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The IT Service Management Forum

IT Service Management
GLOBAL BEST
PRACTICES

Collector's Edition

Modeling

6

6.1 Introduction

In many IT organizations, lots of different activities are performed every day. To obtain and maintain an overview of all these activities, it is possible to simplify reality by creating a model. The aim of such a model is to offer a better understanding of everyday practice. This better understanding enables the users of the model to explain the causes of events, or even, to some extent, to predict future outcomes. However, the term "model" isn't always used in a consistent way and causes confusion in the field of IT service management.

We can best define a model as "an abstract simplified representation of reality". Next, people need to agree on what symbols and other drawing techniques will be used to represent real life situations. If people don't reach an agreement and don't use the same "modeling language", they will be unable to understand each other.
Bronkhorst, Wiebolt and Ligtenberg introduce well-established Business Process Management (BPM) conventions for modeling business processes, and explain how these methods can be used for designing structured IT service management processes.
Hoving and Van Bon describe why so many process models fail to be implemented correctly. Often, processes are mistaken for functions. This causes badly aligned process descriptions and badly aligned roles, which will inevitably result in a badly defined process model. As a solution, Hoving and Van Bon present a very simple process model, with six elementary processes that every service organization (IT organizations included), will recognize.
This process model, and the modeling conventions described by Bronkhorst et al, may help readers to prevent their organization from implementing badly defined and ambiguously described processes.

CONTENTS
Both articles in this chapter focus on the subject of modeling IT processes:
- **Rapidly designing detailed IT processes. Business process management concepts applied to IT service management.**
  Authors: Jeroen Bronkhorst, Jeroen Wiebolt and Ruud Ligtenberg (Hewlett-Packard, The Netherlands)
- **Functions and processes in IT management. Migrating from an ITIL reference model to a universal implementation model.**
  Authors: Wim Hoving (BHVB, The Netherlands) and Jan van Bon (Inform-IT, The Netherlands)

SHORT SUMMARIES
Business Process Modeling Notation (BPMN), Unified Modeling Language (UML) and Business Process Execution Language for Web Services (BPEL-WS) are well-established conventions for designing business processes and information systems. As yet, there are no such standards available in the field for modeling IT service management processes. Although ITIL® offers a process framework for IT service management, it does not provide

the detailed process design needed for organizationally embedding and automating the IT processes described. **Bronkhorst, Wiebolt and Ligtenberg** provide a number of principles that can be used as a starting point for designing structured IT service management processes, and explain how to use them.

Hoving and Van Bon identify the six elementary processes of a service provider, and explain why all other service provider activities would be better described as "functions". They cite process management literature which is already established in the field. Based upon this, they introduce definitions of the terms "process" and "function". With the help of these definitions, Hoving and Van Bon arrive at an elementary process model which can be practically implemented. As ITIL does not clearly and structurally distinguish processes from functions, they refer to ITIL as being a "reference model" rather than a "practical implementation model". This is one of the reasons why so many organizations fail when they try to implement ITIL. As practice has shown, a simple implementation model would provide much better use of the guidance available in the ITIL reference model. The authors provide examples of various types of functions, and guidance on the implementation of a simple ITIL-based process model.

6.2 Rapidly designing detailed IT processes

Business process management concepts applied to IT service management

ITIL describes a process framework for IT service management, but does not provide the detailed process design needed for organizationally embedding and automating the IT processes described. Jeroen Bronkhorst, Jeroen Wiebolt and Ruud Ligtenberg present a number of principles that serve as the premise for the structured design of IT processes while leveraging developments in the area of Business Process Management (BPM).

INTRODUCTION

More and more IT organizations are utilizing the best practices described in ITIL® for structuring and organizing IT processes. This is done, for example, in an attempt to improve the quality of the services provided, to reduce IT costs, to acquire ISO 9001 and/or ISO/IEC 20000 certification, and/or to satisfy relevant laws and regulations.

Although ITIL is a de-facto standard for IT service management, accepted throughout the world, it provides only a framework, not the detailed design that is needed to organizationally embed and automate the IT processes described. In other words, ITIL primarily applies to "tier 1" of the ISO 9001 process documentation standard (see figure 1).

At the same time, organizations and businesses have worked hard in recent years to map, modify and significantly automate their business processes. Today organizations are confronted with a multitude of changes in business processes as a result of internet and web-related implementations. In other words, as a result of a business environment that is changing at an ever-increasing rate. In addition to optimizing these business processes in order to improve their competitive position, organizations are also striving to improve quality and reduce costs with reference to the appropriate design and implementation efforts.

In the area of modeling business processes in particular, significant advances have been made in terms of standards both for modeling these processes and for automating processes using web-based (workflow) applications. A recent survey by BPTrends, described in the report "State of BPM", indicates that, in addition to general standards such as ISO 9000, SOX and CMM(I), organizations are especially interested in BPM-specific standards such as Unified Modeling Language (UML), Business Process Modeling Notation (BPMN) and Business Process Execution Language for Web Services (BPEL-WS).

Because business and IT management processes share fundamental characteristics, it is only logical for many IT organizations that are struggling to design, rapidly implement and maintain a detailed process framework based on ITIL, to align their efforts to the standards, best practices and tools already being used to design and implement business processes.
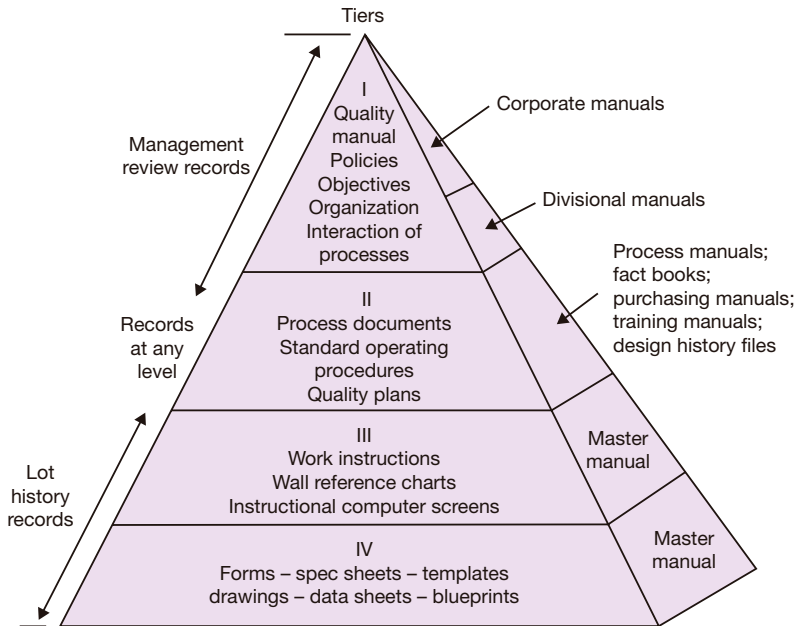
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Figure 1 ISO 9001:2000 Four-tier operational pyramid concept

Objective and target group

This article presents a number of principles that serve as the premise for the structured design of IT processes. In formulating these principles, an attempt has been made to align with BPM developments. The design standards referred to in this article are supervised by existing independent organizations. They do not reflect the introduction of a new school of thought.

The objective of these IT process design principles is to improve the legibility, consistency and integration possibilities of IT processes. By attuning to the BPM standards, techniques already being used for web-based business applications can be used to automate IT processes.

This article is intended for IT architects, process owners, process advisers and IT specialists (both administrators and developers). The article may also be of interest to IT managers, organization advisers, technical consultants and others involved in the field of IT management. A pre-requisite for this article is basic knowledge of IT processes and ITIL.

Scope

This article will not provide an in-depth discussion of specific IT processes or aspects thereof, but will investigate the generic interface between IT processes and tools for process design. The topics will be reviewed from the perspectives of a process designer, process owner and process operator.

Reading instructions

Firstly, the need to design IT processes will be discussed. Consideration is then given to how the design of IT processes is approached in most organizations these days, along with the typical problems involved in the design of detailed IT processes and their consequences.

This is followed by a section introducing BPM standards such as BPMN and BPEL-WS. Next a number of principles are presented for applying BPM standards in IT process design and for addressing the problems identified in the previous section. The last section provides a brief summary and a few conclusions.

THE NEED FOR DESIGNING IT PROCESSES

As indicated in the introduction, there are a variety of reasons for structuring and organizing IT processes. This section will investigate in more detail the context of, and need for, designing IT processes, as well as their advantages.

Why use a process framework?

Let's first take a look at the context for a process framework. The production and maintenance of automated information services in support of business processes requires a framework of processes that are performed in various IT domains:

- **IT business domain** - At the strategic and tactical levels, the information flows are identified that support the business processes. In addition the manner in which these flows are separated, registered and processed is determined (e.g. through a Service Oriented Architecture (SOA)).
  At the operational level, the consistency of the data/information is monitored, whilst reports to control the data/information maintenance are being generated. Desired changes involving the data/information processing are specified and detailed to create a feasible request to modify the information system.
- **IT application domain** - At the strategic and tactical levels the decision is taken as to what way and with what tools (parts of) the information system is/are to be automated. At the operational level, the application code is modified to optimize or innovate how it works.
- **IT infrastructure domain** - At the strategic level, the content of the portfolio of IT services is determined based on consultation with the management and internal clients. On the tactical level, the IT service provision agreements are registered and monitored. The operational level consists of the daily management activities needed to safeguard the continuity and stability of the data processing systems and the IT support functions.

On the one hand, the need to organize these IT domains by means of processes is generated by the requirement of the IT organization to anticipate business developments that place ever-changing demands on the operation of an information system. By aligning processes with strategic, tactical and operational levels, the planning cycles within the various domains can be attuned in due time.

On the other hand, these processes are perfectly suited to efficiently and effectively organize repetitive operational activities. More importantly: a process is a prerequisite for repeating activities in a demonstrable and predictable manner to provide output that is also predictable and consistent. A process identifies activities, responsibilities and dependencies with other processes. This provides a management structure. Historical data also makes it possible to compile prognoses of the effects that changes - e.g. new hardware or modernized applications - will bring.

Automating process activities

By structuring activities in IT processes, it becomes possible to automate the process activities using IT applications that are designed for process support. Automating activities

without an IT process design will lead to sub-optimization. After all, the tactical principles needed to manage the results and success factors are missing. This effect is often magnified by organizational choices based on pragmatic considerations. Developing a system of this type with a set of unrelated functions is difficult to manage.

In order to integrate the various applications for IT process support into a single cohesive system, conventions and standards are needed in addition to IT processes. These conventions and standards affect both the IT business and application IT domains, as well as the IT infrastructure domain. To keep these conventions and standards in place, rules are needed that determine how agreements are made, maintained and enforced.

Integrating external service providers

To an increasing degree, elements in the production and maintenance of information services may be outsourced to external suppliers. In doing so, the IT organization may retain responsibility for the direction of the processes that regulate the outsourced activities, or alternatively the direction of certain services may also be transferred to the supplier.

In both of these situations, feasible agreements can only be made if the activities and responsibilities are documented in a contract such as a Service Level Agreement (SLA). Applying a process model in these situations offers the advantage that both parties have an insight into the (activities behind the) interfaces in the workflow and what is exchanged at those interfaces. Moreover, the IT organization can easily determine from the process model which management information the service provider is expected to supply. A sample process model for service level management is shown in figure 2.

IT process quality systems

An implemented process model with the relevant tools and knowledge management is an unconditional part of any quality system. There are a variety of quality systems, e.g. ISO/IEC 20000, CoBiT®, COSO and CMMI. Based on such a system, the quality of an IT organization can be monitored, including process implementation.

This also works the other way around. While the process model is being designed, the quality system provides context. A limitation is the fact that not all quality systems cover all IT domains. Even if a quality system does so, not all of the processes are evaluated to the same level of detail.

The quality system often defines the need for the information that is required to cohesively manage and evaluate the processes. Implementing IT processes usually means that more data needs to be registered (compared to no structured processes) on the basis of which information can be generated. By registering performance indicators between the three IT domains, a quality management perspective is created, in which an insight is gained into both the contribution of each of the IT domains and their interdependencies in the entire production chain.

CURRENT IT PROCESS DESIGN, PROBLEMS AND CONSEQUENCES

This section describes the manner in which many organizations currently organize the creation and maintenance of their IT process design. This description utilizes the experience of the authors (see the names at the end of this knowledge brief) gained in various IT organizations over the past twelve years. The problems that surface and the consequences of failing to address these problems are also discussed.
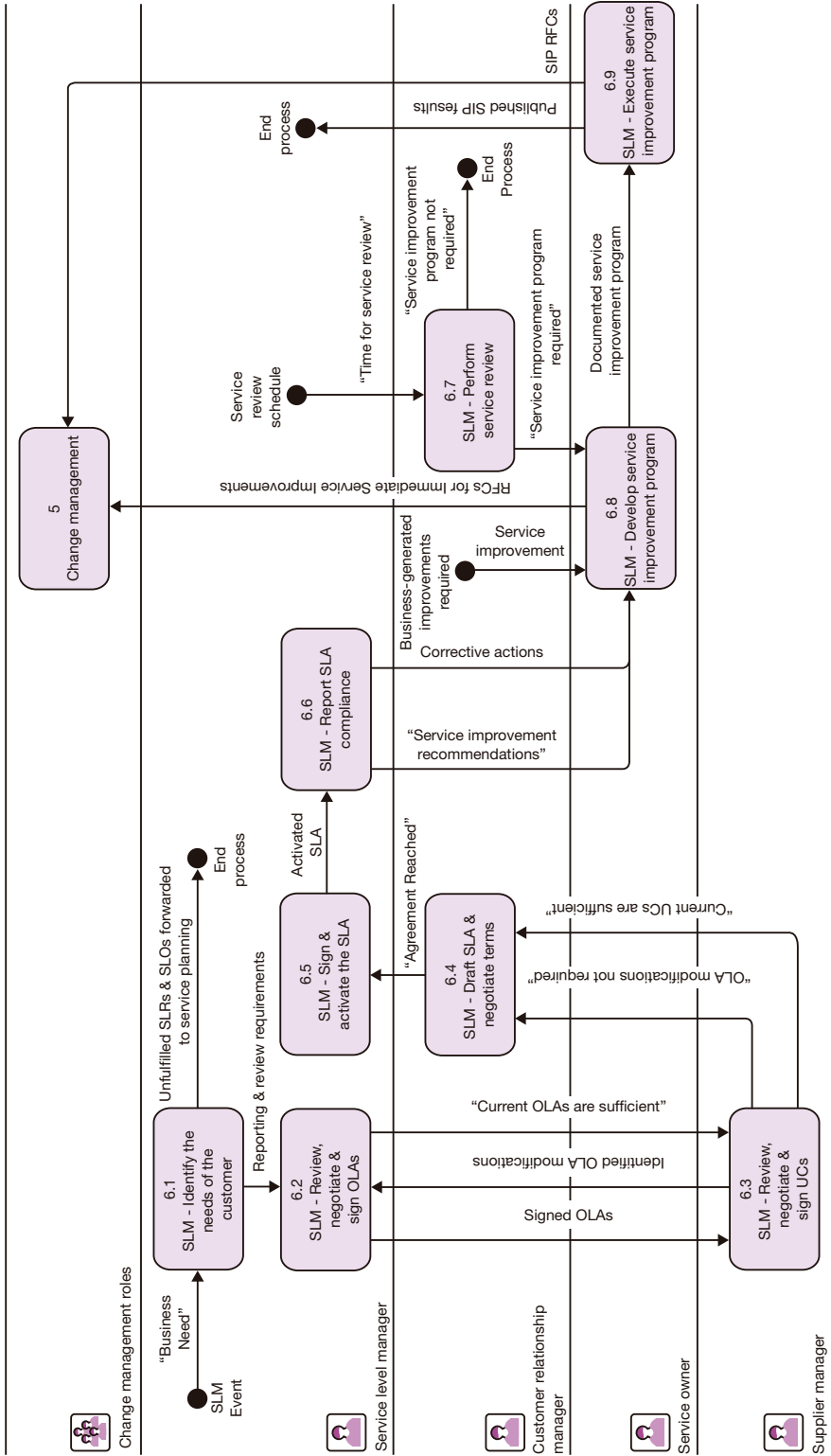
Figure 2 Sample service level management process

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IT process context

In practice, problems encountered in daily operation are often the reason for initiating an IT process implementation. As a result, the scope is often limited to organizing the operational processes such as incident, configuration and change management, as well as the service level management process from the tactical level.

Problem 1 - No process architecture

During the process design phase, the step of defining an umbrella process architecture first is often skipped. In process architecture, the processes and process clusters and their interdependencies/interactions, their relationship with the IT organization structure, and the IT process support application architecture are all identified.

Processes content is typically developed bottom-up from within the processes themselves. This places too much emphasis on the performance per process, rather than the added value of IT as whole for the business processes.

There is often no quality system by which the dependency of the processes on one another is assessed from a qualitative perspective. As a result, which of the process performance indicators are critical success factors for related processes remains unclear. Certainly, when the processes are within different IT domains - business, application or infrastructure – results are often protected based on an "us versus them" culture.

The focus on the individual processes also usually means that organizational aspects are not studied sufficiently. The process-specific role descriptions consist of skills and responsibilities. The consequences of the role are clear for each individual process, but a department that is required to contribute to five processes sees a much more complicated world, often because multiple process-specific roles are combined into a single job profile.

The process owner (who has overall accountability for a process) is usually a little bit further away from the actual process design because the lack of a process architecture puts the focus on detailed practical process aspects. This is then left to the process manager (accountable for daily coordination), since they are the party considered most competent based on his/her experience as a specialist.

Consequences: Insufficient direction from, and control for, IT managers and process managers to positively influence and manage the results of the entire chain.

IT process design

Normally, a process manager is appointed for each process at the beginning of a process design project, either with or without external support. One or more workshops are usually held to map out the workflow, after which a working group defines and documents the details.

Problem 2 - Proprietary standards and techniques

Many organizations use their "own" workflow drawing techniques and standards, often based on Office-like software such as Microsoft PowerPoint and Microsoft Visio (technical drawing software). Symbols and types of relationship connectors are used based on the organization's own insight. Diagrams compiled in this manner can often be interpreted in different ways.

Consequences: Little or no exchange and reuse of (workflow diagrams in) process documentation. Inconsistencies and errors in interpreting workflow diagrams.

Problem 3 - Inconsistency

When using Office software to compile process documentation, it is extremely difficult and time consuming to design and maintain the various processes consistently.

From the beginning, manual effort must be devoted to ensuring that the various symbols, concepts and definitions are used consistently. Consistency in the interfaces is important as well as difficult to maintain. In layman's terms: do the arrows in the description of one process lead to the other, and do the arrows represent the same thing in both? Figure 3, for example, can be interpreted as an activity flow as well as an information flow.
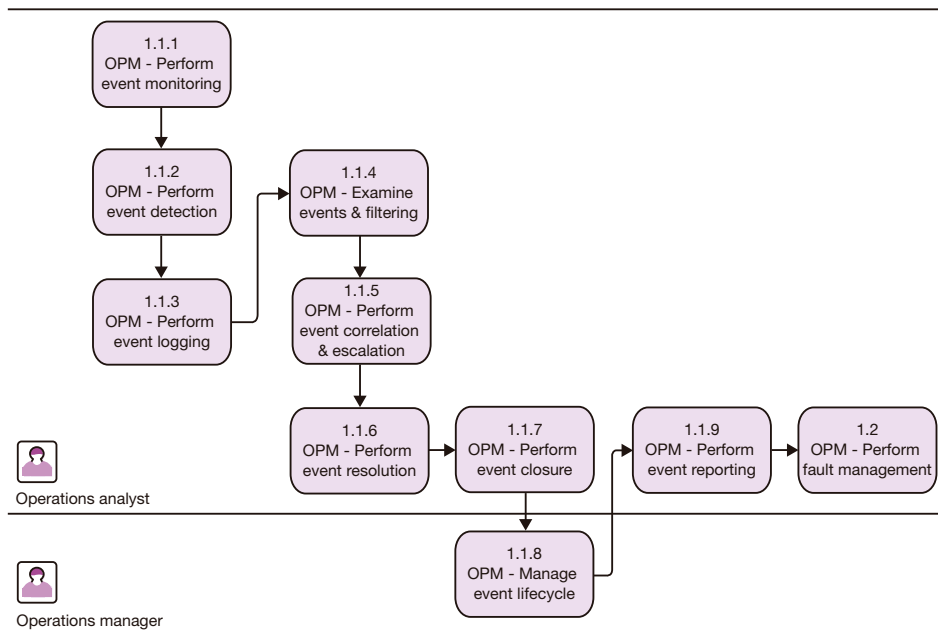

Figure 3 Ambiguous process flow sample

This not only applies to the various processes, but also within a process if it is constructed of process steps, each with its own procedures. The division of what is to be included in a procedure or any work instructions is also not determined based on repeatable rules.

As it is, consistency is difficult enough to monitor during the design phase. If modifications are added later, the project turns into a complete maintenance nightmare.

Consequences: Keeping process documentation consistent and up-to-date using Office software is often time consuming because these software suites are not designed for process work, but rather for back office operations, for example in finance.

Problem 4 - One size fits all

Existing process documents are often used to serve various target groups. At one end of the spectrum are the process owners and process designers, with the process operators at

the other end. Process documents are often used not only as a guideline for implementation and operation, but also as input for the functional design of process support applications, for example. In practice, usually only one description is given that must serve each of the various target groups.

Consequences: Either a summarized document that leaves much room for interpretation, or an extremely thick and cumbersome document. The latter requires significant reader motivation if the relevant information is to be distilled from the full content. In many cases, none of the target groups will have sufficient affinity with the description, which will therefore lack support.

Problem 5 - Insufficient details
The process design itself is often characterized by the fact that process documentation has only been compiled for ISO 9001 level I + II (see figure 1). As a result, the work instructions do not give sufficient details. Moreover, the details of the workflow are often limited to the highest process level, meaning that there are actually no details for the procedure level.

Consequences: Ambiguity and inconsistency when different individuals perform the same processes.

IT process automation
An IT process design is always translated into actual operation on the work floor, requiring some degree of interpretation. Thus, the more uniform the workflow diagrams, the better the results will be.

Problem 6 - IT process automation differs from IT process design
As indicated earlier, standardization is often lacking. When this is combined with the fact that – manual - interpretation is needed, much room is left for errors. In other words: the existing situation stimulates (mis)interpretation.

When implementing an IT process support application, the impact of the above will be even greater: the process design is manually translated into a functional and technical application design, to which all of the previous risks apply. There is also a risk that the IT process support application will not support the workflow as designed: the lack of standardization in workflow structures means that application suppliers cannot determine in advance which workflow structure variations are supported by their products.

Also often lacking is the know-how in using standardized process design patterns for workflow drawing solutions. As a result, the opportunity to better attune to the automation of process activities goes unused. Such automation software will increasingly offer standard solutions for existing process design patterns.

Consequences: Implementation will deviate (unintentionally) from the original design.

IT process maintenance

Problem 7 - Version management
Initially, the various process documents within a business will normally be attuned to one another, or related to an agreed internal structure. Sadly, often little or no version management (process) is applied to process documents, and when processes are

implemented in phases the documents will increasingly deviate from one another as time and insight progress. This problem is heightened as various authors will work on the documents.

As already indicated, once a process has been designed, it is subject to change. Because the process documents themselves are often created using a word processor, no insight can be given into the impact of changes on other related processes. Changes are often made in the process based on experience from daily practice. Such changes often remain undocumented and are not related to any specific versions.

Consequence: When a process document is compared to actual practice, discrepancies will often be identified.

Problem 8 - Difficult process integration in the event of outsourcing or a merger
As explained above, the lack of standards results in a diversity of process descriptions. In the event of mergers, or in other situations when operations are combined, there is guaranteed to be an evident lack of uniformity and exchangeability. These are the very situations where standardization would help things go smoothly.

The same applies to situations where IT activities are outsourced. This often means that once again a common process framework will need to be created first. This brings the risk of yet another new variation to the process description, in which the best of both the IT organization and its outsourcing partner are mixed.

Consequences: Higher costs because more process consultancy is required, longer integration throughput period, embedding of new process design insights.

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BPM CONCEPTS FOR IT PROCESS DESIGN

"If you're looking for trouble, you came to the right place." (Elvis Presley)

Elvis' quote accurately describes maintaining process architecture without a structured design approach. This section describes the BPM standards that relate to structured IT process design.

An insight is given into the essence of the BPM concepts: Unified Modeling Language (UML), Business Process Modeling Notation (BPMN) and Business Process Execution Language for Web Services (BPEL-WS). Finally, current BPM functionality support through modeling applications is discussed.

BPM concepts

Business Process Modeling Notation (BPMN)
BPMN is a graphical notation for the design/modeling of steps in a business process. It is intended to reflect the logical sequence of activities and the exchange of messages within or between business processes. The BPMN specification also describes a relationship between the graphic elements and the BPEL4WS language for automating business processes.

The primary objective of this standard is to offer an easily legible notation for not only process owners and process operators, but also technical process developers who are

responsible for automating the business processes. Thus, BPMN is intended to bridge the gap between process design and (automated) implementation of (automated) processes.

This standard was initially developed by the Business Process Management Initiative (BPMI.org). BPMN version 1.0 was published in May 2004 and was the version current at the time this article was originally written. BPMI merged with the Object Management Group (OMG) in the Business Modeling & Integration (BMI) Domain Task Force (DTF) in June 2005. BPMN was also adopted as an OMG standard at that time.

BPMN has four categories of objects/symbols as shown in figure 4.
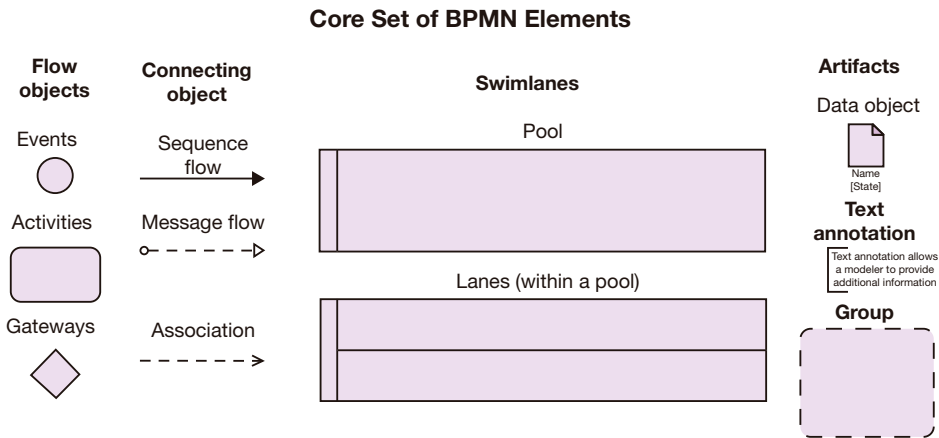
Core Set of BPMN Elements

Figure 4 BPMN elements

These symbols are the building blocks for various types of process diagrams. When using BPMN a distinction is also made between two basic types of diagrams: public business-to-business (B2B) process diagrams, and private internal business process diagrams.

The first basic type, B2B process diagrams, describes the interaction between two or more organizations or businesses. It describes the interaction between participating parties that are visible to the outside world. The second basic diagram type has more detail and depth than the B2B process diagrams. An example of a B2B process diagram is shown in figure 5.

The second type of diagram reflects the internal business process and will normally concentrate on a single organization and the activities that are not usually visible to the outside world. The business process in this type of diagram takes place in its entirety within a single pool, in which use is only made of messages to reflect the interaction with other processes. Thus, a business process diagram may reflect multiple internal business processes.

In developing BPMN, it is important to combat fragmentation in the manner in which process modeling takes place. BPMN can be considered a consolidation of the best parts of various types of notation, including: UML Activity Diagram, UML EDOC Business Processes, IDEF, ebXML BPSS, Activity-Decision Flow (ADF) Diagram, RosettaNet, LOVeM, and Event-Process Chains (EPCs).
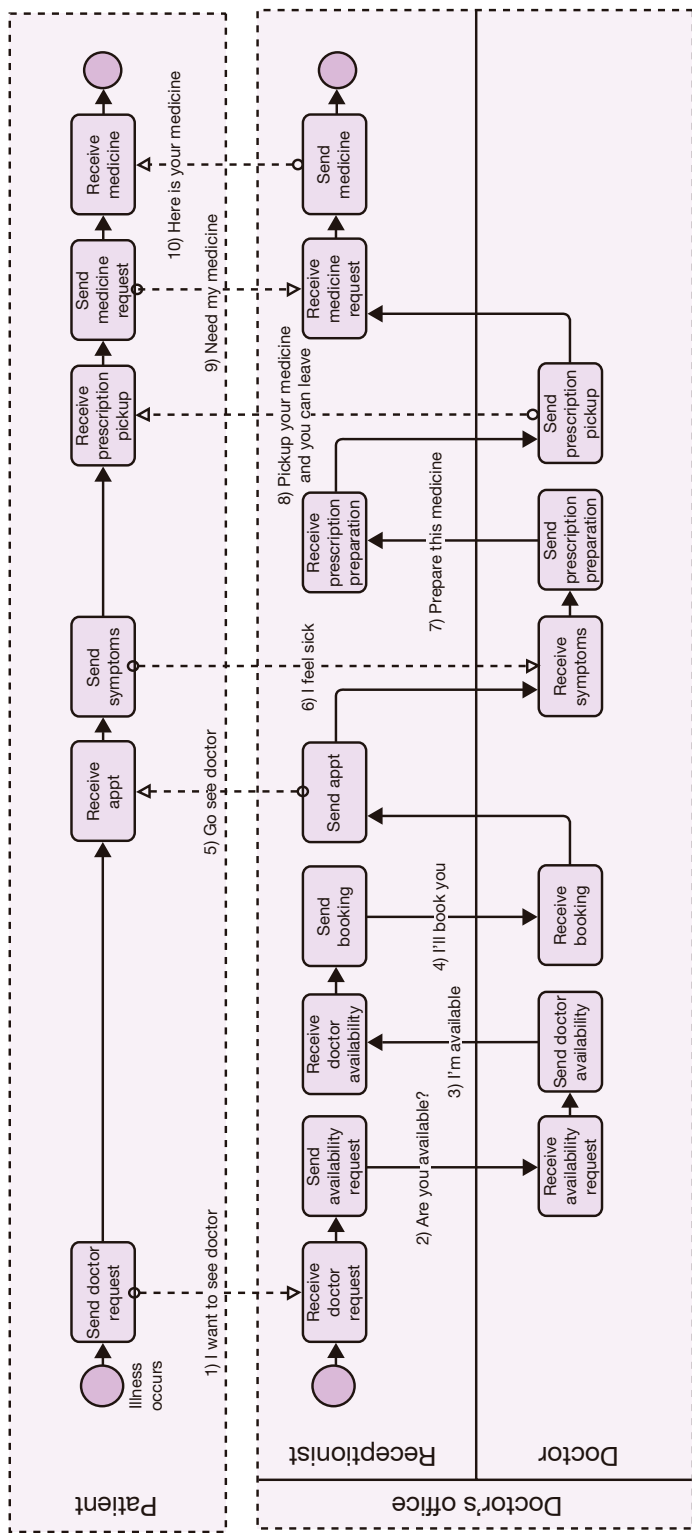
Figure 5 BPMN B2B process diagram

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Another reason for developing BPMN is that business processes are traditionally written by people who are relatively far removed from the technology used to automate business processes. Manual translation of business processes leads to numerous errors and makes it difficult for process owners to manage the evolution and performance of their processes.

In order to shorten the gap to the underlying technology, BPMN also has a uniform depiction of graphic objects in accordance with the Business Process Execution Language for Web Services (BPEL4WS). This is the de facto standard language for defining business processes (see section after UML).

Unified Modeling Language (UML)

UML is a graphic approach to modeling and designing applications/software. It is based on object oriented principles and can be used to design any type of application running on any combination of hardware, operating system, programming language and network.

In recent years UML has developed into a language for developing software designs/ blueprints for analysts, designers, programmers, etc. The primary objective of UML is to offer a common language to all those involved in the design of software/applications.

The UML standard was developed by the Object Management Group. UML version 2.0 was published in October 2004 and was the version current at the time this article was originally written. UML version 1.4.2 was also adopted as an international standard: ISO/IEC 19501.

UML is based on the principle of object oriented problem solving, starting with the construction of a diagram. A diagram is an abstraction of an underlying problem, and the domain is the world in which the problem exists.

UML 2.0 describes thirteen types of diagrams divided into three categories: application structure diagrams, behavior diagrams, and interaction diagrams (see Table 1 UML 2.0 diagrams).

Structure diagrams	Behavior diagrams	Interaction diagrams
Class diagram	Use case diagram	Sequence diagram
Object diagram	Activity diagram	Communication diagram
Component diagram	State machine diagram	Timing diagram
Composite structure diagram		Interaction overview diagram
Package diagram		
Deployment diagram		

Table 1 UML 2.0 diagrams

Diagrams consist of objects that send messages to one another. An object consists of attributes and a defined behavior. The status of an object is determined by the value of its attributes. A class is the blueprint for an object and describes the attributes and behavior of a single entity. Objects are instances of classes. An example to clarify this basic principle is shown in figure 6.
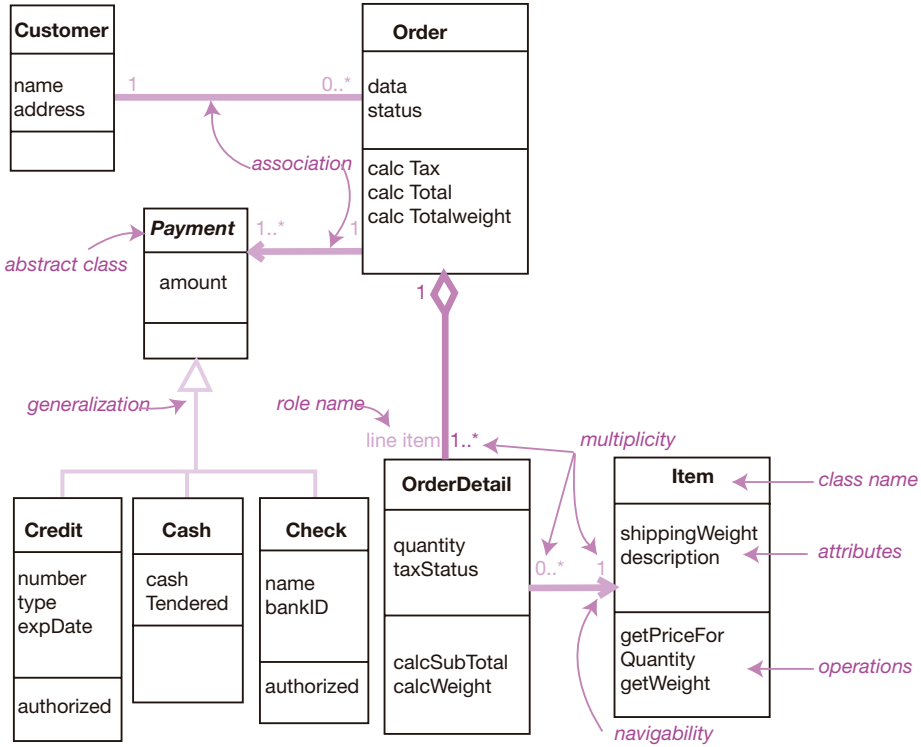
Customer

name
address

1   0..*

association

Order

data
status

calc Tax
calc Total
calc Totalweight

Payment

amount

1..*   1

abstract class

1

generalization   role name

line item 1..*   multiplicity

Credit

number
type
expDate

authorized

Cash

cash
Tendered

Check

name
bankID

authorized

OrderDetail

quantity
taxStatus

calcSubTotal
calcWeight

0..*   1

Item   class name

shippingWeight
description   attributes

getPriceFor
Quantity
getWeight   operations

navigability

Figure 6 UML Class diagram example

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The difference between UML and BPMN lies in the fact that UML focuses on object oriented application modeling while BPMN supports process oriented system modeling. The standards do not compete but can be viewed as different approaches to designing systems.

BPMN and UML are compatible. A business process need not always be automated. Business processes that are modeled with BPMN can be reflected in UML concepts. Various documents have already been published on this subject, including the document "Use of UML and Model Transformations for Workflow Process Definitions", by Audris Kalnins and Valdis Vitolins.

Business Process Execution Language (BPEL)
BPEL is a language (meaning: XML notation and semantics) for describing business processes which often involve interactions with external web services. BPEL specifies the sequence in which a collection of web services are activated, and assigns responsibility for providing each of the web services to partners.

In essence, web services are applications made available via the internet or an intranet as services in accordance with a Service Oriented Architecture (SOA). See also figure 7.

The BPEL standard is managed by the Organization for the Advancement of Structured Information Standards (OASIS). This is a consortium that works towards the development, convergence and adoption of e-business and web service standards. The most recent
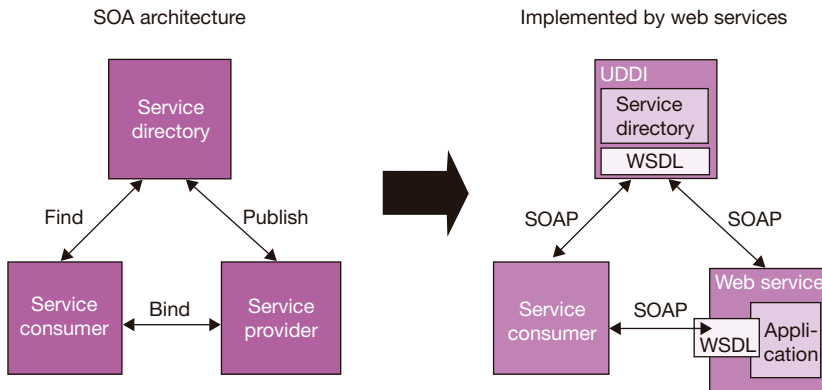
SOA architecture   Implemented by web services

Figure 7 SOA and web services

version of this standard is the WS-BPEL 2.0 which was released as a committee specification in February 2007.

At the highest level, a BPEL process defines the interaction between partners. A BPEL process has synchronous and asynchronous interaction with its partners. The building blocks for a BPEL process are descriptions of the parties participating in the process, the data flowing through the process, and the activities undertaken during the execution of the process. An example is shown in figure 8.

```
<sequence>

    <receive partnerLink="client" variable="input"
        operation="ns1 : register"/>

    <invoke partnerLink="letterCenter"
        operation="ns2 : confirmation"
        inputVariable="input"/>

    <flow>

        <invoke partnerLink="clearingCenter"
            operation="ns3 : clearConnection"
            inputVariable="input"/>

        <invoke partnerLink="directories"
            operation="ns4 : register"
            inputVariable="input"/>

    <flow>

        <invoke partnerLink="letterCenter"
            operation="ns5 : completion"
            inputVariable="input"/>

</sequence>
```

Figure 8 BPEL code example

The BPEL process itself is a web service and is carried out by a BPEL engine that performs the process description. A number of limitations are consciously applied to the processes that can be described in BPEL, meaning that processes can be defined in BPMN but cannot subsequently be translated into BPEL code. Some BPMN concepts, e.g. ad hoc sub-processes, therefore cannot be automated.
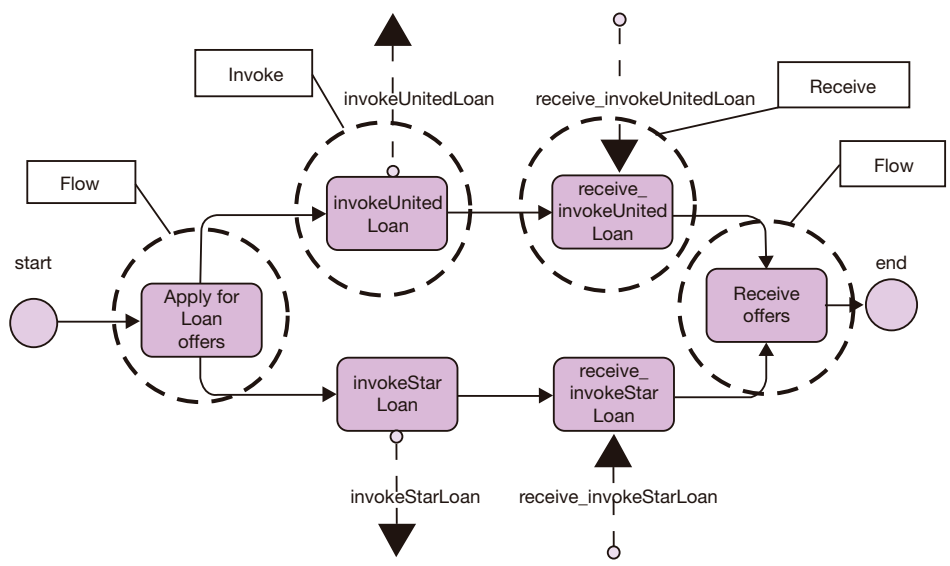
Figure 9 Example BPMN model with relevant BPEL code

There is no graphic notation for BPEL. Some suppliers have compiled their own notation while others have adopted BPMN (see figure 9). As indicated earlier, a mapping between BPMN and BPEL 1.1 is part of the BPMN specification. Due to a few fundamental differences, however, it is very difficult and sometimes even impossible to generate BPEL code that can be translated back into BPMN models. Even more complicated is the synchronization of a BPMN model and BPEL code - in which a modification of one automatically leads to modification of the other.

BPM concepts overview
The standards described in this section build upon one another as reflected in figure 10.
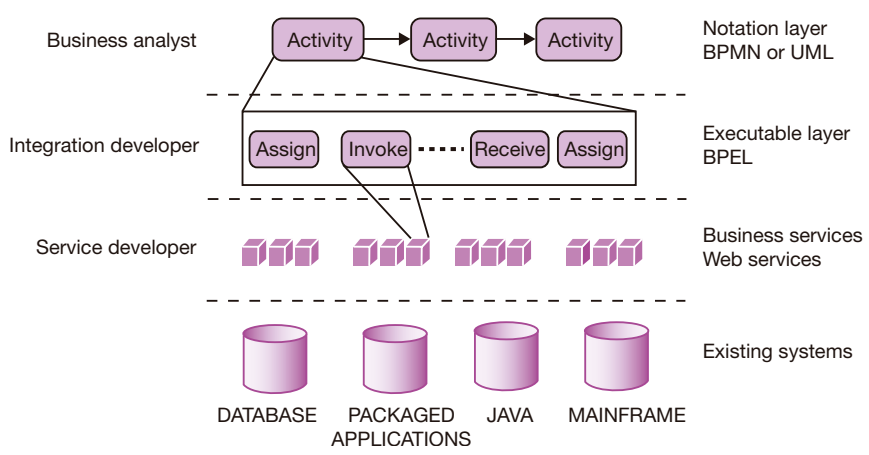

Figure 10 BPM concepts summary

Commercial modeling applications

The market for business process management offers a wide variety of applications. These include not only applications for process modeling, but also for process simulation, process automation and process monitoring. This section specifically views the characteristics of applications used to model, analyze and modify processes because these are the most appropriate within the context of this article.

Simple drawing programs, e.g. Microsoft PowerPoint or Microsoft Visio, have not been included because they have not been designed and created for creating and maintaining large numbers of closely integrated models.

Process modeling applications differ from drawing programs in that they save the model data in an object-oriented database structure. Thus an activity in a flow diagram is more than a symbol: it is an object with attributes in a database.

As a result, when an object is reused in a different diagram, all of the data linked to the object is also immediately available. Moreover, object modifications are immediately visible in all diagrams/models in which the object is used.

Applications of this type support three primary functions. Firstly, they are used to document an existing situation. Secondly, they help in the analysis of the effects of possible changes. Finally, they support the documentation of plans to implement changes.

As a result, modeling applications offer the possibility of making diagrams/models of both the existing situation (as is) and the desired situation (to be).

There is a relatively large variety of applications available in the market and the functionality offered varies considerably between them. Some applications are intended for managers, others are meant for analysts and/or application developers. There are also generic applications that can be used for any type of architecture and process modeling, as well as applications specifically intended for certain types of modeling and analysis, e.g. SCOR, eTOM, Zachman, etc.

Some modeling applications support twenty or more different types of diagrams/models and a large number of different notations. Others support only a few notation and diagram/model types. Lastly, there is a group of applications that makes it possible to compile one's own conventions and modifications based on existing notations, diagrams and/or models.

Simulation

Most modeling applications also offer some type of simulation, either as part of the application itself or as a separate add-on module. Simulation functionality includes simulating processes based on fictive input and/or based on real-time data, interaction with operational systems, reporting of simulation measurement data, and the possibility of applying static analysis to simulation data.

There are two simulation methods: "system analysis", based on mathematical models and numerical methods, and "discrete events", based on an event processing method, with the latter being the most popular method among suppliers.

Simulation requires a process modeling application that saves information for every activity. Single simulations can be performed with case data – scenarios – after which the case processing is analyzed. Most simulation functions offer information about throughput times, bottlenecks and costs.

Support of BPM concepts

A large number of process modeling applications support UML and BPMN, and can generate BPEL code. Businesses and organizations that use applications that support BPMN are actually using a tool for both managers and developers, with which flow diagrams can be rapidly translated into code. The BPM applications use the code to continually monitor, perform and manage processes.

The perfect processing modeling application does not, as yet, exist. Most suppliers provide a core application and a variety of add-ons that can make the application suitable for one or more specific target groups. Moreover, suppliers prefer to work on multiple niche markets.

Thus it is sensible for an organization to determine its own requirements in terms of the mix of functions that are needed and which application best satisfies these needs. Business Process Trends is an organization that does extensive research in the area of business process management: it publishes a variety of reports, including detailed information about BPM applications and suppliers, and keeps the information up-to-date.

PRINCIPLES FOR IT PROCESS DESIGN

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Principle 1 - Use BPMN for IT process modeling

The most important advantage of this principle is an easily legible but nevertheless uniform notation for process owners, designers and operators, thereby improving the exchangeability and communication involved in IT processes.

What is more, the risk that an IT process design is not technically feasible is reduced considerably by the fact that the interpretation and implementation of the IT process design based on BPMN can be extensively automated. This basic principle is therefore best served in combination with applications and an infrastructure that uses BPEL and web services.

The impact of this principle is that all of the parties involved must be trained and coached as necessary in using this standard.

Principle 2 - Select a commercial modeling application

Keeping large numbers of related IT process models/diagrams consistent and reducing the risks involved in (automated) translation to a workable code are only two of the major advantages of using a commercial modeling application.

Depending on the selected application, decisions can be made based on better information because detailed process analyses can be performed, e.g. by simulating activity-based costing models.

In addition to the purchase and maintenance investments for the selected application and any additional hardware needed, all of the parties involved in using the application will also need to be trained and coached as necessary.

Principle 3 - Reuse pre-defined and proven IT processes

This basic principle contributes significantly to designing and implementing IT processes more rapidly, with fewer risks and at less cost.

A consequence of this principle is that a thorough study must be performed of IT process documentation - available both internally and externally - before a project addressing IT process design and implementation can commence. An external supplier will not only be a source of process documentation, but will also play a part in helping to bridge any internal organizational resistance to change (meaning: IT processes).

SUMMARY AND CONCLUSION

The previous sections explained that IT processes are needed to operate from a future-oriented perspective and to anticipate changing circumstances. Furthermore, IT processes are perfectly suited to efficiently and effectively organizing and automating repetitive activities.

The following problems were identified as the most important ones in making and maintaining an IT process design: the lack of a strategy, no context and process architecture, inconsistency, insufficient detailing, difficulties in version management and the relatively large number of errors in process implementation and process automation.

By addressing these problems, investments in terms of time and money can be significantly reduced in the design, implementation and maintenance of IT processes. We recommend that, amongst others, the following principles be applied:
- Use BPMN for IT process modeling.
- Select a commercial modeling application.
- Reuse pre-defined and proven IT processes.

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REFERENCES

- **Hall C, & P. Harmon** (2006). The Enterprise Architecture, Process Modeling and Simulation Tools Report, version 2.0. *BPTrends.*
- **Havey, M.** (2005). *Essential Business Process Modeling*. http://www.oreilly.com/catalog/essentialpm/. O'Reilly Media.
- **Holt, J.** (2001). *UML for Systems Engineering: Watching the Wheels.* London: Institution of Electrical Engineers.
- **OMG** (2006). Unified Modeling Language: Infrastructure, version 2.0, formal/05-07-05. *Object Management Group.*

- **Piispanen, T.** (2006). BPEL & SOA (Presentation). http://users.tkk.fi/~tpiispan/BPEL_SOA_presentation.pdf
- **Raj, J** (2004). BPEL and BPMN, Modeling Business requirements for BPMS Choreography. Global Business Process Forum 2004, *BPMG.org*.
- **Scheer, A.W.** (1999). *ARIS Business Process Frameworks.* Springer
- **White, S.A.** (2004) (2005). BPMN Fundamentals. http://www.omg.org/docs/pm/05-12-06.ppt
- **White, S.A.** (2004). Business Process Modeling Notation (BPMN) version 1.0 – May 3, 2004. *BPMI.org*
- **White, S.A.** (2004). Introduction to BPMN. http://www.bpmn.org/Documents/ Introduction to PMN.pdf
- **Wolf, C. & P. Harmon** (2006). The State of Business Process Management. *BPTrends*

Websites
- http://www.workflowpatterns.com
- http://www.bptrends.com

6

6.3 Functions and processes in IT management

Migrating from an ITIL reference model to a universal implementation model

ITIL does not structurally and clearly discriminate between processes and functions. This makes ITIL a mixed reference model, where organizations need implementation models to bring ITSM to practice. In this article, Wim Hoving and Jan van Bon describe the fundamental difference between functions and processes and provide a simple implementation model that works in practice.

INTRODUCTION

The ITIL® books are being used more and more as the basis for organizing an IT department or company. From the 1990s on, many thousands of organizations have adopted ITIL as the framework for their IT service management approach. It is clear that significant improvements were realized in many of these projects. And, as a result, IT service management as a practice was raised to a higher level of maturity.

It is also clear that many of the projects did not meet their expectations. Even taking into account the fact that ITIL projects include the known complexity of regular organizational change projects, the average results are below expectation. Although the phase "adopt and adapt" is widely accepted as the best approach to ITIL, in practice people tend to use ITIL as is. And that's where the problems arise…

ITIL is a clear example of a reference framework that covers very practical issues in live IT service organizations. For many years, and for each of the targeted subjects, the best practices have been collected and documented in separate publications from a practical point of view. A consequence of this approach was the lack of a basic design.

After some time, titles were grouped in V2 "sets" to organize them. The V2 books did little more than regroup the activity-based V1 books into new covers that had a more comprehensive focus on processes and functions, added some missing content from the same practical point of view, and lost some other content.

The V3 books built on this and added an overall approach, the service lifecycle. However, the authors' team decided not to change the most popular parts of ITIL, in spite of the "known errors" in the previous version. As a result, they inherited most of the problems that came with the V1 and V2 books.

A lot of these problems originated from the vague and contradictory use of the word "process". In fact, a lot of the limited results of so-called "ITIL implementation projects" can be directly related to the misuse of this term. If an organization doesn't understand the difference between a process and a function, it will be very hard to get organized in an effective and efficient way.

On the other hand, having this essential insight will assist organizations in using ITIL as a reference set of good practices, applying it in a logical and structured way. But the

organization will have to produce its own implementation model, since ITIL simply never provided this in any of its versions.

In this article, we will not address the issues of knowledge and resources, instead we'll focus on all ITIL and ISO 20000 processes and functions. These will be analyzed in terms of process characteristics. The resulting list will make clear which "true" processes are to be found in ITIL and ISO 20000. A simple process model, using the list of "pure process" from the analysis, will be provided to the reader. Examples will then be provided on the functions that can be defined on this, referencing all the entities described in ITIL V2 and ITIL V3.

PROBLEM DESCRIPTION: FAILING IMPLEMENTATIONS

Process management

Organizations are expected to aim for operational excellence, or at least "to be in control". Their "level of maturity" is often used as an indicator for these goals.
Based on most maturity models, organizations always have to go through a phase where they learn how to get in control of their processes. Process management is generally understood to provide the shortest road towards customer value. This directly links process management to customer-focus, which is on top of the list for many service providers.

Processes can be defined in many ways. Depending upon the objectives and considerations of the creator, different aspects will be emphasized more or less. For example, a highly detailed process description will allow for a high level of control. Superficial process definitions illustrate that the creator does not pay detailed attention to how the process steps are executed.

Once the processes are defined, the roles, responsibilities and people can be assigned to specific aspects, bringing the process to the level of a procedure.

ITIL and processes

For the last decade, many organizations have used ITIL as their main source of information on IT management processes. ITIL V1 focused on the tasks of an IT service provider and contained valuable information on processes. ITIL V2 highlighted the elements that were interpreted by many as "the ITSM processes", especially in the service support and the service delivery set. ITIL V3 has concentrated on service lifecycle management, and restrained the level of detail on ITIL V2 content in the new books. Yet, the authors of ITIL V3 say that it is built on processes, using the result that was achieved in ITIL V2. Moreover, they claim to present a series of new processes, which help to make up at least 25 processes in total. This article will show that this is not in line with the definition of "process", as provided in the same ITIL V3 books.

Processes and functions

An important comment was made in the introduction of each new ITIL V3 book, stating that perceiving capacity management as a process rather than a function could be "an error".

"Functions are often mistaken for processes. For example, there are misconceptions about capacity management being a service management process. First, capacity management is an organizational capability with specialized processes and work methods. Whether or not it is a function or a process depends entirely on organization design. It is a mistake to

assume that capacity management can only be a process. It is possible to measure and control capacity and to determine whether it is adequate for a given purpose. Assuming that it is always a process with discrete countable outcomes can be an error." (A quote that is in each ITIL V3 book)

Unfortunately this crucial comment wasn't followed up in the rest of the books.

If you dig a little deeper, you will see that most of the ITIL "processes" appear to be "functions" instead. By definition, processes are different from functions: they have different dimensions. After careful analysis of ITIL V3 only a handful of "true processes" remain. The rest are functions using these processes. Based on a clear and strict definition of "process" and "function", this list of processes and functions will be presented at the end of this article.

Once the distinction between processes and functions is clear, it is much easier to find a proper organization scheme in which process management can be used for optimum results.

Processes, procedures and work instructions
In practice, it is not the process that leads the people in an organization; it is the procedure, and the work instruction. Processes only show how the logic in a procedure is constructed, but they don't tell you who should do what, when and how. However, if you don't understand your processes, and if you don't build your procedure upon your processes, the procedure will often be inconsistent with the next procedure. It will not be clear how and why it was constructed. Therefore, you will need to have your process system in place before you can construct or improve a set of procedures.

Process comes first
Paradigms like "process-people-product", "structure follows strategy", "procedure follows process" and "structure follows process", emphasize the critical role of the process model in an organization. Applied to the process-function issue, this implies that functions should clearly relate to processes for an optimum organization.

PROCESS MANAGEMENT IN MATURITY MODELS
Obviously, processes are important to organizations. Organizations that are aware of this often tend to invest in their "maturity".

There are two mainstream "schools" of maturity thinking. They are based on different interpretations of the term "maturity":
- **Capability maturity models** explain how well certain activities are performed. Examples are CMMI, SPICE, the Test Process Maturity Model, the Project Effectiveness Maturity Model (PEMM), Luftman's Business IT Alignment model, and Nolan's growth model. Basically, all of these models describe process capability levels, expressing how well processes are performed.
- **Value chain maturity models** explain how well an organization is able to contribute to a value chain. Examples of the value chain maturity school are the KPMG World Class IT maturity model (Delen et al., 2002), and the INK management model (based on EFQM).

Combinations can also be found, for example in the Gartner Networking Maturity Model.

There is a hierarchic relationship between both schools: the capability maturity models are focused at process management, which encompasses the second or third stage of the value chain maturity models.

The value chain maturity models make it clear that the road to "total quality" or "business excellence" passes through the process-focused phase. The phase in which the organization becomes skilled in managing processes is elementary in this maturity approach. The organization cannot focus on systems and value chains until the processes are under control. In general, organizations should learn to get in control of their infrastructure first, then master their processes, and then learn how to provide the best services with that. Once they've learned to provide the most effective and efficient services, they can adopt an external focus and learn to understand the needs of the customer in the perspective of the value chain. Only if an organization can do this, will it be able to survive and become a successful and *mature customer-focused organization*.

BUSINESS PROCESS MANAGEMENT

Now we've made it clear why process management is an important phase in the road towards business excellence, we should look at process management in more detail. The most sensible way of doing this should at least involve the knowledge that was developed in the discipline of Business Process management (BPM).

BPM involves the management and improvement of business processes. A structured approach to BPM is often based on continual improvement methods like PDCA, and contains steps like process design (activity flows, actors, inputs/outputs, standard procedures, communication), process modeling (resources, conditions, scenarios), process execution (systems, tools, rules), process monitoring (measuring and tracking of individual processes, metrics, KPIs), process improvement (evaluation, improvement scenarios) and then back to process (re-)design.

The ISO 9001 documentation describes generally accepted approaches to BPM, using the process approach. An important element in this process approach is the mapping of the process structure, using process flow charts. Processes are presented as logically connected sequences of activities, and not loosely coupled groups of activities.

The ISO 9001 quality model discriminates between processes, procedures and work instructions. Developing a quality management framework starts at the top and works its way down the pyramid: first the processes, then the procedures, and finally the work instructions with supporting documents (figure 1).

A number of these BPM lessons have been widely accepted in businesses all over the world. And, of course, it is no surprise that ITIL has claimed to adopt this knowledge in its documentation of best practices. In practice, only a small part of the ITIL documentation is indeed constructed with this knowledge.

BASIC GUIDANCE ON PROCESS MANAGEMENT

When arranging activities into processes, we do not use the existing allocation of tasks in the live organization, nor the existing departmental divisions. Instead, we look at the elementary and logical relationship between activities, in terms of their relevance for, and contribution
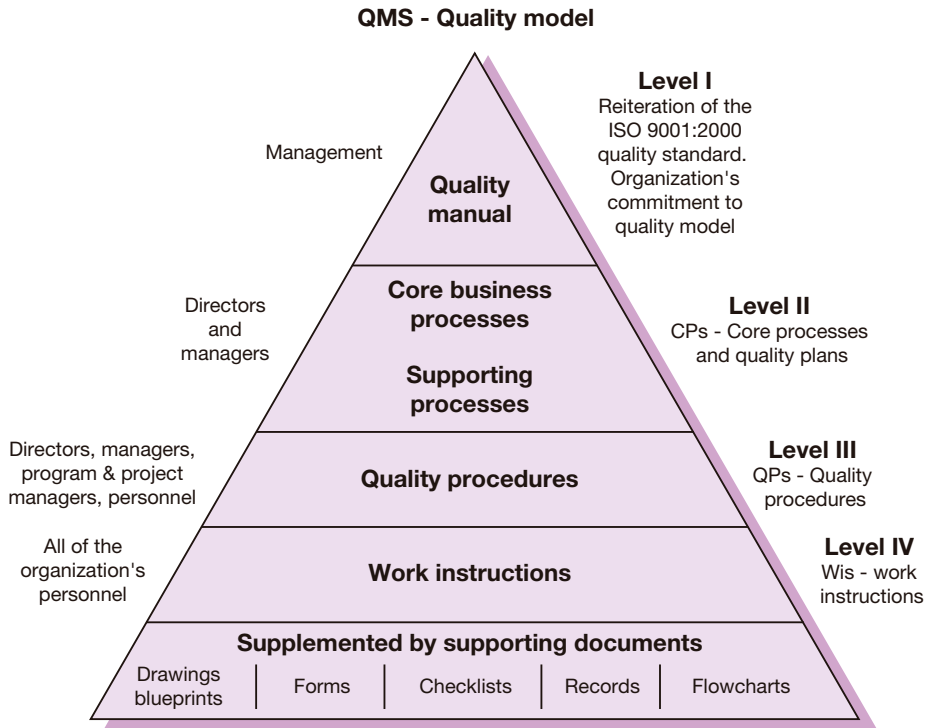
QMS - Quality model

Figure 1 Process documentation in the ISO 9001 quality model (Tricker, 2006)

to, one specific output. This is a conscious choice. By opting for a process structure, we can often show that certain activities in the organization are uncoordinated, duplicated, neglected or unnecessary.

A process organizes activities in a meaningful, logical, effective and efficient sequence to realize a pre-defined objective. We focus on the objective of the process and the relationships with other processes. In this sense, a process is a series of activities carried out to convert an input into an output, and ultimately into an outcome. See the elementary ITOCO model (Input-Throughput-Output-Control-Outcome) in figure 2.
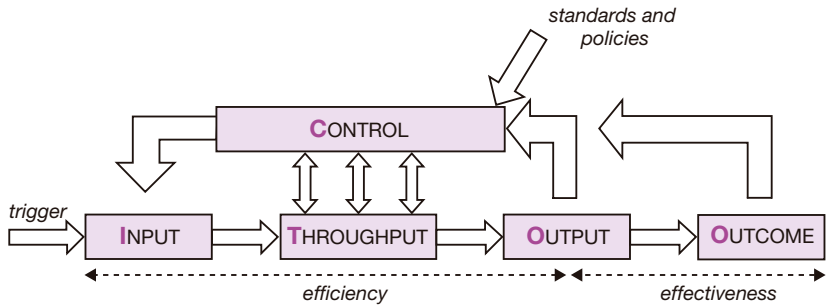
Figure 2 Process diagram, based on the ITOCO-model

The process is set off with a trigger. The (reported) output describes the immediate results of the process, while the outcome indicates the long-term results of the process (in terms of meaningful effect). Control activities assess whether the input, throughput and output of each process are compliant with policies and standards, and take action if necessary.

This produces process chains which show what input goes into the organization and what the result is. It also provides monitoring points to check the quality of the organization's products and services.

Control activities

Processes are composed of two kinds of activities:
* **activities to realize the goal** - operational activities concerned with the throughput, converting input to output
* **activities to manage these** (**control activities**) - make sure the operational activities (the workflow) are performed in time and in the right order

For example, in the processing of changes it is always ensured that a test is performed *before* a release is taken into production.

The standards for the output of each process have to be defined, such that the complete chain of processes in the process model meets the corporate objective. If the output of a process meets the defined requirements, then the process is effective in transforming its input into its output. To be really effective, the outcome rather than the output should be considered.

If the activities in the process are also carried out with the minimum required effort and cost, then the process is efficient. It is the task of process management to ensure that processes are executed in an effective and efficient way, using planning and control. Therefore, each process will also contain control activities that make sure that quality standards are followed. This results in clear transfer points where the quality of processes can be monitored.

Procedures and work instructions

Processes as such are too abstract for most people to be used in daily practice. The processes only describe the *what* of an organization, and people need to understand the *who*, the *why*, the *when* and the *how* to be able to use the processes in practice.

*A **procedure** is a specified way to carry out an activity or a process. It describes the "how", and can also describe "who" carries out the activities. A procedure may include stages from different processes and can vary depending on the organization.*
*A set of **work instructions** defines how one or more activities in a procedure should be carried out in detail, using technology or other resources.*

The process describes what the organization does, the procedure adds the who, when and why, and the work instructions also cover the how and with. Figure 3 illustrates the fact that the system gets interesting and meaningful for most people at the level where they are involved. This is often at the procedure and work instruction level.
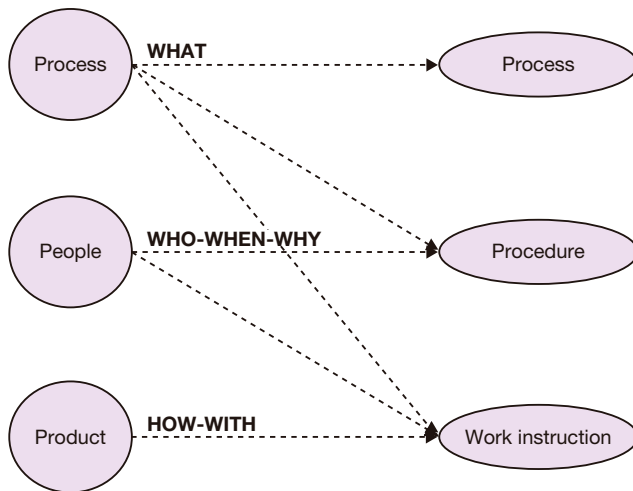
Figure 3 Processes, people, products, procedures and work instructions

WHAT DOES ITIL V3 TELL US ABOUT PROCESS MANAGEMENT

ITIL V3 (like V2 and V1) is "clear but ambiguous" about what a process is. The glossary says the following.

> **Process**: A structured set of activities designed to accomplish a specific objective.
> A process takes one or more defined inputs and turns them into defined outputs. It may include any of the roles, responsibilities, tools and management controls required to reliably deliver the outputs. A process may define policies, standards, guidelines, activities, and work instructions if they are needed. (ITIL V3 glossary)

This definition clearly doesn't follow the BPM definition, as illustrated in figure 3. A process here also contains elements from quite different levels, like work instructions.

Yet, the ITIL V3 Service Strategy book says something quite different.

> A **process** is a set of coordinated activities combining and implementing resources and capabilities in order to produce an outcome which, directly or indirectly, creates value for an external customer or stakeholder. (ITIL V3 Service Strategy)

The use of the term "outcome" instead of "output" indicates a very high level of process *capability* maturity. It's more likely that the term "output" was actually meant here. The reference to "resources and capabilities" indicates that the scope of this definition is more at the level of a procedure than at the level of a process.

At other positions in the V3 books, ITIL describes the widely accepted definition of "a sequence of activities" (figure 4).

"Process definitions describe actions, dependencies, and sequence", the ITIL V3 Service Strategy book says. But if we look at the way the term "process" is applied throughout the ITIL books, we see that none of these definitions are actually followed in a consistent way. All
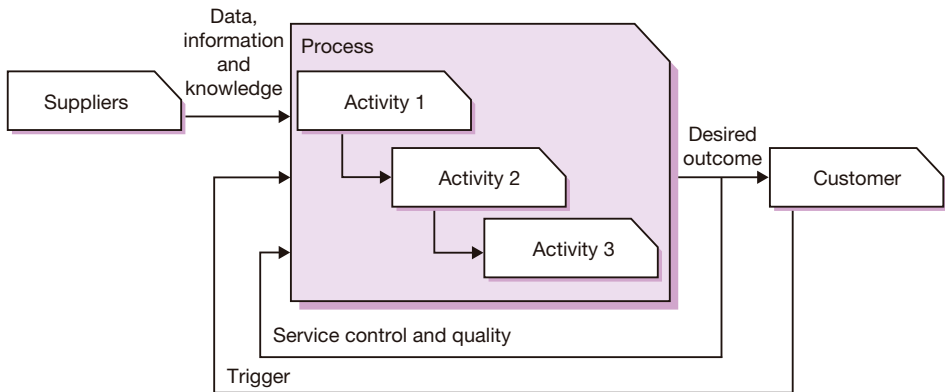
Figure 4 A basic process, according to ITIL V3 (source: OGC)

kinds of activity sets, all kinds of practical advice or "guidance" are described with the term "process". In fact, the ITIL V3 core books list at least 25 activity-sets labeled as processes:

- **Service Strategy**:
  - financial management
  - service portfolio management
  - demand management
- **Service Design**:
  - service level management
  - service catalogue management
  - supplier management
  - capacity management
  - availability management
  - information security management
  - IT service continuity management
- **Service Transition**:
  - transition planning and support
  - change management
  - release and deployment management
  - service validation and testing
  - evaluation
  - knowledge management
  - service asset and configuration management
- **Service Operation**:
  - incident management
  - problem management
  - access management
  - event management
  - request fulfillment
- **Continual Service Improvement**:
  - 7-step improvement process
  - service measurement
  - service reporting

This clearly follows the definition of the ITIL V3 glossary, and not the detailed definition system that is provided throughout the core books. And it certainly doesn't follow the lessons learned in the business process management discipline. Since a process is only about the *what*, process definitions should exclude all information on the other dimensions (*who*, *how* and *when*).

As soon as we see a process title like capacity management, alarm bells should start ringing. Since this term refers to *infrastructure* - clearly an element of the lowest level in figure 3 - it should not be an element of a process description at all. The same would go for network management, desktop management, application management and many more infrastructure-based activity clusters. Activities that are gathered under this kind of title are actually often *functions* using a number of elementary processes.

ELEMENTARY PROCESSES OF A SERVICE PROVIDER

As illustrated, there are several definitions of "process". For a simple, understandable and practical view on process management, we need to choose a clear definition and a context for its application.

> **Process**: *A sequence of interrelated or interacting activities transforming inputs into outputs, designed to accomplish a defined objective in a measurable and repeatable manner.*
>
> *A process description defines what will be done, what input is required, and what output is produced. See the ITOCO model in figure 2.*
> *Processes have clear business reasons for existing.*
> *A process can be detailed in one or more procedures, and subsequent work instructions.*
> *The organization can define roles and responsibilities and relate these to the activities in the process.*

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Sequence

The structure of a process is in fact a sequence of activities that are placed in a repeatable logical order: a *workflow*. This workflow is controlled by control activities. These activities make sure the operational activities are performed on time, in the right order and in the correct way.

Repeatable and measurable

A process is measurable, has specific results delivered to a customer, and responds to a specific event. ITIL says: "While we can count changes, it is impossible to count how many service desks were completed. So change is a process and service desk is not: it is a function."

A logical question would now be: how many capacities have you done today, how many continuities, and how many availabilities? Obviously, this question cannot be answered, and we are at risk of degrading the real question to a word game. It would make a lot more sense if we would turn this into questions like:
• How many *capacity incidents* have you managed today?
• How many *capacity changes* have you managed today?
• How many *capacity risks* have you managed today?

These questions refer to repeatable, measurable and meaningful results.

Effectiveness and efficiency

So what would a set of elementary processes look like? Like any other kind of service organization, an IT service provider has only a very limited set of high frequency elementary processes:

- Four processes are concerned with **effectiveness**:
  a. *Agree* with your customer what you will deliver. We can call this the *contract management* process.
  b. *Deliver* what you have agreed. We can call this the *operations management* process.
  c. *Repair* anything that goes wrong. We can call this the *recovery management* process.
  d. *Change* your service if your customer wants another service. We can call this the *change management* process.
- Two processes are concerned with **efficiency**:
  e. You *know* what you use to deliver your service with. We can call this the *configuration management* process.
  f. You *adjust* (to) conditions that may prevent you from delivering tomorrow what you have agreed today. We can call this the *risk management* process.

This applies not only to an IT service provider, but also to service providers in other disciplines. Imagine a catering service provider, the national post, or any other service provider: they all will perform these same elementary tactical and operational processes.

For an IT service provider, the contract management process (a) will cover responsibility areas like service level management, supplier management and business relationship management. The operations management process (b) will cover everything the organization needs in order to produce the IT service, when the service is not down and when it is not changed (which is the bulk of the IT provider's activities). It would normally cover the planning and execution of all operations activities, including the monitoring of all services and components. The recovery process (c) covers everything concerned with the repair of services or components. The change process (d) covers everything to be done when changing an IT service or component. The configuration management process (e) covers all activities for providing correct information on all infrastructure components used to deliver the services. And finally, the risk management process (f) covers all proactive management activities that make sure that the organization will still be able to deliver the service as agreed, in spite of changing conditions (capacity, performance, problem, demand).

Strategic processes

Of course, an organization will have some kind of strategic process covering this elementary set. However, strategic activities do not usually get caught in process descriptions. The frequency of these activities is relatively low, so the short term repetitive character is missing. Moreover C-level managers in strategic positions do not usually consider their activities as being standard and commoditized. The Service Strategy book in ITIL is a good example: although many activities are described, you will have to look very hard to be able to recognize a real strategic process in the book. For practical reasons, we've chosen to limit the set of high frequency elementary processes to the tactical and operational levels in an organization.

A SIMPLE PROCESS MODEL BASED ON ELEMENTARY PROCESSES

Contrary to what ITIL says, the basic processes for an IT service provider are quite standard and vary little. In fact, they are commoditized. They may vary in the level of detail, but the logic and meaning of, for example, the change management process will be similar for all organizations.

The previous paragraph described the six elementary processes that are common to each service provider, in whatever line of business they are active. Combined with the observation that IT organizations have great difficulties in managing their processes, and that they hardly ever master more than four or five processes, this leads to the conclusion that for most organizations, only very simple process models will work in practice. Figure 5 presents such a model, which is based on the ISM® model, as first published by Van den Elskamp c.s. in 1999.
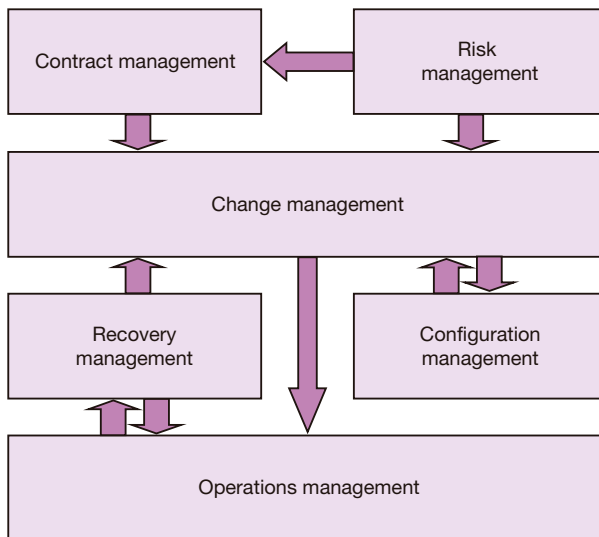

Figure 5 A simple process model for IT service management

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This is a very simple but practical model that covers the vast majority of what a service provider should manage in terms of processes. It's a process model, and therefore it doesn't show any information on functions. It's easy to show how functions can be used to cover the organizational dimension. The model doesn't show information flows, just the process triggers:
• a change in a contract triggers a change in the infrastructure (through change management)
• an infrastructure change triggers an operational activity in the production environment (through operations management)
• if something doesn't function as agreed, it is repaired or reset (in operations management) or adapted (through change management)
• all changes require an update of the administered infrastructure (through configuration management)
• errors in the infrastructure administration may require a controlled change to re-establish the required infrastructure

- risks that are a threat to the realization of the SLA should be taken away by changing the information system or by negotiating the SLA (through risk management)
- changing conditions may require an adjustment of the agreed service specifications or a change to the infrastructure

Functions like capacity management, application management or the problem management team may use these processes to realize their specific objectives.

FUNCTIONS

Having defined "processes", it's now time to define "functions".

What is a function

"Service management is a set of specialized organizational capabilities for providing value to customers in the form of services. The capabilities take the form of functions and processes for managing services over a lifecycle" (ITIL V3 Service Strategy book)

So, according to ITIL V3, functions and processes are apparently different entities.

ITIL V3 provides a clear definition of the term "function".

Functions are units of organizations specialized to perform certain types of work and responsible for specific outcomes.

They are self-contained with capabilities and resources necessary for their performance and outcomes. Capabilities include work methods internal to the functions. Functions have their own body of knowledge, which accumulates from experience. They provide structure and stability to organizations.

Functions are a way of structuring organizations to implement the specialization principle. Functions typically define roles and the associated authority and responsibility for a specific performance and outcome.

In organization design, functions are commonly coordinated through shared processes. Functions tend to optimize their work methods locally to focus on assigned outcomes. Poor coordination between functions combined with an inward focus leads to functional silos that hinder alignment and feedback, which are critical to the success of the organization as a whole. Process models help avoid this problem with functional hierarchies by improving cross-functional coordination and control. Well-defined processes can improve productivity within and across functions. (ITIL V3 Service Strategy)

Although ITIL V3 does not make this explicit, it's worthwhile to note that functions don't have to be limited to fixed organizational units. Virtual teams would also fall within the definition of function.

Apart from the organizational unit, the term "function" is also used in various other meanings. Definitions (Van Bon, 2008) of the term cover the following:
1. A (virtual) team or group of people and the tools they use to carry out one or more processes or activities. For example the service desk, availability management, capacity management and IT operations.

2. An intended purpose of a configuration item, person, team, process, system or IT service. For example, one function of an email service may be to store and forward outgoing mails. One function of a business process may be to dispatch goods to customers.
3. To perform the intended purpose correctly. For example, "The computer is functioning".

In this article, we only use the first of these three meanings. We extend it, however, to be more complete. The basic difference between a process and a function is that they describe the same organization along different dimensions. The processes *only* describe the *activities*, and don't cover the people and the product factors. The functions cover *all three components*: activities, people and products.

This implies that an organization can be organized in at least two dimensions: the dimension that uses the classes *people*, *process* and *product*, and the dimension that uses *functions*. This function principle can have different formats. In practice, we find functions that are classified along:

- **An infrastructure format** – This is focused on managing a part of the information system, such as the application, the network and the database. Relevant functions can be application management (team), network management (team) and database administration.
- **A service quality format** – This is focused on managing a quality aspect, such as availability, continuity and security. Relevant functions can be availability management (team), IT service continuity management (team) and security management (team).
- **An activity format** – This is focused on managing one or more specific activities (processes). Relevant functions can be the change management team, the configuration management team, requirements engineering and the service desk.
- **An organizational format** – This is focused on organizing responsibilities in departments according to criteria such as size, region, skills and specialism. Examples of functions can be the EMEA business unit, team west or the corporate headquarters.

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A function can, of course, also be a mix of any of these—or other—formats. Finding the optimum organizational structure is a balancing act: which functions are most important to the organization, which processes are essential, how is management balanced between the function dimension (also known as "the line") and the process dimension?

Processes describe only the order in which activities should be executed, functions contain all the elements necessary to execute certain activities. These activities are then executed according to the process description.

The next paragraph analyzes this relationship between processes and functions.

The process management matrix
The ITIL definition of the term "function" is based on a widely accepted understanding of the difference between the process dimension and the organization dimension (the line). Any organization that understands this, and applies both processes and functions in their management system, will know that they work with a management matrix, combining both dimensions.

A process-based organization has structured all of its activities in a neat series of processes, so that "floating" or "orphan" activities no longer exist. If an activity is sufficiently important to be documented, it should be part of one of the defined processes and it should be allocated

to the line. Activities can be managed through the process as well as through the line. An organization that wants to be in control of all of its important activities should establish the relevant process as well as the line aspects for these activities. It also needs to establish a strategy to manage the activity: through the process, through the line, or through a mix.

In practice, process-based organizations are always *matrix organizations*: they combine a mix of management via the line and via the processes. Each individual organization can vary the extent to which it uses these two control mechanisms according to its own preferences (figure 6).
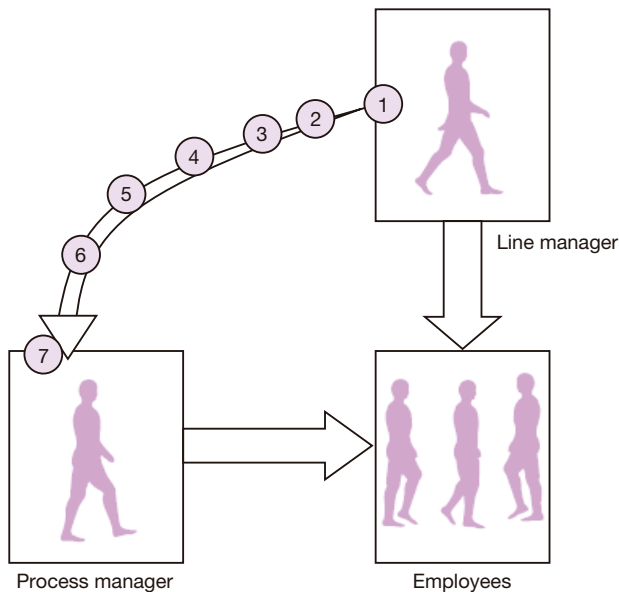
Figure 6 Different ratios of line and process-based control (Hoving & Van Bon, 2008)

According to the process management matrix (PMM, see the article of Wim Hoving and Jan van Bon in this book), the mix of the two "pure" control models can take seven key positions:
1. **The pure line organization** - All recognized activities are only managed from the position of a team or a role.
2. **The line organization recognizes workflows** – Workflow-defined activities are related to teams or roles.
3. **Tactical process management** - Processes are described and managed by reports.
4. **Operational process** - Processes are described and process control is responsible for monitoring the process performance, informing the involved staff and escalating to management. The line is still in charge.
5. **Operational process direction** - Processes are described and process control is responsible for monitoring the process performance and informing, directing or correcting the staff involved. This is the first position where the process is actually in charge.
6. **Operational and content direction through processes** - Processes are described and process control is responsible for monitoring the process performance and informing, directing or correcting the staff involved. Process control should also allocate the staff to the process activities.
7. **Full process direction** - All teams are organized to execute a process.

Depending upon the weight of process management in the management matrix, an organization will spend more or less energy on its process system. The "heavier" the process component is, the more an organization will have to understand and manage its processes. An organization that is in stage one, two or three of the PMM will have a rather superficial understanding of processes, but any stage beyond that will require thorough awareness and understanding of processes.

Functions in IT service management

IT service management literature provides us with many examples of best practices, guidance and instructions. Some of these descriptions are in the format of a process, some are in the format of a function, and some are rather unclear. If an organization wants to implement a clear management approach to IT service management, it will have to make a choice on how to organize the work. This means that it should be aware of the use of processes and functions, since both require quite a different approach.

Example: change management can be presented as a process—a logical sequence of activities—that start with a trigger (RFC) and provide a specific and measurable customer-related output. However, many organizations also have a department known as change management, or a change management team. This unit doesn't cover all the human resources that are involved in all of the organization's changes: since almost everyone in an organization is involved in the change management process, that wouldn't be a practical model. Instead, the change management team takes care of most of the administration of the changes, and provides human resources that act as change coordinators. Often, the change management team is combined with the configuration management team.

It may be difficult to determine whether something is a function or a process. According to ITIL, whether something is a function or a process depends entirely on the organizational design. For example, according to ITIL, capacity management could be defined as a process with specific and measurable results that focuses on a specific goal.

Now, if ITIL defined capacity management as a logically ordered sequence of activities realizing a certain predefined objective, with inputs, outputs, procedures, work instructions, adjustment on the basis of feedback and comparison against standards, then it could surely be deemed a process.

However, this is not the case in ITIL. ITIL's capacity management covers a range of activities that cannot be ordered as a logical sequence of activities. As such, the ITIL context presents a capacity management function and not a capacity management process. The processes deployed by capacity management are generic processes specified to that part of the infrastructure that is the subject of attention in capacity management: all elements of the information system that deal with capacity.

Based on the definition of a process in terms of the *what*, anything that describes the *who*, *how* and *when* will have to be classified as a procedure or a work instruction. And as soon as the *who* comes into the description, it touches on the organization. And then, we might classify this as a function.

There are quite a few entities in IT service management literature, specifically in the ITIL books (V1, V2 and V3), that can be recognized as functions instead of processes. Looking at content in terms of the *who*, *when*, and *how*, helps in recognizing these.

Infrastructure-specific functions

First of all, we can recognize a set of functions that are infrastructure-specific. Terms like capacity management, network management, print and output management, and financial management clearly relate to a specific part of the enterprise infrastructure. This kind of entity will typically be a function: an organizational unit that is involved with all aspects of this entity, using all the processes that are recognized in that organization. You may recognize functions like:

- **Capacity management**, a function limited by its scope. It addresses only the capacity elements of an IT service. As a function, it uses a set of elementary processes:
  – for realization of the capacity of the agreed services at the agreed rate/demand, this function uses the operations management process.
  – for repairing capacity issues it uses the recovery management process.
  – for changing capacities it uses the change management process.
  – for agreeing on capacity aspects it uses a contract management process.
  – for proactive actions of capacity issues it uses a risk management process.
  – for knowledge of which capacity carriers are deployed in which parts of the enterprise infrastructure it uses the configuration management process.
- **Application management**, a function limited by its scope. It is not addressing the entire IT services but just an infrastructural sub domain (applications). As a function, it uses a set of elementary processes:
  – for realization of the application components of the agreed services at the agreed rate/demand, this function uses the operations management process.
  – for repairing application issues it uses the recovery management process.
  – for changing applications it uses the change management process.
  – for agreeing on application functions it uses a contract management process.
  – for proactive actions on application issues it uses a risk management process.
  – for the knowledge of which applications are deployed in which parts of the enterprise infrastructure it uses the configuration management process.

Network management, data management, workload management and print management will now all be recognized as variations to the themes above. Table 1 shows the set of entities that can be recognized as infrastructure-specific functions.

This analysis is limited to primarily infrastructure-related or service-related processes. Secondary supporting activities that are normally managed outside the scope of IT service management—such as financial management and knowledge management—are out-of-scope. This doesn't mean that it is impossible to apply the approach to financial management, but it would require the financial management activities and functions to be specified in the SLA and, as a consequence, controlled in IT service management. In practice, however, the financial department normally is a function that is managed as a separate entity. The same goes for knowledge management: the scope of knowledge management is not restricted to the core service management activity domains, so this is something that is normally managed apart from the service management domain.

Service quality specific functions

Secondly, we can recognize a set of entities that are quality-specific. Terms like availability management, continuity management and security management relate to just one quality aspect of the information service. This kind of entity will also use the elementary processes that each service organization follows, and will apply these to just their specific objective. For example, availability management uses:

- the operations management process for realization of the availability of the agreed services at the agreed rate/demand
- the recovery management process for repairing availability issues
- the change management process for changing availability
- the contract management process for agreeing on availability aspects
- the risk management process for proactive actions of availability issues
- the configuration management process for the knowledge of which availability measures are deployed in which parts of the enterprise infrastructure

Replacing "availability" with other service quality attributes like security or continuity, will provide a series of other functions (see table 1). This is not limited to the quality attributes that ITIL V3 lists, but also to attributes like performance, scalability, reliability, maintainability, portability, or traceability.

Activity-specific functions

Thirdly, we can recognize a set of process- or activity-specific functions, such as teams for change, problem, service level, supplier and configuration management, but also a service desk (see table 1). All of these teams can be functions that focus on elements of specific processes but are involved in other processes as well. For example, the problem management team will coordinate the handling of problems and administer the problem management database in the risk management process, but it will also support the handling of incidents in the recovery management process: one of the most commonly cited mistakes in IT service organizations is that anything handled by the members of the problem management team automatically is a problem. Following the same logic, the supplier management team will also be involved in the processes for contract, change and recovery management.

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Type	Function
Infrastructure functions	Application management (*)
	Capacity management (*)
	Database administration
	Data & information management
	Desktop support
	Directory services management
	Facilities & computer management
	Internet/web management
	Mainframe management
	Middleware management
	Network management
	Print management
	Server management & support
	Storage and archive (*)
	Technical management (*)
Service quality functions	Access management
	Availability management
	Capacity management (*)
	IT service continuity management
	Security management
	Workload management

Type	Function
Activity functions	Business relationship management
	Change management (team)
	Configuration management (team)
	Demand management
	IT operations
	Managing communications and commitment
	Managing organization and stakeholder change
	Monitoring & control
	Problem management (team)
	Requirements engineering
	Service level management (team)
	Stakeholder management
	Storage and archive (*)
	Supplier management
Organization functions	Application management (*)
	IT operations management
	Service desk
	Technical management (*)

Table 1 Functions in IT service management, based on ITIL V3. Financial and knowledge management are out of scope. (* = function classified in more types)

While the number of significant processes is limited to just a few, the number of important functions that can be defined is endless: a function can be defined for each service attribute that is agreed upon. Common paragraphs in an SLA deal with familiar service quality attributes like availability, capacity, and continuity. As a consequence, we will find availability management, capacity management, and continuity management functions in that organization. But if the organization also agreed to specifications for performance, reliability, portability, or others, you may expect to find functions like performance management, reliability management and portability management. These functions would then all use the elementary processes for their activities.

Organization-specific functions

Finally, organizations can vary tremendously in terms of their organizational shape. A small IT shop of five people simply cannot be compared to the IT department of a multinational or a large bank. Furthermore, organizational structures like centralization and decentralization will make a lot of difference. And the relative position in the process management matrix will have significant influence as well. An organization at positions one and two doesn't recognize processes and will not have process managers. An organization moving around position three will mainly have team leaders, while process ownership may reside with a quality manager. And an organization that moves around the positions four or five of the PMM will have process managers in high-ranking positions, for example in the management team.

Many IT organizations still organize according to traditional principles like development versus operations. Although this may seem logical, based on the specific nature of the activities involved, it doesn't make much sense in terms of a process focus: the processes clearly do not follow these boundaries but go right through them.
Culture and history have great influence on practical organizational structures. And

"organizational change" appears to be one of the most challenging activities in IT organizations.

Finally, the infrastructure that organizations use can have a great influence upon organizational structure. Activities and knowledge vary with this infrastructure, and organizations tend to cluster similar skills in organizational units.

As a result, we'll see all kinds of organizational functions in practice (table 1), and there is no simple standard to be applied here.

ITIL AS A SOURCE OF INFORMATION

ITIL has been used as the source of best practice on IT service management for many years now. It has also been claimed that ITIL describes a set of processes. In ITIL V2, the main focus of attention was primarily on the scope of the ITIL Foundations certificate, which was largely concentrated in just two of the core books, Service Support and Service Delivery. These two books were said to document ten processes and one function.

Service delivery contained:
1. service level management
2. service continuity management
3. financial management
4. capacity management
5. availability management

Service support contained:
1. incident management
2. problem management
3. change management
4. release management
5. configuration management
6. and the function: service desk

An eleventh "process", security management, was within the scope of Foundations, but was covered in a separate book (as well as in the availability management chapter of service delivery).

In ITIL V3, a lot of new processes were added to this list. Table 1 showed most of these processes, but qualified them as functions. The processes and activities that fit the description of the set of six are now shown in Table 2. This table also qualifies a number of the ITIL V3 processes as components of the six elementary processes.

Although it was claimed that ITIL V3 would align better to ISO/IEC 20000, there was still one ISO process missing in this version: business relationship management (see table 1.).

Main processes and sub processes

Some of the ITIL V3 processes in table 2 are no more than activities in the larger perspective of an elementary process. For example, the V2 change management process was split into several steps of the overall change process. This means that some of the V3 processes are

The six elementary processes in IT service management	ITIL V3 processes and activities
Contract management	Service level management Service portfolio management Service catalogue management
Change management	Transition planning & support Change management Evaluation Service validation & testing Release & deployment management
Recovery management	Incident management
Operations management	IT operations Monitoring & control Event management Request fulfillment
Configuration management	Service asset & configuration management
Risk management	Problem management The 7-step improvement process Service measurement Service reporting

Table 2 Processes and activities in ITIL V3

actually sub-processes that can be reassembled into one process, and describe the steps of what was called "the change management process" in ITIL V2.
Conflicts in process definitions, such as change management versus release management, were not solved in V3.

Other processes are really clusters of sub-processes. For example, the ITIL V3 service asset and configuration management covers various kinds of activities that cannot be aligned in a process sequence, but rather cover an implementation sequence, or PDCA approach: management and planning, configuration identification, configuration control, status reporting, verification and audit. Therefore, it should be qualified as a process cluster, just like the V2 configuration management.

IMPLEMENTING ITSM BASED ON EXISTING REFERENCE MODELS
Information on the details of the six essential processes can be found in many places. The ITIL books provide detailed guidance on at least four of them (contract, change, recovery, and configuration management), and some information on the two others (risk and operations management).

But once an organization understands that simplicity is a key requirement for a practical process model, it won't be difficult to define all six processes. And if an organization would prefer to use traditional ITIL titles, it could for example replace recovery management with incident management, configuration management with configuration management, contract management with service level management, and risk management with problem management. In that case, however, the organization must be able to adequately differentiate between ITIL guidance referring to processes and ITIL guidance referring to functions.

Implementing an IT service management approach based on the six essential processes can be a lot more effective and efficient than the general, complex approach using published practices in ITIL. The fact is that the ITIL practices are not designed in terms of processes and functions. They only provide practical guidance on aspects of the service management system, which by itself is quite useful, but also holds significant risks in terms of overview and manageability.

Once an organization understands the difference between processes and functions, it can determine its service management architecture, and build on that.

Implementation projects are then much easier to carry out, and they have a very significant advantage above traditional approaches: the implementation project can focus on the organizational change, and the people involved. Defining a set of simple processes is the first step, but since these processes are at the end of their evolution (thanks to ITIL and other sources), this would require very little time. The energy of the implementation project can be almost entirely focused on the softer side of the project, which is exactly where traditional projects have always failed.

Project teams can start with the existing organization, gaining an understanding of the way they use the six elementary processes. Once they understand this, they can carefully migrate to a better, more effective and efficient organization. This may involve a new position in the process management matrix, for example bringing some process management roles into the organization's management team. It may also involve training and coaching focused on the roles the organization has chosen to fill in their function structure.

There is one thing the organization should never forget: if you haven't organized your "what", you don't know what you do. If a house is built on quicksand, it will collapse in time, or it will cost a lot of resources to keep it upright. And the fundament of each organization is its identity: the "what". Without a thorough understanding of your most elementary processes in a comprehensive process model, you're bound to pay the price sooner or later.

6

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REFERENCES

- Bon, J. van (to be published in 2008). *Compendium IT Management. A definitions set.*
- Delen, G., M. Griep, D. Grund, & J. Roelofs (2002). The future of the IT organization. A multi-client study into the transformation of IT organizations. In J. van Bon (ed.), *The Guide to IT Service Management* (Pages 366-382)*. London: Addison Wesley.
- Elskamp, H. van den, W. Kuiper, H. Wanders, J. van Bon, & W. Hoving (1999). ISM: Integrated Service Management. In J. van Bon (ed.), *IT Beheer Jaarboek 1999* (Pages 149-162). The Hague: ten Hagen & Stam.
- Hoving, W., & J. van Bon (2008). The Process Management Matrix. In J. van Bon (ed.), *IT Service Management, Global Best Practices, Volume 1.* Zaltbommel: Van Haren Publishing.

- *ITIL. Continual Service Improvement* (2007). OGC. London: TSO.
- *ITIL. Service Design* (2007). OGC. London: TSO.
- *ITIL. Service Operation* (2007). OGC. London: TSO.
- *ITIL. Service Strategy* (2007). OGC. London: TSO.
- *ITIL. Service Transition* (2007). OGC. London: TSO.
- Tricker, R. (2006). *ISO 9001:2000. The Quality Management Process.* Zaltbommel: Van Haren Publishing.

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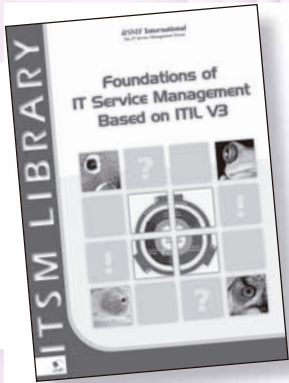
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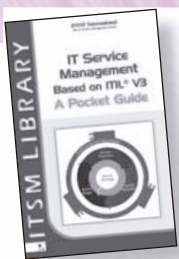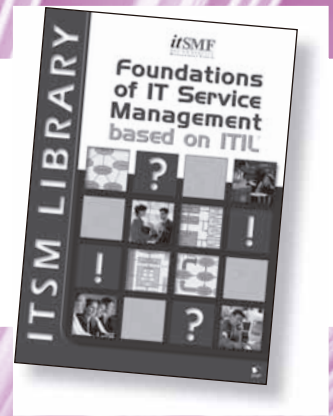ISBN: 978 908753057 0 (ENGLISH EDITION)
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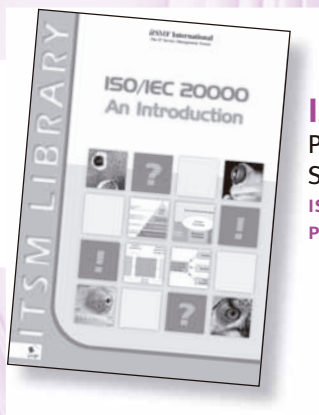
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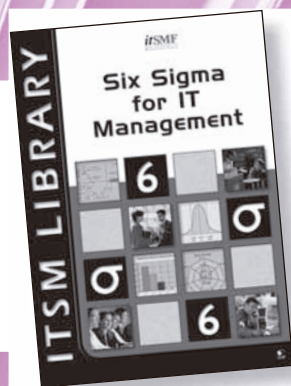
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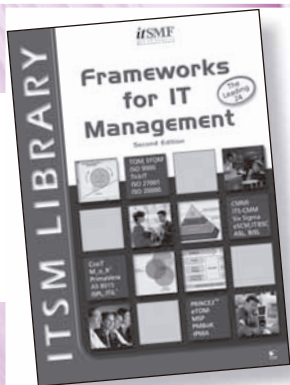**PRICE €39.95 EXCL TAX**

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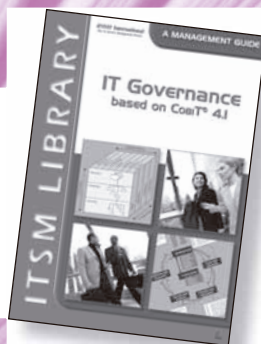**PRICE €39.95 EXCL TAX**

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