

IT Process Architectures for Enterprises  
Development: A Survey from a Maturity Model  
Perspective

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### **Abstract**

During the last years much has been published about IT governance. Close to the success of many governance efforts are the business frameworks, quality models, and technology standards that help enterprises improve processes, customer service, quality of products, and control. In this paper we (i) survey existing frameworks, namely ITIL, ASL and BiSL, (ii) find relations with the IT Governance framework CobiT to determine if the maturity model of CobiT can be used by ITIL, ASL and BiSL, and (iii) provide an integrated vista of IT processes viewed from a maturity model perspective. This perspective can help us understand the importance of maturity models for increasing the efficiency of IT processes for enterprises development and business-IT alignment.

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# Chapter 1

## Introduction

Over the last years organizations have recognized that the degree of dependence on IT to reach their business goals is increasing. Evolved from this dependence, comes the need for IT services which correspond to the business goals and satisfy the requirements and expectations of customers with a high level of quality.

As a result, emphasis on the developments of IT applications to manage IT services is also increasing. At this point the exploitation of IT applications is a crucial factor for organizations.

*Through the life cycle of IT products, beside the development, the exploitation phase take 70-80% of both time and money resources assigned to the IT projects. Effectiveness and efficiency of IT management are decisive for the success of the IT applications. This applies to each type of organization, large or small, in the public or private sector. (Translation from [18], p.31)*

Information System Management (ISM) is a key component of successful implementation and utilization of information and communication technology in an organization [12]. ISM refers to all activities and organizational structures needed to establish and maintain the information infrastructure of an organization at the operational, tactical and strategic level. With ‘organizational structures’ we mean the relationships among business units, and those involved, within organizations; and the term ‘information infrastructure’ concerns an infrastructure which represents the functionality of the information systems.

In this survey, we approach ISM from two perspectives: governance control and ISM frameworks. On the one hand, controlling helps to efficiently deliver IT service. We think of controls as mechanisms that hold ICT <sup>1</sup> in check in terms

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<sup>1</sup>ICT is an abbreviation for Information and Communications Technology, and we consider this term as IT and related technology. The term ICT is used extensively in the ASL and BiSL literature.

of bringing value and managing risk. To put it another way, we can say that controls are safeties that permit to have a better preservation of value through the management of risks. As Stephen Katz, former chief information security officer for Citibank, once said, “Controls don’t slow the business down; like brakes on a car, controls allow you to go faster” [02]. The brakes on a car not only serve to stop the car and keep it under control, they enable the driver to actually go faster and still remain safe. Actually a number of formal IT control frameworks have been developed, and CobiT is one of these frameworks.

*The aim of CobiT is to support management and process owners by means of IT Governance. CobiT helps with bridging the differences between business risks, the resulting need, from that, for the control of the business processes, and supporting IT services and IT infrastructure.* (Translation from [20], p.01)

On the other hand, we have ISM frameworks. The trio ITIL, ASL and BiSL helps in that area and they form an answer to the well-known management model of Looijen [12]: technical management, applications management and functional management. These three management forms are now available to be implemented in organizations: ITIL for technical management, ASL for applications and BiSL for functionality. They do not stand apart from each other. Between the functional management domain and the other two management domains exist some links, but of course every domain knows its own specific points of interest, activities and responsibilities. In Figure 1.1, taken from [16], we can observe this:

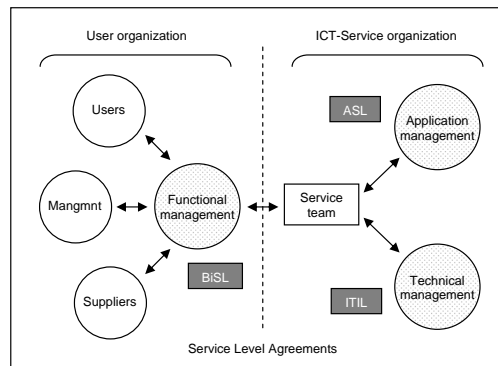


Figure 1.1: Position of ITIL, ASL and BiSL (source: [16]).

*Functional management has been positioned as a component of the user organization. Functional management is, on behalf of the user organization and management, responsible for the total provision of*

*information in the organization. In this context, functional management acts as a client for the ICT-Service organization.*

*ICT-Service organization provides all services in the field of technical management and applications management which are necessary to provide information to the user organization. The activities of applications management and technical management come together in the service team. This service team operates as integrator of the provided service. The service team forms with that an univocal contact point for the functional management in the name of the ICT-Service organization. (Translation from [16], pp. 21-22)*

When surveying and mapping the processes of CobiT and the three management models, a fundamental structure can be obtained to control and assess enterprises' IT processes in order to determine lacks of governance having in mind the establishing of improvement strategies. We selected CobiT because CobiT is the standard framework for IT Governance and IT Governance is an important topic for the VITAL<sup>2</sup> project where we are working. In addition, CobiT, as we will explain in Chapter 3, is a control framework which establishes best practices for the IT management, term related with ITIL, ASL and BiSL.

ITIL is a well-known standard for IT management; it guides organizations through some best practices to get to have a high quality technical management. Both ASL and BiSL were originally developed by PinkRocade, The Netherlands. ASL is often used to improve applications management and is becoming an international framework in this area, and BiSL is one of the newly introduced frameworks covering the links between business, infrastructure and applications, working in the information management area.

With such survey, we can (i) observe the relation between CobiT and ITIL, ASL and BiSL (this relation helps providing a view of what extensive CobiT is covered by the three management models), (ii) determine if the Maturity Model of CobiT can be used by ITIL, ASL and BiSL, (iii) provide an integrated vista of IT processes viewed from a maturity model perspective. This perspective can help understand the importance of maturity models to increase IT processes' efficiency for enterprises' development and business-IT alignment.

The paper is structured as follows. Chapter 2 explains the Maturity Model perspective we took to write this survey. In Chapter 3 we give a description of the four frameworks mentioned. Chapter 4 gives an overview, and shows results, of the comparison of the frameworks and describes the way we did such comparison; and Chapter 5 discusses some relevant points related to our results. Finally, Chapter 6 concludes the paper and gives possible future research directions.

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<sup>2</sup>See [www.vital-project.org](http://www.vital-project.org)

## Chapter 2

# The Maturity Model Perspective

Experience with improving the quality of IT services has taught us that it can rarely be enough to systematize and fix the available IT applications. The causes by which services do not satisfy the requirements of the users are frequently tracked back to the way the organization is controlled and managed. The permanent improvement of quality demands a certain maturity of the organization [18]. At this point, we can talk about maturity approaches because maturity approaches have their roots in the field of quality management.

*“Maturity Models have been around for some time. The basic idea of a maturity model is to assess work process practices (development, management, manufacturing, customer service, any repetitive process) against a ‘norm’ and identify areas of possible improvement. These improvements must connect to a business benefit.”* ([01], p.01)

Glen Alleman, in his article “Some Thoughts on Project Management Organizational Maturity Models” [01], says that over the years, the idea of maturity assessment has become the means of identifying risks, focusing management on improvement and identifying areas of business retributions. So, we can say that the establishment of an organization’s maturity can induce the development of an improvement strategy. This strategy can be converted into a concrete plan which can help to get paybacks. So, an organization can establish goals for process improvement and identify opportunities for business optimization. By this assessment and by the planning of improvements an organization begins its processes evolving from an ad-hoc state to an efficient and effective state: the development of its maturity.

A maturity model will also:

- allow an organization to benchmark itself with other internal or external organizations. With a benchmarking process, an organization can measure

its operations against similar operations of other entities for the purpose of improving its own processes, which is an intention of the maturity model.



This processes improvement is one area that has caught the attention of most of the organizations. They try to develop and execute a process management improvement strategy, and those that have succeeded in this area are gaining real economic value. Unfortunately, as Gainer notes [05], there is often significant resistance in some organizations to a formalized process. Some organizations are certainly truly preoccupied with market and daily demands that a serious process improvement initiative is almost just a fantasy.

Seeking formal improvement can be time consuming and expensive, but the rewards in the quality of the processes can be significant.

- offer an improvement path to the firm so that it can set priorities for process improvement actions. These improvement actions will permit an organization to achieve a higher level of maturity increasing its possibility of predicting. It means, if an organization's maturity increases, then the definition of results becomes more accurate. In other words, the planned results resemble more the real results [06].
- allow a possible interested party to have certainty on the potential of the organization. Depending on the level of maturity that an organization has, an external party (another organization, a stakeholder, a client, or a supplier) can have a clear idea about the organization's capabilities, in order to decide to have economic dealings with such organization (importance of a maturity model from a value viewpoint).

With a maturity model the organizations can determine their maturity, and they are going to be able to evolve toward a culture of process improvement excellence.

The Maturity Model (MM) perspective we are going to take in this survey came from the question "How can we know what level of maturity our organization has after the use of the ITIL, ASL and/or BiSL frameworks?". As we know, ITIL, ASL and BiSL are management frameworks and they do not have a MM to establish what level of maturity organizations have to make improvements. A solution to this situation is to find a way to use a MM as a base for this particular case. Among the existing MMs, the MM of CobiT could help us because CobiT is a control framework which establishes best practices for IT management. This will be defined in Chapter 3.

## Chapter 3

# Frameworks Studied

In this chapter, we give a description of the four frameworks studied. Each description will treat both concepts and process architectures. In Chapter 4, we will map the ITIL, ASL and BiSL management frameworks taking as basis the CobiT control framework.

The first three frameworks are related to the three fold model of IT service management introduced by Looijen [12]. The model identifies the following three areas of IT management:

*Technical management* is responsible for maintenance and management of the technical IT infrastructure. This infrastructure consists of all the used automation resources to store, process and provide data and information. Technical management consists of the technical components of the automated information systems, the equipment, the basic programs and communication systems, including related procedures and documentation. A management framework for this area is ITIL. ITIL provides businesses with a customizable framework of best practices to achieve quality service and to overcome difficulties associated with the growth of IT systems.

*Application management* works in the maintenance of the application programs and databases. Application management corresponds to the function of a software house: producing, maintaining and adapting application designs and programs. This is the working area of ASL. ASL is intended to simplify the process of application management by providing tools best-practices to do it.

*Functional management* is on behalf of the user organization responsible for maintaining and controlling information of the organization. From the perspective of the user organization and the business process, this management area has as goal to support the organization and the business process by means of the management of the information. BiSL is a framework for functional management and information management. This framework provides guidelines for

processes and activities that are necessary for a proper information provisioning structure within organizations.

### 3.1 ITIL

ITIL (Information Technology Infrastructure Library) is a set of best practices for IT service management. ITIL was created in the 1980's by the UK government's CCTA (Central Computer and Telecommunications Agency) in response to the growing dependence on IT to meet business needs and goals. ITIL provides businesses with a customizable framework of best practices to achieve quality of service and to overcome difficulties associated with the growth of IT systems [11].

The specific goals of ITIL are to develop and maintain IT services that (i) meet the existing IT requirements of the business, (ii) are easily developed and enhanced to meet future business needs, within appropriate time scales and costs, and (iii) make effective and efficient use of all IT resources to contribute to the improvement of the overall quality of IT service.

Starting from the Frank Niessink's definition of 'service' [13]: *a service is an essentially intangible set of benefits or activities that are sold by one party to another*, we think of 'IT Services' as IT functions done for a customer that provide value. Within the context of this survey, we do not make any distinction between the terms 'users' and 'customers'. For us, users, or customers, are people who use information systems in their work; therefore, they are consumers of information and they could make a large number of demands. Users can be internal or external to the organization. So, from a customer perspective, an IT service is what exactly the customer receives from the IT Service provider. It is a set of related components (hardware, software, and communication facilities) that support the activities of an organization holding up business processes.

The Office of Government Commerce of the United Kingdom [14] asserts that some benefits realized by many IT organizations through implementing ITIL are:

- Continuous improvement in the delivery of quality IT services.
- Reduced long term costs through improved Return on Investment (ROI) or reduced Total Cost of Ownership (TCO) through process improvement.
- Reduced risk of not meeting business objectives, through the delivery of rapidly recoverable, consistent services.
- The ability to absorb a higher rate of change with an improved, measurable rate of success.

The overall structure of ITIL consists of five parts [11]:

The business perspective	Supporting IT Services	Delivering IT Services	Managing Applications	Managing Infrastructure
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There are a considerable number of books where we can read about these five ITIL components but the core of the ITIL processes is found in two of them: the Service Delivery set (tactical level) and the Service Support set (operational level). These processes are shown in the Figure 3.1. From [18] and [11] we have deduced a brief description of the ITIL processes:

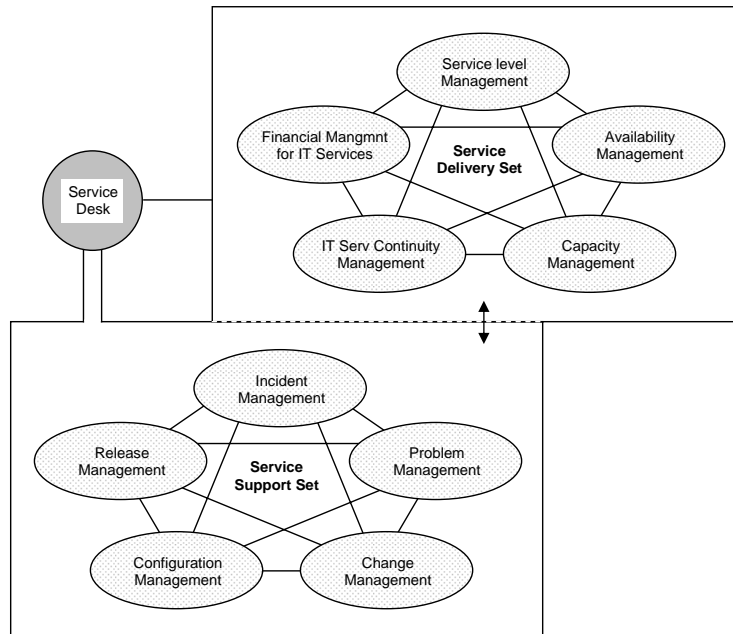


Figure 3.1: ITIL framework (source: [18]).

Service Support Set	
Change Management	Processes to ensure that standardized methods and procedures are used for efficient and prompt handling of all changes, in order to minimize the impact of any related incidents upon service maintaining the proper balance between the need for change and the potential detrimental impact of them.

Configuration Management	Processes to provide a logical model of the IT infrastructure by identifying, controlling, maintaining and verifying the version of all configuration items (CI's) in existence.
Release Management	Processes to take a holistic view of a change to an IT service and ensure that all aspects of a release, both technical and non technical, are considered together. Release Management should be used for large or critical hardware roll-outs, major software roll-outs and batching related sets of changes.
Incident Management	Processes to restore normal service operation as quickly as possible with minimum disruption to the business, ensuring that the best achievable levels of availability and service are maintained.
Problem Management	Processes to resolve problems quickly and effectively, to ensure resources are prioritized to resolve problems in the most appropriate order based on business needs, to improve the productivity of support staff, and to provide relevant management information.
<b>Service Delivery Set</b>	
Service Level Management	Processes to maintain, and gradually to improve, business aligned IT service quality, through a constant cycle of agreeing, monitoring, reporting and reviewing IT service achievements and through instigating actions to eradicate unacceptable levels of service.
Capacity Management	Processes to understand the future business requirements (the required service delivery), the organization's operation (the current service delivery), the IT infrastructure (the means of service delivery), and ensure that all current and future capacity and performance aspects of the business requirements are provided in a cost-effective way.
Financial Management for IT Services	Processes to provide cost effective stewardship of the IT assets and the financial resources used in providing IT services. An effective financial management system will assist in the management and reduction of overall long term costs, and provide accurate and vital financial information to assist the decision making process.

Availability Management	Processes to optimize the capability of the IT infrastructure and supporting organization to deliver a cost effective and sustained level of availability that enables the business to satisfy its objectives.
IT Service Continuity Management	Processes to support the overall business continuity management process by ensuring that the required IT technical and services facilities can be recovered within required and agreed business time-scales.
<b>Service Desk</b>	
Service Desk Operations	Processes to act as the central point of contact between the user and IT Service Management to handle incidents and requests, and provide an interface for other service management activities.

## 3.2 ASL

ASL (Application Service Library), according to the ASL foundation <sup>1</sup>, is a framework for application management that is based on best practices of professionals with years of experience. The model has been developed in such a way that it guarantees optimum IT support for business processes allowing organizations to focus on their core business.

ASL rests on the assumption that the quality of the primary business processes of an organization is directly related to the quality of its IT support. An application does not just support a business process; it is an integral part of it. As a result of this, ICT has become a production factor, thus creating the need for a higher degree of professionalism. ASL's goal is the professional development of application management.

Professional application management reflects the fact that applications may have a long life cycle, that today's applications could still affect a company's competitive position in five years' time. Application management is future-focused. A professional application management permits that not only the organization itself has a role to play. Process chain automation also makes organizations dependent on others. The uniformity of application management among organizations is therefore an important success factor when it comes to mutually coordinating applications and application service providers [07].

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<sup>1</sup>See [www.aslfoundation.org](http://www.aslfoundation.org)

Figure 3.2 illustrates the ASL framework. The big ovals and the rectangle in the middle each represent a cluster of processes. Three levels are distinguished: operational, tactical and strategic. In [07] we can find the next explanations.

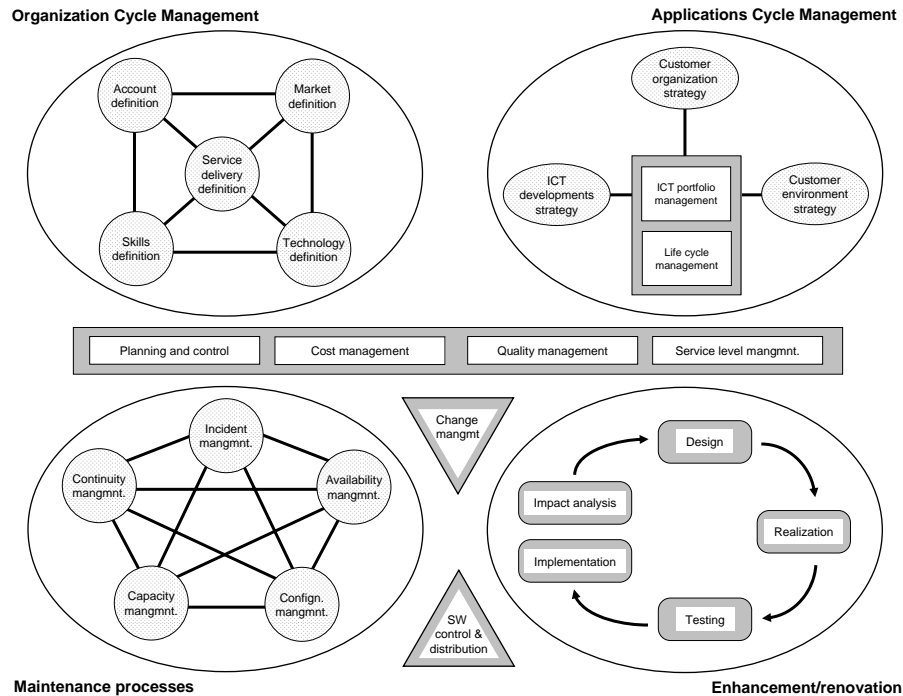


Figure 3.2: ASL framework (source: [15]).

The operational level recognizes two clusters of processes:

- 1 maintenance of applications: processes that ensure the optimum availability of the applications currently being used to support the business process with a minimum of resources and disruption in the operation.
- 2 enhancement/renovation of applications: processes that adapt applications to new needs and requirements in response to changes to the organization and its environment. The necessary adjustments are made to the software, the data model and the documentation.

The tactical level consists of the overall management processes. These processes provide for the guidance of the operational processes for 'services' and 'applications'. Both the strategic and the operational level supply the management processes.

The clusters of processes at the strategic level are:

- 1 Organization Cycle Management (OCM): processes that are aimed at developing a future vision of the ICT service organization and translating that vision into a policy for its renewal.
- 2 Applications Cycle Management (ACM): processes that serve to shape a long-term strategy for the various applications that fit within the entirety of an organization's information provisioning in relation to the organization's long-term policy.

The next table shows a brief description of the ASL processes which have been deduced from [15] and [07]:

<b>Maintenance Processes</b>	
Incident Management	Processes to deal with questions and wishes concerning the existing applications, and to take care of the incidents.
Configuration Management	Processes to register and store information about Information Systems (IS) and applications versions.
Availability Management	Processes to provide, monitor and guarantee the availability of services and ICT components.
Capacity Management	Processes to take care of the optimal deployment of resources, i.e. right time, right place, right quantity, and at a realistic price.
Continuity Management	Processes to deal with the continuity of the realizations and the support of the information provisioning by means of the IS.
<b>Enhancement/renovation Processes</b>	
Impact Analysis	Processes to condition and chart the implications of a change proposal.
Design	Processes to set up the specifications of the users of the IS or general changes, i.e. further information analysis and design.
Realisation	Processes to set up the design's results into concrete and correct changes in automated systems.
Test	Processes to test the changed objects with the following end results: completed products for acceptance, acceptance tests, etc.

Implementation	Processes to introduce the changed objects focusing on conversion, training, instruction and migration.
<b>Connecting Processes</b>	
Change management	Processes to make an inventory, to set priorities, to make an evaluation and to support the desired changes on applications.
SW control and distribution	Processes to manage and distribute SW objects as versions, releases, documentations, data definitions.
<b>Management processes</b>	
Planning and control	Processes to manage time and capacity relating to all activities that are involve in maintenance, enhancement, and renovation of applications.
Cost management	Processes to manage and charge ICT costs.
Quality management	Processes to manage the quality of the application management processes, the products, the service and the organization.
Service level management	Processes to specify in more detail the desired services, and to specify and monitor the desired service level to make it transparent.
<b>Application Cycle Management Processes</b>	
ICT developments strategy	Processes to examine which ICT developments could be of interest to the customer's organization and its information provisioning.
Customer environment strategy	Processes to provide an image of process chain developments and resulting requirements and opportunities for the applications and information provisioning of the customer's organization.
Customer organization strategy	Processes to chart the developments within the customer's organization as well as the obstacles, the impact on the applications and the ways of responding to them.

Life cycle management	Processes to match the existing options of and the future requirements for one or more applications that support a business process.
ICT portfolio management	Processes to chart the significance and performance of the various existing applications for the organizations, to translate the company policy into the various objects, and to set out a strategy for the future of the objects in the ICT portfolio.
<b>Organization Cycle management Processes</b>	
Market definition	Processes to determine the market segments on which the services will be provided in the future on the basis of an analysis of the market, supply chain and client developments..
Account definition	Processes to determine the image, strategy, organizational form for the realization of the approach to the desired markets.
Skills definition	Processes to determine skills, knowledge and expertise called for by the future service of the organization.
Technology definition	Processes to determine the (development) tools, technology and methods that the firm wants to use to realize the future service.
Service delivery definition	Processes to chart the service that the market wants and that the ICT service provider can supply using his skills, and to translate it into policy and strategy.

### 3.3 BiSL

BiSL (Business Information Service Library) is, like ITIL and ASL, a set of recommendations for organizations to work more efficiently. The framework describes the planning of the operational functional management and information management, on the basis of best practices. This process model underlines the importance of the role of information management and functional management in organizations for the connection between ICT and business processes.

Caroline van Dolder [19] establishes that functional management is the voice

of the user organization; it is the responsible for the supervision of ICT vendors and for the support to users.

This framework offers a number of general advantages, including the following:

- better visibility of the added value of an organization’s information provisioning.
- better functionality of information systems.
- potential of ICT suppliers is exploited entirely.
- justified ICT investments
- satisfaction of (the user) organization
- more effective applications management and technical management

BiSL covers (see Figure 3.3) seven clusters of processes [16]:

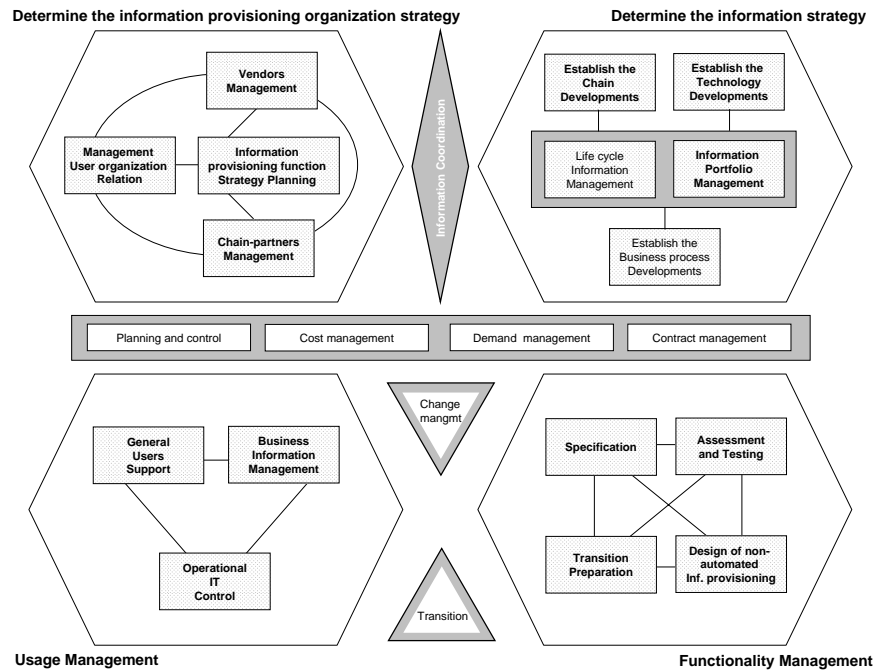


Figure 3.3: BiSL framework (source: [16]).

### **Usage Management**

These processes help to assure a continuous and optimal user support service, which is essential to users in their daily use of information to execute their activities within the company processes. The main question in these processes is: “Is the operational information well used and aimed?”

### **Functionality Management**

This cluster of processes addresses the route along which changes in information provisioning are formed and carried out. These processes care for the realization of the desired modifications on automated and non-automated information provisioning.

### **Connecting Processes**

The clusters Usage Management and Functionality Management can not be seen in separation. The Connecting Processes decide (i) what changes must be carried out in the information provisioning area, and (ii) the actual execution in the user organization of a change to the information provisioning.

### **Management Processes**

These processes take care of the integral control of the process clusters. This concerns the supervision of the management activities, the enhancement/renovation processes and the connecting processes. The Management Processes control the activities in terms of costs and profits, demands, contract and service levels, and planning. The central question of this process cluster is: “How do we guide the information provisioning?”

### **Determine the information strategy**

It is very important to the organizations that the information suits the requirements which are going to be established in the future. That calls for a strategy for the information provisioning for the future years. In this cluster, the decisions about the contents of the information are made.

### **Determine the information provisioning organization strategy**

In the information provisioning area, more parts act in management, decision-making and influencing roles. Management, structuring and working methods must thereby be coordinated. This applies also to the relations to the management parties beyond the functional management domain, as vendors,

chain-partners and the users organization. The processes in this cluster are (i) the vendors management, (ii) the management user organization relation, (iii) the chain-partners management, and (iv) the information provisioning function strategy planning.

### Connecting processes at the guiding level

The link between the two previous clusters needs also a process where the decisions on several areas are coordinated. This process, Information Coordination, forms the connecting cluster in the functional level of BiSL.

## 3.4 CobiT

*“CobiT (Control Objectives for Information and related Technology) has been developed as a generally applicable and accepted standard for good Information Technology (IT) security and control practices that provides a reference framework for management, users, and IS audit, control and security practitioners.” ( [08], p.01)*

CobiT enables an enterprise to implement effective governance over the IT that is pervasive and intrinsic throughout the enterprise. In particular, CobiT contains a framework responding to management’s need for control and measurability of IT offering tools to assess and measure the enterprise’s IT capability for the 34 CobiT IT processes (see Figure 3.4) [08].

For each of the 34 IT processes, CobiT has a number of management instruments, such as:

- Control objectives, which are in fact the management objectives per IT process. The 34 processes together consist of 318 detailed control objectives.
- Critical Success Factors (CSF’s), that define the most important issues or actions for management to enable achieving control over and within its IT processes.
- Key Goal Indicators (KGI’s) that, representing the process goal, are measurable indicators of “what” has to be accomplished in a process.
- Key Performance Indicators (KPI’s), which define measures to determine “how well” the IT process is performing in enabling the goal to be reached.
- Maturity levels on a scale of 0 up to and including 5, where 0 stands for ‘non-existence’ and 5 stands for ‘best practice’.

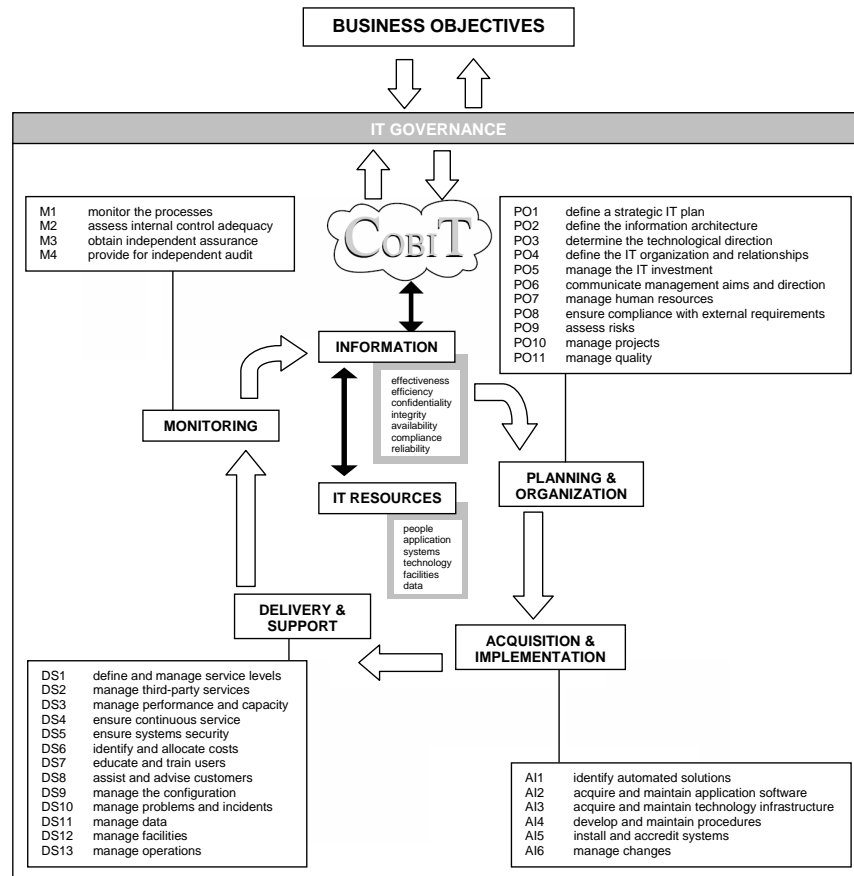


Figure 3.4: The CobiT framework (source: [09]).

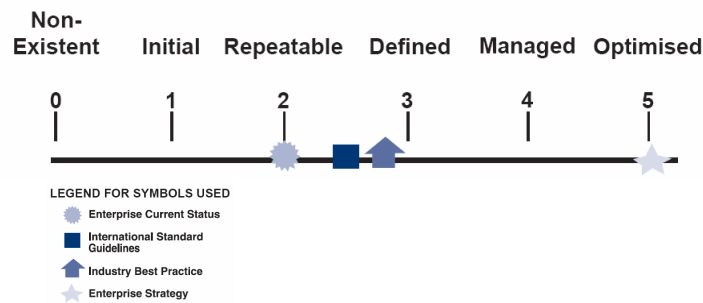
- Audit guidelines; directives for interview, information and tests which can be carried out to provide management assurance and/or advice for improvement.

CobiT has been based on the idea that IT resources must be managed and controlled on the basis of processes grouped in a natural manner. The aim of CobiT is to support the management and the process owners by means of information technology governance. The process owner should be able to determine the level of adherence to the control objectives either as a quick self-assessment or as a reference in conjunction with an independent review. Managers may wish to place any of these assessments in context by comparison to the industry and the environment they are in, or by comparison to where international standards and regulations are evolving (i.e., emerging future expectations).

*“The approach to Maturity Models for control over IT processes consists of developing a method of scoring so that an organization can grade itself from non-existent to optimized (from 0 to 5). This approach is based on the Maturity Model that the Software Engineering Institute defined for the maturity of the software development capability. Whatever the model, the scales should not be too granular, as that would render the system difficult to use and suggest a precision that is not justifiable.” ( [10], p.10)*

The MM of CobiT helps management to map:

- the current status of the organization - where the organization is today
- the current status of (best-in-class in) the industry - the comparison
- the current status of international standard guidelines - additional comparison
- the organization’s strategy for improvement - where the organization wants to be



For each of the 34 IT processes, there is an incremental assessment based on ratings of “0” through “5”. This is associated with some generic qualitative maturity model descriptions ranging from “Non Existent” to “Optimized” as follows [10]:

### Generic Maturity Model

**0 Non-Existent.** Complete lack of any recognisable processes. The organisation has not even recognised that there is an issue to be addressed.

**1 Initial.** There is evidence that the organisation has recognised that the issues exist and need to be addressed. There are however no standardised processes but instead there are ad hoc approaches that tend to be applied on an individual or case by case basis. The overall approach to management is disorganised.

**2 Repeatable.** Processes have developed to the stage where similar procedures are followed by different people undertaking the same task. There is no formal training or communication of standard procedures and responsibility is left to the individual. There is a high degree of reliance on the knowledge of individuals and therefore errors are likely.

**3 Defined.** Procedures have been standardised and documented, and communicated through training. It is however left to the individual to follow these processes, and it is unlikely that deviations will be detected. The procedures themselves are not sophisticated but are the formalisation of existing practices.

**4 Managed.** It is possible to monitor and measure compliance with procedures and to take action where processes appear not to be working effectively. Processes are under constant improvement and provide good practice. Automation and tools are used in a limited or fragmented way.

**5 Optimised.** Processes have been refined to a level of best practice, based on the results of continuous improvement and maturity modelling with other organisations. IT is used in an integrated way to automate the workflow, providing tools to improve quality and effectiveness, making the enterprise quick to adapt.

Summarizing, CobiT helps to meet the multiple needs of management by bridging the gaps between business risks, control needs and technical issues. This framework provides good practices across processes and presents activities in a manageable and logical structure together with a MM which helps IT professionals explain to managers where IT management shortcomings exist, and sets targets for where they need to be by comparing their organization's control practices to the best practices [09] [10].

## Chapter 4

# Mapping of frameworks

As has already been mentioned, ITIL, ASL and BiSL do not have a MM to find what level of maturity the organizations have to make improvements. CobiT has a MM and we assume that the CobiT MM can be used by ITIL, ASL and BiSL.

In order to confirm that assumption, we have conducted a mapping between the CobiT framework and ASL. Mappings between CobiT and ITIL have already been investigated, among others, by Andy Cameron from PinkRocade (UK) [03] and Martin Dion from Above Security (Canada) [04]. They have found different results in their mappings. A closer look into their reports indicates that they took different ways to do the mapping. The differences are in the *level of detail* and the *point of view* taken. Their results suggest that Above Security took a technical point of view to do the mapping using the 318 recommended detailed control objectives from CobiT and the specific activities from the ITIL processes; while PinkRocade made a general comparison of the CobiT/ITIL processes from a management point of view. Both mappings can be found in [03] and [04] respectively.

From both mappings, we can conclude that CobiT and ITIL are complementary. They show that even if the organizations have a fully compliant ITIL process suite, CobiT stills provides significant scope to further improve the management of IT processes. CobiT provides an over-arching framework covering all IT activities; ITIL is focused mostly on service management (CobiT's Delivery & Support domain) and the most noticeable opportunities for ITIL are in the domains "Planning and Organization" and "Monitor" from CobiT.

## 4.1 Mapping of ASL

Figure 4.1 describes the mapping process we used to conduct the CobiT-ASL mapping.

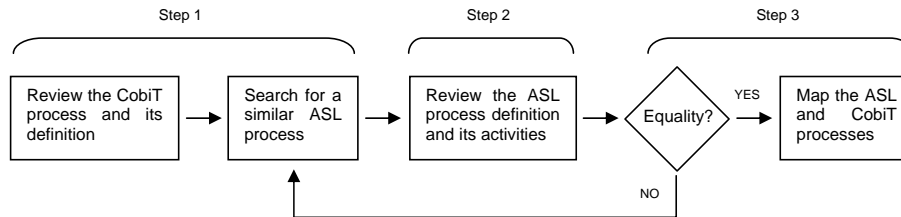


Figure 4.1: The mapping process.

For the mapping, we only used the 34 generic CobiT processes and the 26 ASL processes grouped on 6 clusters because this degree of analysis was sufficiently specific to find relations between the two frameworks. Nevertheless, we did not limit our study to those processes in case we needed more detail.

After reviewing the CobiT literature, we began to read each CobiT process definition while searching for a similar ASL process. If we found some equality in the definition of that process, we considered the processes equal. Each ASL process could be placed in one or more CobiT process (e.g. an ASL process could completely satisfy a CobiT process, but in other case the same ASL process could overlap one of more of the specific objectives of other generic CobiT process so, we also mapped those processes). Subsequently, we determined in what grade the processes could be mapped.

If we did not find some equality or similarity between the processes, we continued looking for another possible similar ASL process (if it existed).

For a better understanding of this process, we show an example.

### Step 1. Review of the CobiT process.

For this example, we take the process “Define a Strategic IT Plan” from CobiT. It is the first CobiT process of the domain “Planning & Organization” from CobiT.

The business goal, as stated in the CobiT Management Guidelines [10], of this process is “*striking an optimum balance of information technology opportunities and IT business requirements as well as ensuring its further accomplishment by the IT strategic planning definition*”. The principal activities in this process are the “*definition of IT in long- and short- term*”, and the “*assessment of existing systems*”.

The management instruments that CobiT uses to describe its processes are related in the following way: Control over the process “Define a Strategic IT Plan” ensures to bring information to the organization that “addresses the required **Information Criteria** and is measured by **Key Goal Indicators**. It also considers **Critical Success Factors** that leverage specific **IT Resources** and is measured by **Key Performance Indicators**.” [10]

This process is enabled by a strategic planning process done at regular intervals giving rise to long-term plans that need to be translated into operational plans establishing clear and specific short-term goals. This process “Define a Strategic IT Plan” from CobiT takes into consideration the:

- enterprise business strategy
- existing systems assessments
- definition of how IT supports the business objectives
- inventory of technological solutions and current infrastructure
- monitoring the technology markets
- timely feasibility studies and reality checks
- enterprise position on risk, time-to-market, quality
- need for senior management buy-in, support and critical review

In Figure 4.2, taken from [10], we can find the specific CSF’s, KGI’s, KPI’s, the information criteria and IT resources of this process in particular.

### **Setp 2. Review of the ASL process.**

It is evident that the process “Define a Strategic IT Plan” from CobiT completely overlaps with the process “ICT developments strategy” from ASL. This ASL process examines which ICT developments could be interesting for the organization to establish an IT strategy having as objective: to specify the impact of IT over the applications and business processes.

The process “ICT developments strategy” tries to identify the trends for application developments because IT developments have a strong influence on the future of applications in the long term. The principal activities of this process are (translated from [15]):

- 1 To identify relevant technological developments for the business processes.
- 2 To determine what are the possible opportunities of that IT within the organization.

Control over the IT process **Define a Strategic IT Plan** with the business goal of *striking an optimum balance of information technology opportunities and IT business requirements as well as ensuring its further accomplishment*

ensures delivery of information to the business that addresses the required **Information Criteria** and is measured by **Key Goal Indicators**

is enabled by *a strategic planning process undertaken at regular intervals giving rise to long-term plans; the long-term plans should periodically be translated into operational plans setting clear and concrete short-term goals*

considers **Critical Success Factors** that leverage specific **IT Resources** and is measured by **Key Performance Indicators**

Critical Success Factors
<ul style="list-style-type: none"> <li>The planning process provides for a prioritisation scheme for the business objectives and quantifies, where possible, the business requirements</li> <li>Management buy-in and support is enabled by a documented methodology for the IT strategy development, the support of validated data and a structured, transparent decision-making process</li> <li>The IT strategic plan clearly states a risk position, such as leading edge or road-tested, innovator or follower, and the required balance between time-to-market, cost of ownership and service quality</li> <li>All assumptions of the strategic plan have been challenged and tested</li> <li>The processes, services and functions needed for the outcome are defined, but are flexible and changeable, with a transparent change control process</li> <li>A reality check of the strategy by a third party has been conducted to increase objectivity and is repeated at appropriate times</li> <li>IT strategic planning is translated into roadmaps and migration strategies</li> </ul>

Information Criteria	IT Resources
P effectiveness	✓ people
S efficiency	✓ applications
confidentiality	✓ technology
integrity	✓ facilities
availability	✓ data
compliance	
reliability	

(P) primary (S) secondary

(✓) applicable to

Key Goal Indicators
<ul style="list-style-type: none"> <li>Percent of IT and business strategic plans that are aligned and cascaded into long- and short-range plans leading to individual responsibilities</li> <li>Percent of business units that have clear, understood and current IT capabilities</li> <li>Management survey determines clear link between responsibilities and the business and IT strategic goals</li> <li>Percent of business units using strategic technology covered in the IT strategic plan</li> <li>Percent of IT budget championed by business owners</li> <li>Acceptable and reasonable number of outstanding IT projects</li> </ul>

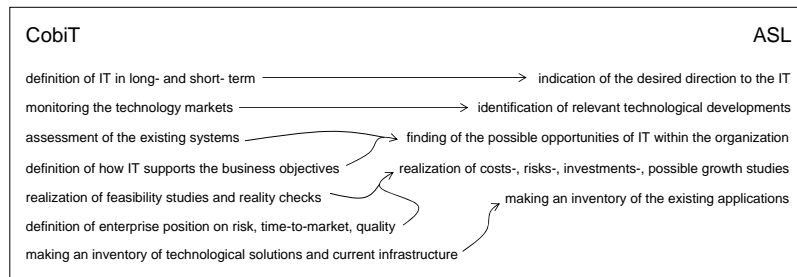
Key Performance Indicators
<ul style="list-style-type: none"> <li>Currency of IT capabilities assessment (number of months since last update)</li> <li>Age of IT strategic plan (number of months since last update)</li> <li>Percent of participant satisfaction with the IT strategic planning process</li> <li>Time lag between change in the IT strategic plans and changes to operating plans</li> <li>Index of participants involved in strategic IT plan development, based on size of effort, ratio of involvement of business owners to IT staff and number of key participants</li> <li>Index of quality of the plan, including timelines of development effort, adherence to structured approach and completeness of plan</li> </ul>

Figure 4.2: The process “Define a Strategic IT Plan”, taken from [10].

- 3 To realize costs-, risks-, investments-, possible growth studies.
- 4 To indicate the desired direction to the IT (IT strategy establishment).
- 5 To make an inventory of the existing applications and their impact in the company.

**Step 3. Map the processes.**

Between the process “Define a Strategic IT Plan” from CobiT and the process “ICT developments strategy” from ASL can be found more than one relation if we take into account their complete definitions. So, we mapped the activity “*definition of IT in long- and short- term*” from the CobiT process (one of the two principal activities identified in step 1 above) with the activity “*indication of the desired direction to the IT*” from the ASL process (item 4 identified in setp 2 above). For the other activities of the process “Define a Strategic IT Plan” from CobiT, we could identify similar mappings. The results of this are presented in the figure below.



These results show how the process “Define a Strategic IT Plan” from CobiT and the process “ICT developments strategy” from ASL are related. There are, however, more ASL processes that overlap with the process “Define a Strategic IT Plan” from CobiT. The next table presents the process “Define a Strategic IT Plan” from CobiT together with de ASL processes which overlap with this one.

COBIT	ASL	
PLANNING & ORGANISATION	CLUSTER	PROCESS
Define a Strategic Information Technology Plan	Application Cycle Management	ICT developments strategy
	*	Life cycle management
	*	ICT portfolio management
	Organization Cycle Management	Technology definition
	*	Service delivery definition

The process “ICT developments strategy” from ASL overlaps completely with the process “Define a Strategic IT Plan” from CobiT. But it is not the

unique one. Each ASL process has also its own activities. The ASL processes with activities related to the process “Define a Strategic IT Plan” from CobiT are presented in the next table:

CLUSTER	PROCESS	ACTIVITY
Application Cycle Management	ICT development strategy	To define the ICT strategy and to indicate de impact of the existing applications.
"	Life cycle management	To establish possible scenarios for the IT strategy
"	ICT portfolio management	To establish the strategy & activities to reach the desired ICT portfolio situation.
Organization cycle management	Technology definition	To establish the strategy to acquire IT and knowledge
"	Service delivery definition	To define the strategy and path to follow for the ICT service provider.

In addition to the process “ICT developments strategy” from ASL, the other ASL processes partially overlap with the CobiT process and they also converge with other CobiT processes. For instance, the process “Service delivery definition” from ASL partially overlaps with the process “Communicate Management Aims and Direction” from CobiT in the definition of IT policies, and with the process “Manage Project” from CobiT in the definition of the necessary means for IT Services.

The specific mapping of the CobiT/ASL processes can be found in Appendix 1. Figure 4.3, which is structured in a similar way as the diagram utilized in the CobiT - ITIL mapping of PinkRocade (UK) [03], shows the relation found between ASL and CobiT. The components of ASL are depicted in the centre of the figure. The grey boxes in the surrounding framework indicate where ASL completely overlap the requirements of CobiT. The dotted boxes indicate the CobiT processes are only partially satisfied by ASL and the white boxes indicate the CobiT processes are not satisfied by ASL.

We can see in the figure that CobiT and ASL are related to each other. They have relations in some processes. Organizations which use ASL can extend their IT management with the utilization of CobiT and so, they can also use the MM of CobiT. We found that the CobiT MM can easily be used to determine the maturity levels of the ASL processes that completely map to the CobiT processes. For the ASL processes that only partially overlap with the CobiT processes, the organizations will need to make some adjustments in the CobiT MM, but these adjustments are not so considerable because partially the ASL/CobiT processes are equal. To describe how the CobiT MM can exactly be used by ASL is not the purpose of this survey, as we only intend to determine if the maturity model of CobiT can be used by the management frameworks.

## 4.2 Mapping of BiSL

BiSL has some activities that can be related to best practices of CobiT, namely Financial Management, Change Management, and Planning and Control. How-

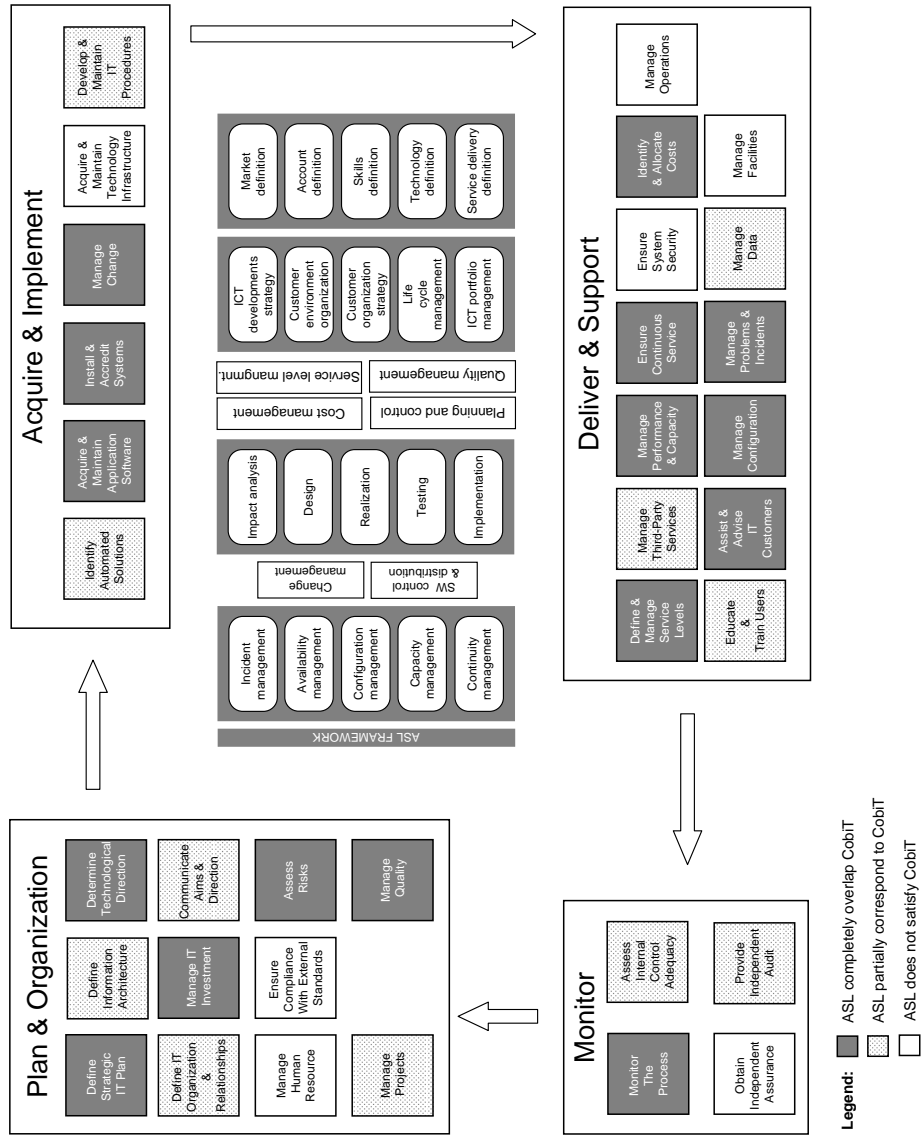


Figure 4.3: Mapping between CobiT and ASL.

ever, BiSL can not be directly mapped with CobiT because BiSL works more in the area of information provisioning (functional management). In Figure 4.4 we can see that. The BiSL area (functional management) is a complementary part of ITIL (technical management) and ASL (application management). This last two frameworks can be easily mapped to CobiT because CobiT works also in those management areas.

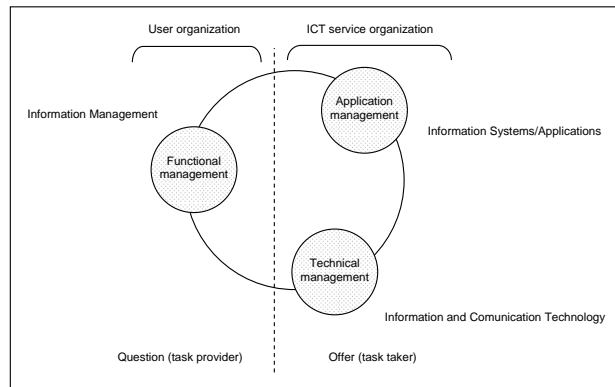


Figure 4.4: Technical, Application and Functional Management.

## Chapter 5

# Discussion

As we have seen, the CobiT MM can be used in some processes of the management frameworks. The problem is what to do with the rest of the processes (i.e. processes which do not overlap with CobiT processes). The question stated in Chapter 2 about “How can we know what level of maturity our organization has after the use of the ITIL, ASL and/or BiSL frameworks?” remains still with an incomplete answer because we have established that BiSL can not be mapped with CobiT. They are two separated areas and therefore, it would not make sense to establish mappings between them. We still need to see maturity to get to a point that we can make improvements in the functional management area in general, or the BiSL framework in particular.

The Information Management Maturity Model (IMMM) developed by BearingPoint (formerly KPMG Consulting LP) for the Canadian Government could be a good candidate solution because its elements are related with the management of information which is an important task in the BiSL framework, but it is necessary to do a study about how it fits to BiSL. The study needs to focus not only on the usability of this capacity checking tool in this context, but also on the benefits that can be obtained.

ITIL, ASL and BiSL are frameworks which describe which activities and processes take place in ISM and how these processes coincide. But they are merely frameworks, models: simplified representations of reality. Organizations can use them to structure and manage their processes. A process model assumes the idea that an organization operates as a physical process with predictable and controllable actions. However, not everything is predictable and entirely manageable. ITIL, ASL and BiSL are checklists that say which processes need to be established in an organization. These frameworks offer all the freedom to let work then within the organizations. They are not mandatory frameworks. They are there as means to improve quality in the ISM area in the organizations. We could say that ITIL, ASL and BiSL run the “day-to-day” operations of IT in the organizations, and CobiT is the control framework where these

management frameworks could be working. CobiT says what to do but not how to do it and it does not deal directly with software development or IT services. ITIL, ASL and BiSL do that. All these models can work together because they are complementary.

To introduce a MM point of view in this context, we show Figure 5.1.

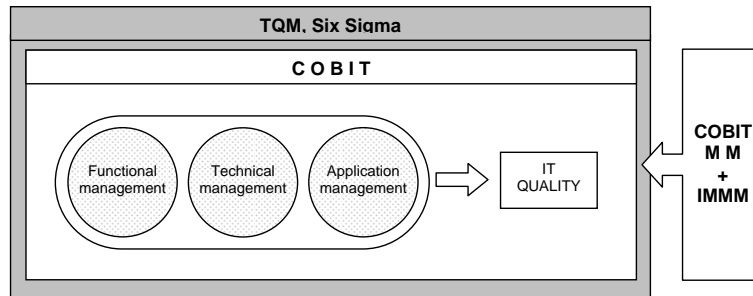


Figure 5.1: ITIL, ASL, BiSL and CobiT in a MM/TQM point of view.

The oval represents the ISM area where ITIL, ASL and BiSL work to improve quality on IT processes. Besides, CobiT brings check points to assure good performance of these processes. So, while organizations use ITIL, ASL and/or BiSL to support the IT quality, CobiT can be implemented to introduce control points.

TQM (Total Quality Management) and Six Sigma also are showed in the Figure 5.1. Any of them can bring an ideal set of skills to implement CobiT and the three management frameworks. Actually the Carnegie Mellon<sup>®</sup> Software Engineering Institute (SEI) is doing research on this hypothesis. They are investigating how Six Sigma can enable the adoption of software, systems, and IT improvement frameworks — one of these frameworks is CobiT. They establish that Six Sigma, used in combination with those improvement frameworks, can result in (i) better selections of improvement practices and projects, (ii) accelerated implementation of selected improvements, and (iii) more valid measurements of success.

After considering that a quality framework (e.g. TQM or Six Sigma) can help to implement ITIL, ASL and/or BiSL and COBIT, we need to see their maturity in order to decide to make improvements plans. Is the combination of the Cobit MM and the BearingPoint IMMM the MM we are looking for? Can that help to make a consolidation of the three management frameworks and CobiT? Can this consolidation be implemented in a real organization, or even in a cross-organizational environment? These are our next questions for possible future research.

## Chapter 6

# Conclusion

In this paper, we surveyed existing frameworks, namely ITIL, ASL and BiSL, and we tried to establish relationships between the processes contained in these frameworks and the CobiT processes through mappings in order to obtain a fundamental structure of enterprises' IT processes. We found that mappings between CobiT and ITIL have already been investigated [03] [04], asserting that organizations which use ITIL can extend their IT management with the CobiT framework. This assertion also applies to ASL. We mapped CobiT/ASL processes and from the results, we concluded they are also complementary. Mappings between BiSL and CobiT were not made because they correspond to different management areas: BiSL works in the functional management area, while CobiT processes are more focused on the ITIL and ASL areas.

With that as evidence, we suggested that the CobiT MM can be easily used to assess ITIL and ASL processes to determine their maturity level, but additional research is needed at this point to specify more precisely how that can be done. However, if organizations use also the BiSL management framework, with the MM of CobiT they are not going to be able to determine what maturity they have in the functional management area. For this context, we propose that the IMMM developed by BearingPoint for the Canadian Government can be used because this maturity model seems to have elements which overlap with BiSL. This is another line of study, which we combine with the question of “can a quality framework help to bring more excellence in this context?”, as a topic for further research.

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## Appendix 1. Specific mapping of CobiT and ASL

COBIT	ASL	
PLANNING & ORGANISATION	CLUSTER	PROCESS
Define a Strategic Information Technology Plan	Application Cycle Management	ICT developments strategy
	"	Life cycle management
	"	ICT portfolio management
	Organization Cycle Management	Technology definition
	"	Service delivery definition
Define the Information Architecture	Application Cycle Management	ICT developments strategy
	"	Customer environment strategy
Determine the Technology Direction	Organization Cycle Management	Market definition
		Account definition
		Technology definition
Define the IT Organisation and Relationships	Application Cycle Management	Customer organization strategy
Manage the Investment in Information Technology	Management	Cost Management
Communicate Management Aims and Direction	Organization Cycle Management	Service delivery definition (policies)
Manage Human Resources		X
Ensure Compliance with External Requirements		X
Assess Risks	Maintenance	Continuity Management
Manage Projects	Connecting Processes	Change Management
	"	SW control and distribution
	Enhancement/renovation	Design
	Organization Cycle Management	Service delivery definition
Manage Quality	Management	Quality Management
	Enhancement/renovation	Test
ACQUISITION & IMPLEMENTATION		
Identify Solutions	Organization Cycle Management	Technology definition
	Enhancement/renovation	Design
Acquire and Maintain Application Software	Application Cycle Management	ICT developments strategy
	Management	Planning and control
	Maintenance	Availability Management
	"	Continuity Management
	"	Capacity Management
	"	Configuration Management
		X
Acquire and Maintain Technology Architecture	Organization Cycle Management	Technology definition
Develop and Maintain Information Technology	Enhancement/renovation	Realization
Install and Accredite Systems	"	Implementation
	"	Test
	Connecting Processes	SW control and distribution
Managing Changes	Connecting Processes	Change Management
	Enhancement/renovation	Impact analysis
DELIVERY & SUPPORT		
Define Service Levels	Management	Service level Management
Manage Third-Party Services	"	Cost Management (accountability)
		Service level Management
	Maintenance	Continuity Management (risks)
Manage Performance and Capacity	"	Availability Management
		Capacity Management
Ensure Continuous Service		Continuity Management
Ensure Systems Security		X
Identify and Allocate Costs	Management	Cost Management
Educate and Train Users	Maintenance	Incident Management
	Enhancement/renovation	Implementation
	Organization Cycle Management	Skills definition
Assisting and Advising Information Technology	Maintenance	Incident Management
Manage the Configuration	"	Configuration Management
Manage Problems and Incidents	"	Incident Management
Manage Data	Connecting Processes	SW control and distribution
	Maintenance	Continuity Management (back-up)
Manage Facilities		X
Manage Operations		X
MONITORING		
Monitor the Process	Management	Planning and control
Assess Internal Control Adequacy	"	Quality Management (audits)
Obtain Independent Assurance		X
Provide for Independent Audit	Management	Quality Management (audits)
	Connecting Processes	Change Management
	Organization Cycle Management	Technology definition
	"	Service delivery definition