the building criteria for a sustainable IT Governance model?*
3. *Which IT governance frameworks are known by the literature and what are their characteristics?*
4. *What IT Governance frameworks exist on the various decision-levels of Dutch municipal organizations?*
5. *What is the status of the IT Governance frameworks within the study case municipal organization?*

[6] *6 Patrick Dunleavy Helen Margetts Sim, September 2005, New Public Management Is Dead—Long Live Digital-Era Governance, Journal of Public Administration Research and Theory, Volume 16, Issue 3, 1 July 2006,*

4 What is IT Governance?

In its most basic definition, IT governance is the process of making decisions about IT investments. How decisions are made, who takes decisions, who is held accountable and how the results of decisions are measured and monitored, are all elements of IT governance. Based on this definition, everyone has a form of IT governance. Unfortunately, for many companies, the governance process is ad hoc and informal. There is no consistency in the company, the accountability is weak, if it is already present, and there are no formal mechanisms to measure and monitor the outcome of the decisions. In other words, IT governance is a formal framework that provides organizations with a structure to ensure that IT investments support business objectives. IT Governance offers a structure with which the IT strategy can be aligned with the business strategy. IT Governance frameworks that are known by literature and business Organizations around the globe can produce measurable results toward the achievements of business strategies and goals.

The term 'governance' refers to the totality of process and (administrative) systems that determine how an organization or society works. The term Governance is also used to identify activities that differ from operational implementation and where Governance is considered to be a guiding principle that determines the way operational activities are carried out. The origin of the term Governance lies in the Latin word gubernàre, which means to control something '. This depends on the specific board perspective, and perhaps on IT, but also on the organization as a whole, so IT is referred to IT governance, company or corporate governance respectively. Governance distinguishes itself from 'management'. The term management has its origin in the Latin word manus (hand).

According to Well & Ross (2004), IT governance specifies the right to decision and accountability structures to encourage des[7]irable behaviour in the use of IT and is defined by Gartner as processes that ensure the effective and efficient use of IT so that an organization can achieve goals. Corporate governance of IT involves evaluating and leading the use of IT to support the organization and to monitor this use to realize plans. It includes the strategy and guidelines for the use of IT within an organization. Pang, (2014) indicates that government organizations are becoming increasingly interested in IT management because they become large IT users and are forced by their stakeholders (public, media, politics) to modernize their services and administration.

4.1 IT Governance Maturity

Forrester recommends that Organizations in the process of developing their current IT Governance framework, to conduct an IT Governance maturity assessment. For organizations it's important to understand where they stand on the maturity stair, is extremely helpful in trying to formulate an IT Governance strategy. Forrester's IT Governance Maturity Model is comprised of four internships.

Phase 1: - Ad hoc;

There are no formal IT Governance processes, and it is not acknowledged by management as being a necessity. IT investments are made on a complete ad hoc basis. This scenario is almost always found in highly decentralized Organizations, but it is not limited to them

Phase 2: - Fragmented;

In this phase, attempts are being made to formalize IT governance processes in a fragmented way. These formalized processes can exist in one or more business units and IT decisions within those business units can be optimized. There is no enterprise-wide effort to coordinate investment decisions or to explore trade-offs between business units or company-wide investments versus business units.

Phase 3: - Consistent; at the third level of maturity,

IT governance processes have been applied consistently across the enterprise. All business units / entities comply with the same set of IT governance processes and IT investment decisions are based on a shared business vision.

Phase 4: - best practices; at the fourth level of maturity,

IT governance processes have evolved and are optimized throughout the enterprise. There is a strong IT portfolio management process to ensure that all IT investment decisions are optimized, the CEO and the executive team are active participants in the governance process and the IT strategy is part of the business strategy. Research shows that the Study case municipal organization is located between the second and the third phase of the Forrester maturity model. The

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organization policy is increasingly being developed in standard procedures that are applied throughout the organization and investments take place from a central vision. On the other hand, not all IT Governance processes have been set up and elaborated in procedures.

4.2 Why IT Governance?

Why IT governance?
IT governance is important for the organizations because there is a focus on IT costs. The awareness of managers about IT-related risks has increased in recent years. Municipal organizations are responsible for the protection of confidential information from their public role and function, they have to be accountable annually and are under pressure from stakeholders (local politicians, residents and businesses) to modernize their services. IT Governance is used to support business strategies and objectives for IT support (improvement of service)

Van Grembergen (2003: 242)[8] defines IT Governance as the organizational management of IT and (integrated) business processes; Patel (2002)[9] agrees that IT governance includes aligning IT to business objectives; providing business opportunities through IT.
The basic description of IT Governance as a merger between business and IT is also supported by Parker, Peterson & Ribbers[10]. They argue that IT Governance is based on 'lateral decision-making processes' between the organization and its IT departments.

Ron Exler (2003)[11] states that IT governance is a complex but essential company that requires complete immersion in and integration with the company. Corporate governance frameworks and their activities may not include and separate IT. As large IT consumers, government organizations have to deal with business and IT performance, transparency, quality and service and efficiency (Ali and Green 2007, Campbell et al. 2009). Other reasons are that IT can organize their organization in a more efficient way, in the sense that IT governance can lead to: cuts in operational expenses by: efficiency on IT processes, reduction of IT costs and more control over IT investments. At a higher level, further alignment of municipal organizations processes with IT services, organizational goals, process standardization and the automation of IT processes.

The relevance for scientific research is that although technology and innovation have become part of our daily lives and we are becoming increasingly dependent on technology and innovation, it is difficult for organizations to find the right way to create new IT connections. Bring developments and innovative solutions and benefits to their business and shareholders.

5 ITG Requirements for a sustainable ITG model

(Sub question 1: What are the IT Governance requirements on the various decision-levels for Dutch municipal organizations?)

5.1 The Strategic decision-making level

Municipal administrative organizations are financed by the local government to manage public services and deliver them to citizens. Municipal organization investing in IT to improve their business performance. Municipal organizations need sustainable IT governance to demonstrate that taxpayers' money is well spent and that public service has improved. IT Governance is capable of managing the value creation through IT investments and can evaluate the business value generated by IT investments. Municipal organizations are responsible for the (IT) investments that they make and must account for heir over.

An IT Governance requirement on the strategic level of Municipal organizations is an IT Governance framework that is able to manage the value governance of (IT) Investments.

[8] *W. van Grembergen & S. de Haes, September 2007, implementing Information Technology Governance: Models, Practices and Cases: Models, Practices and Cases, IGI Global*
[9] *Nandish V. Patel, 2004, Strategies for Information Technology Governance; Brunel university; source author/editor: Wim Van Grembergen (University of Antwerp – Antwerp Management School, Belgium), DOI: 10.4018/978-1-59140-140-7.ch00*
[10] *Wim van Greenberger, 2004, Strategies for information Technology Governance, idea Group Inc.;*
[11] *Ron Exler, "IT Governance Frameworks, July 10, 2003)," Analysts Corner, C/O magazine*

5.2 The Steering decision-making levels

A core business on the steering level of municipal organizations is the data processing and information provisioning. Managers need a functional management support framework that can support the information systems with modifications, that are able to maintain the information systems and can assist information workers on IT related issues towards the use of information systems. Functional management support withheld the support for the data processing processes and the IT support to information workers. An ITG requirements on the Steering decision-level that is able to control and manage the various information systems and information stream in a way that create value for decision-makers and the business by the timely delivery of trustworthy and valuable information are seen as a valuable asset for municipal organizations. Other aspects that emphasize the importance of functional management is that the Information provision to: decision-makers of municipal organizations, other government organizations and to customers must be accurate, reliable, and trustworthy.

An IT Governance requirement on the steering level of Municipal organizations is an IT Governance Framework that is able to manage the Functional support for information systems and information workers

A special point of attention in the sharing of data and the provision of information by government organizations is "privacy". Over the years, municipal organizations have collected large amounts of (personal) data. A large part of this data relates to the personal and social circumstances of citizens. According to Dutch law, the sharing and distribution of these data must be legally protected. The European Union approved the General Data Protection Regulation (GDPR)[12] on 14 April 2016. This rule will be maintained on 25 May 2018. Organizations that fail before 25 May 2018 risk high EU fines. In order to comply with the law and regulations, municipal organizations must take demonstrable measures to protect and protect privacy-sensitive information in their branch. The EU General Data Protection Regulation (GDPR) replaces the Data Protection Directive 95/46 / EC and is intended to harmonize data privacy legislation across Europe. To protect and strengthen the data privacy of all EU citizens and to reshape the way organizations deal with data privacy. The aim of the GDPR is to protect all EU citizens from privacy and data leaks in an increasingly data-driven world that is very different from the time when the 1995 directive was drafted. Although the main principles of data privacy are still in line with the previous directive, many changes to the regulatory policy have been proposed; the core points of the GDPR, as well as information about the consequences for the business community, you can consult the link below: (Https://www.eugdpr.org/key-changes.html).

An IT Governance requirement on the steering level of Municipal organizations is an IT Governance Frameworks- that is able to manage the security of the data and Information.

The steering level in municipal organizations relates to the overall management of organization policies and procedures. Policies and procedures give structure to the organization and can be seen as the guidelines for managers and employees to manage and organize their- interacting business and IT processes. Managers on the steering level of municipal organization need an IT Governance framework that enable them to manage and control the various management processes within the organization. A management framework that supports them in managing the risks, chances, uncertainty, investments and value creation for the organization.

An IT Governance requirement on the steering level of Municipal organizations is an IT Governance Frameworks that is able to manage the various management processes within municipal organizations.

Dutch municipal organizations regularly initiate and manage IT projects. These projects are often initiated by changing regulatory rules or to improve business processes or overall business performance. From time to time, failed business and IT-related projects from municipal government organizations are published in the newspapers in a negative way. These failed IT projects are seen as a waste of tax money and have a negative impact on the image of the municipal organizations. In order to reduce these risks, municipal organizations need a framework for (IT) projects that is able to check whether (IT) projects are still in line with the business case.

An IT Governance requirement on the steering level of Municipal organizations is an IT Governance Frameworks that is able to manage Government projects in a way that match with the business case.

[12] The Dutch name for the "General Data Protection Regulation" (GDPR) is de "Algemene verordening gegevensbescherming (AVG)"

5.3 The Operational decision-making level

Core business processes at the operational level of municipal organizations are the for service and support management processes. IT governance requirements at the operational decision level of Dutch municipal organizations are the use of IT governance frameworks that support the user organization of the business and deliver IT- resources and services in an efficient and cost-effective way. Management objectives at the level of the operational decision-making of municipal organizations are the management of IT Service and support management processes for the business and user organization of the company.

An IT Governance requirement on the operational level of Municipal organizations is an IT Governance Frameworks that is able to manage the Service & Support processes.

Municipal organizations have a permanent obligation towards the delivery of public services to their citizens. Government organization also have the monopoly on the delivery of travel documents (passport, ID-cards) and other government documents and licences. Municipal organizations, as a monopolist of government papers and licenses, wants to secure the ongoing delivery of public services to citizens and need an ITG framework that is able to secure the ongoing business, by diminishing the risk of disturbance and outfall of service delivery and are able to reinstalling the service delivery to the citizens, in the shortest possible time.

An IT Governance requirement on the operational level of Dutch Municipal organizations is an IT Governance framework that is able to manage and secure the business continuity.

6 The Design & Building Criteria's

(Sub question 2: What are the building criteria for a sustainable IT Governance model?)

6.1 Building Criteria for a sustainable IT Governance model

1. The research chooses to use standard frameworks for the building of the best IT Governance model, because that they are owned- and maintained by branch related organizations and because the best IT Governance model should be an actualized and sustainable model.
2. A research criterion is that municipal organizations should be able to align their business processes on the various decision-levels with standard IT Governance frameworks that are known by literature and accepted by the business as valid IT governance frameworks.
3. Since IT governance frameworks are replace in time by newer versions, the research criteria to use the latest version of the IT governance frameworks that best fit with the business processes is added to the list of criteria.
4. ITG frameworks that are accepted by the literature and the business community and are rooted within Dutch municipal organizations are added to the Best ITG model for Dutch municipal organizations (e.g. the Nine-Pane Model of Rik Maes).

6.2 Research Criteria's

The research has chosen to use standard IT Governance (ITG) frameworks for the study on ITG frameworks because ITG standard frameworks that are known by literature and are accepted by the business community as valid ITG frameworks add to the sustainability of the best ITG model for Dutch municipal organizations.

7 IT Governance Frameworks known by Literature

Sub question 3: W Which IT governance frameworks are known by the literature and what are their characteristics?

7.1 The Business Continuity Management Frameworks

IT Governance frameworks for the Business Continuity, been developed by the British Standard Institute Group (BSI) & the International Standard Organization (ISO).

7.1.1 Pas 56 standard

The P56 standard is a publicly available specification (PAS 56) on Business Continuity, which has been published in 2003 by the British Standard Institution Group (BSI). BSI published a guide, "PAS56", which could be used to establish the process, principles and terminology of Business Continuity Management (BCM). PAS 56 describes the activities, and both the incomes (input) and outcomes (output) of establishing a business continuity management process and provided a series of recommendations for good practice.

The objective of a Publicly Available Specification is to speed up standardization. PAS's are often produced in response to an urgent market need. In 2006 the "PAS 56" is replace by the Business Continuity Management standard BS 25999-1 and BS25999-2.

The PAS 56 can be seen as a first step in the standardization for business continuity provision. It aims to setup guidelines for best practices that can help businesses to improve their business continuity planning and management. The PAS 56 Guide to Business Continuity Management (BCM) describes the activities and outcomes involved in establishing a Business Continuity Management process and provide recommendations for good practice.

The main aim of PAS 56 is to define the process, principles and terminology of business continuity management, to provide a generic framework for incident anticipation and to describe evaluation techniques and criteria. At the core of PAS 56 is a BCM lifecycle which shows that BCM is a continuous cyclical process. This Lifecycle consist of the following processes:

- Understanding business; Develop BCM strategies; Develop and implement BCM plans;
- Building and embedding of a BCM culture
- The Exercising, maintenance and auditing of a BCM.

7.1.2 British standard 25999 (BS 25999 standard)

In November 2006, the British Standards Institution replaces PAS56 by publishing an official standard "BS 25999-1". A year later, in November 2007, a second part of this standard named "BS 25999-2" was published. The British Standard, BS 25999 has been developed by practitioners throughout the business continuity community, drawing upon their academic, technical and practical experiences of Business Continuity Management (BCM). It has been produced to provide a system that is based on good practice for BCM. The "BS 25999-1:2006 Business Continuity Management "Code of Practice", takes the form of general guidelines and seeks to establish processes, principles and terminology for the Business Continuity Management. Elements of the "Code of Practice" are: the scope, policy, identifying critical business functions, developing and managing a business specific continuity plan, monitoring and maintaining performance and embedding a culture of business continuity awareness in the Organization.

The BS25999-1:2006 document is a guide that consists of the principles, terminology and process of business continuity management. It covers the activities and deliverables applicable in establishing a continuity management process and provides the recommended steps to take for good practice. The BS25999-1:2006 is a standard that is applicable to all Organizations, regardless of size or industry or commercial sector, and provide assistance for managing a business continuity programme.

The sections of the code of practice (BS 25999-1) are:

- The Scope and Applicability; defines the scope of the standard, making clear that it describes generic best practice that should be tailored to the Organization implementing it.
- The Terms and Definitions; describes the terminology and definitions used within the body of the standard.

- The Overview of Business Continuity Management; describes the overall processes, its relationship with risk management and reasons for an Organization to implement along with the benefits.
- The Business Continuity Management Policy; central to the implementation of business continuity is having a clear, unambiguous and appropriately resourced policy.
- The BCM Program Management; Program management is at the heart of the whole BCM process and the standard defines an approach.
- Understanding the Organization; In order to apply appropriate business continuity strategies and tactics the Organization has to be fully understood, its critical activities, resources, duties, obligations, threats, risks and overall risk appetite.
- Determining of BCM Strategies; once the Organization is thoroughly understood the overall business continuity strategies can be defined that are appropriate.
- Developing and implementing a BCM response; the tactical means by which business continuity is delivered, including the incident management structures, incident management and business continuity plans.
- Exercising, maintenance; audit and self-assessment of the BCM culture. Without testing the BCM response an Organization cannot be certain that they will meet their requirements. By exercising, maintaining and reviewing the processes the business continuity capability will be able to continuously meet the Organizations goals.
- Embedding BCM into the Organizations culture; Business continuity should not exist in a vacuum but become part of the way that the Organization is managed.

The "BS 25999-2:2007 specifies the requirements for implementing, operating and improving a documented Business Continuity Management System (BCMS), describes the requirements for objective and independent auditing and provides the specifications and guidelines for the setup of a business continuity management system.

The sections of the specification (BS 25999-2) are:

- Scope; defines the scope of the standard, the requirements for implementing and operating a documented business continuity management system (BCMS).
- Terms and Definitions; describes the terminology and definitions used within the body of the standard.
- Planning the Business Continuity Management System (PLAN) is to plan the BCMS, establishing and embedding it within the l; the first step Organization.
- Implementing and Operating the BCMS (DO); actually, implement the created BCM according to the BCM planning schema.
- Monitoring and Reviewing the BCMS (CHECK); to ensure that the BCMS is continually monitored the Check stage covers the internal audit and management review of the BCMS.
- Maintaining and Improving the BCMS (ACT); To ensure that the BCMS is both maintained and improved on an ongoing basis this section looks at preventative and corrective action of the previous Plan-Do-Check and ACT phase.

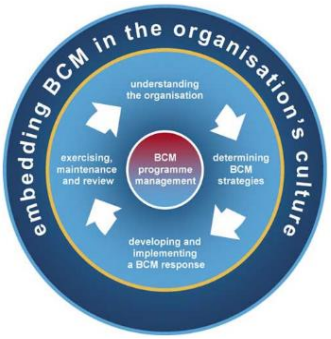


Figure 2 BCM Life Cycle

The PDCA (plan–do–check–act or plan–do–check–adjust) is an iterative four-step management method used in business for the control and continual improvement of processes and products. It is also known as the Deming circle/cycle/wheel, the Shewhart cycle, the control circle/cycle, or plan–do–study–act (PDSA). The BS 25999-1:2006 and BS 25999-2 BCM were both withdrawn in 2012 and replaced by the new ISO 22313 standard for Business continuity.

7.1.3 ISO 22313 & ISO 22301

The International Organization for Standardization (ISO) Technical Committee (TC) 292 is the committee that is responsible for writing security, resilience, and business continuity standards.

The BS ISO 22301 specifies the requirements to identify crucial risk factors already affecting the Organization, understand the Organization's needs and obligations (e.g.: regulatory), establish implement and maintain a business continuity management system and measure the Organization's overall capability to manage incidents guarantee compliance with the business continuity policy. ISO 22301: 2012, "Societal Security - Business Continuity Management Systems - Requirements", specifies a management system that manages an Organization's business continuity

arrangement. It is developed by the Technical Committee 223, Societal Security (ISO TC223) of the international Standard Organization. It is a formal style to facilitate compliance auditing and certification. ISO 22301 encapsulates international business continuity best practice into a specification of requirements for planning and implementing a business continuity management system (BCMS). The BCMS certification belongs to the ISO 22301 audit standards.

7.1.4 The ISO 22313: 2012

The ISO 22301 is the main standard that defines the framework for business continuity and is supported by a guidance document that is published as ISO 22313, which is an auxiliary standard that helps with the ISO22301 implementation. The ISO 22301 is based on the 'Plan-Do-Check-Act' model that seeks to continually improve the effectiveness of the Organization through planning, implementation, supervision, review and maintenance. "Societal Security - Business Continuity Management Systems - Guidance", provides pragmatic advice in regard to the business continuity management. I.e. to setup continuity management as a plan-do-act- cycle. This is aimed to recognize benefits and pitfalls of business continuity management.

A business continuity management system (BCMS) emphasizes the importance of:

- understanding the Organization's needs and the necessity for establishing business continuity policy and objectives;
- implementing and operating controls and measures for managing an Organization's overall capability to manage disruptive incidents;
- monitoring and reviewing the performance and effectiveness of the BCMS;
- Continual improvement based on objective measurement.

A BCMS, like any other management system, includes the following key components:

- a policy;
- people with defined responsibilities;
- management processes relating to:
    - policy;
    - planning;
    - implementation and operation;
    - performance assessment;
    - management review;
    - Improvement.
- a set of documentation providing auditable evidence;
- Any BCMS processes relevant to the Organization.

Business continuity is generally specific to an Organization; however, its implementation can have far reaching implications on the wider community and other third parties. An Organization is likely to have external Organizations that it depends upon and there will be others that depend on it. Effective business continuity therefore contributes to a more resilient society.

The Plan-Do-Check-Act cycle

This International Standard applies the 'Plan-Do-Check-Act' (PDCA) cycle to planning, establishing, implementing, operating, monitoring, reviewing, maintaining and continually improving the effectiveness of an Organization's BCMS.

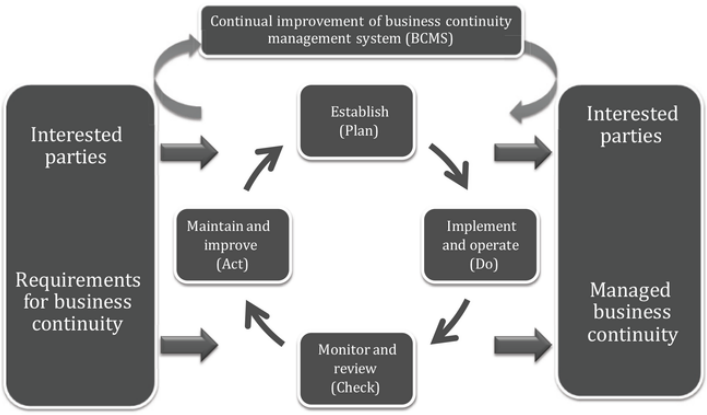


Figure 3 Business Continuity Model

Figure 4, illustrates how the BCMS takes interested parties' requirements as inputs for business continuity management (BCM) and, through the required actions and processes, produces business continuity outcomes (i.e. managed business continuity) that meet those requirements.

Plan (Establish)	Establish business continuity policy, objectives, controls, processes and procedures relevant to improving business continuity in order to deliver results that align with the Organizations overall policies and objectives.
Do (Implement & operate)	Implement and operate the business continuity policy, controls, processes and procedures.
Check (Monitor & review)	Monitor and review performance against business continuity objectives and policy, report the results to management for review, and determine and authorize actions for remediation and improvement.
Act (Maintain & improve)	Maintain and improve the BCMS by taking corrective actions, based on the results of management review and re-appraising the scope of the BCMS and business continuity policy and objectives.

7.1.5 The ISO/TS 22317: 2015

ISO/TS 22317:2015; societal security -- Business continuity management systems -- Guidelines for business impact analysis (BIA) was officially published on September 17, 2015.

ISO 22317 is a Technical Specification (TS), which means that it provides detailed technical content on how to implement a BIA process, but it is not auditable. Said another way, organizations cannot certify their BIA to ISO 22317. However, organizations can use ISO 22317 as guidance on how to effectively implement or mature a BIA process.

ISO/TS 22317:2015 provides guidance for organizations to establish, implement, and maintain a formal and documented business impact analysis (BIA) process. This Technical Specification does not prescribe a uniform process for performing a BIA but will assist an organization to design a BIA process that is appropriate to its needs. The ISO/TS 22317:2015 standard is applicable to all organizations regardless of type, size, and nature, whether in the private, public, or not-for-profit sectors. The guidance can be adapted to the needs, objectives, resources, and constraints of the organization.

ISO 22317 complements (and does not contradict) ISO 22301 and ISO 22313 by building on the high-level content within these existing standards. However, ISO 22317 can be used as a standalone document by organizations that do not use ISO 22301 or ISO 22313 content but seek guidance on how to perform the BIA process. The BIA process analyses the consequences of a disruptive incident on the organization. The outcome is a statement of justification of business continuity requirements.

7.2 The Information Security Management Frameworks

The International Organization for Standardization (ISO) and the International Electro technical Commission (IEC) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective Organizations to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international Organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. IT Governance frameworks for the Information Security framework that have been developed by the International Standard Organization (ISO) are:

7.2.1 ISO / IEC 27031: 2011

"Information security - Security techniques – Guidelines for information and communication technology [IT] readiness for business continuity" offers guidance on the IT aspects of business continuity management.

7.2.2 ISO 17799 & ISO / IEC 27001

ISO 17799 also known as ISO 17799:2000, is based on the British Standard "BS 7799 and contains "the Code of Practice for Information Security Management" (Part 1). Part 2 is published under ISO / IEC 27001 and contains the "Specification with Operating Instructions", which also describes the process-based security embedding (part 2).

7.2.3 ISO 17799:2000

ISO17799:2000 which is the ISO standard for information security is introduced in 2000 and provides best practices for information security and for an information security management system. ISO 179999 contains 10 chapters, 37 goals and 134 measures (best practices).

In 2005 the ISO / IEC standard 17799: 2000 is incorporated and replaced by the ISO / IEC standard 17799: 2005, which sets out guidelines and general principles for initiating, implementing, maintaining and improving information security management in an Organization. The outlined objectives provide general guidelines on the generally goals of information security management. The ISO 17799:2000 is replaced by ISO 17799:2005.

7.2.4 ISO / IEC 17799: 2005

ISO / IEC 17799: 2005 contains the best practices of control objectives and controls in the following areas of information security management: security policy; Organization of information security; asset management; human resources security; physical and environmental protection; communication and management; access control; acquisition, development and maintenance of information systems; information security incident management; business continuity management and compliance. Contains the best practices of control objectives and controls in the following areas of information security management: security policy; Organization of information security; asset management; human resources security; physical and environmental protection; communication and management; access control; acquisition, development and maintenance of information systems; information security incident management; business continuity management and compliance. The ISO/IEC 17799:2005 is replaced by ISO/IEC 17002:2007 The international standard ISO/IEC 17002:2007 provides guidelines and general principles for initiating, implementing, maintaining and improving information security in an organization.

ISO ISMS (Information Security Management Standards)

The ISMS standard is intended to assist Organizations of all types and sizes to implement and operate an ISMS and consists of the following International Standards, under the general title Information technology, Security techniques (given below in numerical order):

ISO/IEC 27000	*Information security management systems, Overview and vocabulary*
ISO/IEC 27001	*Information security management systems, Requirements*
ISO/IEC 27002	*Code of practice for information security controls*
ISO/IEC 27003	*Information security management system implementation guidance*
ISO/IEC 27004	*Information security management, Measurement*

ISO/IEC 27005	*Information security risk management*
ISO/IEC 27006	*Requirements for bodies providing audit and certification of information security management systems*
ISO/IEC 27007;	*Guidelines for information security management systems auditing*
ISO/IEC TR 27008	*Guidelines for auditors on information security controls*
ISO/IEC 27009	*Sector-specific application of ISO/IEC 27001, Requirements*
ISO/IEC 27010	*Information security management for inter-sector and inter-Organizational communications*
ISO/IEC 27011	*Information security management guidelines for telecommunications Organizations based on ISO/IEC 27002*
ISO/IEC 27013	*Guidance on the integrated implementation of ISO/IEC 27001 and ISO/IEC 20000-1*
ISO/IEC 27014	*Governance of information security*
ISO/IEC TR 27015	*Information security management guidelines for financial services*
ISO/IEC TR 27016	*Information security management, Organizational economics*
ISO/IEC 27017	*Code of practice for information security controls based on ISO/IEC 27002 for cloud services*
ISO/IEC 27018	*Code of practice for protection of personally identifiable information (PII) in public clouds acting as PII processors*
ISO/IEC 27019	*Information security management guidelines based on ISO/IEC 27002 for process control systems specific to the energy utility industry*

Table 1 ISO Information Security Standards

The general title "Information technology, Security techniques" indicates that these International Standards were prepared by Joint Technical Committee ISO/IEC JTC 1, Information technology, Subcommittee SC 27, IT Security techniques. ISO 27799, *Health informatics, Information security management in health using ISO/IEC 27002.*

7.2.5 ISO 27001

The ISO 27001 Information Security and data protection is importance for safeguarding Organizations data globally. It allows Business to safeguard both their client and company data against potential threats, by integrating a robust information security management system.

ISO 27001 is an international standard that is globally recognized for managing risks with regard the security of information. The ISO 27001 Certification allows Organizations to prove to their clients and other stakeholders that they are managing the security of their information.

ISO 27001:2013 (the current version of ISO 27001) provides a set of standardized requirements for an information security management system (ISMS). The standard adopts a process approach for establishing, implementing, operating, monitoring, reviewing, maintaining, and improving the Information Security Management System (ISMS).

The ISO 27001 Information Security Management system (ISMS) standard provides a framework for Information Security Management best practice that helps Organizations to: protect clients and employee information; manage risks to information security effectively; achieve compliance and protects the company's brand image.

7.2.6 ISO/IEC 27002

The international standard was published by ISO (www.iso.org/iso/home.htm) and the IEC, which established a joint technical committee, ISO/IEC JTC 1. The historic source for the standard was BS 7799-1, of which essential parts were taken in the development of ISO/IEC 17799:2005 Information Technology; Code of Practice for Information Security Management. It was developed and published by the British Standards Institution (BSI), labelled as BS 7799-1:1999. The original British Standard was issued in two parts: *BS 7799 Part 1: Information Technology; Code of Practice for Information Security Management; BS 7799 Part 2: Information Security Management Systems; Specification with Guidance for Use. BS 7799 was adopted by the ISO /IEC 17799 in 2000.*

The standard was published in 2000 in its first edition, which was updated in June 2005 (ISO 17799:2005). It can be classified as current best practice in the subject area of information security management systems. The original BS 7799 was revised and reissued in September 2002 and finally incorporated in the ISO 27000 series of standards as ISO/IEC

27002 in July 2007. ISO/IEC 27002 is often used as a generic term to describe what actually two different documents are:

ISO/IEC 17799 (now renamed ISO 27002; a set of security controls (a code of practice). ISO/IEC 27001, formerly BS7799-2), a standard 'specification' for an information security management system (ISMS). The goal of ISO/IEC 27002:2005 is to provide information to parties responsible for implementing information security within an Organization. It can be seen as a best practice for developing and maintaining security standards and management practices within an Organization to improve reliability on information security in inter-Organizational environments.

Relationships. It defines 133 security controls strategies, under 11 major headings. The standard stresses the importance of risk management and makes it clear that it is not necessary to implement every stated guideline, only those that are relevant. The guiding principles in ISO/IEC 27002:2005 are the initial points for implementing information security. They rely on either legal requirements or generally accepted best practices.

Measures based on legal requirements include: The protection and non-disclosure of personal data protection of internal information and the protection of intellectual property rights. Best practices mentioned in the standard include: Information security policy; Assignment of responsibility for information security; Problem escalation and Business continuity management.

The critical success factors that should be considered for the implementation of a system for information security management are: The security policy, its objectives and activities should reflect the business objectives; The implementation should consider cultural aspects of the Organization; Open support from and engagement of senior management should be required; Thorough knowledge of security requirements, risk assessment and risk management should be required; Effective marketing of security should target all personnel, including members of management; The security policy and security measures should be communicated to contracted third parties; Users should be trained in an adequate manner; A Cohesive and balanced system for performance measurement, which supports continuous improvement by giving feedback, should be available.

After presenting introductory information (scope, terms and definitions), a framework for the development of an Organization-specific ISMS should consist of at least the following parts: Security policy; Organizational security; Asset classification and control; Personnel security; Physical and environmental security; Communications and operations management; Access control; Systems development and maintenance; Business continuity management; Compliance; The security policy and security measures should be communicated to contracted third parties; Users should be trained in an adequate manner and a Cohesive and balanced system for performance measurement, which supports continuous improvement by giving feedback, should be available.

After presenting introductory information (scope, terms and definitions), a framework for the development of an Organization-specific ISMS should be presented. Such a system should consist of at least the following parts: Security policy; Organizational security; Asset classification and control; Personnel security; Physical and environmental security; Communications and operations management; Access control; Systems development and maintenance; Business continuity management and Compliance

7.3 The Quality management frameworks

(Model for quality assurance in production, installation and servicing).

7.3.1 ISO 9000

The ISO 9000 was originally published in 1987 by the International Organization for Standardization (ISO), which is a specialized international agency for standardization composed of the national standards bodies of more than 160 countries.

ISO 9000 is a set of international standards on quality management and quality assurance developed to help companies effectively document the quality system elements that have to be implemented in order to maintain an efficient quality system. ISO 9000 can also be seen as a first step to help a company satisfy its customers, meet regulatory requirements, and achieve continual improvement. ISO 9000 is a series, or family of standards and also contains an individual standard named ISO 9000. The ISO 9001, ISO 9004 and ISO 9011 are standards within the ISO 9000 family.

The ISO 9000 family standards for Quality management systems	
ISO 9000:2015	Describes the fundamentals & vocabulary (definitions) of a QMS.
ISO 9001:2015	Describes the requirements of a Quality Management System.
ISO 9004:2009	Guidelines for (continuous) improvements of a QMS.
ISO 19011:2011:	Guidelines for auditing management systems

The ISO 9000 standard lays out the fundamentals and vocabulary of a quality management system (QMS). The ISO standard 9001 is a document that describes the requirements of a QMS. Internal audits are required to ensure that the quality management system is working properly. Besides internal auditing organizations can also invite an independent certification body to ensure conformity with the standards.

ISO 9000 & ISO 9001 principles of quality management

The ISO 9000:2015 and ISO 9001:2015 standards are based on seven quality management principles that senior management can apply for organizational improvement:

1. Customer focus

- Understand the needs of existing and future customers
- Align organizational objectives with customer needs and expectations
- Meet customer requirements
- Measure customer satisfaction
- Manage customer relationships
- Aim to exceed customer expectations

2. Leadership

- Establish a vision and direction for the organization
- Set challenging goals
- Model organizational values
- Establish trust
- Equip and empower employees
- Recognize employee contributions

3. Engagement of people

- Ensure that people's abilities are used and valued
- Make people accountable
- Enable participation in continual improvement
- Evaluate individual performance
- Enable learning and knowledge sharing
- Enable open discussion of problems and constraints

4. Process approach

- Manage activities as processes
- Measure the capability of activities
- Identify linkages between activities
- Prioritize improvement opportunities
- Deploy resources effectively

5. Improvement

- Improve organizational performance and capabilities
- Align improvement activities
- Empower people to make improvements
- Measure improvement consistently
- Celebrate improvements

6. Evidence-based decision making

- Ensure the accessibility of accurate and reliable data
- Use appropriate methods to analyse data
- Make decisions based on analysis
- Balance data analysis with practical experience

7. Relationship management

- Identify and select suppliers to manage costs, optimize resources, and create value
- Establish relationships considering both the short and long term
- Share expertise, resources, information, and plans with partners
- Collaborate on improvement and development activities
- Recognize supplier successes

7.4 The ITIL Service & Support Management Framework

(Information Technology Infrastructure Library)

The IT Governance framework for Service and Support management framework ITIL is known by literature is the IT Infrastructure Library framework or ITIL framework.

The ITIL framework is developed in the late 1980s by the Central Bureau of Computing and Telecommunications (CCTA), which is founded by the British government. The ITIL framework, which is formally an acronym for Information Technology Infrastructure Library, is a set of detailed best practices for IT service management (ITSM) that focus on the setup and use of IT services to business needs. ITIL is owned and a registered trademark of the British OGC (Office of Government Commerce) that regularly adjusts the library. In Belgium and the Netherlands, Organizations such as ITSMF and IIR are engaged in translation, application and development of process-oriented work. Since 1 January 2014, ITIL has been owned by Axelos.

Figure 4 ITSM Framework, Bwrkely.edu

The IT Infrastructure Library is a collection of five books, each covering a specific field of practice within IT service management. Each of these books is covering another ITSM life cycle phase. By using ITIL Organizations focus more on the services needed by customers, than solely on technologies. ITIL describes processes, procedures, tasks and checklists that are non-Organization-specific, but can be applied by an Organization to integrate with Organization's strategy like value delivery and to maintain a certain minimum level of competency.

7.4.1 ITIL V2.

ITIL version 2 has divided the ICT management processes into eight parts:

1. Service Delivery; Financial Management for IT Services, Capacity Management, Availability Management. ITS Service Continuity Management (ITSCM), Service Level Management and Security Management.
2. Service Support; Change Management. Release Management. Problem Management, Incident Management, Configuration Management and Service Desk (Helpdesk).
3. Planning to Implement Service Management.
4. Security Management. Security.
5. ICT Infrastructure Management; Network service management. Operations. Management. Management of local processors. Computer installation and acceptance and Systems Management.
6. The Business Perspective.
7. Application Management.
8. Software Asset Management.

7.4.2 ITIL V3.

ITIL version 3 focuses on the complete Service Lifecycle. In addition, a clear customer-oriented approach is used, from a service and end-to-end perspective. ITIL version 3 was formally published in 2007 and updated in 2011. This update is known as ITIL v3 Edition 2011. The Service Lifecycle is divided into five phases, which are subdivided into different processes

9. Service Strategy; Financial Management for IT services). Service Portfolio Management (SPM), Demand Management, Strategy Management for IT services, Business Relationship Management;
10. Service Design; Service Catalogue Management, Service Level Management, Capacity, Management. Availability Management, ITS Service Continuity Management (ITSCM), Information Security Management, Supplier Management, Design Coordination;
11. Service Transition; Transition Planning and Support. Change Management, Service Asset and Configuration Management, Release and Deployment Management, Service Validation and Testing, Evaluation, Change Evaluation, Knowledge Management;
12. Service Operation; Event Management, Incident Management, Request Fulfilment, Problem Management, Access Management;
13. Continuous Service Improvement (7-steps); 1. What should you measure? (Vision, strategic, or operational); 2. What can be measured? (Actively measure that what will be of beneficial for the Organization); 3. Gather Data (measure to enable Organization to reached its goal based on the vision, mission, goals and objectives that have been previously set), 4. Process Data (to determining the correct style and format to each business unit); 5. Analyse Data (trends, discrepancies and associated explanations are prepared for discussion with the business); 6. Present and use information (the business/stakeholders are informed as to whether the goals have been achieved or not); 7. Implement Corrective Action (document improvements, add to the Service Improvement Program (SIP); create a new baseline and start the 7 steps again.

The most important reasons that intended benefits are sometimes not achieved are: Insufficient attention to the corporate culture; insufficient support from management and employees; too much sticking to procedures and documents; Successful ITIL implementations are based on a change management approach.

7.5 The Project Management Framework

PRINCE2 (Projects in Controlled Environments, version 2) is a project management method that is aim to the management, the steering and Organization of projects. PRINCE is developed by the British semi-government organization Office of Government Commerce (OGC). The PRINCE method was developed for ICT projects in the late 1980s. The methods are developed on best-practice experiences, of the British semi-government agency, the Office of Government Commerce (OGC). PRINCE came on the market in 1989 and was mainly used within the ICT industry. PRINCE2 was introduced in 1996 as an improved and extended version of PRINCE and intended as a project management method for all types of projects, not just ICT.

The PRINCE2 (**Pr**ojects **IN C**ontrolled **E**nvironments) is a process-based method for effective project management. PRINCE2 is an international standard project management method that is known by literature and widely recognised and practised by the world-wide business community. PRINCE2 is applicable to all kind of projects and consist of 7 principles, 7 themes and 7 processes. Only the application of the principles determines whether something is a PRINCE2 project and the strict application of the themes or processes.

The 7 Principles of PRINCE-2

1. Always make sure you have business permission
2. Learn from experiences
3. Define the roles and responsibilities in advance
4. Divide the project into manageable stages
5. Only escalate with exceptional events
6. Plan and send on products
7. Scale the method where necessary

Figure 5 © Derrick Robinson

1. *Always provide business justification*

A PRINCE2 project must have a valid reason throughout the duration of the project and which we tested against the "Business Case", which is continually updated. The goal is to prevent a project from continuing all the time, while no more benefits can be expected.

2. *Learn from experiences*

Project teams are expected to take note of the experience gained from previous projects. In order to serve a next project, Lesson learned during the duration of the project are recorded in an experience log ("lessons log").

3. *Define the roles and responsibilities*

Everyone who is involved in a project must know the role and the corresponding responsibility, of himself and the other project members.

4. *Divide the project into manageable stages*

From a management point of view, complex tasks can be better divided into separate stages. A PRINCE2 management stage is something other than a technical phase. The technical phasing is the same for most projects, for example: specification, design, construction, test, implementation and aftercare. Within the definitions of PRINCE2, these are technical phases, while at management stages it is all about project management and not technical realization. A project planning that has been divided into technical phases separated by go / no go milestones cannot be managed by the steering committee, because it does not have to be professionally technical in terms of content. In this way the project is guaranteed by decision makers instead of technicians.

5. *Only escalate with exceptions*

A well-running project requires hardly any intervention from above. Only when the tolerances are exceeded, the steering group is informed by means of an exception report ("Exception Report") and can ask the steering committee for an exception plan ("Exception Plan"). This guarantees efficient use of (usually busy) management. "Manage by Exception" is the trade mark of PRINCE2.

6. *Plan and send on products*

What may be expected of the delivered products must be known in advance. Product requirements determine the required work and not the other way around.

7. *Scale the method where necessary*

The PRINCE2 methodology offers a large set of resources to manage a project of any size or complexity. This completeness means that the methodology can be tailor-made per project in order to meet the needs of a specific environment. After all, PRINCE2 is a tool to manage the project as well as possible. Depending on the project, this may mean that certain parts of the methodology are omitted, except for the 7 principles. For example, in a simple project, the project organization can be reduced to the steering group, the project manager and a small executive team if required.

The 7 themes of PRINCE-2

The themes provide insight into how to manage the project. They can be seen as knowledge areas, about how the principles can be applied in practice. These are drawn up at the start of the project and monitored for the entire duration. Constantly addressing these themes keeps projects on the right track.

1. Keep the Business Case valid;
2. Define the required quality of the products beforehand;
3. Record the organization in terms of roles and responsibilities.
4. Make plans;
5. Identify the risks;
6. Conformity of changes;
7. Monitor the progress;

Figure 6 © Derrick Robinson 2012-

1. *Business Case*

In connection with the constant business justification principle, this theme provides insight into whether the project is sensible and feasible. Theoretically, a negative Business Case can gradually arise. Then either the objective must be made less ambitious, or the project be discontinued.

2. *Quality*

Related to the Plan and steering on products principle, this theme contributes to achieving the quality expectations formulated by the customer through acceptance criteria. Quality is an abstract concept. A product is not ready until it meets the requirements. To this end, a quality review is regularly conducted at the initiative of the Borg group.
A quality review is a standardized method for testing the quality of products in a controlled manner. These are mostly subjective quality criteria. Quality reviews ensure that the results, the products, match the expectations of the users.

3. *Organization*

Related to defining the roles and responsibilities principle, this theme requires that these matters be recorded and all project members commit to this.

4. *Plan*

NB: Planning as the plural of a Plan (and not the timetable)
A plan describes how goals are achieved in terms of: product descriptions, time planning, costs, acceptance criteria and benefits.

5. *Risk*

A project necessarily involves more uncertainties than the daily line activities. The project must constantly pay attention to keeping these risks manageable. Risk management aims to detect risks that threaten the project and then manage it. It is not necessarily necessary to completely eliminate the risks, which will cost a disproportionate amount of effort. It is usually sufficient to take risk-reducing measures, such as e.g. a good back-up of the data or the presence of a fall-back scenario.

6. *Change*

This theme is about managing changes ("Change control") that occur during the duration of the project. All potential changes are treated as Project Issues. PRINCE2 distinguishes the following types of Project Issues: Change proposals; Deviations from the specifications and Problem or concern.

7. *Progress*

The theme of progress is about being able to follow this progress. This informs managers of where the project is located in relation to the planning. Often, projects derail without the knowledge of management.

The 7 Processes of PRINCE-2

The PRINCE2 Process model also consist of 7 processes. Activities of a project phase are grouped into processes. PRINCE2 is a process-based approach for project management and each provides a set of activities. These activities help to direct, manage and deliver a project, and are described in the PRINCE2 manual. Like any process, a PRINCE2 process takes one or more inputs, acts on them, and provides defined outputs.

1. *Starting a project (SU)*

Starting a project is a process. After the business management has granted the project mandate, it has become the year of the start of the project. A global Business Case is drawn up, the Project Organization is drawn up and the project approach is taken off. These matters are included in the "Project Brief" (project in brief) and handed over to the steering committee with the request to initiate the project. The "Project Brief" is the stage of the initiate stage.

Initiate a project (IP)

The first stage within a project is called the "Initiation Stage". This stadium is mandatory in every PRINCE2 project and aims to put a good foundation under the project. At this stage the intended results, plans, decisions and responsibilities are recorded. The "Business Case" is also fully developed. This leads to the sustainable project Initiation Documentation (PID). This PID will be discussed later.

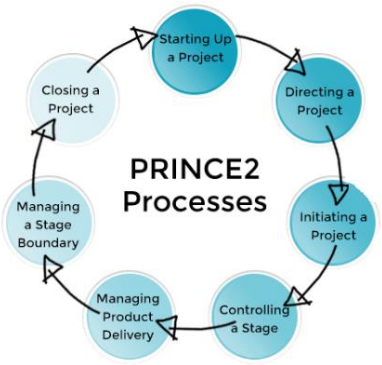


Figure 7 © Derrick Robinson

2. *Directing a project (DP)*

"Directing a project" is the process where the Steering Committee (seat team). The steering group of the authorizations and judges and directs in case of exceptions.

3. *Managing an internship (CS)*

Controlling a stage is the management of a project stage. Dividing a project into stages increases control because a part product is bred that remains within the limits of quality, risk and budget.

4. *Management of a stage boundary (SB)*

The "Managing a Stage Boundary" process contains the activities that the project manager undertakes to ensure the smooth running of the current stage of the project's progress. Judge.

5. *Manage product delivery (MP)*

The process "Managing Product Delivery" controls the delivery of the (sub) products, which is often carried out by a project team (s). To this end, they are working work packages, which are issued by the "Controlling a stage" process.

6. *Close a project (CP)*

When all stages have been successfully completed, the project can be closed. To this end, proposal is the steering group with the End Project Report, the updated PID and a report of the learning moments. The steering group informs the ordering organization that the project has been completed and can be granted discharge.

7.6 The Architecture for Information Management

The Dutch Government Reference Architecture

Dutch translation: Nederlandse Overheid Referentie Architectuur (NORA)

Nora" is the abbreviation for Dutch Government Reference Architecture and consist of start-up documents and guidelines for setting up information management for government organizations. The NORA architecture is relevant for the execution of all public tasks by public and private organizations in the Netherlands. The Nora architecture has limit itself to the 'information' aspects. Nora architecture respects the subsidiarity principle, which means that only matters that necessarily have to be agreed on government-wide scale in order to achieve a well-functioning, shared information management system.

NORA was created in the by the Dutch advisory board ICTU in collaboration with architects from the national Dutch government, provinces, municipalities, water boards, executive organizations and sectors, such as education, public order and safety and health care. Other standards that were developed by the ICTU are Digi-D, Burger Service number (unique code for every Dutch citizen).

NORA 3.0 is derived architecture principle that consists of ten basic principles, which are describe in the section strategy and 40 principles, which derive from them and are describe in the section "NORA 3.0 Principles for cooperation and services".

The ten basic principles describe the quality of government services from the perspective of the buyer. As such, these principles are not verifiable. The 40 derived principles give a more concrete interpretation to the basic principles. They can be regarded as a checklist of quality characteristics. For each service the service provider translates these quality characteristics (in the form of design principles) to quality standards (in the form of design decisions). By using the checklist important choices are made at the right time and the right place.

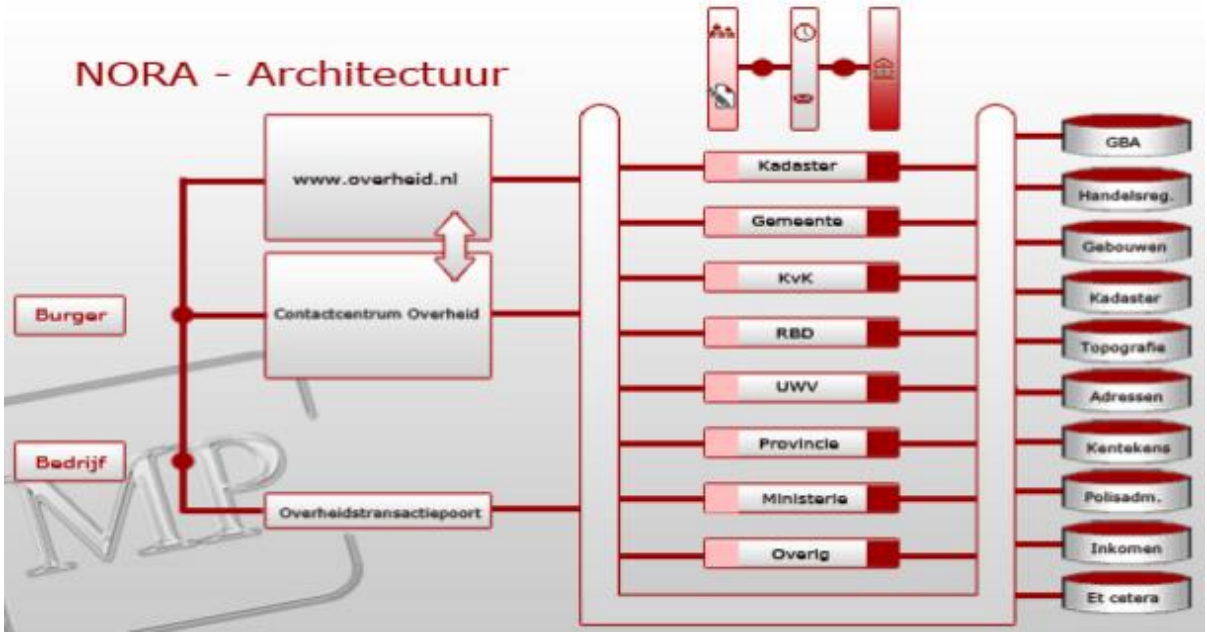


Figure 8 MP Recruitment © 2011 | Designed by Triple One Design

Basic principles of the Nora architecture

1. BP01- Proactive; Customers receive the services they need.
2. BP02- Discoverable; Customers can easily find the service.
3. BP03 - Accessible; Customers have easy access to the service.
4. BP04 - Standard Basic principle; Customers experience uniformity in the provision of services through the use of standard solutions.
5. BP05 Bundled; Customers receive bundled related services.
6. BP06 Transparent; Customers have access to relevant information.
7. BP07 Necessary; Customers are not confronted with superfluous questions.
8. BP08 Confidential; Customers can rest assured that information is not misused.
9. BP09 Reliable; Customers can be confident that the service provider keeps to agreements.
10. BP10 Responsible; Customers can provide input on the services.

Principles derives from the 10 basic principles
(Derived principles or in Dutch: Afgeleide Principes (AP)

1. AP01; Services are reusable
2. Ap02; Disconnection with services
3. AP03; Services complement each other
4. AP04; Position the service
5. AP05; Accurate service description
6. AP06; Use standard solutions
7. AP07; Use the rural building blocks
8. AP08; Use open standards
9. AP09 Preferred channel internet
10. AP10; Additional channel
11. AP11; Equivalent result regardless of channel
12. AP12; One-off request
13. AP13; Source registrations are leading
14. AP14; Report back to source holder
15. AP15; Target binding (AP)
16. AP16; Identification information objects
17. AP17; Information objects systematically described

18. AP18; Spatial information via location
19. AP19; Perspective user
20. AP20; Personal approach
21. AP21; Bundling services
22. AP22; No wrong
23. AP23; Automatic service
24. AP24; Proactive offering
25. AP25; Transparent service
26. AP26; The customer has access
27. AP27; A responsible organization
28. AP28; Agreements recorded
29. AP29; The service provider meets the standard
30. AP30; Accountability for service delivery possible
31. AP31; PDCA cycle in quality control
32. AP32; Control quality at the highest level
33. AP33; Baseline quality services
34. AP34; Accountability control quality
35. AP35; Irrefutability
36. AP36; Availability
37. AP37; Integrity
38. AP38; Confidentiality
39. AP39; Verifiability

7.7 The Control Management Framework.

(Control Objective framework for Information Technologies)

The ISACA group start in 1967 as a group of individuals with similar jobs—auditing controls in the computer systems that were becoming increasingly critical to the operations of their organizations. In 1969, the group formalized, incorporating as the EDP Auditors Association. In 1976 the association formed an education foundation to undertake large-scale research efforts to expand the knowledge and value of the IT governance and control field. Previously known as the Information Systems Audit and Control Association® (ISACA).

he CobiT IT Governance Framework was first released in 1996 by ISACA and started as a set of control objectives to help the financial audit community better manoeuvre in IT-related environments. ISACA released a broader version 2 in 1998 and expanded that version by adding management guidelines in 2000's version 3. The development of the: Australian Standard for Corporate Governance of Information and Communication Technology (AS 8015) and the standard ISO/IEC DIS 29382 (which became ISO/IEC 38500 has Increased the awareness and need for more IT technology and IT Governance components. ISACA decide to add these two related components/frameworks with versions 4 and 4.1 in 2005 and 2007 respectively, "addressing the IT-related business processes and responsibilities in value creation (Val IT) and risk management (Risk IT)." In April 2012, ISACA released version 5 of CobiT.

The IT Governance frameworks for the information related objectives framework literature and is a conceptual model for and evaluating technology intensive systems. COBIT provides a structure for Governance, the associated IT and IT architecture. The CobiT IT framework is a framework that is known and accepted by the word-wide businesses a framework for Governance and of Enterprise IT.

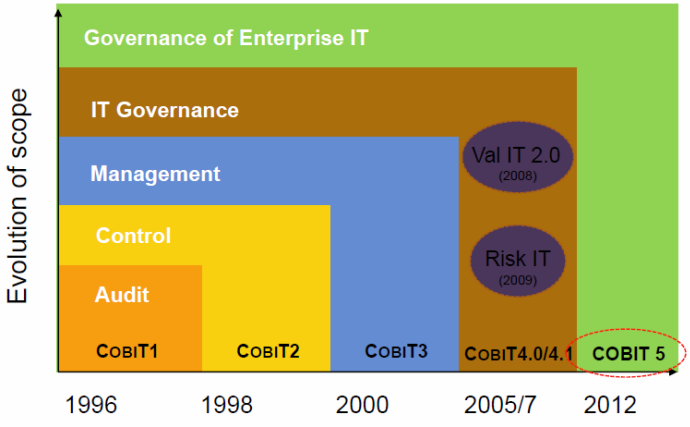


Figure 9 Governance frameworks from ISACA

control of is known by developing information setting up IT Organization Governance by literature community as management

The CobiT version 4.1 is released in 2007 an IT Governance Framework that

by ISACA as focuses on

process and key enablers and consists of 34 high level processes that cover 210 control objectives. Categorized in the domains: Plan and Organise (PO); Acquire and Implement (AI); Deliver and Support (DS); Monitor and Evaluate (ME).

The CobiT framework (Version 4) consists of four domains and those domains consist of one high level Control Objective for each IT process. There are 34 different Control Objectives that includes everything from strategy to development, operation, and support. The purpose of the model is to help managers or staff with management control responsibilities by clarifying which demands they should have on the various control objectives, which Key Performance Indicators should be used and how to measure the matureness of the processes to identify the risks. The research will use CobiT version 4.1 as a reference in examining the status of IT Governance on the steering and strategic level of the SCMO.

7.7.1 CobiT version 4.

Plan & Organise

- PO1 Define a Strategic IT Plan
- PO2 Define the Information Architecture
- PO3 Determine Technological Direction
- PO4 Define IT Processes, Organization and Relationships
- 7PO5 Manage the IT Investment
- PO6 Communicate Management Aims and Direction
- PO7 Manage IT Human Resources
- PO8 Manage Quality
- PO9 Assess and Manage IT Risks
- PO10 Manage Projects

The high-level IT Governance processes of the Planning and Organization Domain Includes handling of strategies and tactics. The purpose is to identify how IT can support the achievement of the business objectives. It is important that an IT strategy plan is made and communicated throughout the Organization. This part also includes the responsibility to manage IT investments, projects, quality, and human resources. To handle this, it is necessary to define the IT Organization and relationship. The Planning and Organization domain covers the use of information & technology and how best it can be used in a company to help achieve the company's goals and objectives. It also highlights the Organizational and infrastructural form IT is to take in order to achieve the optimal results and to generate the most benefits from the use of IT. The following table lists the high-level IT processes for the Planning and Organization domain.

Acquire & Implement

- AI1 Identify Automated Solutions
- Ai2 Acquire & Maintain Application Software
- AI3 Acquire & Maintain Technology Infrastructure
- AI4 Enable Operation & Use
- AI5 Procure IT Resources
- AI6 Manage Changes
- A17 Install and Accredit Solutions and Changes

The high-level IT Governance processes of the Acquire and Implement domain covers identifying IT requirements, acquiring the technology, and implementing it within the company's current business processes. This domain also addresses the development of a maintenance plan that a company should adopt in order to prolong the life of an IT system and its components. To be able to realize the IT strategies that were developed in the Acquire & Implement domain above it is necessary to identify, develop, or acquire IT solutions. It is also important to implement and integrate the solutions into the business process. Furthermore, this domain is responsible for changes and maintenance of existing systems to make sure that the lifecycle is continued.

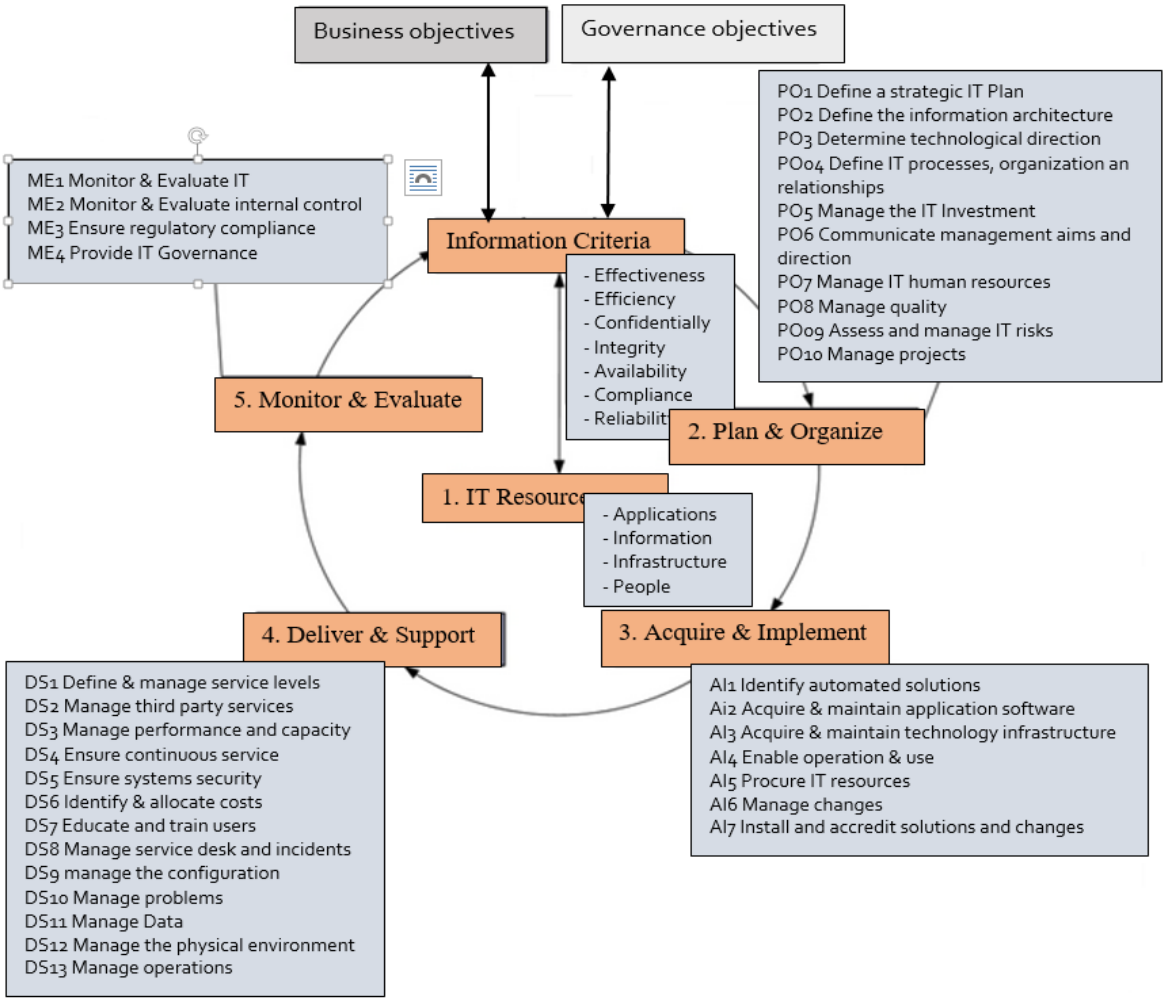


Figure 10 the IT Governance Processes of the CobiT 4 Framework

Deliver & Support

- DS1 Define & Manage Service levels
- DS2 Manage Third-party Services
- DS3 Manage Performance and Capacity
- DS4 Ensure Continuous Service
- DS5 Ensure Systems Security
- DS6 Identify &Allocate Costs
- DS7 Educate and Train Users
- DS8 Manage Service-Desk and Incidents
- DS9 Manage the Configuration
- DS10 Manage Problems
- DS11 Manage Data
- DS12 Manage the Physical Environment
- DS13 Manage Operations

The high-level IT Governance processes of the Delivery and Support are responsible for the actual delivery of the required service. This includes tasks as; define and manage service levels, ensure security, identify and allocate costs, educate and train users, assist and advise customers. Also included are managing the configuration, problems and incidents, data, facilities and operations. To be able to deliver services it is necessary to develop a support process. The Delivery and Support domain focuses on the delivery aspects of the information technology. It covers areas such as the execution of the applications within the IT system and its results, as well as, the support processes that enable the effective and efficient execution of these IT systems. These support processes include security issues and training.

Monitor & Evaluate

- ME1 Monitor & Evaluate IT Performance
- ME2 Monitor & Evaluate Internal Control
- ME3 Ensure Compliance with External Requirements
- ME4 Provide IT Governance

The high-level IT Governance processes of the Monitoring and Evaluation domain deals with the company's strategy in assessing the needs of the company and whether or not the current IT system still meets the objectives for which it was designed and the controls necessary to comply with regulatory requirements. Monitoring also covers the issue of an independent assessment of the effectiveness of IT system in its ability to meet business objectives and the company's control processes by internal and external auditors. All the IT processes that the IT Organization is composed of needs to be regularly monitored. This is necessary if one want to be able to get the sought-after effect of the companies IT. All the 34 IT processes can be applied at different levels within an Organization. This means that some of the processes will be applied at an enterprise level, some on an IT function level and others at a business process owners' level. These 34 high-level control objectives are broken down into 318 detailed control objectives by CobiT (2000).

7.7.2 CobiT version 5.

The CobiT 5 framework is illustrated by a number of Best Practices in IT Governance and the following five principles: 1. meeting stakeholder's needs; 2. covering the enterprise end-to-end; 3. applying a single integrated framework; 4 enabling a holistic approach and 5. Separating Governance from management. Within these five principles, management objectives and accompanying measures, performance indicators and maturity levels are central. COBIT 5 further consolidated and integrated the CobiT 4.1, Val IT 2.0 and Risk IT frameworks and drew from ISACA's IT Assurance Framework (ITAF) and the Business Model for Information Security (BMIS).

CobiT 5 is not included in the literature study because CobiT 5 focuses more on Governance Enterprise IT of large Organization (i.e. Amazon, Google, and Apple) and CobiT 4.x focuses more on the IT Governance processes of Non-Enterprise IT Organization like the SCMO. The research will use the IT Governance processes of the CobiT framework version 4.xx and the Value IT framework version 2 as a reference while examining the status of IT Governance setup and use by the SCMO.

7.7.2.1 The Risk Governance Framework

The Risk IT Framework fills the gap between generic risk management frameworks and detailed (primarily security-related) IT risk management frameworks. It provides an end-to-end, Cohesive view of all risks related to the use of IT and a similarly thorough treatment of risk management, from the tone and culture at the top, to operational issues. In summary, the framework will enable enterprises to understand and manage all significant IT risk types, building upon the existing risk related components within the current ISACA frameworks, i.e., COBIT and Val IT.

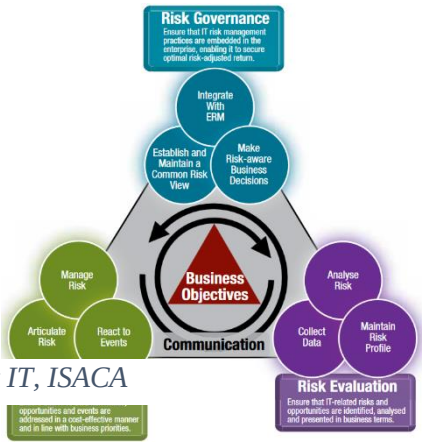


Figure 11 Risk IT, ISACA

The Risk governance framework is incorporate into the CobiT framework processes
The risk management process model groups key activities into a number of processes. These processes are grouped into three domains. The three domains of the Risk IT framework are: Risk Governance; Risk Evaluation and Risk Response. The Risk Governance domain define Risk management and provide guidelines to ensures that risk management processes are embedded in the enterprise enabling it to secure optimal risk adjusted return. The processes of Risk governance are: Integrate with ERM; Establish and maintain a common risk view and Make Risk-aware business Decisions. The Risk Response domain ensures that risk IT related risk issues, opportunities and events are addressed in a cost-effective manner and in line with business priorities. The processes of Risk Response management are: Manage Risk, Articulate Risk and React to Events

The Risk Evaluation domain ensures that IT related risks and opportunities are identified, analysed and presented in business terms. The processes of Risk evaluation are: Analyse risk, Collect Data and Maintain Risk profile

7.8 The IT-Value Governance Framework

The Val IT Governance framework is used to create business value from IT investments. It consists of a set of guiding principles, a number of processes and best practices that are further defined as a set of key management practices to support and help executive management and boards at an enterprise level. The VAL IT Governance Framework is often used by managers at the top level of the Organization like the board of directors, executers, CEO and CIO for managing the IT business centre framework.

The Overlap between Val-IT and CobiT is that Val IT focuses on the business value and on some COBIT components that focus on the value from the business point of view. The Val IT framework is closely aligned with and complements the COBIT Framework, which provides a comprehensive framework for the delivery of high-quality information technology-based (IT-based) services. While COBIT sets good practices for the means of contributing to the process of value creation, Val IT sets good practices for the ends, by providing enterprises with the structure they require to measure, monitor and optimise the realisation of business value from investment in IT. Val IT is a Governance framework that used to create business value from IT investments. IT consists of a set of guiding principles and a number of processes and best practices that are further defined as a set of key management practices to support and help executive management and boards at an enterprise level.

Figure 12 Val-IT framework, ISACA

The Val IT framework is supported by publications and operational tools and provides guidance to:

- Defining the relationship between IT and the business and those functions in the organization with governance responsibilities;
- Management of organization's portfolio of IT-enabled business investments;
- Increase the quality of the business cases for IT business investments, by emphasizing the definition of key financial indicators, quantifying (soft) benefits and taking ban risk mitigation measures.

Val IT addresses assumptions, costs, risks and outcomes related to a balanced portfolio of IT-enabled business investments. It also provides benchmarking capability and allows enterprises to exchange experiences on best practices for value management.

Val IT principles are: IT-enabled investments will be managed as a portfolio of investments; The IT-enabled investments will include the full scope of activities that are required to achieve business value; The IT-enabled investments will be managed through their full economic life cycle.; The Value delivery practices will recognize that there are different categories of investments that will be evaluated and managed differently; The Value delivery practices will define and monitor key metrics and will respond quickly to any changes or deviations.; The Value delivery practices will engage all stakeholders and assign appropriate accountability for the delivery of capabilities and the realization of business benefits. And Value delivery practices will be continually monitored, evaluated and improved.

The three domains of the Val IT framework are: Value Governance; Portfolio Management and Investment Management. Each of these domains contains a number of processes (22) that are each enabled by a number of key management practices

VAL IT Major Processes

Each of the following major processes/activities have a responsibility assignment (RACI) matrix, indicating the responsibilities of the senior executives, business managers, and information managers, along with the major and minor COBIT control objectives associated with the activity.

Value Governance

- VG1: Establish informed and committed leadership.
- VG2: Define and implement processes.
- VG3: Define portfolio characteristics.
- VG4: Align and integrate value management with enterprise financial planning.
- VG5: Establish effective Governance monitoring.
- VG6: Continuously improve value management practices.

The VG domain addresses the structures and processes required to ensure that value management practices are embedded in the Organization. The domain deals with the engagement of leadership (VG1), the definition and implementation of value management practices (VG2), and the integration of the latter into the Organization's financial management processes (VG4). It also addresses that portfolio types and criteria need to be defined by the business (VG3), that effective Governance monitoring should be established over the value management practices (VG5), and that there should be a continuous improvement cycle through implementing lessons learned (VG6). It is clear that these processes are defined at a higher level in Val IT and encompass "necessary conditions" to enable a value-based approach in portfolio and investment management.

Portfolio Management

- PM1: Establish strategic direction and target investment mix.
- PM2: Determine the availability and sources of funds.
- PM3: Manage the availability of human resources.
- PM4: Evaluate and select programs to fund.
- PM5: Monitor and report on investment portfolio performance.
- PM6: Optimize portfolio performance.

The PM domain addresses the processes required to manage the whole portfolio of IT-enabled investments. This domain states that the strategic direction of the Organization should be clarified and that the target portfolio mix should be defined (PM1). Also, available resources in terms of funding (PM2) and human resources (PM3) need to be inventoried. Based on detailed business cases arising from the IM processes (IM1-IM5), investment programs are selected and moved into the active portfolio (PM4). The performance of this active portfolio needs to be continuously monitored, reported on (PM5) and optimized (PM6), based on performance reports coming out of the IM processes.

Investment Management

- IM1: Develop and evaluate the initial programs concept business case.
- IM2: Understand the candidate programs and implementation options.
- IM3: Develop the programs plan.
- IM4: Develop full life-cycle costs and benefits.
- IM5: Develop the detailed candidate programs business case.
- IM6: Launch and manage the programs.
- IM7: Update operational IT portfolios.
- IM8: Update the business case.
- IM9: Monitor and report on the programs.

The processes in the IM domain are situated at the level of a single IT-enabled investment. The first five processes in this domain focus on the emergence of new investment opportunities in the Organization (IM1) and the development of detailed business cases (IM5) for the approved opportunities, including analyses of alternative courses of action (IM2), a definition of a detailed program plan (IM3) and full cost-benefit analysis (IM4). After approval of detailed business cases (PM4), investment programs need to be launched (IM6) and monitored (IM8) and, if required, business cases need to be updated (IM9). All investment programs need to be retired (IM10), bringing programs to an orderly closure when there is agreement that the desired business value has been achieved or when it is clear it will not be achieved. Also, changes to operational IT portfolios, as a result of the investment program, need to be incorporated in the portfolios of IT services, assets

8 Designing a sustainable IT Governance Model

The results of the design science method are used to design a sustainable IT governance model, also refer to as the best model for Dutch municipal organizations. The (concept) of a sustainable IT governance model is designed by comparing and combining the various research results with each other. The ITG requirements for Dutch municipal organizations (chapter 5) and the building criteria for a sustainable IT Governance (chapter 6) are compared with the research results on IT Governance frameworks that are known by the literature (chapter 7). From this comparison a conceptual IT Governance model is designed.

The research findings have led to the following concept IT Governance model for Dutch municipal organization.

Value Governance Management processes		
Requirements	**Framework**	**Description**
Value governance *(Strategic level)*	Val-IT Governance framework (ISACA)	Alignment of strategic IT governance objectives with corporate governance and Value governance on IT investments (mange created value by IT investments)

Information Security management Standard frameworks (ISMS)		
Requirement	**Framework**	**Description**
Information Security management *(Steering level)*	ISO 27001 Standard	ISO 27000 Information security management family have various optional frameworks that can be added to the standard ISO 27001 security framework

Project management framework		
Requirements	**Framework**	**Description**
management of Project *(Steering level)*	PRINCE-2	A Structured Project management model. Scrum and Agile are often used in development phase of projects.

Business Demand Delivery chain		
Requirements	**Framework**	**Description**
Business demand translated to IT requirements and IT service delivery *(Steering-level)*	Nine-Pane Model of Maes (2004)	Overview of how business needs are organized and addressed by resource and IT Service Suppliers

Information Systems Functional Support		
Requirements	**Framework**	**Description**
Management of Information Roles and Activities *(Steering level)*	Business Information Service Library (BISL)	Functional management support for business and Information workers on the use and maintenance on Information systems

Management Control on Management processes		
Requirements	**Framework**	**Description**
Control & Management on IT management processes *(Steering Level)*	Control Objective framework for Information Technologies (CobiT)	Organization wide control on IT infrastructural aspects. i.e. IT Information roles and activities

IT Service management & Support frameworks (ITSM)		
Requirement	**Framework**	**Description**
Service & Support management *(Operational level)*	Information Technology Infrastructure Library (ITIL)	IT Service & Support management framework that consist of detailed best practices and guidelines for detail IT Service delivery and IT Support management (ITSM) to the business & business Users-Organization.

Business Continuity Management frameworks (BCM)		
Requirement	**Framework**	**Description**
Business Continuity *(operational Level)*	ISO 22301	Main standard framework for Business Continuity
	ISO 22313	Guidance document for the ISO 22301 implementation
	ISO 22317	The Business Impact Analysis Standard (BIA) Provides guidance for organizations to establish, implement, and maintain a formal and documented business impact analysis (BIA) process.

8.1 Testing the Designed ITG model

The Design Science approach is used to test the concept IT governance model for Dutch municipal organizations.

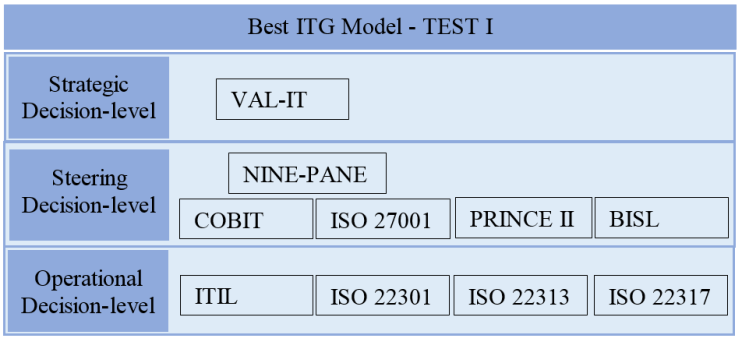


Figure 13 Concept ITG Model for Dutch Municipal Organizations

The IT Governance model concept is tested in three iterative test rounds. The respondents to this test are nine IT specialists from the municipal study case organization. After each round of interviews, the results are collected and paid off against the conditions set for: the alleged against the IT governance requirements for Dutch municipal organizations, the building criteria for a sustainable IT Governance model and the condition that IT governance frameworks must be recognized by the literature. If these conditions are met, the test results are added to the IT Governance model concept.

An outcome of the first round of the interviews shows that an IT Governance model for Dutch municipal organizations should include the Dutch Government Reference Architecture (NORA). After the first round of interviews NORA was added to the best IT Governance model for Dutch Municipal organizations.

Dutch Government reference Architecture (NORA)		
Requirement	**Framework**	**Description**
Quality management framework *(Steering level)*	Dutch Government Reference Architecture (NORA)	Description of starting points for setup and implement information management for the Dutch government organizations. The NORA architecture is relevant for the execution of all public tasks by public and private organizations. The NORA Architecture family consist of many branch tailored frameworks

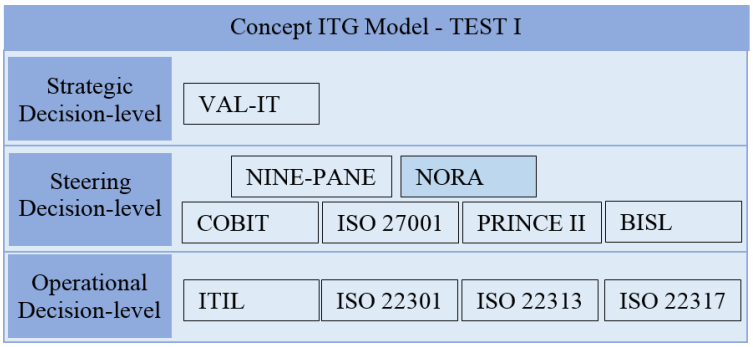


Figure 14 Concept ITG Model after the first Test Cycle

An outcome of the second round of interviews shows that that municipal organization have difficulties with the maintenance of their IT Governance. A result of the research in the second round of interview shows that municipal organizations need to have a Quality Management framework that is able to assist municipal organizations with the management and maintenance of their IT Governance. After the second round of interviews, the ISO 9000 family was added to the IT Governance model for Dutch municipal organizations.

Quality management System (QMS)		
Requirement	**Framework**	**description**
Quality management framework *(Operational & Steering level)*	ISO 9000	The ISO 9000 is a family of quality management standards. The ISO 9001; ISO 9004 and ISO 9011 are standards within the ISO 9000 family. The ISO 9001 describes the fundamentals & vocabulary (definitions) of a QMS, the ISO 9004 contain the guidelines for (continuous) improvements of a QMS and the ISO 9011 contain the guidelines for auditing management systems.

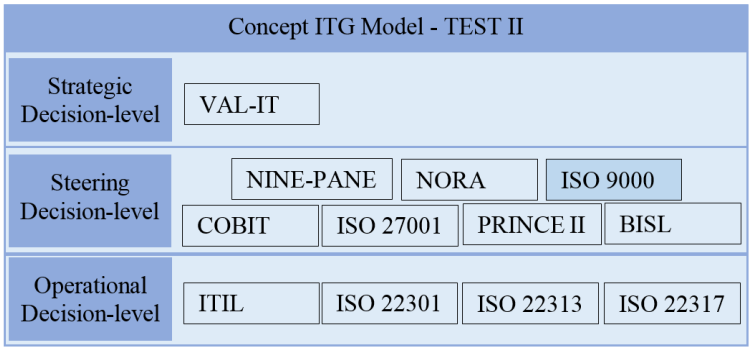


Figure 15Concept ITG Model after the second Test Cycle

The third round of interviews has not deliver additional input for the test model. Chapter 6 – "The IT Governance framework known by literature" has been updated with these additions to the research findings.

The Best ITG model has been tested among IT specialists in an iterative cycle of three interview rounds and research outcomes have been added to the test model after every iterative test cycle. The test results have been analysing and integrated into the building of the best ITG model for municipal organizations. This has led to the following IT Governance model for municipal organizations:

IT Governance frameworks on the operational decision-level:

- Service & Support Management framework (ITIL)
- Business Continuity Management framework (ISO 22301, ISO 22313 and the ISO 22317)

IT Governance frameworks on the Steering decision-level:

- The Control Management framework (COBIT) -
- The Information Security Management framework (ISO 27001)
- The Business Impact Analysis Standard (BIA

- The Project Management framework (PRINCE II)
- The Business Information System Library framework (BISL)
- The Dutch Government Reference Architecture framework (NORA)
- The Quality Management framework (ISO 9000)
- The Business Demand Delivery Management framework (Nine-pane)

8.2 Building of the BEST IT Governance Model

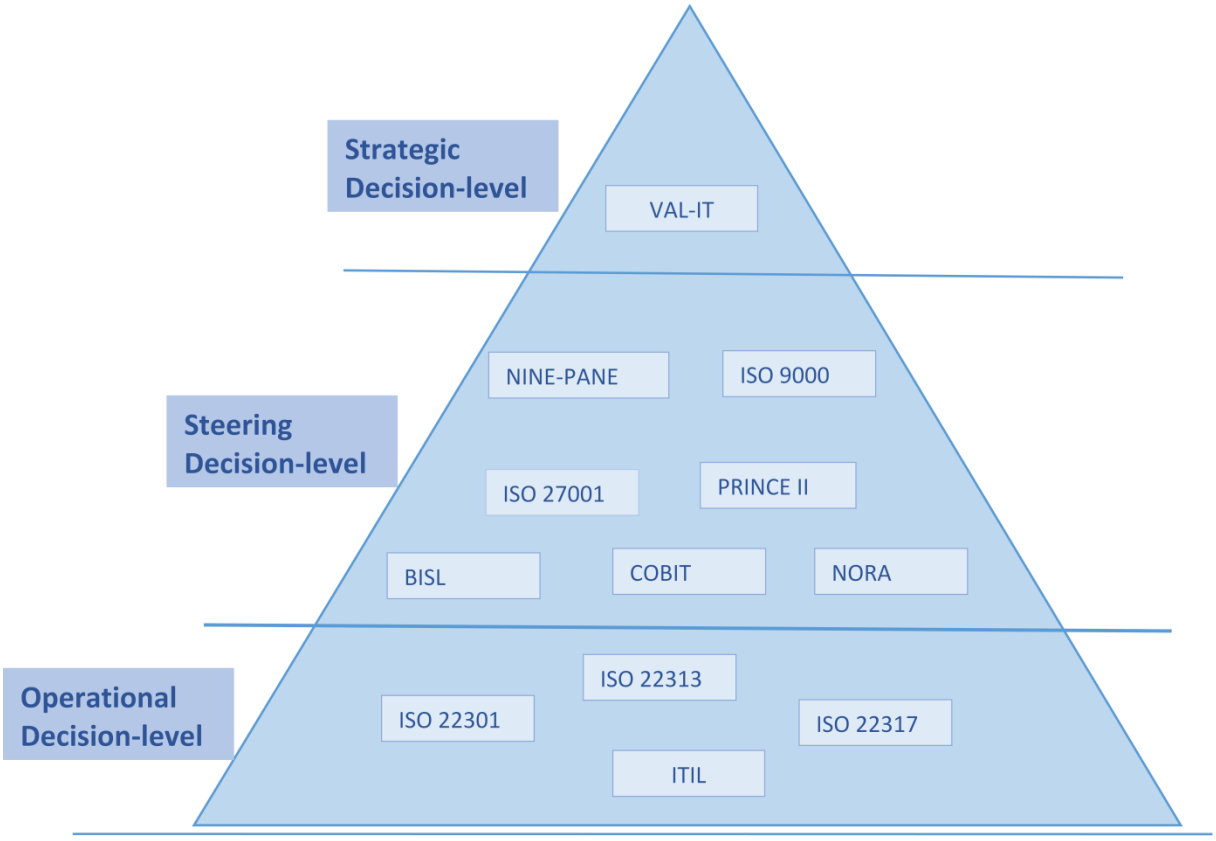


Figure 16 Sustainable IT Governance Model - René Bijnaar

9 ITG frameworks that exist in the study case municipal organization

(Sub question 4: What IT Governance frameworks exist on the various decision-levels of Dutch municipal organizations?)

9.1 The Strategic Level Environment

This chapter deals with research into the IT governance frameworks that exist at the different decision levels of municipal organizations.

The hierarchical responsibility and structure within the municipal organization is generally distributed as follows: The local politics is responsible for the direction in which the municipal policy for the coming years will be worked out. The national government and the municipal council finance the municipal organizations in carrying out their government tasks, such as maintaining and supplying public services to citizens. The city council provides guidelines with which the municipal policy for the coming years must be implemented. The CEO, together with his senior managers, ensures that these guidelines are converted into organizational objectives and devise a strategy through which these objectives can be achieved.

In the large Dutch municipal organizations, the CIO is often ultimately responsible for IT. The CIO devises and draws up an IT strategy that is based on realizing the business objectives. The CIO is the product owner of the IT Governance and is responsible for the design and maintenance of the IT governance and is supported in this by a staff department (CIO-Office).

9.1.1 The VAL-IT Framework

The municipal organization uses the IT Governance framework processes of VAL-IT at strategic level to organize their strategic organizational processes. A survey conducted among senior managers and managers shows the size of installed IT governance framework processes of the Val-IT framework that is used at the strategic level

9.2 The Steering Level Environment

A core business on the steering level of Dutch municipal organization is focus on the administrative government processes that have to do with data processing and information provisioning. The design structure of high-level IT Governance processes towards data security and data provision is often initiated and set by the CIO. The CIO office support the CIO with the management and maintenance of the IT Governance and other day-to-day IT Governance issues. E.g... The monitoring and guidance of the standard Architecture guidelines and rules towards new business initiatives for new projects)

IT Governance framework processes on the steering level aim to improve information systems and to support decision-makers with the timely delivery of valuable, reliable and accurate information. Municipal organization owned and process large amount of citizen data and information on a daily basis. The security of the privacy of citizens and government own data and information is together with the control on the main management processes a top priority for managers on the steering level.

9.2.1 Information Security & Privacy Rules

Municipal organizations are the legal owner of a large amount of data and information and have to follow legal and privacy rules on the sharing and exchanging of citizens related data and information. A large part of data that municipal has been collected through the years relates to the personal and social circumstances and environment of citizens.

According to the Dutch law the sharing and distribution of this data should be legally protected. The European Union has approved the General Data Protection Regulation (GDPR) [13] on 14 April 2016.
The EU General Data Protection Regulation (GDPR) replaces the Data Protection Directive 95/46/EC and is designed to harmonize data privacy laws across Europe, to protect and empower all EU citizens' data privacy and to reshape the way organizations across the region.
This rule will be enforced on 25 May 2018. Organizations that are not compliance by 25 May 2018, risks to be fines by the EU.

[13] The Dutch name for the "General Data Protection Regulation" (GDPR) is de "Algemene verordening gegevensbescherming (AVG)"

9.2.2 Data processing & Information provision

A primary goal and objective for municipal organizations on the Steering level is the alignment of Information provision with the business support processes and the timely delivery of valuable, reliable and accurate information to support the decision-making processes.

The business objectives towards the information provision on the steering level for municipal organizations are that information provision within municipality organizations: should be: reliable, must comply with regulations, should be confidential and of high integrity, should be delivered in a timely manner and should always be available anywhere at any time. In addition to these requirements municipal organizations need to organize and manage the data processing process in an efficient and cost-effective way. In order to meet these business objectives on the steering level, municipal organizations should have IT Governance frameworks that fully supports these criteria and requirements.

Existing ITG frameworks on the Steering level

9.2.3 The Nine-Plane Framework (Rik Maes, 2004)

Municipal organizations in the Netherlands often use the nine-frame framework of Rik Maes (2004) to organize their `Business need - IT delivery` chain processes. The Nine-Pane framework helps managers to organize the business need for IT services by translating this business need into clear IT requirements for the IT organization or IT departments. (supplier of IT services)

The Nine-plane model of Rik Maes, (2004)[14] relates to the IT Governance Supply-Delivery structure of municipal organizations. The Nine-Nine-plane model of Rik Maes, (2004) consist of a business request column, a column that translates the business request into IT requirements and an IT supplier column. The Nine-plane model also consists of three horizontal columns that represents the various decision-making levels (strategic, steering/tactical and strategic).

The Nine-plane framework of Rik Maes (2004) is often used by Dutch municipality Organizations to organise the tasks and responsibilities within the IT function business. The Nine-plane model of Rik Maes (2004) helps managers to organise, structure and translate organizations business need into the required IT deliverables and to see to it that the delivered IT resources and services meet with the business needs. The rows of the Nine-pane framework relate to the activities that takes place on the various decision-levels of municipal organizations. The columns of the Nine-Plan model

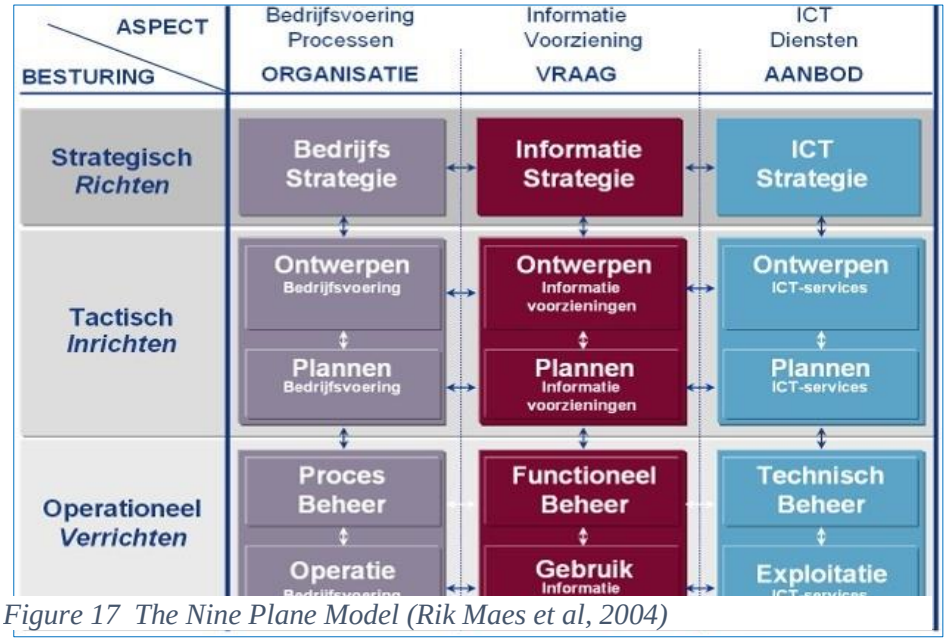


Figure 17 The Nine Plane Model (Rik Maes et al, 2004)

represent and link the following roles and processes within the IT organization.

The first column represents the business processes within municipal organizations (line management). The line management is here positioned as an end user in the first column and also as the client for the second column. The information strategy and ICT strategy are derived from the business strategy. E.g.: If the business strategy states that it wants reliable and timely delivered information to responds quickly to changes in the business environment, then this

[14] Rik Maes et al, 2004 Redefining business-IT alignment through a unified framework, Primavera Working Paper.

place demands on the integrity of data and information systems and reliability of systems interconnectivity. The demands or requirements of business needs are often written down on a business demand list or IT requirement list.

The middle column of the in the Nine-Flat model represents the information management processes. The Information management column represents an intermediate role and Information managers translate the business needs (questions) of line management into clear ICT requirements that are understood by the third column of the Nine-Plane model, which is represented as the ICT (Supplier) organization.

9.2.4 The BISL Framework

The Business Information Service Library (BISL) framework. Dutch municipal organizations use the BISL framework to define the roles and activities within the information provision. BISL stands for "Business Information Service Library" framework (BISL) and was developed in the Netherlands by RCC / Roccade and described by Deurloo et al. In an article "Model for functional management", in the Dutch annual 'IT management yearbook', edition 1998, pages 131-140 (editors: J. van Bon, Ten Hagen & Stam). BISL became a public standard in February 2005, which means that the BISL philosophy is available to everyone and can be used freely. BISL is managed by the ASL & BISL Foundation and supports best practices, which can be used to implement functional management and information management in an organization. In total, BISL describes 23 processes, divided over three levels and seven process clusters. While ITIL focuses on the IT organizations (delivery), BISL focuses on the user organization (question). BISL is often used by the Dutch municipal organization as a guideline for setting up a professional demand organization.

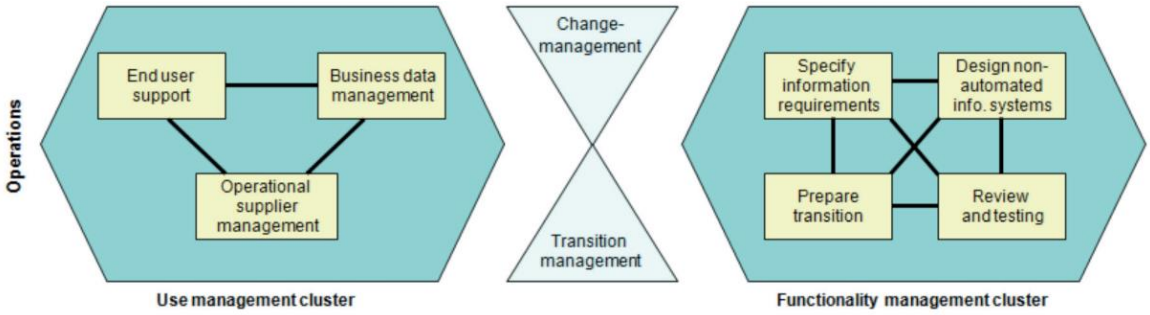
Roles and functions

Functionality management
The functional manager is responsible for the availability, performance and implementation of the business information systems. The functional managers implement changes, test business information systems according to the written procedures and manage the overall performance of the information provision systems. The Functional manager is responsible for the change management on the information provision. Changes should fit within the framework of demands and should deliver on business needs and requests. A Demand manager assist the user-organization of information workers on IT related issues and problems.

The functional manager

The functional manager is responsible for the User Organization of the business and assist the user Organization on their need for IT support. He worked close together with the IT Organization and assist Information managers with the translation of the business needs into IT requirements and see to it that those IT requirements are delivered accordingly. He supports the User-Organization of the business in their day-to-day usage of the information provision and play an important role in the business –to-IT delivery chain...

A central question on the operational level is: Why and how to change the Information Provisioning?



The connection processes Change management & Transition management between the User management cluster and "Functional management cluster" need to improve cooperation and collaboration between functional management and user management in regard to the changing of the Information provision and the effect on the usage of the information provision by the users of the study case municipal organization.

BISL Processes on the steering level
(Product manager, system owner, information manager);

The BISL processes on the steering level consist of the Planning & Control, Financial management, requirement management, and contract management processes. The information managers on the steering level are responsible for the quality of the information provisioning within the municipal organizations. The steering processes supports managers with the steering of the functional management and user management processes (i.e. the management, maintenance, renewal and connecting processes) the steering processes monitors and control the activities in terms of costs, benefits, needs, contracts service levels and planning).

A central question on the steering level is: How to steer the information provision?

BISL processes on the strategic level

Setting up an Information strategy
(CIO - Chief Information Officer)

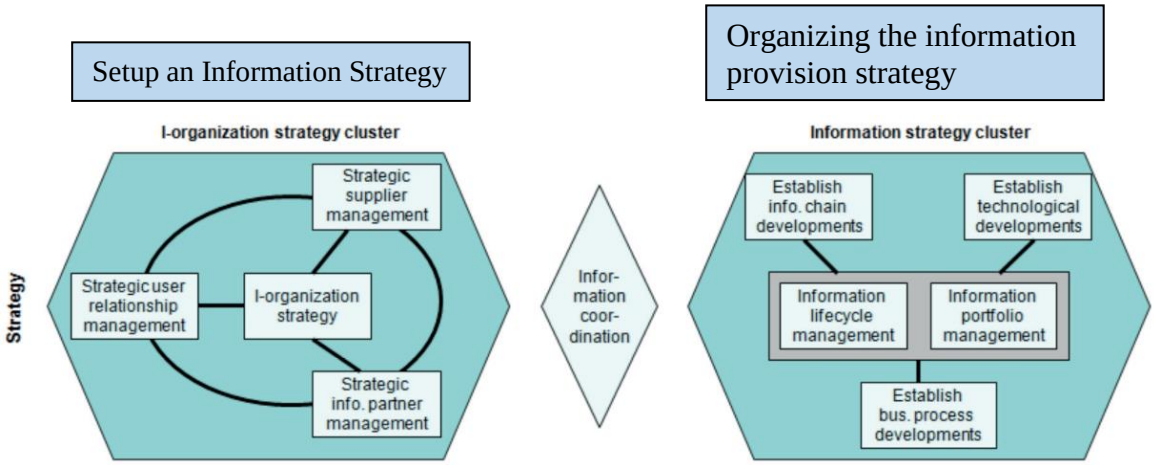
Within large municipal organizations, the CIO is responsible for the initiation of an IT strategy. Information strategy within municipal organizations does not only focus on achieving short term organizations and management goals but focus more on future development of the Information provision. The CIO is often assisted by a staff department (CIO office), that help him with the day-to-day Information related issues... The function of the information unit manager in municipal organizations often forms the bridge between the IT and the business organization. And between the strategic and steering level. The Information unit manager works close together with the CIO and senior business managers. The large Dutch municipal organizations are collaborating with each other and with the national government in order to align information provision and data sharing in a legal and lawful way and to find a sustainable and secure information provision governance for municipal organizations

A central question on the strategic level is: How will the information provision look like in the future?

Organizing an Information provision strategy
(CIO, Information Unit manager)

The information unit manager is the head of the Information provisioning teams within municipal organizations. The Information unit managers work close together with CIO's in municipal organizations and translate the IT strategies into policies and guidelines for business managers. Business managers incorporate these IT policies into their business objectives and together with information managers work-out procedures for management and monitoring of these IT related procedures.

Connection between processes on the strategic level
The connection on the strategic decision-level between the processes:" Setting up an information strategy" and "organizing the information provision strategy" needs to be aligned on the different decision-making areas in order to coordinate the information.



A Central question on the setup of an Information strategy is: How to acts in line with the agreements

A central question on organizing the information provision is: how to organize the execution and steering of the information provision?

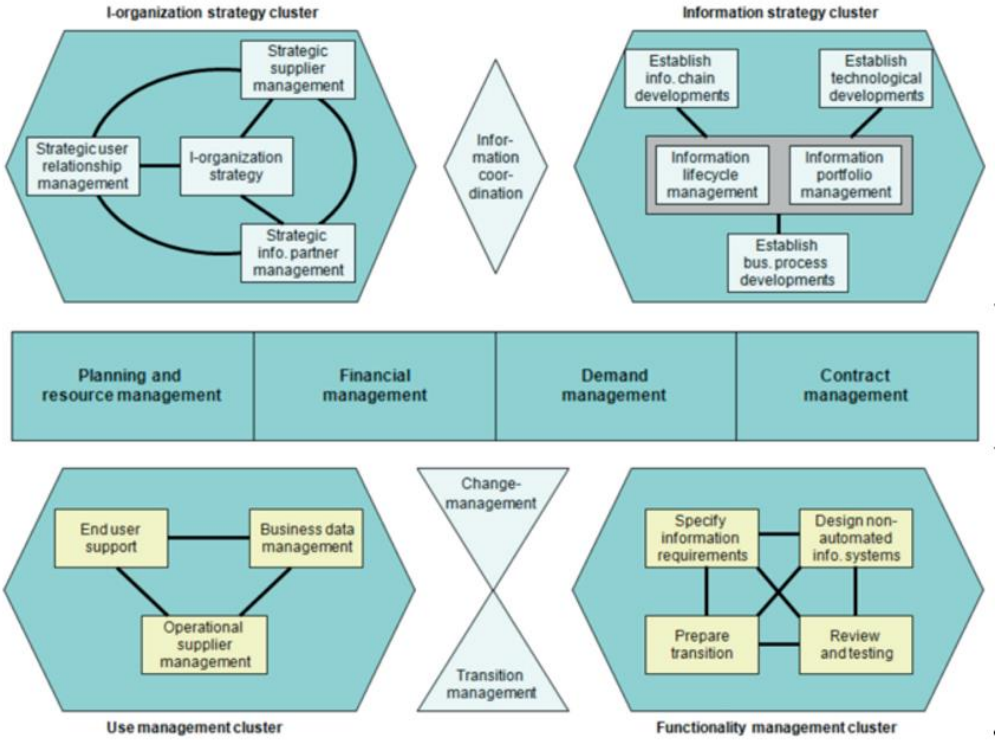


Figure 18 BISL Framework,

9.2.5 The I-Vision Framework

The I-Vision framework is a none-standard information provisioning framework. This framework is use by the study case municipal organization to help Information departments to organize their data & information provision processes in a secure and efficient way. The I-Vision framework is having been introduced by the CIO and should support managers of the study case municipal organization to organize data & information processing within the municipal organization. (I.e. by the reuse of once collected data).

The 10 principles of the I-Vision framework are:

1. Information provisioning belongs to the business;
2. Information provisioning is designed in an urban contexts and frameworks;
3. Information services are reused and shared;
4. Data is reused and shared;
5. Information services must be safe and reliable;
6. The costs of providing information are always set against the utility and the necessity;
7. Information processing and recording is based on European national and open standards;
8. The IT Organization of the SCMO is responsible for the managing of the IT infrastructure; 9. Information services are regulated by the business but executed by the market and
10. Information provisioning is realized through proven solutions.

9.2.6 The PRINCE-II Project Management Framework

A core business of municipal organization is project management. Municipal organization initiate many projects on an annual base. A large part of the projects that are initiated by municipal organizational need IT support or IT participation. The involvement and participation of IT in business projects means that compliancy of business projects with the standard IT architecture will be assess (i.e. use of standard IT resources and IT services). A project management standard used within municipal organizations is the Prince-2 project management framework.

Prior to the initiation of projects within municipal organizations, the following, the following questions need to be answered:

- What are we trying to do?);
- When will we start? (execution date);
- What do we need? (prerequisites);
- Can we do it alone, or do we need help? (The setup and Organization);
- How long will it take? (duration and planning and the financial support);
- How much will it cost? (The requested project.).

The answers to these questions will be used for the composition of a business case and will influence future decision on whether a project will be approved or rejected.

9.3 The Operational Level Environment

The operational environment of municipal organization focusses on the IT support for the Users-organization of the business and the delivery of IT resources and IT services. The resources and services are managed, maintain and deliver through an IT network infrastructure that need to be manage and maintained.

The Operations departments

In order to support the users-organization on question about the use and implementation of IT resources, it is necessary to have an IT Service-desk on the operational level.

The Service and Support management process

A Service and support management framework that is often used on the operational level by municipal organization is the ITIL framework. Various software applications have incorporated the ITIL framework into their software suite to deliver IT Services Management & Support services to the Users-organizations of business organizations

Other IT Services management processes on the operational level are the relation management processes which aim to manage and maintain the customer relation between the business and the IT Service & Support departments. Service management departments handle and clarify questions about the availability of IT support services from the standard IT Service catalogue. A special IT process on the operational level of municipal organizations is the Business continuity management process.

Business Continuity Management

The Business Continuity Management (BCM) helps organizations to prepare for disasters and to protect their ongoing business processes against the consequences of disruptions (i.e. fire, flood or a cyber-attack). BCM for the IT Organization relates to the impact of an emergency on ICT services and the measures that have to be taken to restore these IT services as quickly as possible. This concerns the protection and continuation of the "standard" IT Service Provision to the business (i.e. measures taken to use automated standard workplace- or a redundant e-mail environment).

IT Resources

Hardware Resources

Large municipal organizations have in the last years steadily replaced their hardware servers with virtualized servers. In that way they can quickly responds to customers request for new (virtualized) servers by using scripting technics for the automation installation, configuration and roll out of standardized servers.

The large Dutch municipal organizations often use VMWare virtualization software to virtualize their server and workstation environment (i.e. Microsoft Virtualization software or VMWare hypervisor virtualization software). A Hypervisor is a technique through which one can virtualize the hardware resources of a server.

The storage cabinet nowadays often consists of a large amount of hard disk that are arrange in an enclosure, which is a hardware box with some intelligence (i.e. IBM V70000 storage units) Enclosures are arranged in server racks and server's racks are stored in data centres, which are specially prepared rooms (i.e. in regard to temperature, cooling, security etc.)

Software Resources

Software IT resources within municipal organizations can be categorized into standard software and customized software and special software. Standard software within municipal organizations relate to the Microsoft Office application suite, SQL and Oracle database software. Government organization have often long-lasting contract for use and support of this standard software. Customized software may be necessary for special environment or for special purposes (i.e. software to manage all cables in the ground or the trees in a specific area). Special software is special security software that is use to protect data and/or information (i.e. software tokens)

Network resources

The network infrastructure of Dutch municipal organizations consists of a network infrastructure, with routers and switches that interconnect with the internal network and often through a centralized government portal with the outside world (i.e. internet). The Wi-Fi network is part of municipal organizations network infrastructure. Central IT departments within municipal organization manage and maintain the data and telecom networks infrastructure (including Wi-Fi); they manage the routers, switches and firewalls of the central IT Organization. Today IT departments within municipal organization often use mobile equipment (i.e. smartphone, tablets). A new trend within municipal organization is to outsource their IT infrastructure to private business partners. The reason given is that they say that hardware has become a commodity that it's cheaper to outsource.

Workplace resources

The decision of the national government to restrict formal decentralization within municipal organization has empower centralization and standardization within central IT departments of municipal government organizations. Workplace environment of Dutch municipal organizations have been steadily standardized and the amount of the many different computers have been replaced by uniform desktop computers from one supplier, a virtual desktop environment with standard Office (i.e. Microsoft Office suite) and Web applications (intranet, HRM-, or collaboration web apps) is common nowadays in large Dutch municipal organizations

Service delivery

Besides the delivery of IT resources, Municipal's IT organizations also deliver IT services to the business organizations. The many IT services of IT departments are listed in a catalogue that contain standard IT Services. The service catalogue is often managed and maintained by an account management department that manage and maintain the agreed IT procedures towards the delivery of IT Services with the business. An IT service manager manage and maintain the relationship with the business and is among others responsible for the Service delivery and the advice and evaluation on the provided services.

9.3.1 The ITIL Framework

(Information Technology Infrastructure Library)

The IT functions on the operational level of municipal organizations relates to the "Information Technology Infrastructure Library framework" (ITIL), which is a Service & Support management framework that is used to organise management and maintenance of IT support and IT delivery to municipals business organizations.

Service & Support Management Suite

A Service Management and Support Software Suite is often used to: organize and setup: Resource and Service management, manage Support and Delivery criteria (i.e. efficiency & effectiveness on IT services). A Software application package that is often used to organize Service management Support within municipal organizations is the Topdesk Service Management and Support Software Suit. Topdesk is developed in 1993 by two Dutch engineers of the OGD Company who wanted to improve Service management within organizations. These engineers started their own company named Topdesk in 2004. In 2005, version 2 of the Topdesk suite was integrated with the ITIL standard framework for helpdesk.

IT Objectives on the operational level for municipal organizations often focus on the delivery of an excellent public service to customers (citizens).

10 The ITG status of the Study Case Municipal Organization

(Sub question 5: What is the status of the IT Governance frameworks within the study case municipal organization?)

10.1 The Strategic Decision-Level

In the research into the status of IT Governance within the Dutch municipal organizations, a survey is used that has been set out among senior managers and managers of the municipal study case study. The research examines the status of the high-level IT Governance framework processes on the various decision levels of the study case municipal organization. The research uses reference IT Governance models that are recognized by the literature and are accepted by the business community as valid IT Governance frameworks.

At the strategic decision level, the reference IT governance framework "Val-IT" is used to see whether IT Governance framework processes on the strategic level are in place and are backed by organization procedures (installed) or not. The research considers procedures that have been partly installed, as procedures that are not installed.
The research on the status of IT Governance framework processes can have one of the following outcomes:

- The high-level reference framework process of the VAL-IT Governance framework is installed. In that case the IT Governance framework process is marked as "installed". This means that the procedures are in place and that the execution of tasks take place in a structured manner.
- The high-level reference framework process of the VAL-IT Governance framework is partly installed. In that case the IT Governance framework process is marked as "partly installed". This means that not all of the procedures are in place and that execution of tasks take place on ad-hoc basis.
- The high-level reference framework process of the VAL-IT Governance framework is not installed. In that case the IT Governance framework process is marked as "not installed". This means that the procedures are not in place.

Value Governance Framework processes

Value Governance	ITG Processes Val-IT		
	Yes	**Partly**	**No**
VG1 Establish informed and committed leadership	x		
VG2 Define and implement processes		x	
VG3 Define portfolio characteristics	x		
VG4 Align & integrate value management with enterprise financial planning		x	
VG5 Establish Effective Governance monitoring	x		
VG6 Continuous improve value management practices		x	

Table 1 Value Governance Processes of the VAL IT Framework

10.1.1 Value Governance

The Value Governance domain establishes the overall Governance framework, including defining the Portfolios, required to manage investments and resulting IT services, assets and resources; monitors the effectiveness of the overall governance framework and supporting processes, and recommends improvements as appropriate. The Value Governance domain addresses the structures and processes required to ensure that the value management practices are embedded in the Organization.

The Value Governance processes are: The engagement of leadership; The definition and implementation of value management practices; The definition of portfolio types and criteria needs set by the business; The integration of the latter into the Organization's financial management processes; The establishment of effective Governance monitoring over the value management practices; The continuous improvement cycle through the implementing of lessons learned

Management questions for the Value Governance Domain	**Yes**	**Partly**	**No**
Are we doing the right things?	x		
Are we getting the expected value by managing IT?		x	

Portfolio Management Framework processes

7. Portfolio management	ITG Processes Val-IT		
	Yes	**Partly**	**No**
PM1 Establish strategic direction and investment mix		x	
PM2 Define the availability and resources of funds	x		
PM3 Manage the availability of human resources	x		
PM4 Evaluate and select programs to fund	x		
PM5 Monitor and report on investment portfolio performance	x		
PM6 optimize portfolio performance	x		

Table 2 Portfolio management Processes of the VAL IT Framework

10.1.2 The Portfolio Management

The goal of portfolio management is to ensure that an enterprise secures optimal value across its portfolio of IT-enabled investments. An executive commitment to portfolio management helps enterprises to: Establish and manage resource profiles; Define investment thresholds; Evaluate, prioritise, and select, defer, or reject new investments; Manage and optimise the overall investment portfolio; Monitor and report on portfolio performance; IT-enabled business investment programmes need to be managed as part of the overall portfolio of investments so that all of the enterprise's investments can be selected and managed on a common basis. The programmes in the portfolio must be clearly defined, evaluated, prioritised, selected, and managed actively throughout their full economic life cycles to optimise value for individual programmes and the overall portfolio.

Management questions for the Portfolio Management Domain	**Yes**	**Partly**	**No**
Has the business strategy been translated into the IT strategy and goals?		x	
Are there tactical plans for HR management?		x	

Investment Management Framework processes

8. Investment management	ITG Processes Val-IT		
	Yes	**Partly**	**No**
IM1 Business case development is installed & available	x		
IM2 Program management is executed and managed	x		
IM3 Benefits realizations from the programmes are actively manage	x		
IM4: life-cycle costs and benefits are fully developed		x	
IM5: detailed candidate program business case is fully developed		x	
IM6: The program has been launching and manage	x		
IM7: The operational IT portfolios is updated	x		
IM8: The business case is updated	x		
IM9: The program is Monitored and report on	x		
IM10: The program is Retired			

Table 3 Investment management Processes of the VAL IT Framework

10.1.3 The Investment Management

The goal of investment management (IM) is to ensure that the enterprise's individual IT-enabled investments contribute to optimal value. When Organizational leaders commit to investment management they improve their ability to: Identify business requirements; Develop a clear understanding of candidate investment programmes; Analyse alternative approaches to implementing the programmes; Define each programme and document, and maintain a detailed business case for it, including the benefits' details, throughout the full economic life cycle of the investment.

Management questions for Investment Management Domain	**Yes**	**Partly**	**No**
Is the realization of the benefit register planned?		x	
Does the program's business case to reflect the current status?		x	

10.1.4 Research findings on the strategic decision-level

The design research findings on the Highlight Value Governance processes of the reference ITG framework Val-IT:

1. *Highlight Value Governance processes in place and backed by procedures*
   - Establish informed and committed leadership
   - Define portfolio characteristics
   - Establish Effective Governance monitoring
1. *Highlight Value Governance processes in place, but not backed by procedures*
   - Define and implement processes
   - Align & integrate value management with enterprise financial planning
   - Continuous improve value management practices
2. *Highlight Value Governance processes not in place.*
   - None

The research findings on the Highlight Portfolio management processes of the reference ITG framework Val-IT:

1. *Highlight Portfolio management processes in place and backed by procedures*
   - Highlight Plan & Organise processes in place and backed by procedures
   - Highlight Plan & Organise processes in place and backed by procedures
   - Define the availability and resources of funds
   - Manage the availability of human resources
   - Evaluate and select programs to fund
   - Monitor and report on investment portfolio performance
   - Optimize portfolio performance
   - Highlight Plan & Organise processes in place, but not backed by procedures
   - Highlight Plan & Organise processes not in place
3. *Highlight Portfolio management processes in place, but not backed by procedures*
   - Establish strategic direction and investment mix
4. *Highlight Portfolio management processes not in place.*
   - None

The research findings on the Highlight IT Investments processes of the reference ITG framework VAL-IT:

1. Highlight *Investment management* processes in place and backed by procedures
   - Business case development is installed & available
   - Program management is executed and managed
   - Benefits realizations from the programmes are actively manage
   - The program has been launching and manage
   - The operational IT portfolios is updated
   - The business case is updated
   - The program is Monitored and report on
   - The program is Retired
5. *Highlight Investment management processes in place, but not backed by procedures*
   - life-cycle costs and benefits are fully developed
   - detailed candidate program business case is fully developed
6. *Highlight Investment management processes not in place*
   - None

10.2 The Steering Decision-Level

At the steering decision level, the reference IT governance framework "CobiT" is used to see whether IT Governance framework processes on the steering level are in place and are backed by organization procedures (installed) or not. The research considers procedures that have been partly installed, as procedures that are not installed. The research on the status of IT Governance framework processes can have one of the following outcomes:

- The high-level reference framework process of the CobiT Governance framework is installed. In that case the IT Governance framework process is marked as "installed". This means that the procedures are in place and that the execution of tasks take place in a structured manner.

- The high-level reference framework process of the CobiT Governance framework is partly installed. In that case the IT Governance framework process is marked as "partly installed". This means that not all of the procedures are in place and that execution of tasks take place on ad-hoc basis.
- The high-level reference framework process of the CobiT Governance framework is not installed. In that case the IT Governance framework process is marked as "not installed". This means that the procedures are not in place.

In order to setup the IT Governance framework processes on the steering decision-level, organization should have the high-lighted CobiT framework processes in place and theses processes should be backup by procedures or guidelines.

Plan & Organise Framework processes

Plan & Organise	ITG Processes CobiT		
	Yes	**Partly**	**No**
PO1 Define a strategic IT Plan		x	
PO2 Define the information architecture	x		
PO3 Determine technological direction		x	
PO4 Define IT processes, Organization and relationships		x	
PO5 Manage the IT Investment		x	
PO6 Communicate management aims and direction	x		
PO7 Manage IT human resources			x
PO8 Manage quality			x
PO9 Assess and manage IT risks		x	
PO10 Manage projects	x		

Table 4 Plan & organize processes of the CobiT framework

10.2.1 The Plan & Organize Domain

The highlighted Planning & Organization Processes include the handling of strategies and tactics. The purpose is to identify how IT can support the achievement of the business objectives. It is important that an IT strategy plan is made and communicated throughout the Organization. This part also includes the responsibility to manage IT investments, projects, quality, and human resources. To handle this, it is necessary to define the IT organization and relationship.

Management Questions for the Plan & Organize Domain	**Yes**	**Partly**	**No**
Are IT and the business strategy aligned?		x	
Is the enterprise achieving optimum use of its resources?		x	
Does everyone in the Organization understand the IT objectives?		x	
Are IT risks understood and being managed?	x		
Is the quality of IT systems appropriate for business needs?		x	

Acquire & Implement Framework processes

Acquire & Implement	ITG Processes CobiT		
	Yes	**Partly**	**No**
AI1 Identify automated solutions			x
AI2 Acquire & maintain application software		x	
AI3 Acquire & maintain technology infrastructure	x		
AI4 Enable operation & use	x		
AI5 Procure IT resources			x
AI6 Manage changes		x	
A17 Install and accredit solutions and changes		x	

Table 5 Acquire & Implement processes of the CobiT framework

10.2.2 The Acquired & Implement Domain

After having planned and organise the IT Governance processes on the planning and organizing level, the next step is to translate this strategy into actions on the Acquire and implement level. The Acquire and Implement processes are installed in order to: Identify automated solutions, Acquire & maintain application software, Acquire & maintain technology infrastructure, enable operation & use, Procure IT resources and to Manage changes.

Management Questions for the Acquired & Implement Domain	Yes	Partly	No
Are new projects likely to deliver solutions that meet business needs?	x		
Are new projects likely to be delivered on time and within budget?		x	
Will the new systems work properly when implemented?	x		
Will changes be made without upsetting current business operations?	x		

Deliver & Support Framework processes

Deliver & Support	ITG Processes CobiT		
	Yes	Partly	No
DS1 Define & manage service levels			x
DS2 Manage third party services			x
DS3 Manage performance and capacity		x	
DS4 Ensure continuous service	x		
DS5 Ensure systems security			x
DS6 Identify & allocate costs			x
DS7 Educate and train users	x		
DS8 Manage Service-Desk and incidents	x		
DS9 manage the configuration	x		
DS10 Manage problems		x	
DS11 Manage Data			x
DS12 Manage the physical environment			x
DS13 Manage operations	x		

Table 6 Deliver & Support processes of the CobiT framework

10.2.3 The Deliver & Support Domain

This domain is concerned with the actual delivery of required services, which includes service delivery, management of security and continuity, service support for users, and management of data and operational facilities. The IT Governance processes are: Define & manage service levels; Manage third party services; Manage performance and capacity; Ensure continuous service; Ensure systems security; Identify & allocate costs; Educate and train users; Manage Service-Desk and incidents; manage the configuration; Manage problems; Manage Data; Manage the physical environment and Manage operations

Management questions for the Delivery & Support Domain	Yes	Partly	No
Are IT services being delivered in line with business priorities?		x	
Are IT costs optimized?		x	
Is the workforce able to use the IT systems productively and safely?		x	
Are adequate confidentiality, integrity and availability in place for information security?		x	

Monitor & Evaluate Framework processes

Monitor & Evaluate	ITG Processes CobiT		
	Yes	Partly	No
ME1 Monitor IT			x
ME2 Evaluate the monitored & Evaluate IT			x
ME3 Ensure regulatory compliance		x	
ME4 Provide IT Governance	x		

Table 7 Monitor & Evaluate processes of the CobiT framework

10.2.4 Monitor & Evaluation Domain

All IT processes need to be regularly assessed over time for their quality and compliance with control requirements. This domain addresses performance management, monitoring of internal control, regulatory compliance and governance.

Management questions for the Monitor & Evaluate Domain	Yes	Partly	No
Is its performance measured to detect problems before it is too late?		x	
Does management ensure that internal controls are effective and efficient?		x	
Can IT performance be linked back to business goals?	x		
Are adequate confidentiality, integrity and availability controls in place for information security?		x	

10.2.5 Research findings on the steering decision-level

The research findings on the Highlight Plan & Organise processes of the reference ITG framework CobiT

1. *Highlight Plan & Organise processes in place and backed by procedures*
   - Define the information architecture,
   - Communicate management aims and direction,
   - Management of projects
2. *Highlight Plan & Organise processes in place, but not backed by procedures*
   - Defining a strategic IT plan,
   - Determine the technological direction,
   - Manage IT investment,
   - Manage and assess risks
   - Define IT Organization, Processes and relationship
3. *Highlight Plan & Organise processes not in place.*
   - Manage IT Human Resources Management
   - Manage Quality

The research findings on the Highlight Acquire & Implement processes of the reference ITG framework CobiT:

4. *Highlight Acquire & Implement processes in place and backed by procedures*
   - Acquire & maintain technology infrastructure
   - Enable operation & use
5. *Highlight Acquire & Implement processes in place, but not backed by procedures*
   - Acquire & maintain application software
   - Manage Changes
   - Install and accredit solutions and changes
6. *Highlight Acquire & Implement processes not in place.*
   - Identify automated solutions
   - Procure IT resources

The research findings on the Highlight Delivery & Support processes of the reference ITG framework CobiT:

7. *Highlight Delivery & Support processes in place and backed by procedures*
   - Ensure Continuous Service
   - Educate and Train Users
   - Manage ServiceDesk and Incidents
   - Manage the Configuration
8. *Highlight Delivery & Support processes in place, but not backed by procedures*
   - Manage performance and Capacity
9. *Highlight Delivery & Support processes not in place*

- Define and manage Service levels
- Manage third party Services
- Ensure system security
- Identify & allocate costs

The research findings on the Highlight Monitoring & Evaluation processes of the reference ITG framework CobiT:

10. *Highlight Monitoring & Evaluation processes in place and backed by procedures*
    - Provide IT Governance
11. *Highlight Monitoring & Evaluation processes in place, but not backed by procedures*
    - Ensure Regulatory Compliance
12. *Highlight Monitoring & Evaluation processes not in place*
    - Evaluate the monitored & Evaluate IT
    - Monitor IT

10.3 The Operational Decision-Level

At the operational decision level, the reference IT governance framework "ITIL" is used to see whether IT Governance framework processes on the operational level are in place and are backed by organization procedures (installed) or not. The research considers procedures that have been partly installed, as procedures that are not installed.

The research on the status of IT Governance framework processes can have one of the following outcomes:

- The high-level reference framework process of the ITIL Governance framework is installed. In that case the IT Governance framework process is marked as "installed". This means that the procedures are in place and that the execution of tasks take place in a structured manner.
- The high-level reference framework process of the ITIL Governance framework is partly installed. In that case the IT Governance framework process is marked as "partly installed". This means that not all of the procedures are in place and that execution of tasks take place on ad-hoc basis.
- The high-level reference framework process of the ITIL Governance framework is not installed. In that case the IT Governance framework process is marked as "not installed". This means that the procedures are not in place.

In order to setup the IT Governance framework processes on the steering decision-level, organization should have the high-lighted ITIL framework processes in place and theses processes should be backup by procedures or guidelines.

Service Management Processes

Service & Support Management Processes	Installed ITG Processes		
	Yes	**Yes/No**	**No**
SS1 Financial Management for IT Services		x	
SS2 Capacity Management			x
SS3 Availability Management	x		
SS4 IT Service Continuity Management			x
SS5 Service Level Management	x		
SS6 Security Management (service delivery)		x	
SS7 Change Management	x		
SS8 Release Management	x		
SS9 Problem Management	x		
SS10 Incident Management	x		
SS11 Configuration Management	x		
SS12 Service Desk	x		
SS13 Security Management (security)			x
SS14 IT infrastructures Management	x		
SS15 The Business Perspective		x	
SS16 Application Management	x		
SS17 Software Asset Management	x		

Table 8 Service & Support processes from the ITIL framework

10.3.1 The Service & Support Management Domain

The highlighted Service & Support management domain include the handling of operational strategies and tactics. The purpose is to identify how IT can support the achievement of the business objectives. The mission of municipal organization on the operational level is continuous service delivery to customers and they want to do that in an efficient and cost-effective way to make sure that taxpayer's money is well spent. In the service & support domain it is important to secure business continuation and continuous IT support for the business user-organization. In order to setup the Service & Support management processes of the IT Governance on the operational decision-level, organization should have the high-lighted ITIL framework processes in place and they should be backup by procedures or guidelines.

Management Questions for the Service & Support Domain	Yes	Partly	No
Are IT Service & Support strategy and the business strategy aligned?		x	
Are IT Services being delivered in line with business priorities?		x	
Do employees understand the IT Service & Support objectives?		x	

10.3.2 Research findings on the operational decision-level

The research findings on the Highlight Service & Support management processes of the reference ITG framework ITIL:

13. *Highlight Plan & Organise processes in place, but not backed by procedures*
    - Security Management (service delivery)
    - The Business Perspective
    - Capacity Management
    - IT Service Continuity Management
    - Security Management (security)

11 The GAP analyses

This GAP analysis uses the results of chapter 9 and aims to present the IT Governance framework processes that have not yet been installed in the study case municipal organization more clearly. Chapter 9 examines the status of the IT governance framework processes of the study case municipal organization. Use was made here of reference IT Governance frameworks that are recognized by the literature and are used on the three decision layers (strategic, steering and operational) of municipal organizations. Because it is important from the research perspective to know which IT governance framework processes have not yet been installed, the result of chapter 9 has been translated into a gap analysis that gives a clearer view on the missing IT governance framework processes

11.1 Missing ITG framework processes on the Strategic level

1. *The Not Installed Service & Support management processes.*
   - Security Management (service delivery)
   - The Business Perspective
   - Capacity Management
   - IT Service Continuity Management
   - Security Management (security)

11.2 Missing ITG framework processes on the Steering level

1. *None- Installed Plan & Organize processes*
   - Highlight Plan & Organise processes in place, but not backed by procedures
   - Defining a strategic IT plan,
   - Determine the technological direction,
   - Manage IT investment,
   - Manage and assess risks
   - Define IT Organization, Processes and relationship
   - Manage IT Human Resources Management
   - Manage Quality

2. *None- Installed Acquire & Implement processes.*
   - Acquire & maintain application software
   - Manage Changes
   - Install and accredit solutions and changes
   - Identify automated solutions
   - Procure IT resources

3. *None- Installed Service & Delivery processes.*
   - Manage performance and Capacity
   - Define and manage Service levels
   - Manage third party Services
   - Ensure system security
   - Identify & allocate costs

4. *None- Installed Monitoring processes*
   - Ensure Regulatory Compliance
   - Evaluate the monitored & Evaluate IT
   - Monitor IT

11.3 Missing ITG framework processes on the Operational level

1. *The None- Installed Value Governance management processes:*
   - Define and implement processes
   - Align & integrate value management with enterprise financial planning
   - Continuous improve value management practices

2. *The None- Installed Portfolio management processes*
   - Establish strategic direction and investment mix

3. *The None- Installed Investment management processes*
   - life-cycle costs and benefits are fully developed
   - detailed candidate program business case is fully developed

12 Conclusions and Recommendations

12.1 Conclusions

(Main question 1: On what aspects can the IT Governance of municipal organizations be improved?)

(Main question 2: What is the best IT Governance Model for Municipal Organizations?)

The design and building of a sustainable IT Governance for Dutch municipal organizations has gone through several research stages

- The need and demands of Dutch municipal organizations for choosing the best possible IT Governance framework for each decision level (Chapter 5).
- The design criteria for building a sustainable IT governance model for Dutch municipal organizations (chapter 6).
- The extensive literature study on IT governance frameworks with their characteristics (chapter 7).
- The research on the IT governance frameworks that already existed at the various different decision levels of the study case municipal organization (chapter 9).
- The status of the IT Governance within the study case municipal organization and the surveys and interviews held with managers and employees of the study Case Municipal Organization (Chapter 10).

We believe that the results of this extensive research on IT governance frameworks provide sufficient evidence for building a sustainable IT governance model for (Dutch) municipal organizations (Figure 20).

We think that municipal organizations should take into account the needs of their sector, the criteria for building sustainable IT governance, the standard IT governance frameworks recognized by the literature and supported by companies. As valid IT governance frameworks. In addition, Dutch municipal organizations have to consider whether it is necessary to retain specific IT governance frameworks that have traditionally been part of their IT Governance.

We emphasize that although this research classifies IT governance into three decision-making layers (strategic, tactical and operational), in reality there is only one IT governance, consisting of many IT-related aspects and components, for example different IT governance frameworks). These IT framework guidelines and guidelines are designed to constantly communicate with each other and work together to achieve business IT alignment.

Although research shows that there is a Business Continuity program in place that is based on the IT Service management (ITSM) and Best Practices, we strongly recommend to use the ISO standards that have been examine in this research (ISO 22301, ISO 22313 and ISO 22317) to manage and secure their Business Continuation. These ISO have an official certification program, known the literature and are accepted by the world-wide business community as valid ITG framework standards.

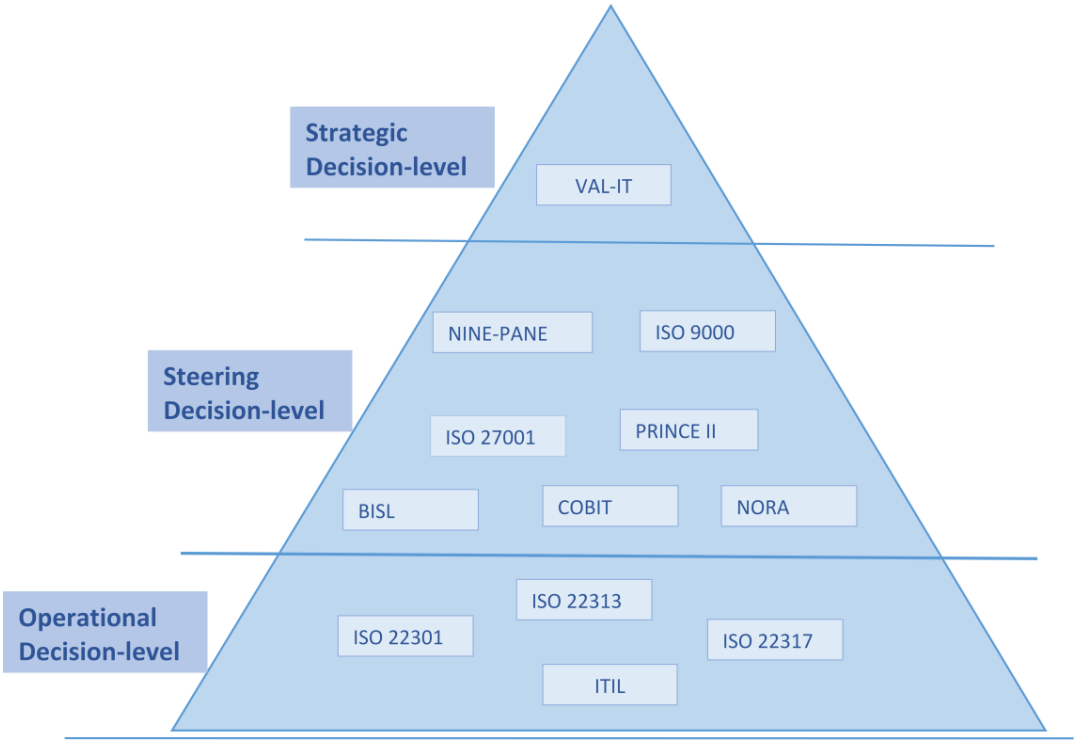


Figure 19 the Best Sustainable IT Governance Model for Municipal Organizations

12.2 Recommendations

A starting point of this research was to add knowledge to science and to contribute to the improvement of IT Governance at Dutch Municipal Organizations. We believe that the research has succeeded in this effort. Based on this research, knowledge in the area of IT Governance has been added to science and a sustainable IT Governance model has been designed and constructed, that can be used by municipal organizations to setup a sustainable IT Governance for improvement of their government business performance.

We advise (Dutch) municipal organizations that have IT governance to use "the Best Sustainable IT Governance model" presented here as a reference model for: the further optimization of their IT governance, the creation of value for their stakeholders and the further improvement of the business - IT alignment.

We recommend municipal organizations that do not yet have an IT governance to use “the Best sustainable IT Governance model”, as presented here as a reference to setup their IT Governance in order to create Value for their Stakeholders and align IT to their business.

The basic IT Governance model as presented in this research provides a solid basis for Dutch municipal organization to build a solid basis IT Governance model. Since IT developments are progressing and new innovations are continuously occurring, we recommend further research in the Area of IT Governance in order to secure future Business-IT alignment. The basic IT Governance model as presented here can be used to setup a solid basic IT Governance model.

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Appendix

1. The research on IT Governance Requirements

The research on IT Governance requirements is a qualitative research that is conducted in the largest Dutch municipal organization. The study case municipal organization works together with other large Dutch municipal organizations in a metropolitan setting and with the national government on ITG issues (i.e. towards the regulations of Information security and Privacy).

The research study on the ITG requirements for Dutch municipal organizations is conducted by examining the organizations literature and by taking interviews with managers and staff of the Study Case Municipal Organization. In addition, interviews have been taken with individual IT Specialist of other large Dutch Municipal organizations.

Although the research has been setup along the strategic, steering and operational decision-levels, we like to emphasize that IT Governance withheld all IT related aspects and interactions between the various ITG frameworks that exist within an organization.

1.1 The Interview Questions on ITG Requirements

- What are the ITG requirements of the strategic level of Dutch municipal organizations
- What are the ITG requirements of the steering level of Dutch municipal organizations
- What are the ITG requirements of the operational level of Dutch municipal organizations

***Resp.1**:*

Strategic level
Make IT investments plans; Set the course for present and future IT development; Translate Government regulations into IT guidelines Value creation for stakeholders, IT Strategy, IT Service portfolio, ITG Processes that focus on the creation of value for the business and their stakeholders.

Steering level
IT support for projects, overall IT connectivity (easily connect to hard and software), easy exchange of data between different IT platforms (standardization); management of business demand for IT resources, management of security and information systems,

Operational level
IT Helpdesk support for users of IT products, management of Incidents, management of IT resources support for business projects, training IT specialists (new skills), Delivery of IT services to the business, management of hard and software, business relation management

Resp.2:

Strategic level
A Strategic Business and IT plan; monitor value creation of IT investment plans, Monitor and evaluate IT overall IT Processes. Rerun on investments for IT investment programs, strategic plans for IT centralizations and standardizations.

Steering level
IT Support for functional management processes, IT participation in project, management of information systems, IT security management.

Operational level

Helpdesk to solve IT related problems, direct communication with an IT specialist to quickly resolve the IT disruptions. Computers, printer's PC's, management of the service catalogue, procurement and account management, management the SLA agreements and obtained licenses, secure business availability

***Resp.3**:*

Strategic level

Having a Strategic IT plan and IT Investment plan for the coming years; Having a strategic IT portfolio; monitor IT Costs and return on investments for IT spending's, evaluate IT Investments

Steering level

Automation of business processes, support for functional management, Translate Government regulations into IT guidelines, data and information security and secure business continuation, demand management, IT support for Project and business Processes

Operational level

Computer hardware, Applications, a fast network, a ServiceDesk that listen to users and understand the essence of them complain, quickly solve disturbances in the business demand and IT supply relation.

Resp.4:

Strategic level

Check the Return on Investments for IT vestments projects, build realistic and achievable portfolio; communicate the IT vision & Strategy, Modernize IT support for public Services; make and evaluate a strategic IT plan and communicate it to the entire company; Monitor spending of Tax payers money; monitor IT spending on Projects

Steering level

Manage Information systems, manage security on data and privacy issues; translate lawful regulations into IT policies; management, functional management, information security; IT participation in project, management of information systems, IT security management.

Operational level

the IT helpdesk, delivery of computer hardware and software, security of servers and computers, training of IT staff, implementation of web services (web-based applications), Business relation management

Resp.5:

Strategic level

Setup an IT Strategy and Investment plan; Align IT with the business (i.e. Align IT investments plan with the business portfolio); evaluate IT investments plans and IT investments; monitor value creation for stakeholders

Steering level

IT support for Project and business Processes; communicate IT policies throughout the entire organization; manage incident and problems; manage IT Support for functional management processes, monitor and evaluate SLA's; IT security on data access and information distribution

Operational level

The Helpdesk, management of incidents, the delivery and maintenance of Computer hardware; Facilitate working from Home, Life Cycle management, Secure user & business data and information (i.e. Back-up solutions, Access rights)

Resp.6:

Strategic level

Align IT to the business processes, make plans to Centralize and Standardize IT; Translate government regulations into IT processes (i.e. Information security & Privacy); Create value for stakeholders, Make an IT Strategy, monitor IT spending

Steering level

Manage and support IT processes and Services; Participate in business and IT projects; manage potential IT risks, manage IT service delivery process;

Operational level

Management of SLA and license services, manage the delivery of IT Resources and Services, management of IT deliveries on business demands, management of user support, IT Incident management, IT change management, IT Configuration management, availability of IT network services

Resp.7:

Strategic level

Make a strategic IT investment plan; Populate the IT business portfolio with traditional and innovative IT tools; Standardize IT, Strategic plans to work close together with private partners of IT related issues. Manage IT Investments; monitor and evaluate the realization of IT programs;

Steering level

Management of data & information security, Procurement of IT resources; manage knowledge of IT specialists (training and education); automation of IT processes; manage functional support; IT support for IT and business projects, Procedures to automate operational processes;

Operational level

PC, Workstations, Servers, Laptops, mobile equipment and the Network infrastructure, prevent disruptions in the service delivery, manage the network, manage the IT ServiceDesk.

Resp.8:

Strategic level

Have an IT vision & strategy, Collect the right IT Services in the portfolio; reserve budget for strategic IT asset maintenance and replacements (i.e. security and availability of the Service Delivery infrastructure). Monitor IT spending; make a strategic plan with a duration that is longer that one year

Steering level

Standard procedures for the usage, support and management of IT, SLA's towards the IT resource and Service delivery; Data and Information security; manage IT risks for organization processes.

Operational level

The ServiceDesk, User support on IT hardware, software and services, Hard and software implantation, management of new hard & software, secure the network, Incident management, IT support for users & Business management of IT service catalogue, IT configuration management

Resp.9:

Strategic level

A robust IT strategy that can last for many years, steadily improve this robust IT strategy, evaluate IT investments and spending, and steadily improve it strategy Return on Investments, Portfolio management, Value creation for stakeholders, IT Strategy, ITG Processes that focus on the creation of value for the business. Monitor the spending of taxpayer's money.

Steering level

IT support for projects, IT Service desk; overall IT connectivity (easily connect to hard and software), Manage business demand for IT Services, easy exchange of data between different IT platforms (standardization); manage information security; manage information systems, management of IT Services.

Operational level
Overall IT connectivity (anywhere and always available), the Helpdesk and management of hard & Software, a 24-hour Helpdesk, prevent disturbances in the IT infrastructure and quickly solve occurring disturbances in the IT infrastructure.

Resp.10:

Operational level
Translate organization policy into a strategic IT plans and organize IT accordingly. Explain the strategic IT Vision to the entire organization, make one Standard IT Infrastructure that speak the same language in the entire organization. (IT specialist should use the same tools & database software). Monitor IT spending

Steering level
IT support for IT and business projects, overall IT connectivity (easily connect to hard and software), easy exchange of data between different IT platforms (standardization); Efficient management of business demand for IT resources.

Strategic level
IT support for users, organizations Projects, Pilots and Processes, delivery of computer hardware and applications, use of IT resources effective and manage the costs, management of IT processes, usage of cloud and web services,

Resp.11:

Strategic level
Make strategic Investment plans for IT Services and capabilities, monitor whether business goals that relates to IT are accomplished. Evaluate the Business value that is created by IT.

Steering level
Management of IT projects, overall IT connectivity, easy exchange of data between different IT platforms (standardization); management business demand for IT Services, manage security of information systems, Setup standard procedures for IT Support and management

Operational level
The ServiceDesk, Support for software installations and usage, manage SLA of external partners, management of the network, implementation of IT hardware and applications, availability of IT Services and IT resources; Efficient use of IT resources,

2. The ITG Requirements

The outcomes of the interviews on the ITG requirements has been grouped and categorized into the following IT Governance framework requirements:

The Strategic level

- An ITG framework for processes that focus on value creation for the business and their stakeholders and controlling the portfolio

- An ITG framework for processes that focus on monitoring and evaluating the IT investments (spending of taxpayer's money); Balance the business and IT portfolio with present and feature investment plans,

The Steering level:

- An ITG framework for processes that aim to secure the data processing and Information delivery streams within municipal organizations (i.e. security procedures and guidelines for usage, access. provisioning, sharing).

- An ITG framework for processes that aim to secure the delivery of public services and optimize Service delivery to the business.

- An ITG framework for processes that aim to assist managers of Dutch municipal to organize and manage the "Business Demand - IT Service Delivery chain".

- An ITG framework for processes that aim to manage functional support for users and business and the maintenance of information systems.

- An ITG framework for processes that focus on the alignment of the various management processes to assist managers with the control and managing of the various management processes.

- An ITG framework for processes that assist managers to structure and standardize the initiation, progress and ending phases of IT projects in order to control spending of taxpayer's money.

The operational level

- An IT Governance framework that supports organization processes that relates to the managing and maintenance of IT resources, the delivery of IT Services and the IT support to the users and business.

- An ITG framework for processes that aim to prevent and anticipate to unexpected disruptions of the business, by preparing recovery measures in case that one of the high profiled disruptions may occur.

3 The ITG Frameworks

The answers of the interviewees on ITG requirements are compared- and matched with the research results of the standard ITG frameworks that are known by literature (chapter 7). This comparison research has led to the following results.

3.1 ITG Frameworks on the Strategic level

The VAL-IT Framework

Research into the IT Governance requirements shows that value governance on IT investments and value creation for the company and stakeholders are important business requirements at the strategic level. The study on IT governance frameworks known in the literature and accepted by industry shows that the standard IT-Val-IT framework meets these requirements.

3.2 ITG Frameworks on the Steering level

The ISO 27001 Framework

Research into the requirements of IT governance shows that privacy and security issues relating to the use, provision and sharing of data and information are important requirements at the steering level. The research on frameworks for IT governance frameworks that are known by the literature and are accepted by the business community shows that the standard ISO 27001 framework meets these requirements.

The PRINCE II Framework

Research into the IT governance requirements shows that the prevention and / or limitation with regard to the increasing exceedances on project budgets and the prevention of a bad corporate image are important requirements at the steering level. The research into frameworks for IT governance that are known to the literature and are accepted by the business community shows that the standard framework PRINCE II meets these requirements.

The BISL Framework

Research into the IT governance requirements shows that that the functional management of information workers and the maintenance of information systems are important requirements on the steering level. The research into frameworks for IT governance that are known by the literature and are accepted by the business community shows that the standard framework BISL meets these requirements

The Nine-Pane Framework

Research into the IT governance requirements shows that the structuring and management of the “business demand - IT supply delivery chain” is an important requirement on the steering & operational level. The research into frameworks for IT governance that are known by the literature and are accepted by the business community shows that the standard Nine-pane framework of Mas (2004) meets these requirements

The COBIT Framework

Research into the IT governance requirements shows that the need to address the dis-alignment, the lack of coordination and collaboration between the various organization processes are important requirements on the steering level. The research into IT governance frameworks that are known by the literature and are accepted by the business community shows that the standard framework COBIT meets these requirements

3.3 ITG Frameworks on the Operational level

The ITIL Framework

The research shows that concerns about IT support for the users and business organizations, the delivery of IT resources and services results in ITG requirements on the operational level. The research shows that the ITG framework ITIL, is known by the literature as a standard ITG framework is able to address the requirements for IT support for the user organization (service desk) and the delivery of IT resources and services to the company (Business).

The Business Continuity Framework

Research into the IT governance requirements shows that the managing of unexpected interruptions in the public service delivery and the rapid restore of these public services are important requirements on the steering level. The research into for IT governance frameworks that are known by the literature and are accepted by the business community shows that the standard Business Continuity frameworks ISO 22301, ISO 22313 and ISO 22317 meet to these requirements

4. The research on the design Criteria

In order to find design criteria's that contribute to the building of a sustainability IT Governance model, we have conduct a research on the IT governance frameworks that are known by the literature and are accepted by the business as valid standard IT governance frameworks (chapter 7). These Standard ITG frameworks has proven their sustainability because they exist more than three decades.

Research findings:
Most of these framework starts as frameworks to address a specific business need. Through the years these frameworks have been gradually evolved. Despite the many improvements that have been continuously added, these frameworks have managed to keep their original identity. Frameworks sometimes incorporated best practices of other frameworks within their own framework or add small improvements to their framework without losing their identity and business focus (core-business. We believe that this business focus and the continuous improvements have led to the recognition of these ITG frameworks by the literature and the acceptance of the business community that to see these frameworks as sustainable standard frameworks. The recognition by the literature and the acceptance by the business community have seen to it that these frameworks have become standard and sustainable IT Governance frameworks for the business area that they focus on.

We think that these standard and sustainable IT Governance frameworks that are recognize by the literature and accepted and trusted by the business community, together with the results of the research on the ITG requirements will form excellent design criteria for the building of a sustainable IT Governance model for Dutch municipal organizations.

Research results on the Sustainable aspects of the ITG frameworks known by literature are that they are:

- Standard frameworks
- Maintained by an ITG authority of body
- They regularly come with new versions
- Are accepted by the business community

5. Testing the concept IT Governance model

The research uses the design-scientific approach to build a sustainable IT governance model for (Dutch) municipal organizations. A focus group of IT specialists participated in the interviews and evaluation of the

concept ITG mode for Dutch municipal organizations. The respondents are expected to have sufficient knowledge on IT Governance and able to evaluate the completeness of the ITG model. Most of these IT specialist work for many years in the IT industry and are consider to be expert in the field of the information technology.

The research outcome of the ITG requirements and the ITG frameworks have been used to construct a concept ITG model for Dutch municipal organizations. The iterative test cycles consist of interview questions that are aim to improve the constructed ITG model for Dutch municipal organizations. This concept ITG model and the improvements are shared with the respondents before each interview.

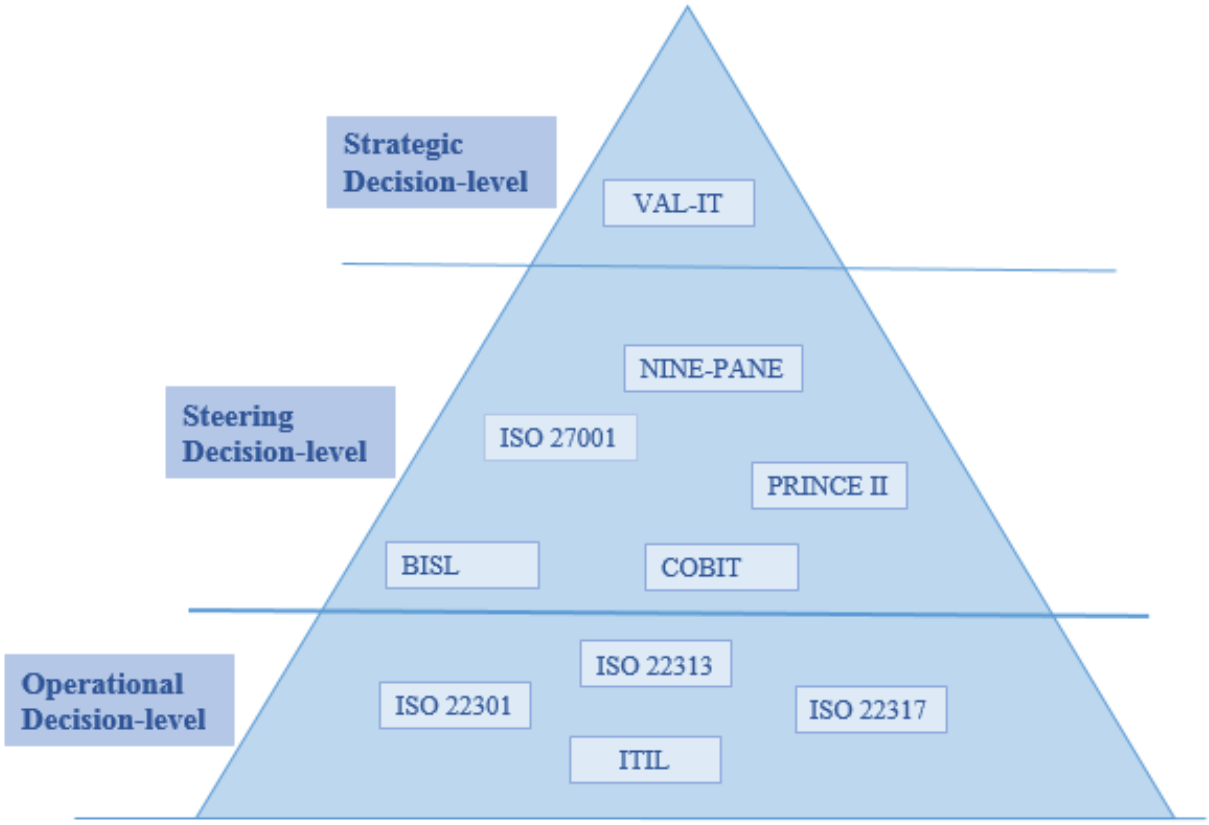

Figure 20 Concept ITG Framework before the Test round

5.1 Interview Questions (first test round)

Respondent 1	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?		x	
Are there ITG requirements missing?	x		An IT Architecture for the IT infrastructure is missing and should be part of the model.
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 2	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?		x	
Are there ITG requirements missing?	x		A framework that is able to set and manage KPI's of business performance; An IT Architecture framework is missing;
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 3	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 4	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?		x	
Are there ITG requirements missing?	x		The Dutch Government reference Architecture framework (NORA) is missing
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 5	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 6	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 7	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?	x		
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 8	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?		x	
Are there ITG requirements missing?		x	An Architecture framework is missing among the requirements;
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 9	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

In the first round the standard ITG Architecture framework for Dutch municipalities, "NORA" was added to the concept sustainable IT Governance model. NORA stands for Dutch Government Reference Architecture and is a mandatory ITG Architecture framework for Information exchange between Dutch municipalities. Other suggestion from the interviews were already present in the concept ITG model. (i.e. de IT ServiceDesk is integrated with the ITIL framework in Dutch municipal organizations. The research on ITG frameworks that are known by the literature did not find any ITG framework that was able to central set and manage KPI's of the various ITG frameworks. We believe that organizations can improve their business processes by following the Setup and implementation guidelines of the standard ITG frameworks from this research We believe that by doing so, they will be able to tune and improve the interaction between the various ITG frameworks and their IT Governance as a whole.

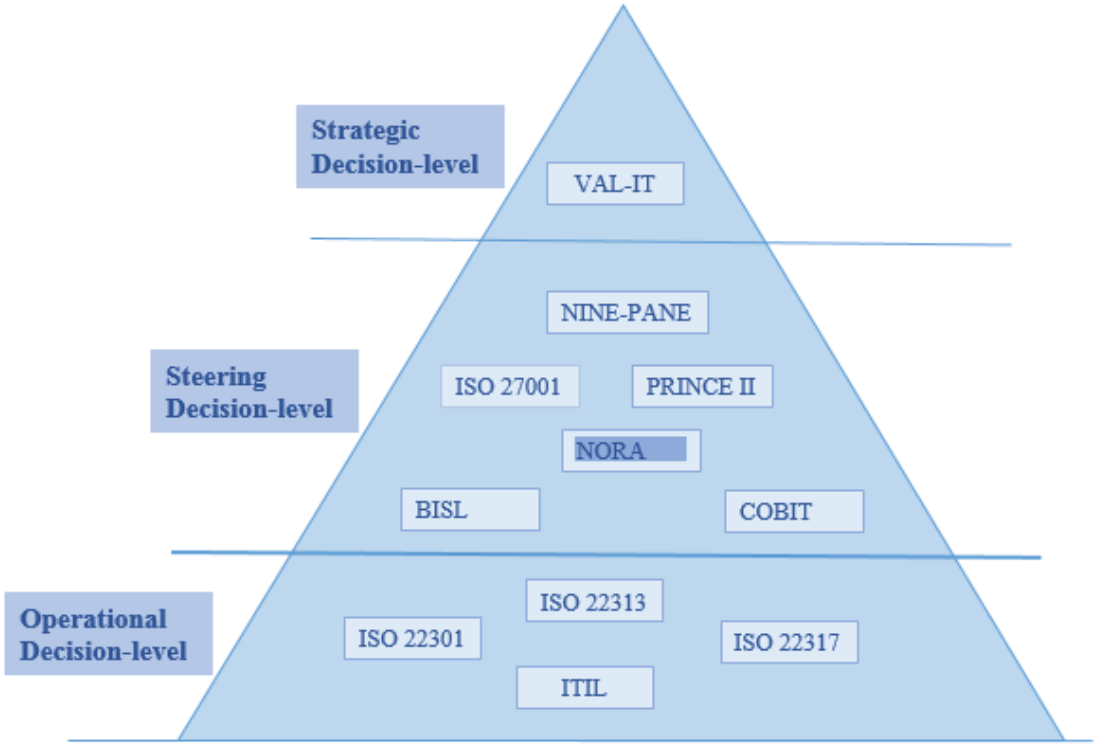

Figure 2 Concept ITG Framework after the first Test round

5.2 Interview Questions (second test round)

Respondent 1	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 2	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 3	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 4	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 5	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?	x		Quality model for measuring improvements
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 6	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 7	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 8	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	A quality management framework is missing among the requirements.;
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 9	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

In the first round the standard ITG Architecture framework for Dutch municipalities, "NORA" was added to the concept sustainable IT Governance model. NORA stands for Dutch Government Reference Architecture and is a mandatory ITG Architecture framework for Information exchange between Dutch municipalities. Other suggestion from the interviews were already present in the concept ITG model. (i.e. de IT ServiceDesk is integrated with the ITIL framework in Dutch municipal organizations.

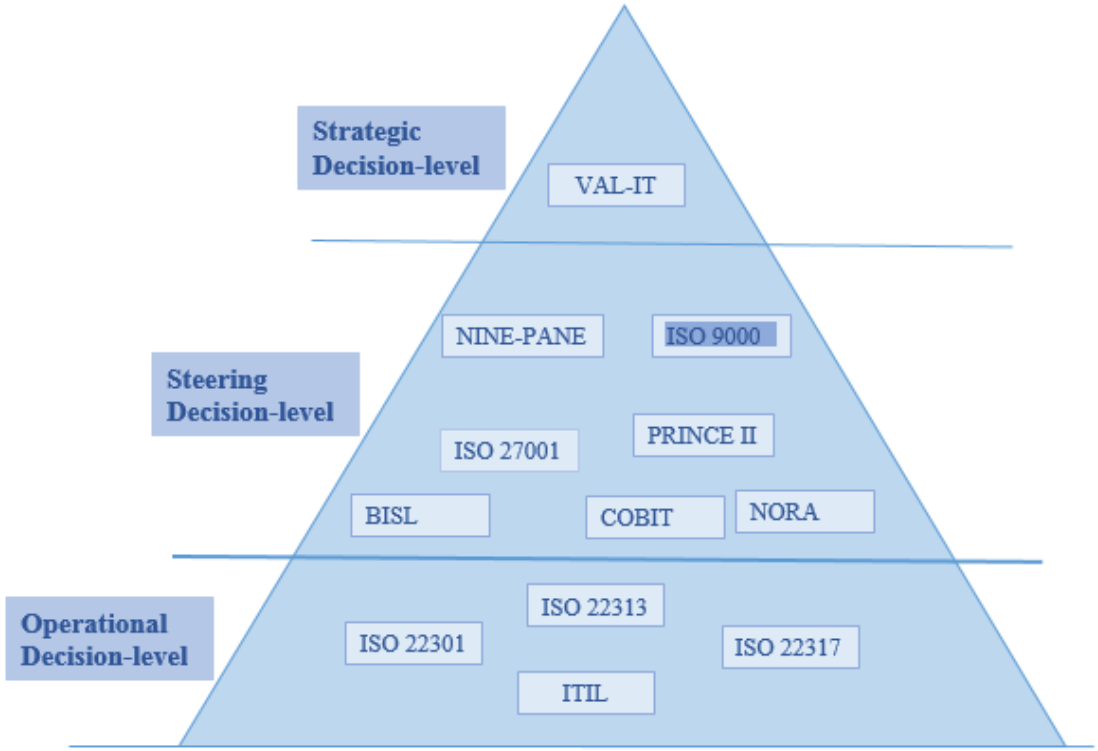

Figure 21 Concept ITG Framework after the second Test round

5.3 Interview Questions (third test round)

Respondent 1	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 2	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 3	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 4	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 5	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 6	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 7	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 8	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

Respondent 9	Yes	No	Remark
Are the ITG requirements representable for Dutch municipalities?	x		
Are the ITG requirements complete?	x		
Are there ITG requirements missing?		x	
Are there other ITG frameworks that can be added?		x	
Are there other IT Governance frameworks missing?		x	

The third round of interviews did not deliver additional improvements to the concept sustainable IT Governance model for Dutch municipal organizations.

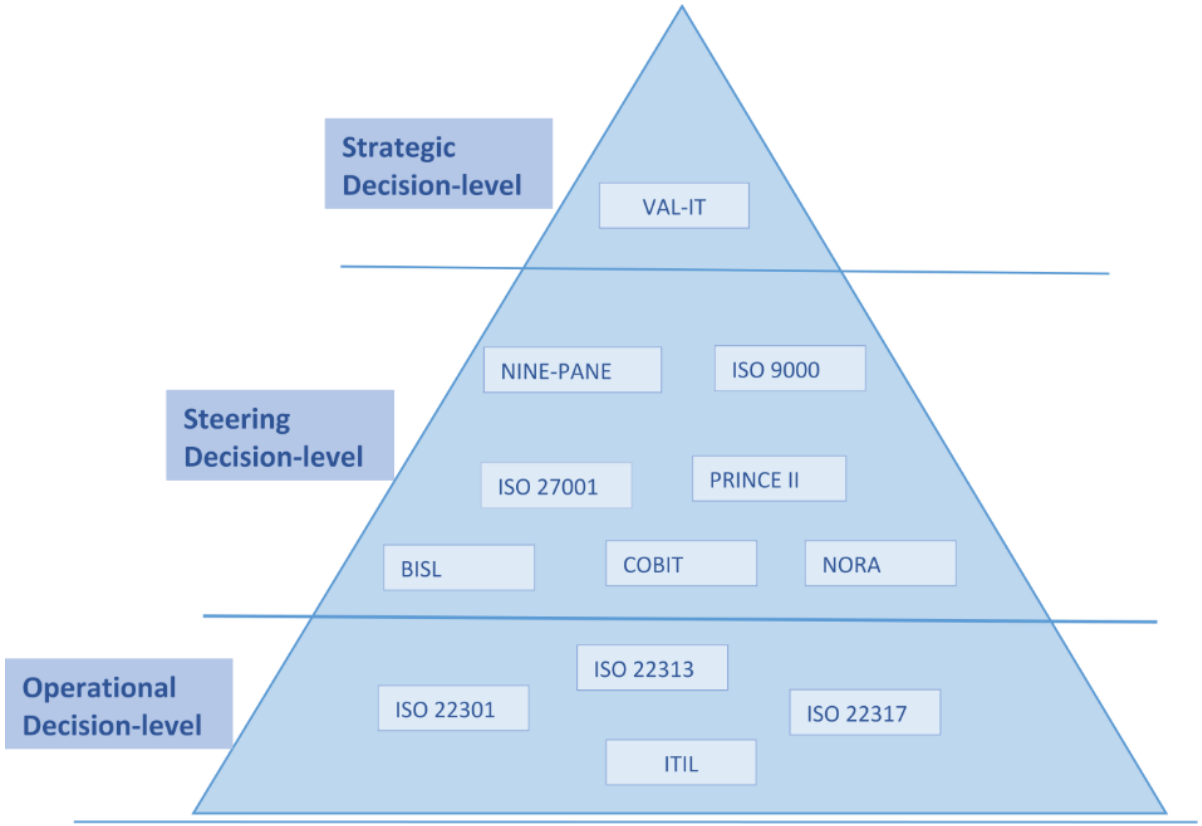

Figure 22 Final IT Governance for Dutch Municipal Organisations after three iterative test rounds