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A Reference Process Model for IT Service Management

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ABSTRACT

Within the recent years the IT Infrastructure Library (ITIL) is increasingly used for the description and delivery of IT-services and can be regarded as a de-facto standard for IT Service Management. However, ITIL is a common practice approach without an explicit process definition which leaves many degrees of freedom. This paper presents the advancement to a reference model for the processes of IT Service Management and shows the integration into a comprehensive process framework for IT management.

Keywords

Process framework for IT management, Cobit, ITIL, IT service management, process models for IT service delivery

INTRODUCTION

Best Practice in IT Management

Reference models are increasingly used in industrial practice and leave the area of research [Fettke and Loos 2007, 2004, see the overview in Brocke 2004, p. 393f., for reference modeling projects see RefMod]. In practice reference models for processes have particular relevance [e.g. SCOR, Fettke et al. 2006, Scheer 1994]. In addition to the work of international institutions, associations, and research institutes, the design of reference models is often undertaken in corporate IT departments. So far most of the work is done for clients in different business domains. However, little attention was spent so far to develop reference models for the IT domain itself. Although process management is one of the main supporting tasks for the business, the process landscape of many IT organizations itself is often fragmented. Only few standards exist for IT management and the respective processes [see Zarnekow and Brenner 2003].

In the context of the definition of IT processes essentially only two standards exist with a widespread use in practice. The Cobit framework (Control Objectives for Information and related Technology) [Cobit, IT Governance Institute 2007] has the focus on implementing IT governance and monitoring the performance. For this purpose the Cobit framework defines 318 detailed control objectives and audit guidelines for a total of 34 processes. The processes are in accordance with the life-cycle of IT resources and structured in the four domains: planning and organization, acquisition and implementation, operations and support, and monitoring. A management guideline defines critical success factors, key objectives, performance indicators and recommendations for a maturity assessment of the processes. The implementation is supported by guidelines with activities and checklists for implementation in an organization. The description is in natural language without further formalization.

The strengths of Cobit lies in the classification of IT tasks, the definition of success factors and metrics, as well as guidelines for the implementation of processes in an organization. It contains no detailed description of the procedures or the inputs and outputs for the processes listed [see Zarnekow et al. 2005, p. 63f.].

The ITIL-Framework (IT Infrastructure Library) [see ITIL, ITSMF (IT Service Management Forum), for an overview Bon et al. 2006] is a collection of recognized procedures and standards particular for IT service management. In the core are two main topics: IT service delivery and IT service support. The IT service delivery describes the planning and provision of IT services for customers. It consists of the service level management, financial management, the capacity management and the availability and continuity of IT services. IT service support, however, describes the support of IT services with the service desk as a central interface for all operational activities to support the IT services. All activities are controlled via the incident management, which handles all incidents (e.g. errors, change requests). Depending on the type, the incident is processed via problem -, change -, and configuration management and finally documented in the release management.

The description is in natural language and a few informal drawings illustrate relationships between tasks. ITIL describes an industry standard for IT service management without innovative, theory based findings like best practice models would feature. Therefore, ITIL can be classified as a common practice [Hochstein et al. 2004, p. 383, 2005].

A formal evaluation of ITIL based on the principles of proper modeling (GoM) [Becker et al. 1995] was undertaken by Hochstein et al. 2004 with the use of four case studies. The following 6 principles of GoM: adequacy in construction, language adequacy, economy, systematic structure, clarity and comparability were used for assessment and led to a critical reflection of the deficiencies and potential benefits of ITIL [Hochstein et al. 2005]. Among others, the low degree of formalization and problems with the consistency of the ITIL models are reported. This leads to difficulties in the comparability and additional expenses for formalization and translatability into company customized reference models.

Even ITIL as a common practice description offers no consistent process descriptions and the level of detail of the various models is very different. The logic of flow and the interfaces between the processes are not in all cases consistent and properly defined [Zarnekow et al. 2005, p. 61]. Nevertheless, as a result of the proliferation of ITIL, it is an indispensable foundation for the implementation of standardized processes for IT service management. The new version ITIL V3 is expanding into related subject areas and is now structured into service strategy, service design, service transition, service operation, and continual service improvement [see high level overview in ITSMF 2007]. However, the informal description of ITIL with leaves room for the interpretation on the process logic and inconsistency among the service management tasks is not resolved with the new version.

Approach and Research Results

A comprehensive standard which covers all tasks of information management and describes all relevant processes in sufficient detail does not yet exist in industrial practice. This paper presents the advancement of a reference processes model for IT service management.

The work was undertaken in a corporate project within Siemens AG. It is part of the development of a reference process house (RPH) in the context of a comprehensive process management initiative [Feldmayer and Seidenschwarz 2005, Schmelzer and Sesselmann 2006, p. 216-224]. Impetus for the development of reference processes was the lack of existing reference models for IT management available on the market as well as the heterogeneity in the management of IT within the company. A number of IT departments exist in the company for the various business units, business sectors or regions. In the initial situation the organization and processes how to deliver IT Services developed diverse over the years in the different IT departments in charge and did not follow a common standard across the company.

However, in a largely decentralized organization the coordination of the IT processes and tasks is a key success factor. At the time only fragmented and different descriptions of IT processes existed in the business units and regions, so a joint effort to develop a common process framework for the IT organization was started. The primary objective was to leverage synergies and cost potentials with a common organization and coordination of IT services. Core element was the definition of reference processes to be implemented across the IT departments which are based on the Cobit and ITIL standards.

The development and use of reference models for the IT is an essential basis for an industrial service generation and thus for the effectiveness and efficiency of the overall IT organization. Essentially, the following advantages are pursued with a consistent process organization for IT:

- comprehensive, systematic coverage of services and tasks of an IT organization
- transparency on process structure, interfaces and dependencies among the processes
- assignment of roles, responsibilities and skills required
- cost efficiency by standard processes and procedures
- documentation of the processes, audit, legal evidence (compliance)
- basis for benchmarks for performance measurement and controlling

In addition, the establishment of defined processes for IT is also a proof of competence for the process management activities which the IT organization provides to the business.

The reference models were developed in a circle of experts, headed by the author, from all business units and some representatives from the regions in a timeframe of 2 years. In addition to the available standards like Cobit and ITIL, the

work was based on the available process models in the various organizations, and the expert knowledge of processes and procedures. Furthermore, the development of reference models should be based on the selection of a widespread used and adequate modelling language and the establishment of modelling guidelines and conventions in order to foster the understanding of the models by a wide circle of employees. The decision was made to use the ARIS method and toolset [Scheer 2000] as the standard for modelling business processes due to its common use and adequate process descriptions which are understood by business and IT. Modelling guidelines aid the process modelling and secure consistency of the designed models.

All subject areas of ITIL version 2 were completely transformed to process models and incorporated into the reference process models. The process models are set corporate standard for all IT departments in Siemens.

The next section sketches the process systematic and modelling rules for the process models. It is followed by an overview of the process framework for IT management.

The third section presents selected examples of the developed process models for IT service management based on ITIL. The reference models show the qualitative advancement from an ITIL description of separate tasks blocks in natural language towards consistent process models, using event driven process chains (EPC) and function allocation diagrams (FAD) for modelling.

PROCESS FRAMEWORK FOR IT MANAGEMENT

Level Concept and Modelling Conventions

The level approach includes the principles and rules for the definition of a comprehensive process architecture. The ARIS toolset is used for modelling [Scheer 2000]. Together with the manual for process modelling & conventions, which describes the ARIS models, notations and naming conventions, the level concept is integral part of the defined methods for process modelling. Clear definitions and rules for the presentation and modelling of processes constitute a consistent documentation and transparency of the processes. Basis of these modelling conventions is a transfer and advancement of the SCOR modelling principles [supply chain operational reference model, see SCOR] to all corporate business processes.

The level concept defines the hierarchical structure of the reference process house (RPH, the detail per level and the models used. Figure 1 shows the defined level structure for all processes of the reference process house with the assigned modelling elements and deployed ARIS model types. Fundamental principle is to use generic models wherever possible, which are adjusted to specific process requirements only at the level of process description where the characteristics of the process need differentiation. The framework is based on the following features [excerpt from Siemens 2004]:

Level 0 outlines the framework with the basic structure of the process groups.

At Level 1 the core processes of a process group are represented. The objective is a uniform representation of the generic core processes as a logical sequence (lifecycle approach) within a process group. All core processes of a process group are assigned to one of the three following core process types:

- "Plan and control" covers all planning and controlling activities for the implementation of the "execute" processes. "Plan and control" processes define the requirements for the "execute" processes and steer them in the sense of a control cycle.
- "Execute" processes are targeted on delivering/ performing goods and services for the customer. The result can be a product, a system, a solution or a service that serves customer satisfaction. In the "execute" processes the essential process steps for value generation are described.
- Enable processes support one or several plan/ execute processes solely within the process group. They can effect on all process level (1-n). Enable processes can interact with other business, management or support processes by input-output relations but may not be connected by process interfaces to them. In each process group at Level 1 there is precisely one process group-specific plan core process, a process group-specific enable core process as well as a number of execute processes.

At Level 2 the process categories, process models and where necessary process variants are shown for all types of a core process (plan, execute, enable). These model types map the complexity of a core process. The complexity is characterized by different divergent process sequences, different responsibilities and/ or specific inputs/ outputs depending on business requirement. The criterion for definition of process categories is the existence of significant differentiation characteristics in the process (e.g. customer, target group, complexity). The criterion for forming the process is identical for all execute processes of a process group.

At Level 3 the process elements and events are represented as a process chain. The objective is a more detailed description of the process models and process variants in a logical flowchart of process elements and events. Level 3 allows a uniform understanding of the execution sequences of all processes of the reference process house at a comparable level of aggregation. The ARIS models event driven process chain (EPC) and function allocation diagrams (FAD) are used for modelling the processes.

At Level 4 and lower levels the process elements and events are shown as a process chain that describes the super ordinate level in more detail. This is the first stage where reference models can be altered for specific requirements of an organization.

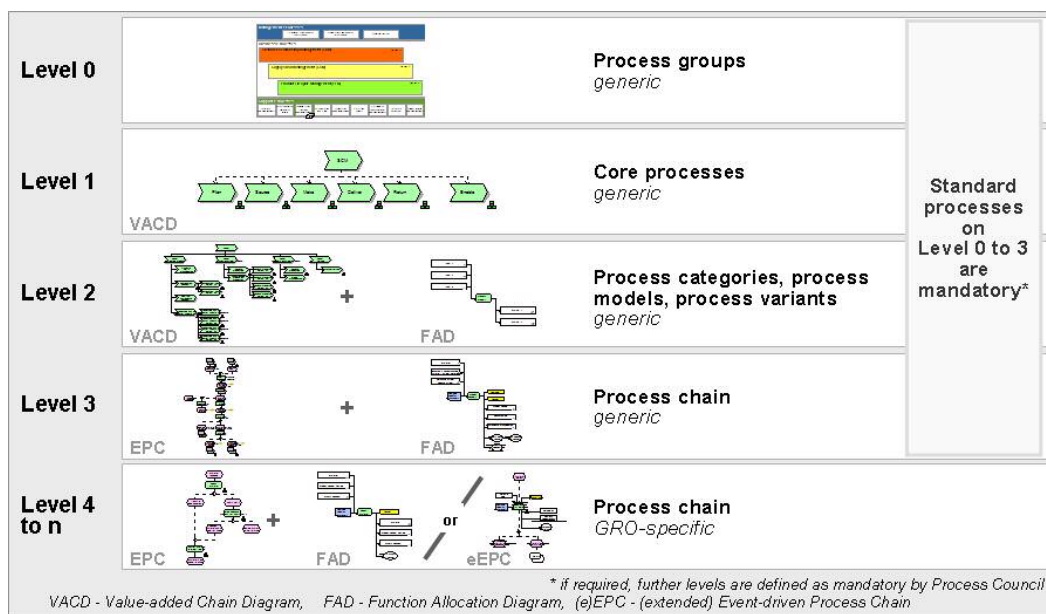


Figure 1: Level concept and modelling principles [Siemens 2004]

Principal Structure of the Framework

The IT processes are classified in the parent reference process house as a support process for the business processes. This support process is divided into several sub ordinate processes and is itself presented in a separate framework. It includes all support activities for the business in all process management and information management topics and is therefore named framework for the “Process and Information Management ”(P&I).

Figure 2 shows the P&I framework in an overview. The P&I framework follows the general modelling guidelines and conventions for the reference process house. The figure shows the classification of the fundamental processes in "plan", "execute" and "enable".

For the P&I processes the execute is structured in the steps "establish goals", "analyze", "define", "realize" and "review".

Naturally, the support process "process and information management" is classified into the categories "process management" and "information management". Each category has its own process models for each execute step. In addition, the two model variants “develop IT solutions and services” and “operate IT services” are differentiated for the category of information management.

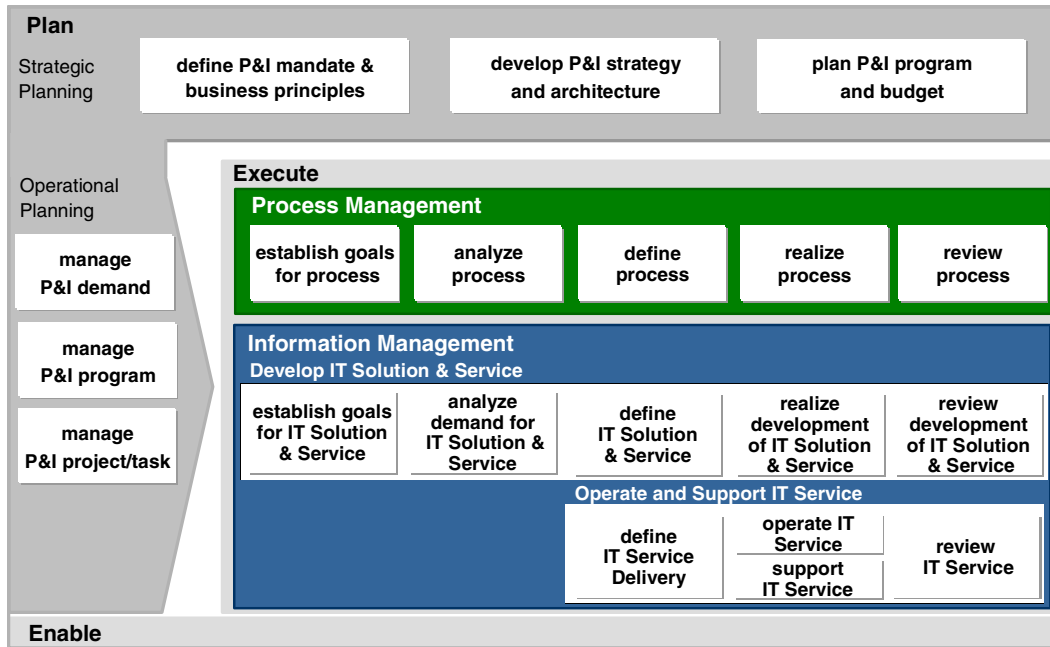


Figure 2: Overview on the process framework for IT management [P&I 2005]

Process Models at a Glance

The P&I framework is divided into 4 clusters, each describing a coherent group of tasks. These clusters comprehensively cover all information management tasks. The following is an excerpt from the P&I processes of version 3.0 [all process models documented in P&I 2005].

The “Plan and Control” cluster relates to all governance and planning activities for P&I. It is composed of a strategic planning with a typical time frame of 2-3 years and the operational planning in charge for the execution of the P&I program within a fiscal year.

The strategic planning covers all tasks from defining the mandate, the design of an efficient organization to the definition of the P&I strategy and architecture to implementation of the P&I program. The focus of strategic planning is on developing a strategy for Process & Information Management, defining the target architecture for the process - and IT landscape and the P&I roadmap, and deriving an overall P&I program and budget. It includes the following processes:

- Define P&I mandate & business principles
(From mandate to implementation of efficient organization)
- Develop P&I strategy and architecture
(From business objectives to P&I Roadmap)
- Plan P&I Program & Budget
(From P&I Roadmap to P&I program & budget)

The operational planning is in charge for the execution of the P&I program. The P&I program management is planning and controlling the overall P&I program composed of projects, services and basic tasks, taking interdependencies into account. Manage P&I demand specifies customer demand for process management and IT which arises during the fiscal year. Where required, adjustments of the P&I program are proposed. The P&I project /task management takes place on the level of a specific project or task. It covers all operational tasks for controlling the P&I program and the planning of the respective projects / tasks in the fiscal year:

- Manage P&I demand
(From P&I demand to P&I project/task profile)
- Manage P&I program
(From P&I program to P&I project/task order)
- Manage P&I project/task
(From P&I project/task order to finished project/task)

The cluster “process management” has the focus on the improvement of customer oriented, efficient, and secure business processes based on process reengineering or continuous process improvement activities. The process chain is structured in the following process models and follows a widespread view on process management [compare the process steps in Becker et al. 2003, p. 23]:

- Establish Goals for Process
(From P&I project/task to defined process improvement goals)
- Analyze Process
(From 'as is' process analysis to identified process improvement levers)
- Define Process
(From process improvement levers to defined target process & values)
- Realize Process
(From defined target process & values to implemented process)
- Review Process
(From implemented process to verified process performance)

The category information management consists of the two clusters “develop IT solutions & services” and "operate and support IT services”. Thus, the two fundamental process chains for operational IT are covered. These process models address applications as well as technical infrastructure.

IT solutions & services are developed based on IT standards & security guidelines. They should meet business requirements and be aligned with process management activities. IT Solutions & Services are new developments, major enhancements, and improvements of existing IT solutions & services.

- Establish goals for IT solution & service
(From P&I project/task to agreed goals for IT solutions & service)
- Analyze demand for IT solution & service
(From agreed goals for IT solution & service to requirements specification for IT solution & service)
- Define IT solution & service
(From requirements specification for IT solutions & service to defined IT solution & service)
- Realize Development of IT solutions & service
(From defined IT solution & service to executable IT solution & service)
- Review Development of IT solution & service
(From compliance and achievements check of IT solutions & service to defined improvement measures for IT solution & service)

The first two process models are shared by the process chains “develop IT solution & service” and "operate and support IT service”.

The cluster “operate and support IT service” consists of operations and maintenance of IT systems and IT service support. It should ensure the efficient and secure delivery of high quality application and infrastructure services. Operations and support of IT Services are based on defined service levels meeting customer demands.

- Define IT service delivery
(From P&I project/task to finalized service level agreements)
- Operate IT service
(From finalized service level agreements to operated and monitored IT service)
- Support IT service
(From finalized service level agreements to managed support of IT service)
- Review IT service
(From monitored IT service to defined IT service improvement measures)

"Enabling" processes are providing supporting functionality across the processes, like "definition & maintenance of roles and privileges". Where applicable support processes of the reference process house like procurement, personal, controlling etc. are used for execution of the P&I processes. Again, the principle is applied to define and use generic processes for reuse wherever possible. Process models are adjusted only at the level where specific requirements call for differentiation (e.g. features for IT procurement).

Overall, the process framework consists of 19 process models comprehensively covering all tasks and processes for IT management. Each of the 19 process models is modelled in ARIS as an event driven process chain with assigned function allocation diagrams and dedicated inputs and outputs as well as roles at level 3. This is added by success factors and metrics for the processes based on Cobit recommendations among others. Furthermore, appropriate methods and tools are assigned to the processes. The level 3 models are further detailed at lower level.

PROCESS MODELS FOR IT SERVICE MANAGEMENT

Overview on IT Service Delivery and Support

In the following an excerpt of the reference models using an example from the cluster "Operate and support IT Service" is introduced. Figure 3 gives an overview on the process models and process steps of this cluster at level 3.

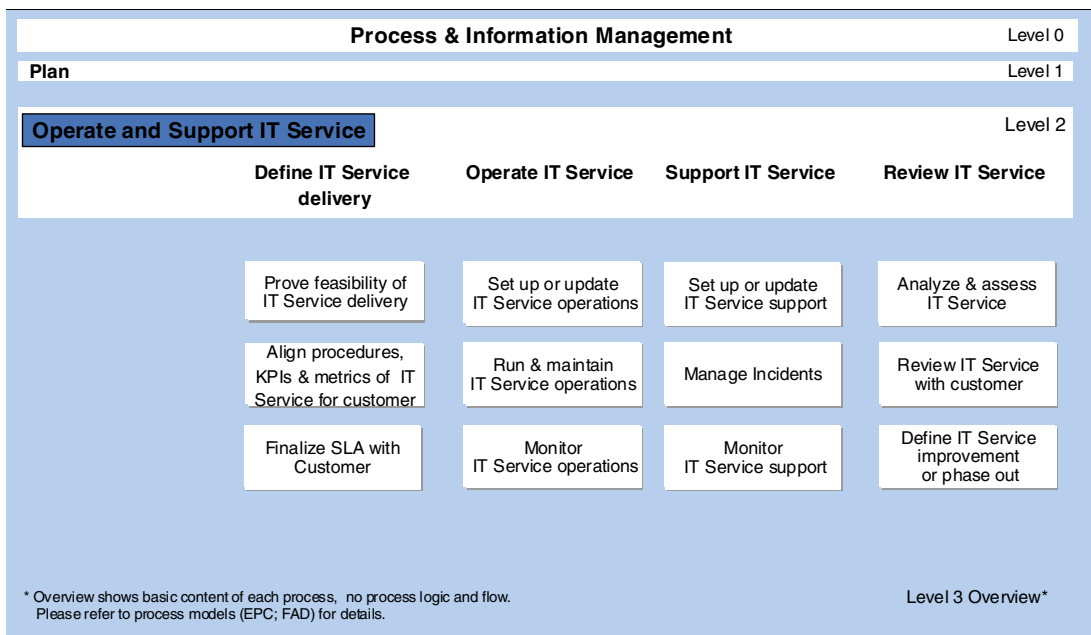


Figure 3: Overview on the process models for “operate and support IT service”

The operation and support of IT services consists of the process models (with the process steps):

- Define IT service delivery
(prove feasibility of IT service delivery, align procedures KPIs and metrics, finalize IT service agreements)
- Operate IT service (set up or update, run & maintain -, monitor IT service operations)
- Support IT service (set-up or update, manage incidents, monitor IT service support)
- Review IT service
(analyze and assess, review, improvement define, decide on phase out of IT Service)

The entire cluster is structured and described according to ITIL. The majority of the ITIL topics is covered in the process models “define IT service delivery” and “support IT service” The management of service level agreements (SLAs) is dealt with in the models "analyze demand for IT solution & service" and the monitoring and reporting of IT services in the model "review IT services" (see figure 2). In all, these process models describe the overall process flow for IT service management.

Selected Process Models for IT Service Delivery

The following is an excerpt of the ARIS models using the process models of "define IT service delivery" as an example. The Figure 4 shows the event driven process chain (EPC) of the process model. Starting point of the process model are the process interfaces from which the process can be triggered. The three process steps at this level of description are the principal prove of feasibility of IT service delivery, the adjustment of performance & measurement parameters as well as procedures for customized IT services, and the definition of service level agreements with the customer.

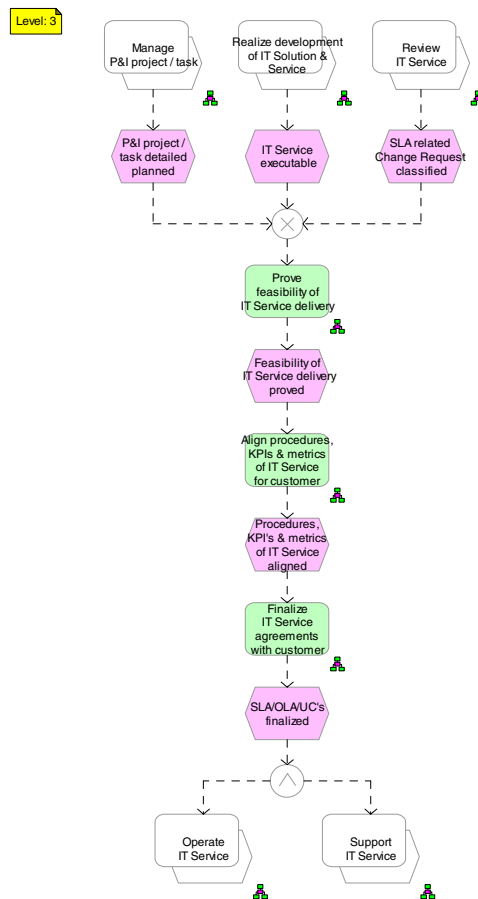


Figure 4: Event Driven Process Chain “define IT service delivery”

For a better overview inputs and outputs are not directly modelled in the event driven process chains but in separate function allocation diagrams. The figure 5 shows the function allocation diagram for the process step "prove feasibility of IT service delivery" from the event driven process chain of figure 4.

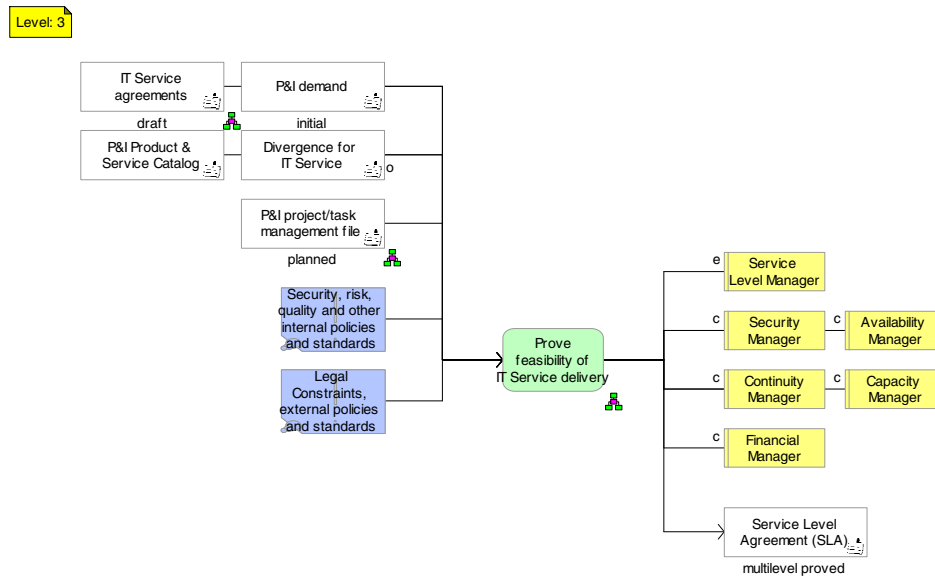


Figure 5: Function allocation diagram “Prove feasibility of IT service delivery”

All process models for IT management are modelled in the same manner. Unlike ITIL they are not only defined as a collection of tasks but modelled in ARIS to show the process flow with the sequence of tasks and interdependencies. For all process models the process interfaces are described to show the interdependencies and the overall value chain. According to the level concept, the presented models are only the first stage of the process description and are modelled in more detail at lower level. Thus, relationships and dependencies between the various tasks are made transparent. All process models are described likewise and result in a comprehensive framework for the processes of IT management. In total, the P&I framework consists of more than 50 EPC's and 150 FAD's. Thus, the given examples show the advancement from an informal ITIL description towards well defined process models for IT service management.

SUMMARY AND OUTLOOK

The framework for the process and information management jointly developed by the IT organizations within Siemens is a corporate standard and an important support process in the overall Siemens reference process house. The considerable effort and men power in coordination of the team members involved in the definition of the process standards is paid off by a variety of benefits which excess the realization of synergy and cost potentials.

Already the cooperative work and consensus building of the IT organizations of the business units resulted in a common terminology and an increased exchange of best practice. The process framework will also serve as a basis and systematic approach for future audits. The process documentation is also a substantial element for compliance.

In general the advantages of the framework and its reference models are the comprehensive process view on the entire value chain of an IT organization. The content and way of description goes far beyond the content of the subject areas described by the Cobit or ITIL standard. In most parts the two standards are only job descriptions with general character but do no feature defined process models which show the relationships and the logic of flow between the various work tasks.

Since the framework is based on these two standards from which the process models are derived and implemented, it can be regarded as a reference which goes beyond the use within the company. In large the process models can be applied to other companies. The models assist in organizational design decisions (e.g. process organization, central / decentralised tasks, design of the customer interface, service organization etc.) and the standardization of applications. The given examples of the process models for IT service management show that the developed models are superior compared to pure ITIL descriptions.

The use of these standards also improves the coordination and agreement on defined processes with external parties. Since ITIL becomes increasingly used with IT service organizations, the application of the models provides an external comparability and coordination of processes, for example the outsourcing of IT services. The reference models proved to be a significant foundation for the development of a shared service organization within the Siemens AG and were used for organization, processes, and service descriptions and agreements with third parties.

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